



APEM



PANEL SWITCHES

PCB SWITCHES

LED INDICATORS

JOYSTICKS

SWITCH PANELS

HUMAN MACHINE INTERFACE PRODUCTS

INTRODUCTION

A WORLD OF SWITCHING CAPABILITIES

APEM is a worldwide manufacturer of professional switches, LED indicators, joysticks and switch panels.

Designed, fully tested and qualified for demanding applications, APEM's robust HMI components and solutions guarantee the highest level of robustness, and reliability to meet national and international standards.

APEM serves more than 20,000 customers, including international industrial groups, directly or through a sales network of more than 130 distributors. From raw material transformation to finished products – through the design and production of tooling – APEM controls all phases of production in its 9 manufacturing facilities to locally support customer requirements.

APEM's products are designed and produced in accordance with quality standards and environmental requirements, with a strong reputation for quality.

HMI PRODUCT CATALOG

In this catalog, you will find the comprehensive range of APEM components, including panel and PCB switches, LED indicators and joysticks. For each product series you will find key features, technical specifications, mounting drawings and a selection of the most typical models. Full series technical information is available on www.apem.com.

These configurations highlight APEM's basic offering of standard HMI components, which are continuously supplemented to satisfy customer special requests.

Product selection guides will help you select the most appropriate series for your application. General technical information and a glossary are available at the end of the catalog.

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PCB SWITCHES

JOYSTICKS



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PUSHBUTTON SWITCHES

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| SP | 127 |
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| 9400-9600 | 133 |
| 10400 | 135 |
| 13000 | 137 |
| 13000X778 | 141 |
| 18000 | 147 |
| AV | 151 |
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| 4700-4800 | 175 |
| CG | 177 |
| CP | 179 |
| PBA | 181 |
| FP | 189 |
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ROCKER SWITCHES

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|-----|-----|
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LED INDICATORS

SWITCH PANELS

SWITCH PANELS

The most common configurations are presented in this catalog. Other commercially available configurations already existing in our different ranges of products, non-standard and custom products are available upon request.



APEM

A WORLD OF SWITCHING CAPABILITIES

A leading worldwide manufacturer of human-machine interface products and solutions since 1952.

With a global footprint spanning 11 countries, APEM locally supports customer unique requirements with manufacturing facilities located throughout North America, Europe, Asia and North Africa.

TECHNICAL EXPERTISE

APEM controls all phases of product development and manufacturing with vertically integrated production and advanced technologies. APEM's dedication and experience facilitates a quick and effective response to the most complex requirements.

This technical expertise ensures the continuity of APEM's vast portfolio of products and the strength of our valued partnerships.

YOUR EXPERT PARTNER

APEM's expansive product range is comprised of more than 50,000 part numbers. Colors, markings, finishes, shapes and dimensions offer an unlimited number of options, creating complete custom solutions for unique customer requirements. For over 65 years, top manufacturers worldwide have placed their trust in APEM to develop and manufacture reliable high-performance HMI components & solutions for their most demanding applications. APEM continues to meet and exceed these demands with innovation, quality and service.





APEM

AT A GLANCE



65

years of experience
Integrated processes for
continuous improvement



1,250

knowledgeable
employees worldwide



50,000

part numbers



12

worldwide manufacturing
facilities

CUSTOM CAPABILITIES

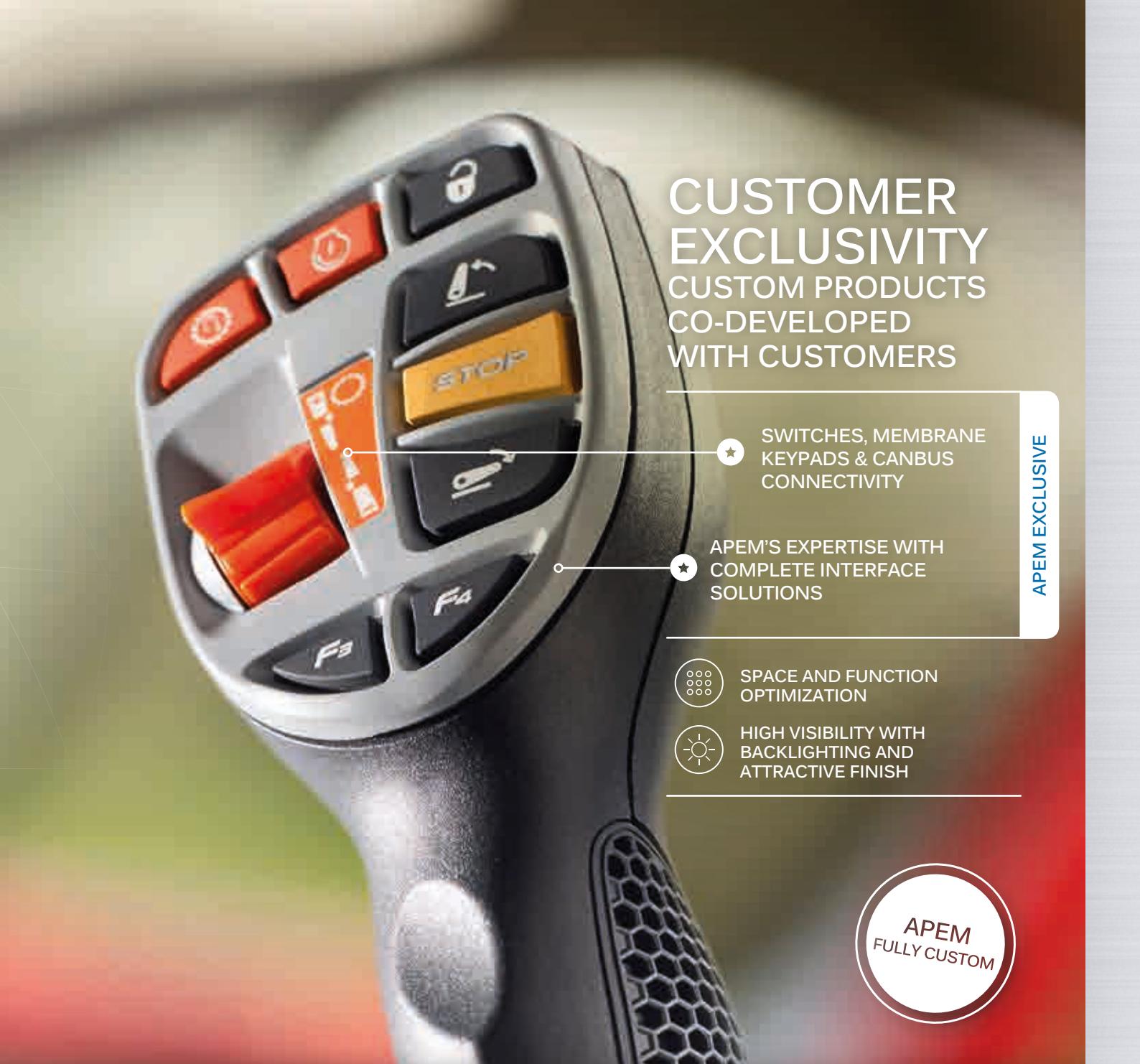
APEM offers a large range of over 50,000 part numbers consisting of switches, indicators, joysticks and switch panels in different colors, markings, finishes, shapes and dimensions... creating an unlimited amount of possibilities.

A GLOBAL APPROACH

UNLIMITED HMI
COMBINATIONS

COMPLETE
INTERFACE
SOLUTIONS

ELECTRONIC
& SOFTWARE
DESIGN



CUSTOMER EXCLUSIVITY

CUSTOM PRODUCTS CO-DEVELOPED WITH CUSTOMERS

APEM EXCLUSIVE

★ SWITCHES, MEMBRANE KEYPADS & CANBUS CONNECTIVITY

★ APEM'S EXPERTISE WITH COMPLETE INTERFACE SOLUTIONS

SPACE AND FUNCTION OPTIMIZATION

HIGH VISIBILITY WITH BACKLIGHTING AND ATTRACTIVE FINISH

APEM
FULLY CUSTOM

APEM'S COMPLETE INTERFACE SOLUTIONS

Combining components (switches, indicators, joysticks, switch panels), standard electronic boards and programming.

An APEM expert is happy to assist you in the development of these complete turnkey solutions, meeting your specific requirements with responsiveness and flexibility.



RELIABLE PRODUCTS FOR DEMANDING ENVIRONMENTS

In the market segments served by APEM, HMI solutions can be safety critical and/or subject to harsh conditions (extreme temperatures, vibrations, shocks, high pressure washing, corrosive substances...).

In these environments, the RELIABILITY of hardware, electronics and software is critical to guarantee the SAFETY of the operator or user.

APEM offers robust HMI components and solutions designed, fully tested and qualified for these demanding applications to guarantee the highest level of robustness, and reliability in line with national and international standards.



APEM OFFERS

1 STANDARD PRODUCTS



2 CUSTOMIZED PRODUCTS

APEM offers unique expertise in HMI product customization. With robust development processes, based on the automotive APQP method, APEM supports custom design specifications for exclusive HMI requirements.



3 SAFETY INTEGRATION POLICY

APEM develops ISO/EN safety compatible products, combining hardware and software solutions which provide customers with integrated HMI products, bringing high levels of safety to their systems. APEM follows the evolution of safety standards in different areas to ensure correct PL (performance level) as well as compatible SIL (safety integration level) to customer applications.

4 ELECTRONICS AND SOFTWARE FUNCTION CAPABILITIES

PERFORMANCE

APEM's fully integrated front panel solutions ensure the highest performance to mechanical, electrical, environmental and EMC/EMI standards.



EFFICIENT INTEGRATION

APEM can design electronics and connector systems to fit most applications.

COMMUNICATION PROTOCOLS

CANbus (J1939, CANopen), RS422, RS485, USB...

INTEGRATED BOOT LOADER

Diagnostic and software upgrade capability

ELECTRONICS AND SOFTWARE DESIGN

LOW POWER

BIT SOFTWARE

Real time Built-In-Test

FILTERING & PROTECTION

ESD, EMI, filter and protection of network...

INTEGRATED DIMMING

APPROVALS

IN-HOUSE QUALITY MANAGEMENT SYSTEM

APEM offers quality products with proven effectiveness in harsh environments. APEM products are designed and produced in accordance with quality standards and environmental requirements.

APEM CERTIFIED PROCESSES

ISO 9001 certification - 2008 version

User certification IECQ

ISO 14001 (APEM SAS)

ISO TS (APEM SAS)

ENVIRONMENTAL COMPLIANCE

RoHS 2 compliant products manufactured according to REACH regulations

APEM FACTORIES AND TEST LABORATORIES ARE QUALIFIED BY :

MIL MIL : DLA land and maritime letter VQ (VQH-11-022447)

SNQ LCIE Service National de Qualité - N°121
Laboratoire Central des Industries Electriques

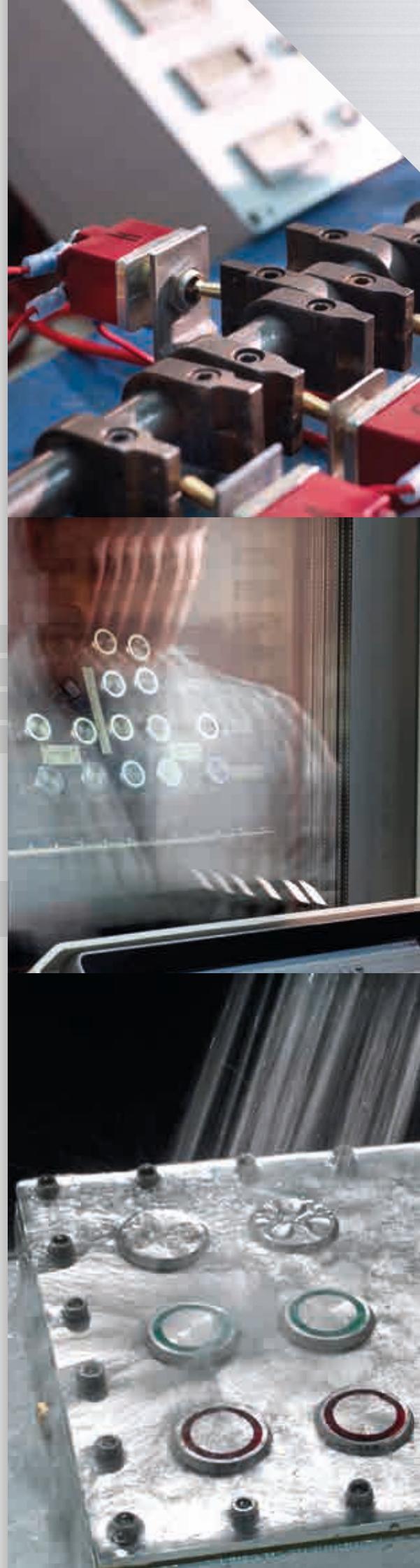
 CECC-IECQ (European)
No 008-95 Standard : CECC 96000

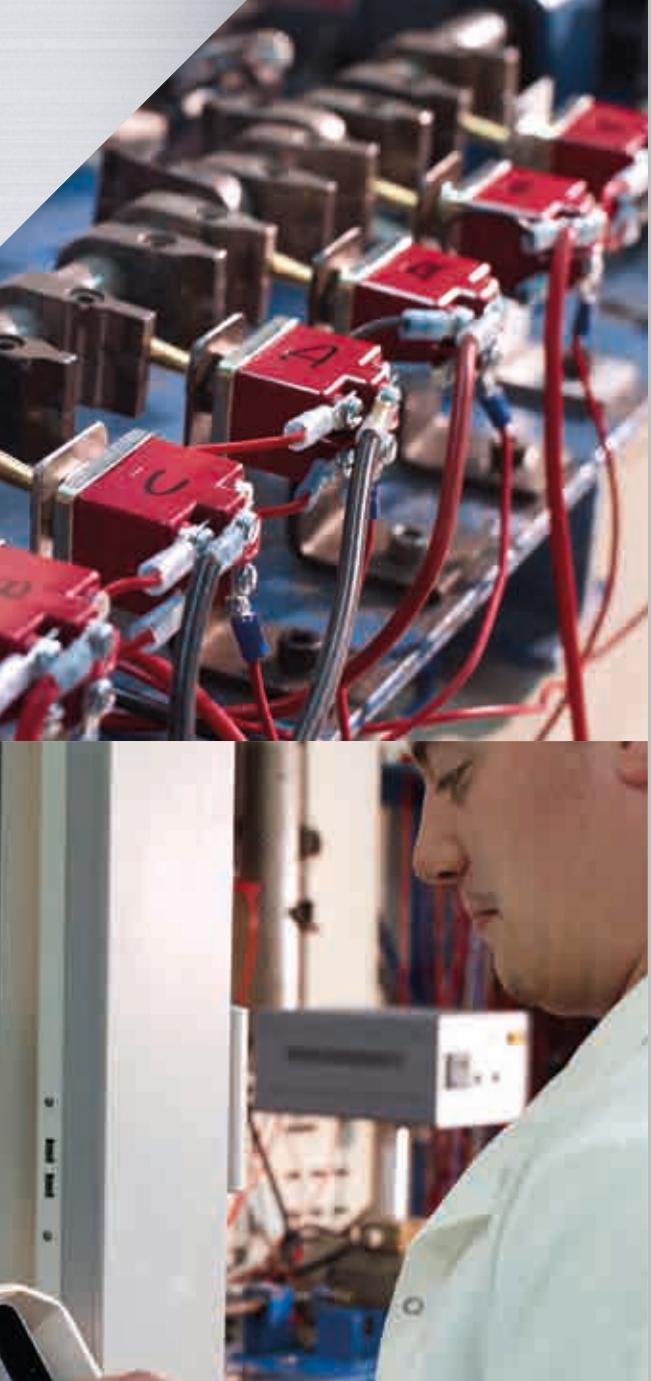
 Underwriters Laboratories

 Canadian Standards Association

 NF - Normes françaises

 VDE - Germany





MILITARY PRODUCT QUALIFICATIONS

EUROPE



USA

MIL

CECC 96400 AND CECC 96200

12000, 13000 and 3500 series

MIL-DTL 3950 AND MIL-DTL-83731

12000 SERIES

For details of approved series, see the selection guides available at the beginning of each section.

OTHER PRODUCT QUALIFICATIONS



ATEX - PBA series - No INERIS08ATEXQ408

PREFERENTIAL LISTS

NATO User code No F7507

Consult factory for details of listed models.

LAB TESTS

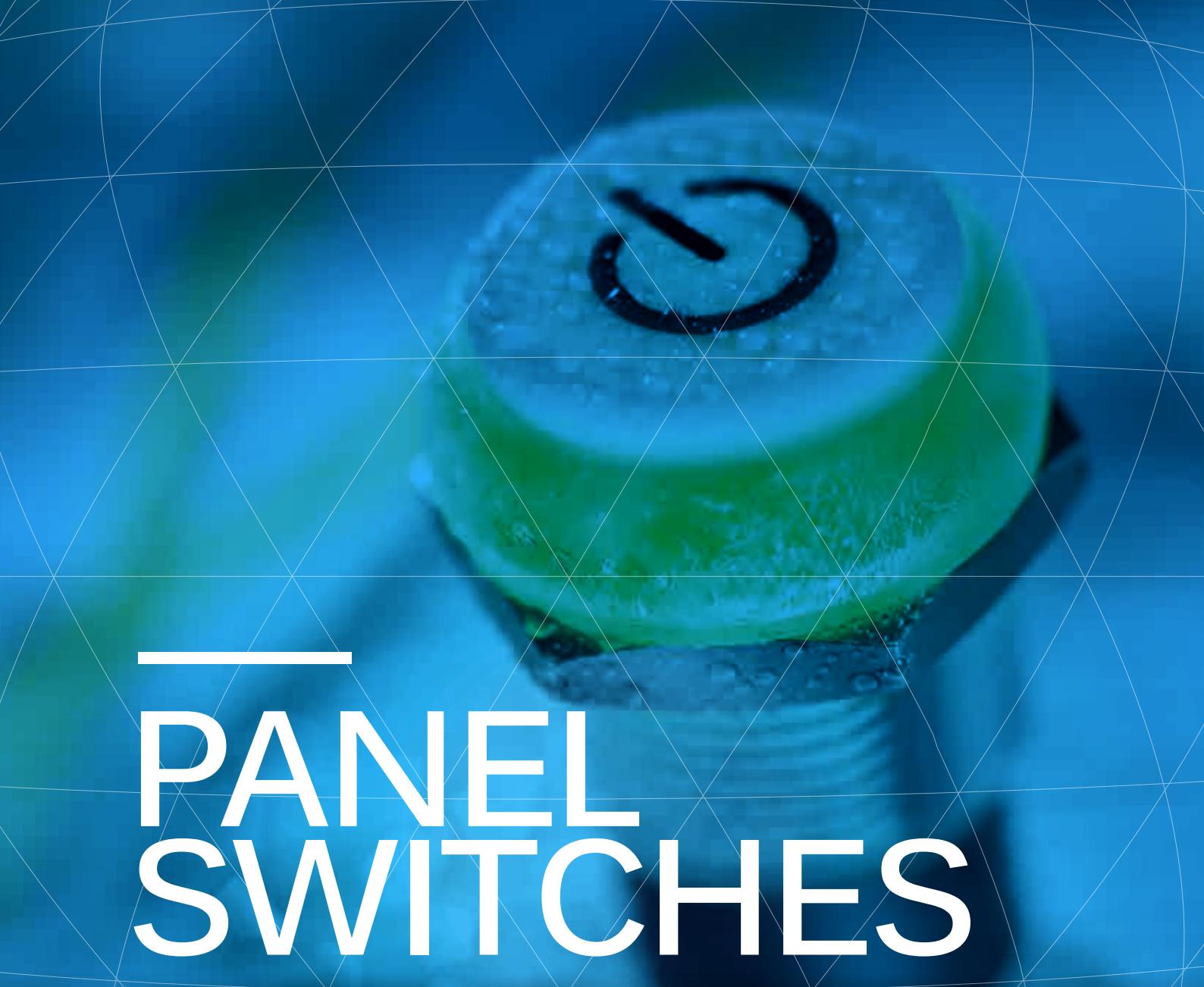
APEM laboratories are approved by the National Standard Office (LCIE) as well as Underwriters Laboratories (UL).

Qualification tests and periodical tests are conducted according to European Standard (CECC 96000), International Standards (IEC 1020, IEC 512, IEC 68...) and other safety standards like UL 1054, CSA 55, CEE 24, EN 61058-1.

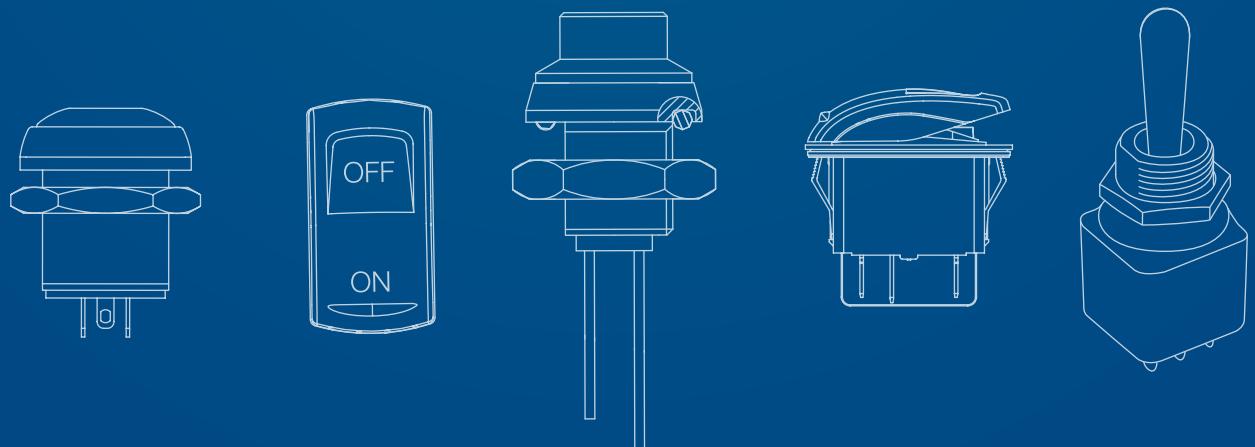
CECC-IEC TYPICAL TESTS

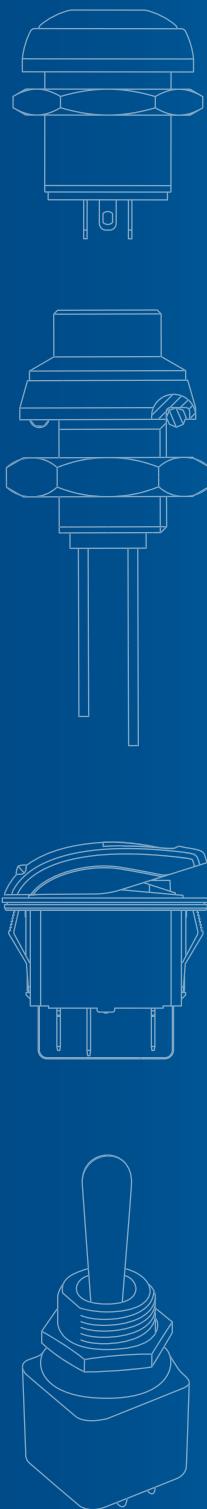
| | |
|------------------------------|---|
| Visual examination: | IEC 521-2 test 1a |
| Outline dimensions: | IEC 521-2 test 1b |
| Functional operation: | CECC96000 - §-4-3-1-7 |
| Initial contact resistance: | IEC 512-2 test 2a or 2b |
| Impact on actuator: | CECC 96000 §-4-3-7-1 |
| Robustness of actuator: | CECC 96000 §-4-3-8-1 |
| Robustness of mounting: | CECC 96000 §-4-3-8-2 |
| Robustness of terminals: | IEC 512-8 test l6f |
| Mechanical endurance: | IEC 512-5 test 9a and CECC 96000 §-4-3-9-1 |
| Electrical endurance: | IEC 512-5 test 9c |
| Electrical overload: | IEC 512-5 test 10a |
| Damp heat, steady state: | IEC 512-6 test 11c |
| Rapid change of temperature: | IEC 512-6 test 11d |
| Vibration: | IEC 512-4 test 6d |
| Bump (if required): | IEC 512-4 test 6b |

| | |
|--|-----------------------|
| Shock: | IEC 512-4 test 6c |
| Climatic sequence: | IEC 512-6 test 11a |
| Insulation resistance: | CECC 96000 § 4-3-3-1 |
| Voltage proof: | CECC 96000 § 4-3-4-1 |
| Temperature rise (if applicable): | IEC 512-3 test 5a |
| Soldering: | IEC 512-6 |
| Operating force: | IEC 512-7 test 13c |
| Sealing (air leakage): | IEC 68-2-17 test Qa |
| Sealing water proof: | CECC 96000 § 4-3-14-2 |
| Sealing immersion proof: | IEC 68-2-17 test Qf |
| Sealing (bubble test): | IEC 68-2-17 test Qc |
| Low air pressure (if required): | IEC 512-6 test 11k |
| Corrosion (salt resist) (if required): | IEC 512-6 test 11f |
| Dry heat: | IEC 512-6 test 11i |
| Cold: | IEC 512-6 test 11j |



PANEL SWITCHES





SELECTION GUIDES

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TOGGLE SWITCHES

| | |
|------------------|----|
| ZL | 29 |
| S | 31 |
| 5000 | 33 |
| 5000M | 41 |
| 11000 | 43 |
| 12000 | 47 |
| 12000X778 | 51 |
| 1000 | 55 |
| 4600-4400 | 57 |
| 600H-600NH | 59 |
| 3500 | 63 |
| 3600NF | 67 |
| 6000 | 69 |

ROCKER SWITCHES

| | |
|------------|-----|
| S | 203 |
| AS | 205 |
| MT | 207 |
| FM | 209 |
| 2600 | 211 |
| KR | 215 |
| KL | 219 |
| KI | 223 |
| KG | 225 |

INDUSTRIAL CONTROL SWITCHES

| | |
|-----------|-----|
| A1 | 227 |
| A01 | 229 |
| A02 | 235 |
| LK | 241 |

PUSHBUTTON SWITCHES "I" RANGE

| | |
|-----------|-----|
| IC | 71 |
| IL | 73 |
| IM | 77 |
| IP | 79 |
| IB | 87 |
| IS | 89 |
| IHS | 91 |
| IHL | 93 |
| IQ | 95 |
| IZ | 99 |
| IR | 107 |
| IA | 117 |
| IF | 119 |

EMERGENCY STOP SWITCHES

| | |
|---------------|-----|
| A01ES-D | 243 |
| A02ES-I | 247 |
| A02ES-H | 249 |
| ES | 251 |

PUSHBUTTON SWITCHES

| | |
|----------------------|-----|
| ZP | 121 |
| 9100-9200-9500 | 123 |
| SP | 127 |
| 8000 | 129 |
| 9400-9600 | 133 |
| 10400 | 135 |
| 13000 | 137 |
| 13000X778 | 141 |
| 18000 | 147 |
| AV | 151 |
| 1200 | 171 |
| 4700-4800 | 175 |
| CG | 177 |
| CP | 179 |
| PBA | 181 |
| FP | 189 |
| FD | 195 |
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TOGGLE SWITCHES

OUR RANGE

For more information, see APEM website



| SERIES | ZL | S | 5000 | 5000M | 11000 | 12000 | 12000X778 |
|----------------------------------|----------------|--------------------------|--------------------------|--------------------------|-------------|-------------|-------------|
| Pages | 29 | 31 | 33 | 41 | 43 | 47 | 51 |
| Approvals | | UL - CECC | VDE - UL - CSA CECC | UL - CSA | CECC | CECC | CECC - MIL |
| Poles | 1 | 1,2 | 1,2,3,4 | 1,2,3,4 | 1,2,3,4 | 2,3,4 | 2,3,4 |
| Maximum ratings | 500mA 48VDC | (2A 250VAC)* 4A 30VDC | (3A 250VAC)* 4A 30VDC | (3A 250VAC)* 4A 30VDC | 4A 30VDC | 4A 30VDC | 4A 30VDC |
| Bushing dimensions | | | | | | | |
| Ø6 (.236) | | | X | | | | |
| Ø6,35 (1/4) | | | X | | X | | |
| Ø11,9 (15/32) | | | X | X | | X | X |
| Mounting options | | | | | | | |
| Vertical - Through hole | X | X | X | | X | X | X |
| Horizontal - Through hole | | X | X | | X | | |
| Vert. right angle - Through hole | | X | X | | | | |
| Panel | X | | X | X | X | X | X |
| Terminal options | | | | | | | |
| PCB | X | X | X | X | X | X | X |
| Solder lugs | X | | X | | X | X | X |
| Quick-connect | | | X | | | | |
| Wire wrap | | | X | | | | |
| Sealing | No | Process | Optional | Optional | Optional | Optional | IP67 |

*See applicable approvals



| SERIES | 1000 | 4600-4400 | 600H-600NH | 3500 | 3600NF | 6000 |
|-------------------------|----------|----------------|----------------------------|-------------|---------------------------|------------|
| Pages | 55 | 57 | 59 | 63 | 67 | 69 |
| Approvals | | VDE - UL - CSA | NF - VDE - UL - CSA | CECC | UL | |
| Poles | 1 | 1,2,3 | 1,2,3 | 1,2 | 1,2 | 1,2,3,4 |
| Maximum ratings | 6A 30VDC | (4A 250VAC)* | (15A 250VAC)* 10A 24VDC | 15A 28VDC | (6A 250VAC)* 15A 28VDC | 6,5A 30VDC |
| Bushing dimensions | | | | X | | X |
| Ø11,9 (15/32) | | | | X | | |
| Ø12 (.472) | X | X | X | | X | |
| Mounting options | | | | | | |
| Vertical - Through hole | | X | | | | |
| Panel | X | X | X | X | X | X |
| Terminal options | | | | | | |
| PCB | | X | | | | |
| Solder lugs | X | X | X | X | X | X |
| Quick-connect | X | X | X | X | X | X |
| Screw | X | | X | X | X | X |
| Sealing | No | No | Optional | IP67, IP69K | IP67 | Optional |

"I" RANGE PUSHBUTTON SWITCHES

OUR RANGE



| SERIES | IC | IL | IM | IP momentary | IP latching | IB | IS | IHS Hall effect | IHL Hall effect |
|--------------------|-------------|-------------|--------------------------|--------------------------|--------------------------|-----------------------------|-----------------------------|--------------------|--------------------|
| Pages | 71 | 73 | 77 | 79 | 83 | 87 | 89 | 91 | 93 |
| Approvals | | | UL | UL | UL | UL | UL | | |
| Poles | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 NPN | 1 |
| Maximum ratings | 5A 28VDC | 2A 24VDC | (2A 250VAC)* 3A 28VDC | (2A 250VAC)* 5A 28VDC | (2A 250VAC)* 4A 12VDC | (2A 250VAC)* 100mA 48VDC | (2A 250VAC)* 100mA 48VDC | 50mA 24VDC | 1,25mA 4,5VDC |
| Illuminated | | X | | X | X | | | | |
| Bushing dimensions | | | | | | | | | |
| Ø12 (.472) | X | X | X | X | X | X | X | X | X |
| Mounting options | | | | | | | | | |
| Panel | X | X | X | X | X | X | X | X | X |
| Snap-in | | | | | | X | | | |
| Terminal options | | | | | | | | | |
| PCB | X | X | X | X | X | X | X | | |
| Solder lugs | X | X | | X | X | X | X | | |
| Quick-connect | X | | X | X | X | X | X | | |
| Screw | | | | | | | | | |
| Flying leads | X | X | | X | X | | | X | X |
| Sealing | IP67 | IP67 | IP67 | IP67 | IP67 | IP54 | IP67 | IP67 | IP67 |

*See applicable approvals

APEM
INNOVATION

IR SERIES

INCREASED VISIBILITY

APEM EXCLUSIVE

 ILLUMINATED BEZEL

 SPECIFIC BACKLIGHTING
for visibility in any viewing angle
LARGE DIAMETER :
16 MM

FRONT PANEL SEALING

LARGE CHOICE OF OPTIONS:
COLOR, SHAPE, MARKING,
ILLUMINATION

For more information,
see APEM website



| SERIES | IQ momentary | IZ metal | IZ plastic | IR microswitch | IR standard | IR latching | IA | IF |
|--------------------|-----------------|-------------|---------------|-------------------|----------------|----------------|-------------|----------------|
| Pages | 95 | 99 | 103 | 107 | 109 | 113 | 117 | 119 |
| Approvals | | | | | | | | |
| Poles | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Maximum ratings | 5A 28VDC | 4A 48VDC | 4A 48VDC | 5A 250VAC | 5A 28VDC | 4A 12VDC | 2A 24VDC | 100mA 48VDC |
| Illuminated | X | X | X | X | X | X | | |
| Bushing dimensions | | | | | | | | |
| Ø16 (.629) | X | X | X | X | X | X | X | X |
| Mounting options | | | | | | | | |
| Panel | | Rear | Rear | X | X | X | X | X |
| Snap-in | X | | | | | | | X |
| Terminal options | | | | | | | | |
| PCB | X | X | X | | X | X | | |
| Solder lugs | X | X | X | | X | X | | |
| Quick-connect | X | X | X | X | X | X | | X |
| Screw | X | X | X | | X | | | |
| Flying leads | X | X | X | | X | X | X | |
| Sealing | IP54 | IP67 | IP67 | IP67 | IP67 | IP67 | IP67 | IP67 |

The most common configurations are presented in this catalog. Other commercially available configurations already existing in our different ranges of products, non-standard and custom products are available upon request.

PUSHBUTTON SWITCHES

APEM
DESIGN

FP SERIES
DESIGNED TO
ATTRACT ATTENTION

APEM
EXCLUSIVE

PRECISE laser
etched symbols.
Total switch
CUSTOMIZATION



LARGE SWITCH WITH
FULLY ILLUMINATED
ACTUATOR



EASY TO MARK
AND CUSTOMIZE



| SERIES | CG | CP | PBA | FP | FD | MP | LPI | PR & V |
|--------------------|----------------|----------------|-------------|-------------|-------------|--------------|-------------------------|--------------|
| Pages | 177 | 179 | 181 | 189 | 195 | 197 | 199 | 201 |
| Approvals | | | Atex | | | | | |
| Poles | 1 NPN | 1 NPN | 1 | 1,2 | 1,2 | 1,2 | 1 | |
| Maximum ratings | 200mA 24VDC | 200mA 24VDC | 1A 24VDC | 4A 12VDC | 4A 12VDC | 20mA 5VDC | 5A 12VDC 100mA 12VDC | 50m 24VDC |
| Illuminated | X | X | X | X | X | | X | X |
| Bushing dimensions | | | | | | | | |
| Ø 14 | | | | | | | | X |
| Ø15,20 (.598) | | | | | | X | | |
| Ø16 (.629) | | X | X | | | | | |
| Ø19 (.748) | | X | X | | | | | |
| Ø22 (.866) | | X | X | | | | | |
| Ø24 (.944) | | | | X | X | | | |
| Ø26 (1.023) | | | | X | X | | | |
| Ø30 (1.18) | | | | X | | | | |
| Ø38 (1.496) | | | | | | | X | |
| Ø44 (1.732) | | | | | | | X | |
| Mounting options | | | | | | | | |
| Panel | X | X | X | X | X | X | X | X |
| Snap-in | | | | | X | | | |
| Terminal options | | | | | | | | |
| Solder lugs | | | | X | X | | | |
| Screw | | | | | | | X | |
| Flying leads | | X | X | | | | | |
| Cable | | X | X | X | | | | |
| Connector | X | X | | | | X | | X |
| Sealing | N/A | IP68, IP69K | IP68, IP69K | No | IP69K | IP68 | IP53 | IP65 |

*See applicable approvals

OUR RANGE

For more information, see APEM website



| SERIES | ZP | 9100-9200-9500 | SP | 8000 | 9400-9600 | 10400 |
|----------------------------------|-------------|----------------|--------------------------|--------------------------|-----------|----------|
| Pages | 121 | 123 | 127 | 129 | 133 | 135 |
| Approvals | | | UL | UL | | CECC |
| Poles | 1 | 1 | 1,2 | 1,2 | 1 | 1,2 |
| Maximum ratings | 500mA 48VDC | 100mA 30VDC | (1A 120VAC)* 1A 30VDC | (3A 250VAC)* 4A 30VDC | 1A 30VDC | 3A 24VDC |
| Bushing dimensions | | | | | | |
| Ø4 (.157) | | X | | | | |
| Ø4.83 (10-48) | X | | | | | |
| Ø6,35 (1/4) | | | X | X | X | |
| Ø10 (.393) | | | | | | X |
| Ø11,9 (15/32) | | | | X | | |
| Ø16 (.629) | | | | | X | |
| Mounting options | | | | | | |
| Vertical - Through hole | X | X | X | X | X | |
| Horizontal - Through hole | | | X | X | | |
| Vert. right angle - Through hole | | X | X | | | |
| Panel | X | X | X | X | X | X |
| Terminal options | | | | | | |
| PCB | X | X | X | X | X | |
| Solder lugs | X | X | | X | X | X |
| Quick-connect | | | | | X | |
| Sealing | No | Optional | Process | Optional | Optional | No |



| SERIES | 13000 | 13000X778 momentary | 13000X778 alternate | 18000 | 1200 | 4700-4800 |
|----------------------------------|--------------------------|------------------------|------------------------|----------|--------------------------|----------------|
| Pages | 137 | 141 | 145 | 147 | 171 | 175 |
| Approvals | UL - CECC | CECC | | | NF - UL - CSA | VDE - UL - CSA |
| Poles | 1,2 | 2,3 | 2 | 1,2 | 1 | 1,2 |
| Maximum ratings | (2A 250VAC)* 4A 30VDC | 4A 28VDC | 4A 28VDC | 7A 30VDC | (4A 250VAC)* 4A 24VDC | (3A 250VAC)* |
| Bushing dimensions | | | | | | |
| Ø6,35 (1/4) | X | | | X | | |
| Ø10 (.393) | | | | | | |
| Ø11,9 (15/32) | X | X | X | | | |
| Ø 12 (.472) | | | | | X | X |
| Mounting options | | | | | | |
| Vertical - Through hole | X | X | X | X | | X |
| Horizontal - Through hole | X | | | X | | |
| Vert. right angle - Through hole | | | | X | | |
| Panel | X | X | X | X | X | X |
| Snap-in | | | | X | | |
| Terminal options | | | | | | |
| PCB | X | X | X | X | | |
| Solder lugs | X | X | X | X | X | X |
| Quick-connect | | | | | X | X |
| Screw | | | | | X | |
| Sealing | Optional | IP67 | IP67 | No | No | No |

AV SERIES PUSHBUTTON SWITCHES

OUR RANGE



| MODELS | AV 19/22 mm anti-vandal, mom. | AV 250V latching | AV 16 mm momentary | AV 19/22 mm momentary | AV 19/22 mm NC/NO |
|----------------------------------|----------------------------------|---------------------|-----------------------|--------------------------|----------------------|
| Pages | 151 | 153 | 155 | 157 | 159 |
| General specifications | | | | | |
| Anti-vandal (IK08/IK10) | X | | | | |
| Security | | X | X | X | X |
| Approvals | UL/CSA | NF | | UL/CSA | |
| Sealing | Up to IP65 | Up to IP65 | Up to IP65 | Up to IP65 | Up to IP67 |
| Illumination | | | | | X |
| Marking | | | | X | |
| Electrical specifications | | | | | |
| Maximum ratings | 2A 48VDC (4A 250VAC)* | (1A 250VAC)* | 0,2A 48VDC | 2A 48VDC (4A 250VAC)* | 1A 30VDC |
| Momentary (NO) | X | | | X | |
| Momentary (NO) tactile | | | X | | |
| Momentary NC/NO | | | | | X |
| Latching | | X | | | |
| Diameter and shape | | | | | |
| Ø 16 (.629) Flat | | AV06100 | AV063 | | |
| Ø 16 (.629) Curved | | AV16100 | AV163 | | |
| Ø 19 (.748) Flat | AV09 | AV09100 | | AV09 | AV9 |
| Ø 19 (.748) Curved | AV19 | AV19100 | | AV19 | |
| Ø 22 (.866) Flat | AV03 | AV03100 | | AV03 | AV3 |
| Ø 22 (.866) Curved | AV02 | AV02100 | | AV02 | |

*See applicable approvals

APEM
RELIABILITY

AV SERIES

WITHSTANDS ANY AGGRESSIVE USE

 RESISTANT to demanding environmental requirements (rain/frost/salt/UV) and vandalism

 IK & IP: TESTED & QUALIFIED PRODUCTS



APPEALING AESTHETICS : MATERIALS, COLORS, CONTRAST, BRIGHT OR DIM ILLUMINATION, EMBOSSED, BRAILLE MARKING, SHAPES & DIMENSIONS...



RESISTANT MATERIALS : STAINLESS STEEL, FLAME-RETARDANT PLASTICS...

For more information,
see APEM website



| MODELS | AV 19/22 mm latching | AV 19 mm tactile, mom. | AV 19/22 mm tactile overmolded | AV 22/24 mm large actuator | AV 30 mm NC/NO |
|----------------------------------|----------------------|------------------------|--------------------------------|----------------------------|----------------|
| Pages | 161 | 163 | 165 | 167 | 169 |
| General specifications | | | | | |
| Security | X | X | X | X | X |
| Approvals | | | | NF/UL | |
| Sealing | Up to IP65 | Up to IP65 | Up to IP67, IP69K | IP65 | Up to IP67 |
| Illumination | X | X | X | | X |
| Marking | | X | X | | X |
| Electrical specifications | | | | | |
| Maximum ratings | 2A 48VDC | 50mA 24VDC | 50mA 24VDC | 5A 250VAC | 1A 30VDC |
| Momentary (NO) tactile | | X | X | | |
| Momentary NC/NO | | | | X | X |
| Latching | X | | | | |
| Diameter and shape | | | | | |
| Ø 19 (.748) Flat | AV09.EA | AV09C7 | AV9S | | |
| Ø 19 (.748) Curved | AV19.EA | AV19C7 | | | |
| Ø 22 (.866) Flat | AV03.EA | | AV3S | AV22LP | |
| Ø 22 (.866) Curved | AV02.EA | | | AV22LB | |
| Ø 24 (.944) Flat | | | | AV24LP | |
| Ø 24 (.944) Curved | | | | AV24LB | |
| Ø 24 (.944) Concave | | | | AV24LC | |
| Ø 30 (1.181) Flat | | | | | AV5 |

The most common configurations are presented in this catalog. Other commercially available configurations already existing in our different ranges of products, non-standard and custom products are available upon request.

ROCKER SWITCHES

OUR RANGE



| SERIES | S | AS | MT | FM |
|----------------------------------|--------------------------|--------------|----------|---------------|
| Pages | 203 | 205 | 207 | 209 |
| Approvals | UL | UL - CSA | | UL - VDE |
| Poles | 1,2 | 1 | 1 | 1 |
| Maximum ratings | (2A 250VAC)* 4A 30VDC | (2A 250VAC)* | 4A 30VDC | (10A 250VAC)* |
| Illuminated | | | | X |
| Mounting options | | | | |
| Vertical - Through hole | X | X | X | X |
| Horizontal - Through hole | X | | | |
| Vert. right angle - Through hole | X | | | |
| Snap-in | X | X | | X |
| Rear mounting | X | | | |
| Panel cut-out | | 18,65 x 8,9 | Ø 17,65 | 19,2 x 12,9 |
| Terminal options | | | | |
| PCB | X | X | X | X |
| Solder lugs | | X | X | X |
| Quick-connect | | | | X |
| Sealing | Process | No | No | Optional boot |

*See applicable approvals


 APEM
PATENTED
DESIGN

KL SERIES PROVEN RELIABILITY



MODERN APPEARANCE &
INTUITIVE ERGONOMICS FOR
EASY ONE-HAND ACTIVATION

APEM PATENTED DESIGN

APEM
EXCLUSIVE



NO RISK OF INADVERTENT
SWITCHING



HIGH MECHANICAL STRENGTH



IP68 FRONT PANEL SEALING



CUSTOMIZABLE:
MARKING, BACKLIGHTING

For more information,
see APEM website



| SERIES | 2600 | KR | KL | KI | KG |
|------------------|---------------|--------------|--------------|--------------|----------------------------|
| Pages | 211 | 215 | 219 | 223 | 225 |
| Approvals | NF-VDE-UL-CSA | | | | VDE |
| Poles | 1,2 | 1,2 | 1,2 | - | 1,2 |
| Maximum ratings | (16A 250VAC)* | 10A 24VDC | 10A 24VDC | 24VDC | (12A 250VAC)* 15A 12VDC |
| Illuminated | X | X | X | X | X |
| Mounting options | | | | | |
| Snap-in | X | X | X | X | X |
| Panel cut-out | 30 x 22 | 36,8 x 21,08 | 36,8 x 21,08 | 36,8 x 21,08 | 36,8 x 21,08 |
| Terminal options | | | | | |
| Solder lugs | X | X | X | X | X |
| Quick-connect | X | X | X | X | X |
| Screw | X | X | X | | X |
| Connectors | | X | X | X | X |
| Sealing | Optional boot | IP68 | IP68 | IP68 | IP65 |

INDUSTRIAL CONTROL SWITCHES

OUR RANGE



| SERIES | A1 | A01 | A01 | A01 | A01 | A02 | A02 |
|--------------------|-----------------------|-----------------------|-----------|-----------------------|-----------------------|-------------------------|-------------------------|
| Pages | 227 | 229 | 229 | 231 | 233 | 235 | 235 |
| Type | Pushbutton | Pushbutton | Indicator | Keylock | Selector | Pushbutton | Indicator |
| Approvals | UL/VDE | UL/VDE | UL/VDE | UL/VDE | UL/VDE | UL/VDE | UL/VDE |
| Poles | 1,2,3,4 | 1,2,3,4 | - | 1,2,3,4 | 1,2,3,4 | 1,2,3,4 | - |
| Sealing | IP65 | IP65 | IP65 | IP65 | IP65 | IP65 | IP65 |
| Back panel sealing | Option | Option | Option | Option | Option | No | No |
| Illuminated | Yes | Yes | Yes | No | No | Yes | Yes |
| Maximum ratings | 6A 250VAC 6A 12VDC | 6A 250VAC 6A 12VDC | N/A | 6A 250VAC 6A 12VDC | 6A 250VAC 6A 12VDC | 16A 250VAC 12A 12VDC | 16A 250VAC 12A 12VDC |
| Panel cut-out | | | | | | | |
| Ø 16 mm | | X | X | X | X | | |
| Ø 19 mm | | | | | | | |
| Ø 22 mm | X | X | X | X | X | X | X |
| Ø 30 mm | | | | | | X | X |
| Flush mounting | Yes | Option | Option | Option | Option | Yes | Yes |
| Terminal options | | | | | | | |
| Solder lugs | X | X | X | X | X | | |
| Quick-connect | X | X | X | X | X | Option | Option |
| Screw | | | | | | X | X |
| Straight PC | | | | | | | |
| PCB mounting | Option | Option | Option | Option | Option | No | No |

* See applicable approvals

APEM
INNOVATION

A1 SERIES DESIGN AND AESTHETICS



BACKLIT LEGENDS ON
METAL INSERTS

CHEMICAL ETCHING OF METAL
INSERT FOR LIGHT PASSAGE

APEM
EXCLUSIVE

METAL ASPECT & FLUSH MOUNTING
FOR A SLEEK APPEARANCE

BACKLIGHTING, VISIBLE EVEN
IN STRONG DAYLIGHT

CUSTOMIZABLE:
MARKING, BACKLIGHTING

For more information,
see APEM website



| SERIES | A02 | A02 | LK | A01ES-D | A02ES-I | A02ES-H | ES |
|-------------------------|--------------------------|--------------------------|---------------------------------|----------------------|-------------------------|-----------------------|-----------------|
| Pages | 237 | 239 | 241 | 243 | 247 | 249 | 251 |
| Type | Keylock | Selector | Keylock | Emergency stop | Emergency stop | Emergency stop | Emergency stop |
| Approvals | UL/VDE | UL/VDE | UL | UL/VDE/DEMKO | UL/TUV | UL/TUV | |
| Poles | 1,2,3,4 | 1,2,3,4 | 1,2,3,4 | 1,2 | 1,2 | 1,2 | 2,3 |
| Sealing | IP65 | IP65 | IP65 | IP65 | IP65 | IP65 | IP65,IP67,IP69K |
| Back panel sealing | IP40 | IP40 | IP40 | IP40 | No | No | No |
| Illuminated | No | No | No | No | Option | No | No |
| Maximum ratings | 16A 250 VAC 12A 12VDC | 16A 250 VAC 12A 12VDC | 2A 250 VAC 4A 125 VAC/28 VDC | 1,5A 250VAC AC-15 | 6A 240 VAC 8A 24 VAC | 3A 240 VAC 2A 30 V | 1A 24VDC |
| Panel cut-out | | | | | | | |
| Ø 16 mm | | | | X | | | |
| Ø 19 mm | | | X | | | | |
| Ø 22 mm | X | X | | | X | X | X |
| Ø 28 mm | | | | | | | X |
| Flush mounting | Option | Option | | | | | No |
| Terminal options | | | | | | | |
| Solder lugs | | | X | X | | | X |
| Quick-connect | Option | Option | | X | | | |
| Screw | X | X | | | X | X | X |
| Straight PC | | | | | | | |
| PCB mounting | | | | Option | | | No |

The most common configurations are presented in this catalog. Other commercially available configurations already existing in our different ranges of products, non-standard and custom products are available upon request.

ZL series

Subminiature toggle switches • metal bushing



DISTINCTIVE FEATURES

- Ø 4,83 mm threaded bushing
- Solder lug and straight PC terminals



ENVIRONMENTAL SPECIFICATIONS

- Operating temperature : -30°C to +85°C
- Moisture : 21 days 95 % (NFC 20-603 - IEC 8-2-3)



ELECTRICAL SPECIFICATIONS

- Max. current/voltage rating with resistive load :
 - gold plated contacts : 0,4VA 20V max. AC or DC
 - silver plated contacts : 0,5A 48V max. AC or DC
- Minimum load : 10mA 50mV - 10µA 5VDC
- Contact resistance : 20 mΩ max.
- Insulation resistance : 1.000 MΩ min. at 500VDC
- Dielectric strength: 1.000 Vrms 50 Hz min. between terminals and frame 500 Vrms 50 Hz min. between terminals
- Electrical life at full load :

| Contacts | Number of cycles | |
|---------------|------------------|-------------|
| | 2 positions | 3 positions |
| Gold plated | 60.000 | 30.000 |
| Silver plated | 20.000 | 10.000 |



GENERAL SPECIFICATIONS

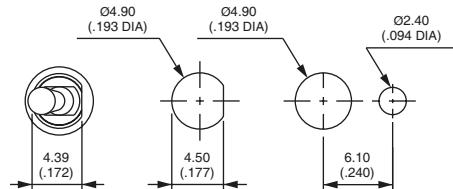
- Strength of terminals : pull-out force 10 N max.
- Torque : 1 Nm max. applied between the 2 nuts
- Max. panel thickness : 1,5 mm (.059) with 2 nuts

The company reserves the right to change specifications without notice.

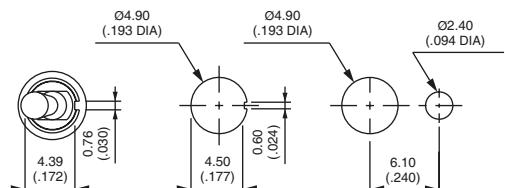


PANEL CUT-OUT

WITH FLAT



WITH KEYWAY



MATERIALS

- Case : thermoplastic UL94-V0
- Actuator : brass, nickel plated
- Bushing : zamac, tin plated
- Contacts and terminals :
 - 0 : brass, gold plated (standard)
 - 1 : brass, silver plated
 - 3 : brass, gold plated
(1,27 micron gold)
- Terminal seal : epoxy



SOLDERING

- Hand soldering : 280°C max. for 5 seconds max.
- Wave soldering : 260°C max. for 5 seconds max.

ZL series

Subminiature toggle switches • metal bushing



BUILD YOUR PART NUMBER

BASIC PART NUMBER

| SERIES | NUMBER OF POLES | ELECTRICAL FUNCTIONS | TERMINALS |
|--------|-----------------|----------------------|----------------|
| ZL | 3 Single pole | 1 ON - OFF | S0 Solder lug |
| | | 6 ON - ON | P0 Straight PC |
| | | 9 ON OFF ON | |
| | | 7 MOM OFF MOM | |
| | | 8 ON OFF MOM | |
| | | 2 ON - MOM | |

OPTIONS

CONTACT AND TERMINAL MATERIALS

- 0 Brass, gold plated
- 1 Brass, silver plated
- 3 Brass, gold plated (1,27 micron gold)

BUSHINGS

- 01 Threaded, with flat
- 02 Threaded, with keyway

MODELS

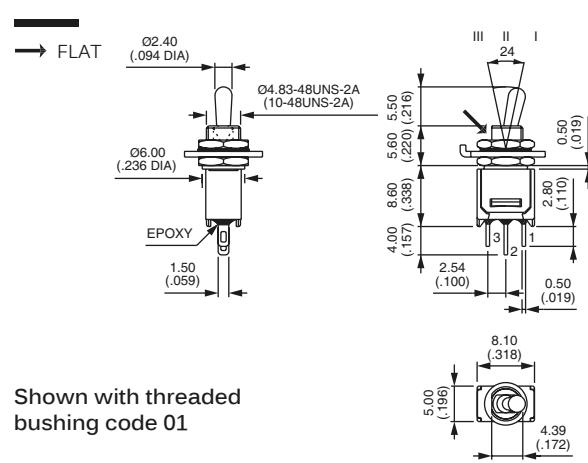
- 00 Standard model

NOTICE : please note that not all combinations of above numbers are available.
Refer to www.apem.com for further information.

SOLDER LUG TERMINALS



| | III | II | I |
|--------|-----|-----|-----|
| ZL31S0 | ON | - | OFF |
| ZL36S0 | ON | - | ON |
| ZL39S0 | ON | OFF | ON |
| ZL37S0 | MOM | OFF | MOM |
| ZL38S0 | MOM | OFF | ON |
| ZL32S0 | MOM | - | ON |



S series

Washable miniature toggle switches •
plain bushing



DISTINCTIVE FEATURES

- Process sealed
- Front and rear sealing
- Process compatible
- Wave solderable
- Washable



ENVIRONMENTAL SPECIFICATIONS

- Operating temperature : -20°C to +85°C
- Storage temperature : -40°C to +85°C
- Moisture : The insulating materials employed and the complete seal permit the switches to withstand a 56 days moisture test (IEC 68-2-3).
- Solderability : The switches are tested at 235°C according to IEC 68-2-20 after accelerated aging.



GENERAL SPECIFICATIONS

- Mechanical strength : Terminals are strengthened by a bracket or a ground plate ensuring the rigidity of the switch on the board. Actuator strength is 10N max.
- Soldering - thermal shock : The switches are especially designed for flow soldering at 260°C during 5 seconds owing to high temperature polymer parts.



MATERIALS

- Case and cover : UL94-VO, polyamide, glass filled or PES
- Actuator : brass, nickel plated
- Contacts
 - CD : brass, gold plated
 - A : silver
 - AD : silver, gold plated
- Terminal seal : epoxy



ELECTRICAL SPECIFICATIONS

- Max. current/voltage rating with resistive load :
 - silver contacts (A) : 4A 30VDC
 - gold plated brass contacts (CD) : 0,4VA 20VAC or DC
 - gold plated silver contacts (AD) : 4A 30VDC (300mA 30VDC for gold plating)
- Initial contact resistance : 10 mΩ max.
- Insulation resistance : 1.000 MΩ min.
- Dielectric strength : 1.000 Vrms 50 Hz min.
- Electrical life at full load :

| Contacts | Number of cycles | |
|----------|------------------|-------------|
| | 2 positions | 3 positions |
| A | 40.000 | 40.000 |
| CD | 100.000 | 50.000 |
| AD | 40.000 | 40.000 |

The company reserves the right to change specifications without notice.

AGENCY APPROVALS



2A 250VAC
4A 125VAC



CECC 96201-006

S series

Washable miniature toggle switches • plain bushing



BUILD YOUR PART NUMBER

| BASIC PART NUMBER | | | | | |
|-------------------|--|--|-----------------|----------------------|-------------|
| S | | | | | |
| SERIES | TERMINALS | TERMINAL SPACING | NUMBER OF POLES | ELECTRICAL FUNCTIONS | |
| W | Right angle, horizontal mounting | 2 Terminal spacing 4,7 (.185) or 3,81 (.150) | 3 Single pole | 6 | ON - ON |
| WW | Right angle, vertical mounting | 0 Terminal spacing 5,08 (.200) (SW switches) | 4 Double pole | 9 | ON OFF ON |
| Y | Bracket mounting | | | 7 | MOM OFF MOM |
| | | | | 8 | ON OFF MOM |
| | | | | 2 | ON - MOM |
| | | | | 4TH | ON ON ON |

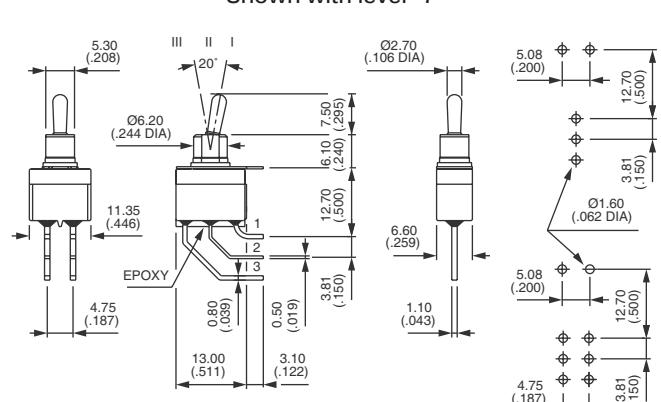
| OPTIONS | | | | |
|------------------------|-------------------|--|--|-------------------|
| CONTACT MATERIALS | LEVERS | APPROVALS | SPECIAL OPTIONS | INSULATING CAPS |
| A Silver | -7 Short Standard | UL CECC Availability : Consult factory for details of approved models. | X601 Silver plated brass contacts | U270 For lever 13 |
| AD Silver, gold plated | -13 Long | | X696 Higher bushing (for insulated levers) | U1710 For lever 7 |
| CD Brass, gold plated | Insulated levers | | | |
| | -11 Long | | | |
| | -8 Short | | | |

NOTICE : please note that not all combinations of above numbers are available.
Refer to www.apem.com for further information.

RIGHT ANGLE TERMINALS - VERTICAL



| | | I 2-3 5-6 | II 2-1 4-5 | III |
|---------------|------------------|-----------------|------------------|-----|
| Single pole | Double pole | | | |
| SWW236 | SWW246 | ON | - | ON |
| SWW239 | SWW249 | ON | OFF | ON |
| SWW237 | SWW247 | MOM | OFF | MOM |
| SWW238 | SWW248** | ON | OFF | MOM |
| SWW232 | SWW242** | ON | - | MOM |
| | SWW244TH* | ON | - | MOM |



*Function 4 : SP in DP case - TH connection, see end of catalog.

**Functions 2 and 8 : reversed connection available. On request.

5000 series

Miniature toggle switches •
threaded or plain bushing



DISTINCTIVE FEATURES

17 actuators including toggles, paddle levers and locking levers in different lengths.

Various contact materials for low and high currents.

8 functions including maintained and momentary versions.

1 to 4 pole configurations.

12 terminal types including 9 for PC board mounting.

Other types include quick-connect and wire-wrap.

Several bushing styles.

3 types of finish including military black.

3 approvals (UL - CSA - CECC).

4 types of sealing for terminal or front panel requirements.

Numerous accessories available.



5000 series

Miniature toggle switches •
threaded or plain bushing



ELECTRICAL SPECIFICATIONS

- Current/voltage rating with resistive load :

| Contact | Maximum | Minimum | Level* |
|--------------------------|---|----------------------|------------|
| Silver (A) | 4A 30VDC | 50mA 10VDC | III and IV |
| Silver, gold plated (AD) | 4A 30VDC Gold plating withstands up to 100mA 30VDC | 10mA 50mV 10µA 5V | I to IV |
| Brass, gold plated (CD) | 0,4 VA at 20VAC or DC | 10mA 50mV 10µA 5V | I and II |

*For details, see Technical Information, end of catalog.

- For inductive, lamp or capacitive load, consult factory.
- Initial contact resistance : 10 mΩ max.
- Insulation resistance : 1.000 MΩ min. at 500VDC
- Dielectric strength :
 - 1.000 Vrms 50 Hz min. between terminals
 - 1.500 Vrms 50 Hz min. between poles
 - 1.500 Vrms 50 Hz min. between terminals and frame
- Contact bounce : 2 ms max.
- Electrical life at full load :
 - 50.000 cycles for single and double pole
 - 40.000 cycles for 3 pole
 - 30.000 cycles for 4 pole
- Low level or mechanical life : 100.000 cycles



MATERIALS

- Case : diallylphthalate (DAP) or high temperature plastic material (UL94-V0)
- Actuator : brass, nickel plated
- Paddles : UL94HB polyamide
- Lever caps : vinyl
- Bushing : brass, nickel plated
- Housing : stainless steel or steel tin plated
- Contacts
 - A : silver
 - AD : silver, gold plated
 - CD : brass, gold plated
 - X814 : for peak currents, see "Special options".
- Terminal seal : epoxy



GENERAL SPECIFICATIONS

- Torque : 1,25 Nm (.922 Ft.lb) max. applied to nut
- Panel thickness : 2,5 mm (.098) with 2 nuts - 4 mm (.157) with 1 nut
- Operating temperature : -40°C to +85°C

AGENCY APPROVALS



CECC 96201-007

3A 250VAC, 6A 125VAC

For VDE, refer to 55000 series on website.

NATO

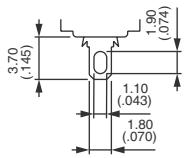
Availability : consult factory for details of approved models.

Marking : to order switches marked UL, CSA or CECC, complete appropriate box of ordering format. The preferential list does not appear on the switches.

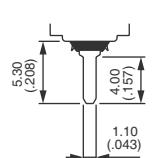
Miniature toggle switches •
threaded bushing Ø 6,35 mm or plain bushing



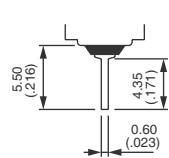
TERMINALS



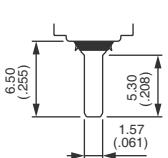
Solder lugs



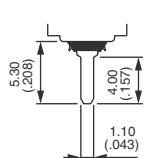
Straight PC



Straight PC



Quick-connect

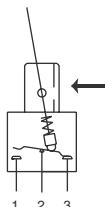


Straight PC bracket mounting

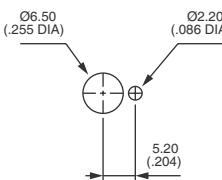


ELECTRICAL FUNCTION

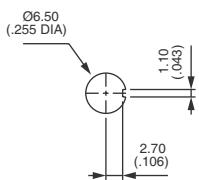
→ KEYWAY



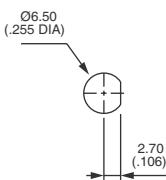
PANEL CUT-OUT



Standard



With K sealing option

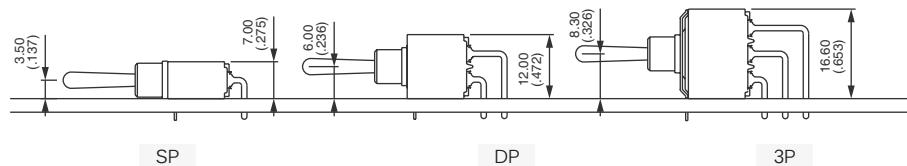


With X408 sealing option



PCB MOUNTING FOR RIGHT ANGLE TERMINAL MODELS

HORIZONTAL WW

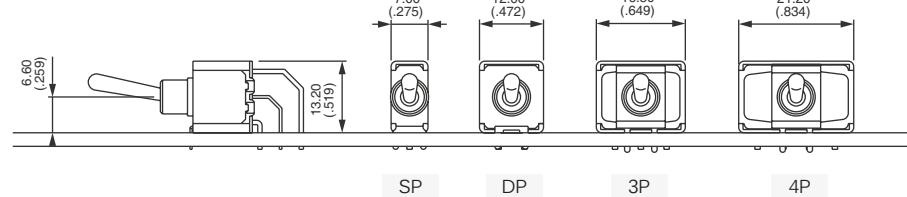


SP

DP

3P

VERTICAL WW



SP

DP

3P

4P

5000 series

Miniature toggle switches •
threaded bushing Ø 6,35 mm or plain bushing



BUILD YOUR PART NUMBER

BASIC PART NUMBER



SERIES

NUMBER OF POLES

TERMINALS

MOMENTARY FOR FUNCTION 4

- 3** Single pole
- 4** Double pole
- 5** Three pole
- 6** Four pole

| | |
|--------------|---|
| Blank | Solder lugs or straight PC depending on model |
| W | Right angle, horizontal mounting (5200 - 5400 switches) |
| WW | Right angle, vertical mounting (5200 - 5400 switches) |
| Y• | Bracket mounting (5200 switches) |
| Z | Quick-connect (5200 - 5900 switches) |

- 1R** ON ON MOM
- 2R** MOM ON MOM

TERMINALS AND BUSHINGS

ELECTRICAL FUNCTIONS

CONNECTIONS FOR FUNCTION 4

| | | | | |
|----------|---|--|--|--|
| 0 | Straight PC terminals, 5,08 (.200) terminal spacing | | | |
| 2 | Straight PC terminals, 4,70 (.185) terminal spacing, right angle or quick-connect | | | |
| 4 | Straight PC terminals, 4 (.157) terminal spacing or right angle terminals | | | |
| 6 | Solder lug terminals | | | |
| 7 | Solder lug terminals, with flatted bushing | | | |
| 9 | Straight PC or quick-connect terminals, with flatted bushing, 4,70 (.185) terminal spacing | | | |

| | | | | |
|----------|-----------------|----------------|------------------|---|
| 6 | ON | - | ON | |
| 9 | ON | OFF | ON | |
| 7 | MOM | OFF | MOM | |
| 8 | ON | OFF | MOM | |
| 2 | ON | - | MOM | |
| 4 | ON ON MOM | ON ON ON | ON MOM MOM | ▲ |

TH Standard**CT** Reversed

For functions 4, 4-1R, 4-2R (leave blank for all other functions).
Wiring diagrams, see Technical information, end of catalog.

Function 4
Must not have blank in «connections» box.
▲ Must not have blank in «momentary» box.

Bushing Ø 6 (.236) x 0,75 IS also available as standard.

5000 series

Miniature toggle switches • threaded bushing Ø 6,35 mm or plain bushing



ABOUT THIS SERIES

-  **Notice :** please note that not all combinations of above numbers are available.
Refer to www.apem.com for further information.
 -  **Sealing boots** are available. See Sealing Boot section.
 -  **Mounting accessories :** standard hardware supplied with all models with Ø 6,35 (1/4) or Ø 6 (.236) threaded bushing :
2 hex nuts 8 mm (.314) across flats, 1 locking ring and 1 lockwasher.

5000 series

Miniature toggle switches •
threaded bushing Ø 6,35 mm

SOLDER LUG TERMINALS SINGLE POLE



5636
5639
5637
5638
5632

| | | |
|-----|-----|-----|
| III | II | |
| 2-3 | - | 1-2 |
| ON | - | ON |
| ON | OFF | ON |
| MOM | OFF | MOM |
| ON | OFF | MOM |
| ON | - | MOM |

SOLDER LUG TERMINALS DOUBLE POLE



5646
5649
5647
5648
5642
5644*
5644 1R*
5644 2R*

| | | |
|-----|-----|-----|
| III | II | |
| 2-3 | | 1-2 |
| 5-6 | | 4-5 |
| ON | - | ON |
| ON | OFF | ON |
| MOM | OFF | MOM |
| ON | OFF | MOM |
| ON | - | MOM |
| ON | ON | ON |
| ON | ON | MOM |
| MOM | ON | MOM |

SOLDER LUG TERMINALS THREE POLE



5656
5659
5657
5658
5652

| | | | |
|-----|-----|----|-----|
| III | | II | |
| 2-3 | | | 1-2 |
| 5-6 | | | 4-5 |
| 8-9 | | | 7-8 |
| ON | - | | ON |
| ON | OFF | | ON |
| MOM | OFF | | MOM |
| ON | OFF | | MOM |
| ON | - | | MOM |

SOLDER LUG TERMINALS FOUR POLE



5666
5669
5667
5668
5662
5664*
5664 1R*
5664 2R*

| III | | II | |
|-------|-----|----|-------|
| 2-3 | | | 1-2 |
| 5-6 | | | 4-5 |
| 8-9 | | | 7-8 |
| 11-12 | | | 10-11 |
| ON | - | | ON |
| ON | OFF | | ON |
| MOM | OFF | | MOM |
| ON | OFF | | MOM |
| ON | - | | MOM |
| ON | ON | | ON |
| ON | ON | | MOM |
| MOM | ON | | MOM |

The drawing illustrates a standard lever assembly with the following dimensions:

- KEYWAY:** Located at the top left.
- Overall Length:** 13.20 (.519)
- Shaft Diameter:** Ø6.35-40UNS (1/4-40UNS)
- Shaft Length:** 1.80 (.070)
- Shaft Keyway Width:** 0.30 (.012)
- Shaft Keyway Depth:** 0.18 (.008)
- Shaft Keyway Center-to-Center:** 10.50 (.413)
- Shaft Keyway Width:** 8.00 (.314)
- Shaft Keyway Depth:** 0.80 (.031)
- Shaft Keyway Center-to-Center:** 12.00 (.472)
- Shaft Keyway Width:** 3.70 (.145)
- Shaft Keyway Depth:** 0.50 (.019)
- Shaft Keyway Center-to-Center:** 1.00 (.039)
- Shaft Keyway Width:** 7.00 (.275)
- Shaft Keyway Depth:** 13.20 (.519)

Annotations include:
 I: Top view of the lever assembly.
 II: Side view of the lever assembly.
 III: Cross-sectional view of the lever assembly showing internal dimensions and keyway details.

KEYWAY

Technical drawing of a mechanical part, likely a bearing housing or similar component. The drawing includes several views and dimensioning:

- Front View:** Shows a stepped bore with a shoulder height of 1.00 (.039) and a total width of 12.00 (.472). A keyway is located at the bottom of the bore.
- Side View:** Shows a shoulder height of 3.70 (.145) and a shoulder width of 0.50 (.019).
- Bottom View:** Shows a shoulder height of 13.20 (.519) and a shoulder width of 12.00 (.472).
- Keyway View:** Shows a shoulder height of 1.00 (.039) and a shoulder width of 10.50 (.413). The keyway width is 24, and the shoulder width is 8.00 (.314).
- Bottom Keyway View:** Shows a shoulder height of 1.80 (.070) and a shoulder width of 4.75 (.187). The keyway width is 1.18 DIA.
- Bottom Hole View:** Shows a hole diameter of Ø6.35-40UNS (1/4-40UNS).
- Left Side View:** Shows a shoulder height of 4.70 (.185) and a shoulder width of 1.00 (.039).

*Function 4 : SP in DP case - specify CT or TH connections.

The technical drawing illustrates a keyway assembly with the following dimensions:

- Overall width:** 16.50 (.649)
- Width from center to center of top holes:** 13.10 (.516)
- Width from center to center of bottom holes:** 3.70 (.145)
- Height of top surface:** 1.00 (.039)
- Height of bottom surface:** 0.50 (.019)
- Width of top slot:** 10.50 (.413)
- Width of bottom slot:** 8.00 (.314)
- Width of side slots:** 0.80 (.031)
- Width of side slots (inner dimension):** 2.41 (.094)
- Width of side slots (outer dimension):** 4.70 (.185)
- Width of side slots (inner dimension):** 3.00 (.118 DIA)
- Threaded hole size:** Ø6.35-40UNS (1/4-40UNS)
- Width of side slots (inner dimension):** 4.75 (.187)
- Width of side slots (inner dimension):** 1.80 (.070)
- Width of side slots (inner dimension):** 3.20 (.125)

*Function 4 : DP in 4P case - specify CT or TH connections.

5000 series

Miniature toggle switches •
threaded bushing Ø 6,35 mm or plain bushing

STRAIGHT PC TERMINALS - SPACING 4,7 (.185) DOUBLE POLE



| | III 2-3 5-6 | II | I 1-2 4-5 |
|------------|-------------------|-----|-----------------|
| 5246 B | ON | - | ON |
| 5249 B | ON | OFF | ON |
| 5247 B | MOM | OFF | MOM |
| 5248 B | ON | OFF | MOM |
| 5242 B | ON | - | MOM |
| 5244 B* | ON | ON | ON |
| 5244 1R B* | ON | ON | MOM |
| 5244 2R B* | MOM | ON | MOM |

Also available in single pole, three and four pole configurations.

STRAIGHT PC TERMINALS SPACING 5,08 (.200)



| | Single pole | Double pole | III 2-3 5-6 | II | I 1-2 4-5 |
|------|-------------|-------------|-------------------|-----|-----------------|
| 5036 | 5046 | ON | - | ON | |
| 5039 | 5049 | ON | OFF | ON | |
| 5037 | 5047 | MOM | OFF | MOM | |
| 5038 | 5048 | ON | OFF | MOM | |
| 5032 | 5042 | ON | - | MOM | |
| | 5044* | ON | ON | ON | |
| | 5044 1R* | ON | ON | MOM | |
| | 5044 2R* | MOM | ON | MOM | |

QUICK-CONNECT TERMINALS DOUBLE POLE



| | III 2-3 5-6 | II | I 1-2 4-5 |
|----------|-------------------|-----|-----------------|
| 5246Z | ON | - | ON |
| 5249Z | ON | OFF | ON |
| 5247Z | MOM | OFF | MOM |
| 5248Z | ON | OFF | MOM |
| 5242Z | ON | - | MOM |
| 5244Z* | ON | ON | ON |
| 5244 1R* | ON | ON | MOM |
| 5244 2R* | MOM | ON | MOM |

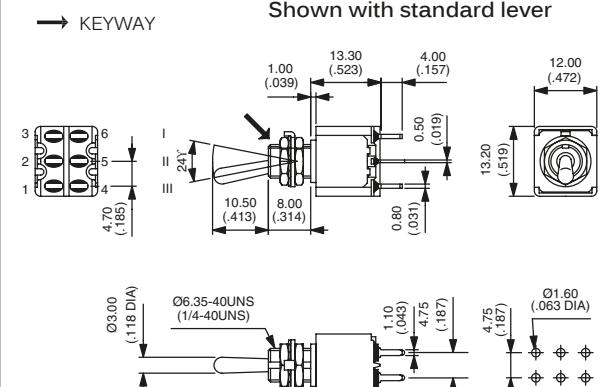
Also available in single pole configuration.

RIGHT ANGLE TERMINALS - HORIZONTAL SINGLE POLE



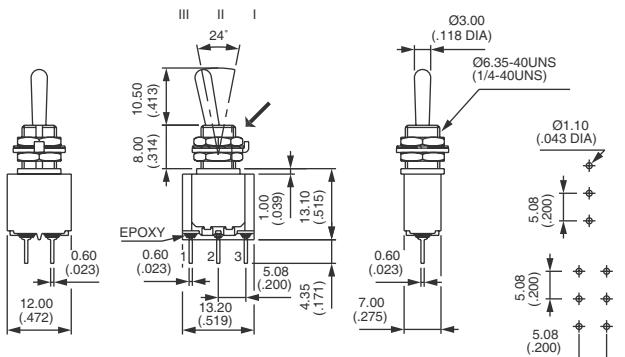
| | III 2-3 | II | I 1-2 |
|-------|------------|-----|----------|
| 5236W | ON | - | ON |
| 5239W | ON | OFF | ON |
| 5237W | MOM | OFF | MOM |
| 5238W | ON | OFF | MOM |
| 5232W | ON | - | MOM |

→ KEYWAY



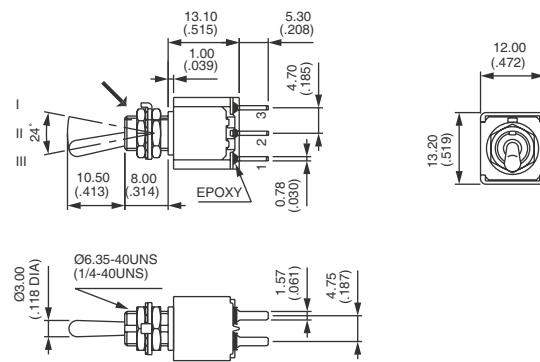
*Function 4 : SP in DP case - specify CT or TH connections.

→ KEYWAY



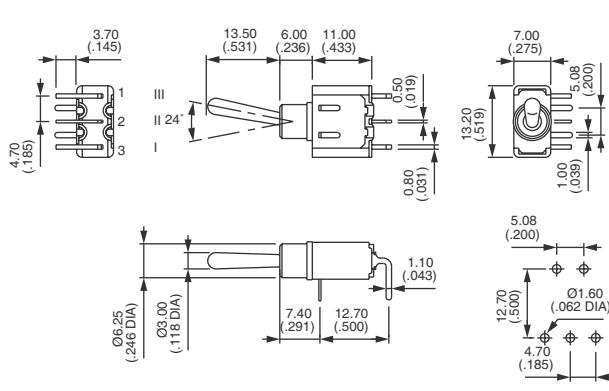
*Function 4 : SP in DP case - specify CT or TH connections.

→ KEYWAY



*Function 4 : SP in DP case - specify CT or TH connections.

→ KEYWAY



5000 series

Miniature toggle switches •
plain bushing

RIGHT ANGLE TERMINALS - HORIZONTAL DOUBLE POLE



| | III | II | I |
|-----------|-----|-----|-----|
| | 2-3 | 4-5 | 1-2 |
| 5246W | ON | - | ON |
| 5249W | ON | OFF | ON |
| 5247W | MOM | OFF | MOM |
| 5248W | ON | OFF | MOM |
| 5242W | ON | - | MOM |
| 5244W* | ON | ON | ON |
| 5244W 1R* | ON | ON | MOM |
| 5244W 2R* | MOM | ON | MOM |

Also available in three pole configuration.

RIGHT ANGLE TERMINALS - VERTICAL SINGLE POLE



| | III | II | I |
|----------|-----|-----|-----|
| | 2-3 | 4-5 | 1-2 |
| 5236WW | ON | - | ON |
| 5239WW | ON | OFF | ON |
| 5237WW | MOM | OFF | MOM |
| 5238WW** | ON | OFF | MOM |
| 5232WW** | ON | - | MOM |

**Reversed connection available. On request.

RIGHT ANGLE TERMINALS - VERTICAL DOUBLE POLE



| | III | II | I |
|------------|-----|-----|-----|
| | 2-3 | 4-5 | 1-2 |
| 5246WW | ON | - | ON |
| 5249WW | ON | OFF | ON |
| 5247WW | MOM | OFF | MOM |
| 5248WW** | ON | OFF | MOM |
| 5242WW** | ON | - | MOM |
| 5244WW** | ON | ON | ON |
| 5244WW 1R* | ON | ON | MOM |
| 5244WW 2R* | MOM | ON | MOM |

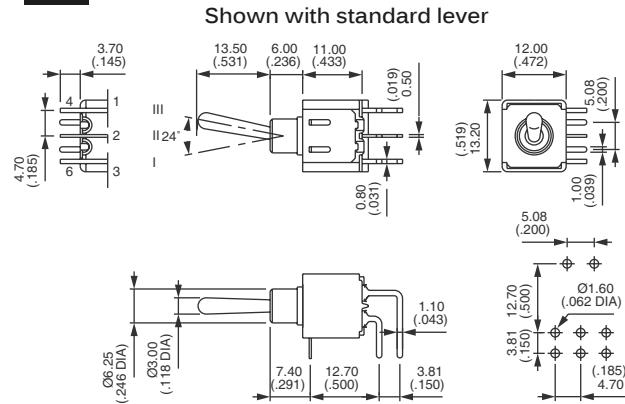
Also available in three pole configuration.

SHORT BRACKET - WIDTH 15,75 (.620) DOUBLE POLE



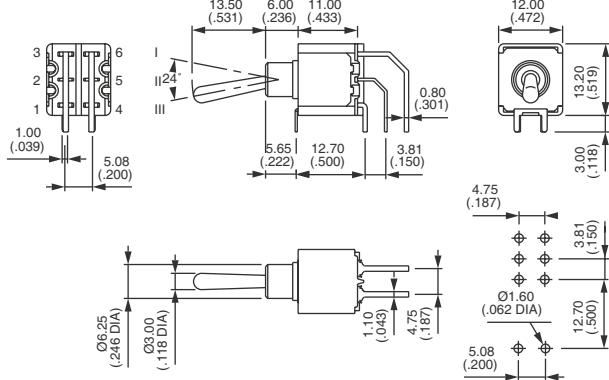
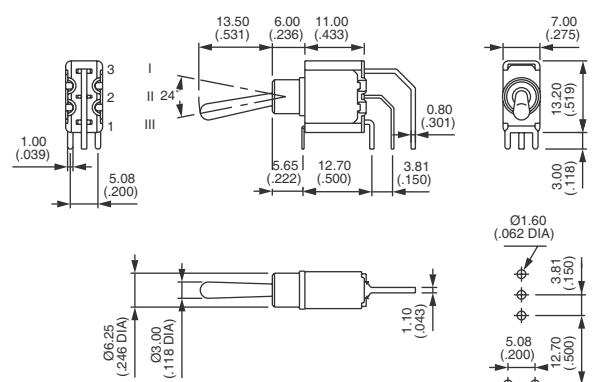
| | III | II | I |
|-------------|-----|-----|-----|
| | 2-3 | 4-5 | 1-2 |
| 5246Y B | ON | - | ON |
| 5249Y B | ON | OFF | ON |
| 5247Y B | MOM | OFF | MOM |
| 5248Y B | ON | OFF | MOM |
| 5242Y B | ON | - | MOM |
| 5244Y B* | ON | ON | ON |
| 5244Y 1R B* | ON | ON | MOM |
| 5244Y 2R B* | MOM | ON | MOM |

Also available with tall bracket and width 19,05 (.750).

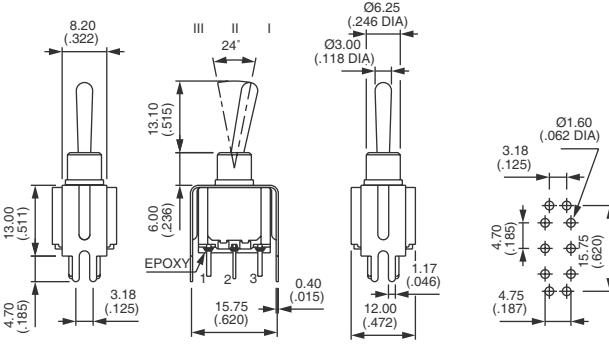


Shown with standard lever

*Function 4 : SP in DP case - specify CT or TH connections.



*Function 4 : SP in DP case - specify CT or TH connections.



*Function 4 : SP in DP case - specify CT or TH connections.

5000M series

Miniature toggle switches •
threaded bushing Ø 11,9 mm



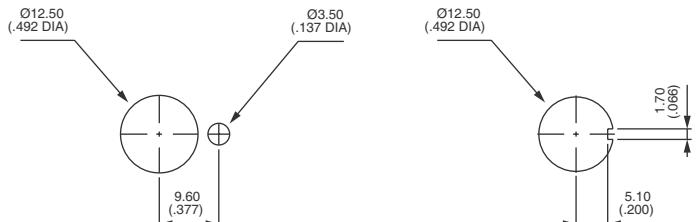
DISTINCTIVE FEATURES

- Bushing Ø 11,9 (15/32)
- Panel mounting and PCB terminal combination available
- 1 to 4 pole configurations
- UL and CSA approved

SPECIFICATIONS : see 5000 series.



PANEL CUT-OUT



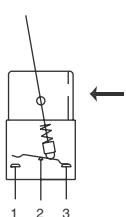
Standard

With K sealing option

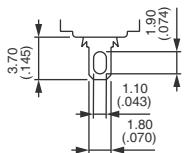


ELECTRICAL FUNCTION

→ KEYWAY



TERMINALS



The company reserves the right to change specifications without notice.

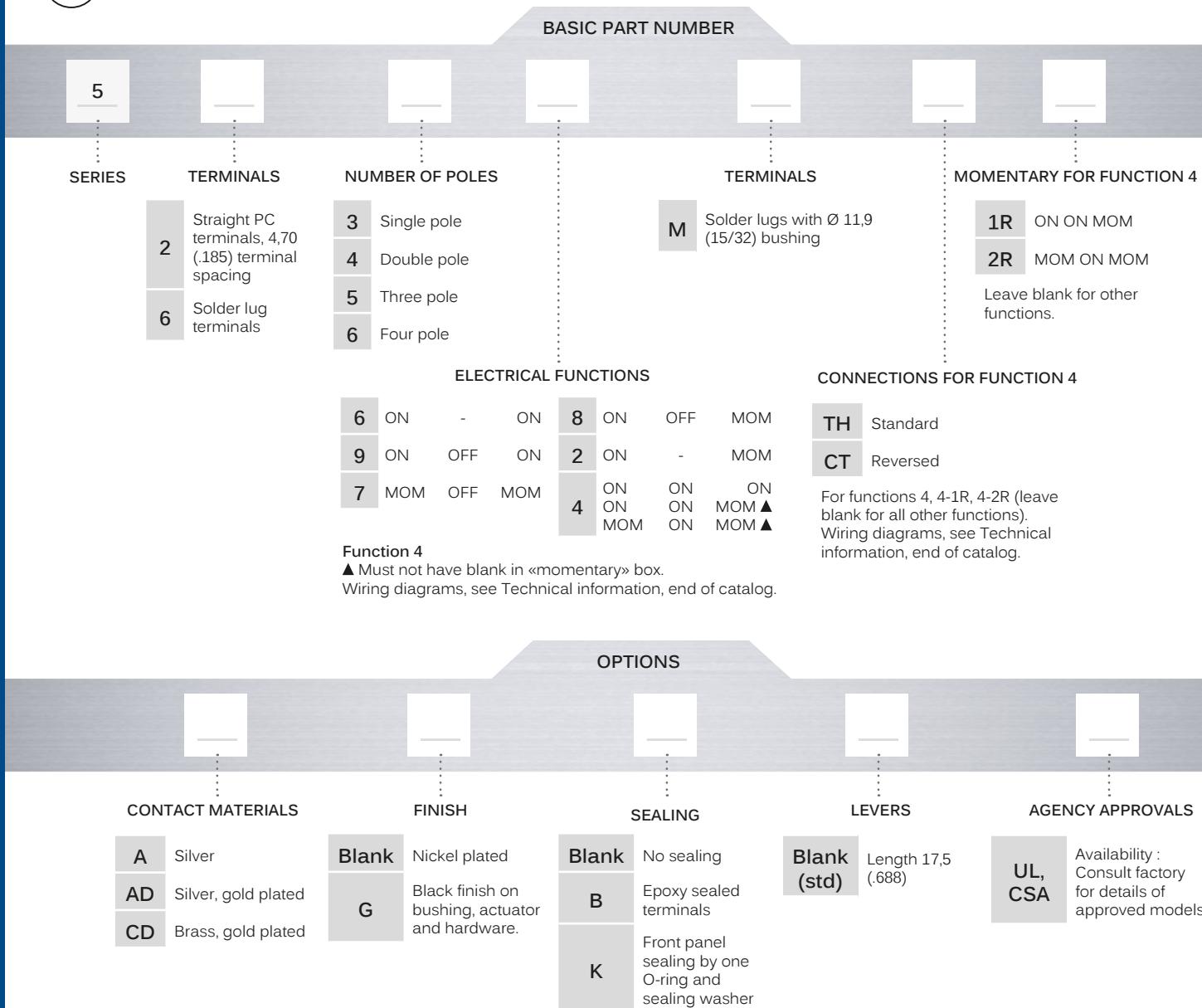


5000M series

Miniature toggle switches •
threaded bushing Ø 11,9 mm



BUILD YOUR PART NUMBER

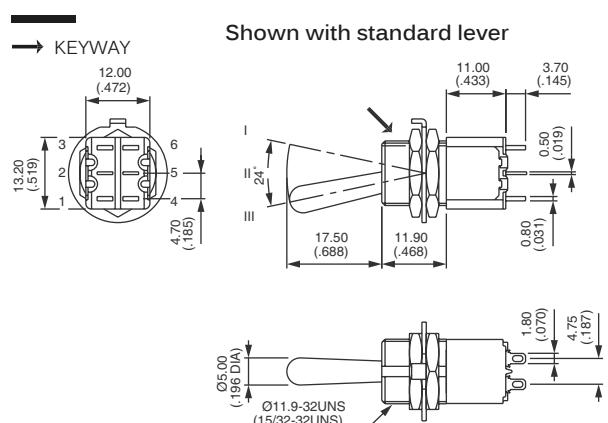


NOTICE : please note that not all combinations of above numbers are available.
Refer to www.apem.com for further information.

SOLDER LUG TERMINALS DOUBLE POLE



| | | | |
|------------------|-------------------|----------|-----------------|
| 5646M | III 2-3 5-6 | II ON | I 1-2 4-5 |
| 5649M | ON | OFF | ON |
| 5647M | MOM | OFF | MOM |
| 5648M | ON | OFF | MOM |
| 5642M | ON | - | MOM |
| 5644 M* | ON | ON | ON |
| 5644M 1R* | ON | ON | MOM |
| 5644M 2R* | MOM | ON | MOM |



*Function 4 : DP in 4P case - specify CT or TH connections.

11000 series

Professional toggle switches •
threaded bushing Ø 6,35 mm



DISTINCTIVE FEATURES

CECC approved

Robust switches for high specification environments

Toggle action on 2-position models for a smooth
mechanical operation

Several front panel sealing options



ELECTRICAL SPECIFICATIONS

- Max. current/voltage rating with resistive load :
 - silver contacts (A-AD2-X780) : 4A 30VDC
 - gold contacts (D) : 100mA 30VDC
- Minimum load : AD2-X780-D contacts : 10mA 50mV, 10µA 5V min.
- Peak currents, refer to "Special options".
- Initial contact resistance : 10 mΩ max.
- Insulation resistance : 1.000 MΩ min. at 500VDC
- Dielectric strength :
 - 1.000 Vrms 50 Hz min. between terminals
 - 2.000 Vrms 50 Hz min. between poles and between terminals and frame
- Contact bounce : 2 ms max.
- Electrical life at full load :

| Contacts | Max. current/voltage rating | Number of cycles | |
|----------|---|------------------|-------------|
| | | 2 positions | 3 positions |
| A | 4A 30VDC | 50.000 | 50.000 |
| AD2 X780 | 4A 30VDC (Gold plating : 100mA 30VDC max.) | 20.000 | 20.000 |
| D | 100mA 30VDC | 80.000 | 50.000 |
| | Low level or mechanical life | 150.000 | 100.000 |



GENERAL SPECIFICATIONS

- Torque : 1,25 Nm (.92 Ft.lb) max. applied between the 2 nuts
- Standard panel thickness : 2,5 mm (.098) max.
- Operating temperature : -40°C to +85°C

The company reserves the right to change specifications without notice.

11000 series

Professional toggle switches •
threaded bushing Ø 6,35 mm



MATERIALS

- Case : diallylphthalate (DAP)
- Actuator : brass, nickel plated
- Bushing : brass, nickel plated
- Housing : brass, nickel plated
- Contacts
 - A : silver
 - AD2 : gold plated silver (2 microns gold)
 - X780 : solid rivet - gold plated silver/nickel alloy
 - D : solid gold rivet
 - X910 : silver/nickel alloy (for peak currents, see "Special options")
- Terminal seal : epoxy

Note : AD2 and X780 contacts can be used for high level applications. In this case, the gold layer is considered only as a protection against oxidation during storage.

AGENCY APPROVALS

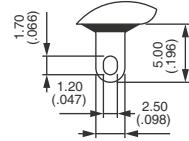


CECC 96201-005
CECC 96201-008

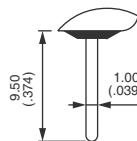
Availability : consult factory for details of approved models.
Marking : to order switches marked CECC, complete appropriate box of ordering format.



TERMINALS



Solder lugs



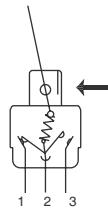
Straight PC



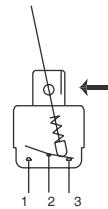
ELECTRICAL FUNCTIONS



KEYWAY



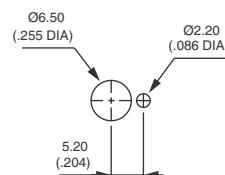
Function 6



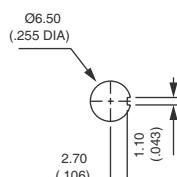
Other functions



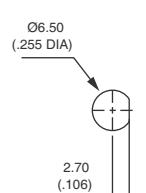
PANEL CUT-OUT



Standard



With K sealing option



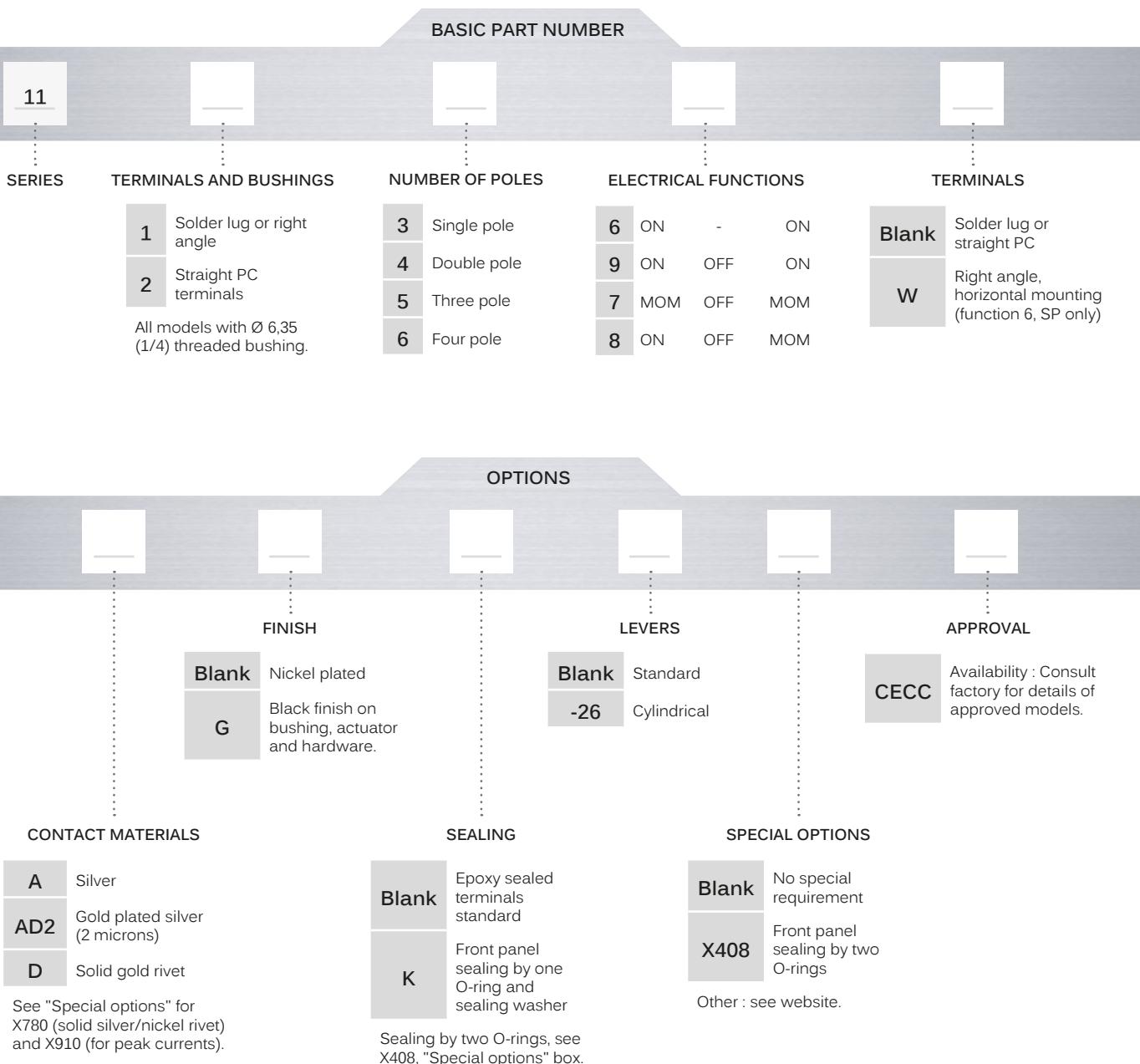
With X408 sealing option

11000 series

Professional toggle switches •
threaded bushing Ø 6,35 mm



BUILD YOUR PART NUMBER



ABOUT THIS SERIES

- (1) **Notice :** please note that not all combinations of above numbers are available.
Refer to www.apem.com for further information.
- (2) **Sealing boots** are available to protect the switches against dust and water. See Sealing Boots section.
- (3) **Mounting accessories** : standard hardware supplied with all models : 2 hex nuts 8 (.314) across flats, 1 locking ring and 1 lockwasher.

11000 series

Professional toggle switches •
threaded bushing Ø 6,35 mm

SOLDER LUG TERMINALS - SINGLE POLE



| | I | II | III |
|-------|-----|-----|-----|
| 11136 | ON | - | ON |
| 11139 | ON | OFF | ON |
| 11137 | MOM | OFF | MOM |
| 11138 | ON | OFF | MOM |

SOLDER LUG TERMINALS - DOUBLE POLE



| | I | II | III |
|-------|-----|-----|-----|
| 11146 | ON | - | ON |
| 11149 | ON | OFF | ON |
| 11147 | MOM | OFF | MOM |
| 11148 | ON | OFF | MOM |

SOLDER LUG TERMINALS - THREE POLE



| | I | II | III |
|-------|-----|-----|-----|
| 11156 | ON | - | ON |
| 11159 | ON | OFF | ON |
| 11157 | MOM | OFF | MOM |
| 11158 | ON | OFF | MOM |

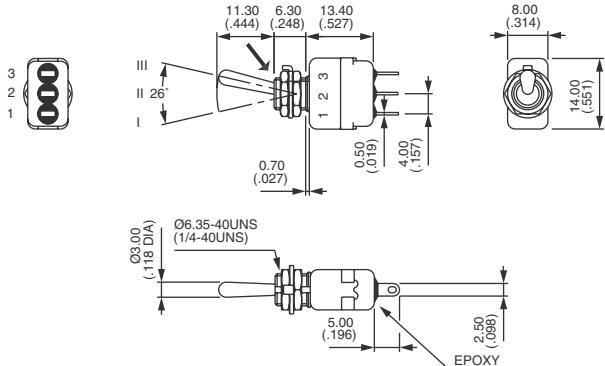
SOLDER LUG TERMINALS - FOUR POLE



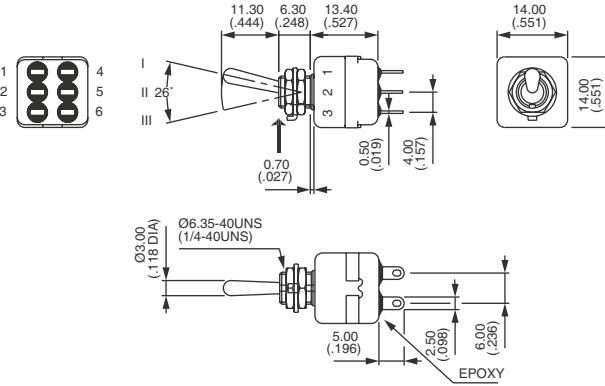
| | II | II | III |
|-------|-----|-----|-----|
| 11166 | ON | - | ON |
| 11169 | ON | OFF | ON |
| 11167 | MOM | OFF | MOM |
| 11168 | ON | OFF | MOM |

→ KEYWAY

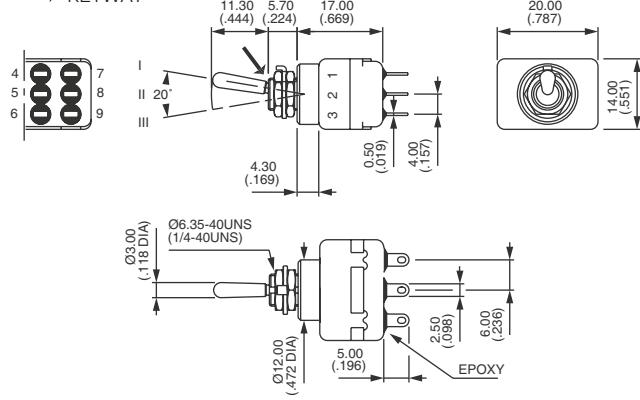
Shown with standard lever



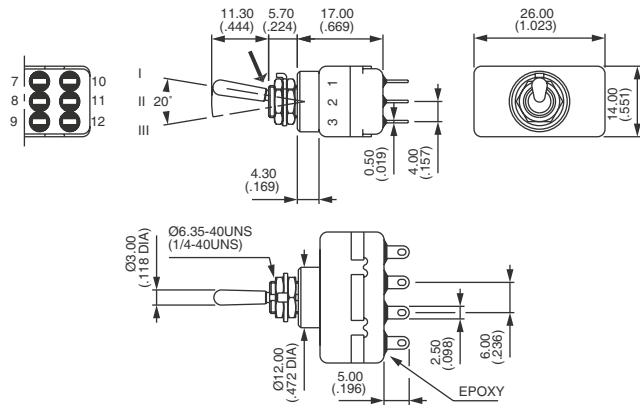
→ KEYWAY



→ KEYWAY



→ KEYWAY



12000 series

Professional toggle switches •
threaded bushing Ø 11,9 mm



DISTINCTIVE FEATURES

- CECC approved - conforms to MIL specifications
- Robust switches for high specification environments
- Toggle action on 2-position models for a smooth mechanical operation
- Several front panel sealing options
- Several locking lever options



ELECTRICAL SPECIFICATIONS

- Max. current/voltage rating with resistive load :
 - silver contacts (A-AD2-X780) : 4A 30VDC
 - gold contacts (D) : 100mA 30VDC
- Minimum load : AD2-X780-D contacts : 10mA 50mV, 10µA 5V min.
- Peak currents : refer to "Special options".
- Initial contact resistance : 10 mΩ max.
- Insulation resistance : 1.000 MΩ min. at 500VDC
- Dielectric strength :
 - 1.000 Vrms 50 Hz min. between terminals
 - 2.000 Vrms 50 Hz min. between poles and between terminals and frame
- Contact bounce : 2 ms max.
- Electrical life at full load :

| Contacts | Max. current/voltage rating | Number of cycles | |
|----------|---|------------------|-------------|
| | | 2 positions | 3 positions |
| A | 4A 30VDC | 50.000 | 50.000 |
| AD2 X780 | 4A 30VDC (Gold plating : 100mA 30VDC max.) | 20.000 | 20.000 |
| D | 100mA 30VDC | 80.000 | 50.000 |
| | Low level or mechanical life | 150.000 | 100.000 |



GENERAL SPECIFICATIONS

- Torque : 1,50 Nm (1.10 Ft.lb) max. applied between the 2 nuts
- Standard panel thickness : 4,5 mm (.177) max.
- Operating temperature : -40°C to +85°C

The company reserves the right to change specifications without notice.

12000 series

Professional toggle switches •
threaded bushing Ø 11,9 mm



MATERIALS

- Case : diallylphthalate (DAP)
- Actuator : brass, chrome plated
- Bushing : brass, nickel plated
- Housing : brass, nickel plated
- Contacts
 - A : silver
 - AD2 : gold plated silver (2 microns gold)
 - X780 : solid rivet - gold plated silver/nickel alloy
 - D : solid gold rivet
 - X910 : silver/nickel alloy (for peak currents, see "Special options")
- Terminal seal : epoxy

Note : AD2 and X780 contacts can be used for high level applications. In this case, the gold layer is considered only as a protection against oxidation during storage.

AGENCY APPROVALS



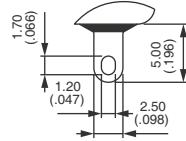
CECC 96201-005
CECC 96201-008

Designed to **MIL** specifications

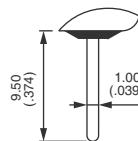
Availability : consult factory for details of approved models.
Marking : to order switches marked CECC, complete appropriate box of ordering format.



TERMINALS



Solder lugs



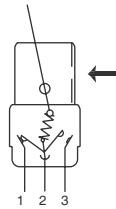
Straight PC



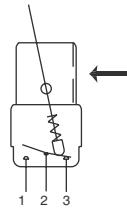
ELECTRICAL FUNCTIONS



KEYWAY



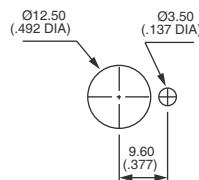
Function 6



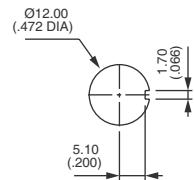
Other functions



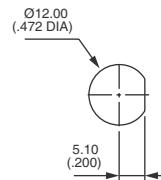
PANEL CUT-OUT



Standard



With K sealing option



With X408 sealing option

12000 series

Professional toggle switches •
threaded bushing Ø 11,9 mm



BUILD YOUR PART NUMBER

BASIC PART NUMBER

| 12 | | | | |
|--------|--|-----------------|--|----------------------------------|
| SERIES | TERMINALS AND BUSHINGS | NUMBER OF POLES | ELECTRICAL FUNCTIONS | MOMENTARY FOR FUNCTION 4 |
| 1 | Solder lug terminals | 4 Double pole | 6 ON - ON | 1R ON ON MOM |
| 2 | Straight PC terminals | 5 Three pole | 9 ON OFF ON | 2R MOM ON MOM |
| | All models with threaded bushing Ø 11,9 (15/32). Bushing Ø 15 (.590), see website. | 6 Four pole | 7 MOM OFF MOM 8 ON OFF MOM 5 - ON MOM 4 ON ON ON ON ON MOM▲ MOM ON MOM▲ | Leave blank for other functions. |

| CONTACT MATERIALS | | SEALING | LEVERS | APPROVALS |
|-----------------------|-------------------------------------|--|--|-----------------------------|
| A | Silver | Blank | Epoxy sealed terminals standard | Blank Standard lever |
| AD2 | Silver, gold plated (2 micron gold) | | | -12 Short lever |
| D | Solid gold rivet | K | Front panel sealing by one O-ring and sealing washer | ⋮ |
| Other : see website. | | Sealing by two O-rings, see X408, "Special options" box. | | |
| LOCKING LEVERS | | | | |
| | | -1V | 1 locked position | |
| | | -2V | 2 locked positions | |
| | | -3V | 3 locked positions | |
| Other : see website. | | | | |



ABOUT THIS SERIES

- Notice :** please note that not all combinations of above numbers are available.
Refer to www.apem.com for further information.
 - Sealing boots** are available to protect the switches against dust and water. See Sealing Boots section.
 - Mounting accessories** : standard hardware supplied with all models : 2 hex nuts 14 (.551) across flats and 1 locking ring.
 - Switch guards** are available to prevent inadvertent lever operation. See Switch Guard section.

12000 series

Professional toggle switches •
threaded bushing Ø 11,9 mm

SOLDER LUG TERMINALS - DOUBLE POLE



| | Angle of throw (A) | I | II | III |
|-----------|--------------------|-----|-----|-----|
| 12146 | 26° | ON | - | ON |
| 12149 | 20° | ON | OFF | ON |
| 12147 | 20° | MOM | OFF | MOM |
| 12148 | 20° | ON | OFF | MOM |
| 12144* | 20° | ON | ON | ON |
| 12144 1R* | 20° | ON | ON | MOM |
| 12144 2R* | 20° | MOM | ON | MOM |
| 12145 | 12° | - | ON | MOM |

*Function 4 : SP in DP case - connections, see end of catalog.

SOLDER LUG TERMINALS - FOUR POLE



| | Angle of throw (A) | I | II | III |
|-----------|--------------------|-----|-----|-----|
| 12166 | 26° | ON | - | ON |
| 12169 | 20° | ON | OFF | ON |
| 12167 | 20° | MOM | OFF | MOM |
| 12168 | 20° | ON | OFF | MOM |
| 12164* | 20° | ON | ON | ON |
| 12164 1R* | 20° | ON | ON | MOM |
| 12164 2R* | 20° | MOM | ON | MOM |

*Function 4 : DP in 4P case - connections, see end of catalog.

STRAIGHT PC TERMINALS - DOUBLE POLE ▲



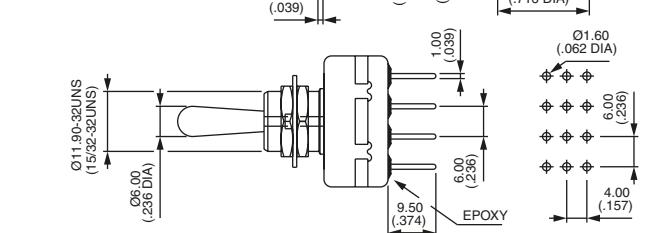
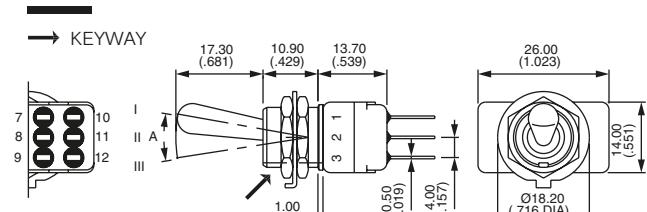
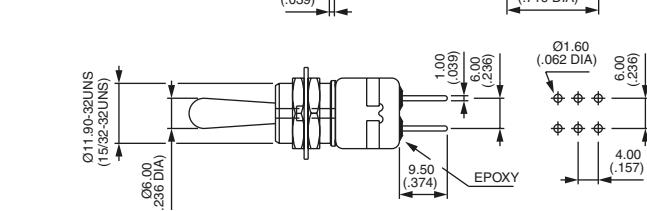
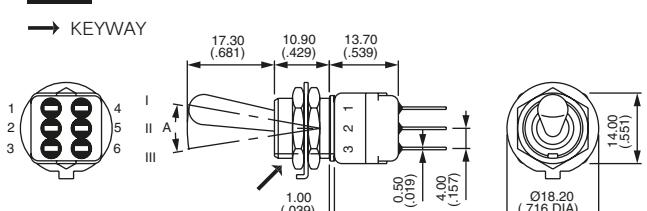
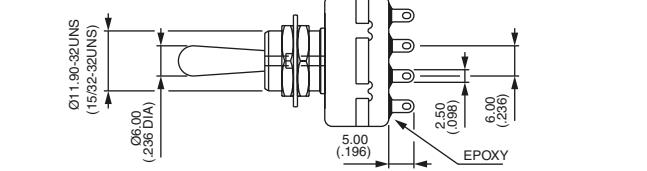
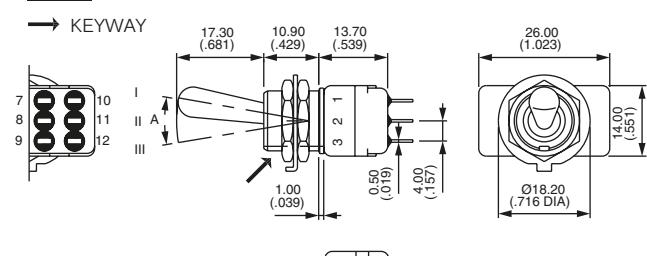
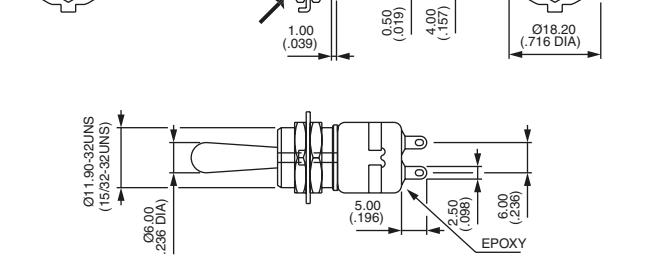
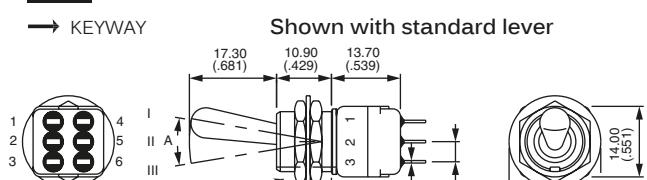
| | Angle of throw (A) | I | II | III |
|-------|--------------------|----|----|-----|
| 12246 | 26° | ON | - | ON |

STRAIGHT PC TERMINALS - FOUR POLE ▲



| | Angle of throw (A) | I | II | III |
|-------|--------------------|----|----|-----|
| 12266 | 26° | ON | - | ON |

▲ 3,5 mm (.138) short terminals available on request for function 6. Standard for functions 9, 7, 8, 4 and 5.



12000X778 series

High performance toggle switches •
threaded bushing Ø 11,9 mm



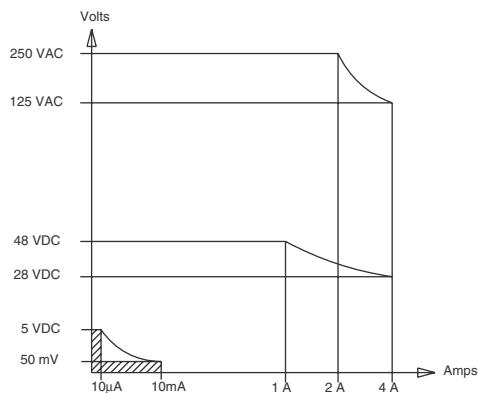
DISTINCTIVE FEATURES

- CECC approved - conforms to MIL specifications
- Highly reliable contacts
- Pinned lever
- Double shell case for high mechanical strength and high electrical insulation
- Compact size



ELECTRICAL SPECIFICATIONS

- Max. current/voltage rating with resistive load : 4A 28VDC
- Minimum load : 10mA 50mV, 10µA 5VDC
When used above 300mA 28VDC, the gold plating is removed on contact areas and is considered only as a protection against oxidation during storage.
- Initial contact resistance : 10 mΩ max.
- Insulation resistance : 1.000 MΩ min. at 500VDC
- Dielectric strength :
 - 1.000 Vrms 50 Hz min. between terminals
 - 2.000 Vrms 50 Hz min. between poles
 - 2.000 Vrms 50 Hz min. between terminals and frame
- Contact bounce : 2 ms max.
- Electrical life :
 - At 4A 28VDC : 20.000 cycles (10.000 for functions 5, 4-1R, 4-2R)
 - At low level (50mV 10mA) :
 - 150.000 cycles (switches with 2 maintained positions)
 - 100.000 cycles (switches with 3 maintained positions)
 - 50.000 cycles (momentary functions 7, 8, 4-1R, 4-2R, 5)



The company reserves the right to change specifications without notice.



12000X778 series

High performance toggle switches •
threaded bushing Ø 11,9 mm



ENVIRONMENTAL SPECIFICATIONS

- Shock test : 50g - 11ms (IEC 68-2-27)
- Vibrations : 10-500 Hz - 10g (IEC68-2-6)
- Humidity test : 56 days, 93 % R.H., 40°C (IEC 68-2-3)
- Salt spray test : 96 hours (IEC 68-2-11)
- Operating temperature : -40°C to +85°C



MATERIALS

- Case : diallylphthalate (DAP) with plastic external shell (epoxy sealed)
- Actuator : brass, black chrome plated
- Bushing : brass, black chrome plated
- Contacts : solid rivet - gold plated silver/nickel alloy

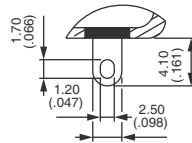


GENERAL SPECIFICATIONS

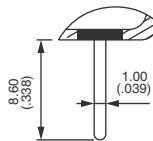
- Torque : 1,50 Nm (1.10 Ft.lb) max. applied to nut
- Panel thickness : 8 mm (.314) max. - 3 mm (.118) min.



TERMINALS



Solder lugs



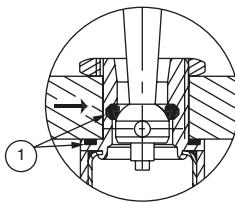
Straight PC



SEALING

- Front panel sealing by two O-rings
Flattened bush for precise orientation
- Panel seal withstands 1 bar pressure and remains sealed even when the switch is operated.
- Epoxy sealed terminals
- Splash-proof case

→ FLAT

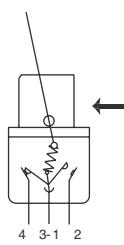


① - O-rings

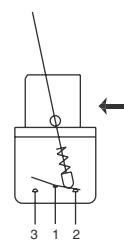


ELECTRICAL FUNCTIONS

→ FLAT



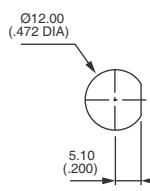
Function 6



Other functions



PANEL CUT-OUT



AGENCY APPROVALS



CECC 96201-005
CECC 96201-008

Designed to **MIL** specifications

Availability : consult factory for details of approved models.
Marking : to order switches marked CECC, complete appropriate box of ordering format.

12000X778 series

High performance toggle switches •
threaded bushing Ø 11,9 mm



BUILD YOUR PART NUMBER

| BASIC PART NUMBER | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|--|-----------------|----------------------|--|---|---|----------------|--|-------------|----------------|----------|------------|-------------------|------------|---|------------|--------------------|---|---|-------------|---|-----|----|----------|-----|-----|-----|----------|----|-----|-----|----------|-----------------|----------------|----------------------|----------|---|----|-----|--|-----------|----|----|-----|-----------|-----|----|-----|
| 12 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SERIES | TERMINALS AND BUSHINGS | NUMBER OF POLES | ELECTRICAL FUNCTIONS | MOMENTARY FOR FUNCTION 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | <table border="1"> <tr> <td>1</td> <td>Solder lug terminals</td> </tr> <tr> <td>2</td> <td>Straight PC terminals</td> </tr> <tr> <td colspan="2">All models with threaded bushing Ø 11,9 (15/32)</td> </tr> </table> | 1 | Solder lug terminals | 2 | Straight PC terminals | All models with threaded bushing Ø 11,9 (15/32) | | <table border="1"> <tr> <td>4</td> <td>Double pole</td> </tr> <tr> <td>5</td> <td>Three pole</td> </tr> <tr> <td>6</td> <td>Four pole</td> </tr> </table> | 4 | Double pole | 5 | Three pole | 6 | Four pole | <table border="1"> <tr> <td>6</td> <td>ON</td> <td>-</td> <td>ON</td> </tr> <tr> <td>9</td> <td>ON</td> <td>OFF</td> <td>ON</td> </tr> <tr> <td>7</td> <td>MOM</td> <td>OFF</td> <td>MOM</td> </tr> <tr> <td>8</td> <td>ON</td> <td>OFF</td> <td>MOM</td> </tr> <tr> <td>4</td> <td>ON ON MOM</td> <td>ON ON ON</td> <td>ON MOM Δ MOM Δ</td> </tr> <tr> <td>5</td> <td>-</td> <td>ON</td> <td>MOM</td> </tr> </table> | 6 | ON | - | ON | 9 | ON | OFF | ON | 7 | MOM | OFF | MOM | 8 | ON | OFF | MOM | 4 | ON ON MOM | ON ON ON | ON MOM Δ MOM Δ | 5 | - | ON | MOM | <table border="1"> <tr> <td>1R</td> <td>ON</td> <td>ON</td> <td>MOM</td> </tr> <tr> <td>2R</td> <td>MOM</td> <td>ON</td> <td>MOM</td> </tr> </table> | 1R | ON | ON | MOM | 2R | MOM | ON | MOM |
| 1 | Solder lug terminals | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | Straight PC terminals | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| All models with threaded bushing Ø 11,9 (15/32) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | Double pole | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | Three pole | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6 | Four pole | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6 | ON | - | ON | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 9 | ON | OFF | ON | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7 | MOM | OFF | MOM | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8 | ON | OFF | MOM | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | ON ON MOM | ON ON ON | ON MOM Δ MOM Δ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | - | ON | MOM | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1R | ON | ON | MOM | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2R | MOM | ON | MOM | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | For function 4 only. Leave blank for other functions. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | Function 4 For 2 and 4 poles only. Δ Must not have blank in «momentary» box. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| OPTIONS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | FLUORESCENT TIP | LEVERS | X778 | APPROVAL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <table border="1"> <tr> <td>Blank</td> <td>None</td> </tr> <tr> <td>-038</td> <td>White fluorescent tip to lever</td> </tr> </table> | Blank | None | -038 | White fluorescent tip to lever | <table border="1"> <tr> <td>Blank</td> <td>Standard lever</td> </tr> <tr> <td>-12</td> <td>Short lever</td> </tr> <tr> <td colspan="2">LOCKING LEVERS</td> </tr> <tr> <td>-1V</td> <td>1 locked position</td> </tr> <tr> <td>-2V</td> <td>2 locked positions</td> </tr> <tr> <td>-3V</td> <td>3 locked positions</td> </tr> </table> | Blank | Standard lever | -12 | Short lever | LOCKING LEVERS | | -1V | 1 locked position | -2V | 2 locked positions | -3V | 3 locked positions | High performance fully sealed black switches. | <table border="1"> <tr> <td>CECC</td> <td>Availability : Consult factory for details of approved models.</td> </tr> </table> | CECC | Availability : Consult factory for details of approved models. | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Blank | None | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| -038 | White fluorescent tip to lever | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Blank | Standard lever | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| -12 | Short lever | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| LOCKING LEVERS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| -1V | 1 locked position | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| -2V | 2 locked positions | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| -3V | 3 locked positions | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CECC | Availability : Consult factory for details of approved models. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Other : see website. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |



ABOUT THIS SERIES

- (**Notice :** please note that not all combinations of above numbers are available.
Refer to www.apem.com for further information.)
- (**Sealing boots** can be used to further protect the switches against dust and water. See Sealing Boot section.)
- (**Mounting accessories** : standard hardware supplied with all models : 1 hex nut 14 mm (.551) across flats, part number U41.)
- (**Switch guards** are available to prevent inadvertent lever operation. See Switch Guard section.)

12000X778 series

High performance toggle switches •
threaded bushing Ø 11,9 mm

SOLDER LUG TERMINALS - DOUBLE POLE



| | Angle of throw (A) | I | II | III |
|---------------|--------------------|-----|-----|-----|
| 12146 X778 | 26° | ON | - | ON |
| 12149 X778 | 20° | ON | OFF | ON |
| 12147 X778 | 20° | MOM | OFF | MOM |
| 12148 X778 | 20° | ON | OFF | MOM |
| 12144 X778 | 20° | ON | ON | ON |
| 12144-1R X778 | 20° | MOM | ON | ON |
| 12144-2R X778 | 20° | MOM | ON | MOM |
| 12145 X778 | 12° | ON | MOM | |

Positions and connections, see website.

SOLDER LUG TERMINALS - FOUR POLE

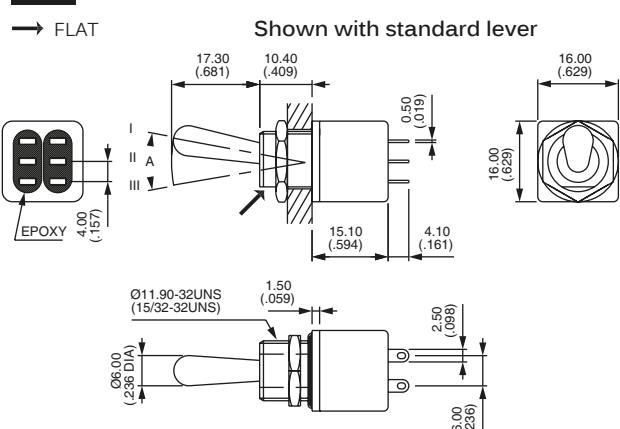


| | Angle of throw (A) | I | II | III |
|---------------|--------------------|-----|-----|-----|
| 12166 X778 | 26° | ON | - | ON |
| 12169 X778 | 20° | ON | OFF | ON |
| 12167 X778 | 20° | MOM | OFF | MOM |
| 12168 X778 | 20° | ON | OFF | MOM |
| 12164 X778 | 20° | ON | ON | ON |
| 12164-1R X778 | 20° | ON | ON | MOM |
| 12164-2R X778 | 20° | MOM | ON | MOM |

STRAIGHT PC TERMINALS - DOUBLE POLE ▲



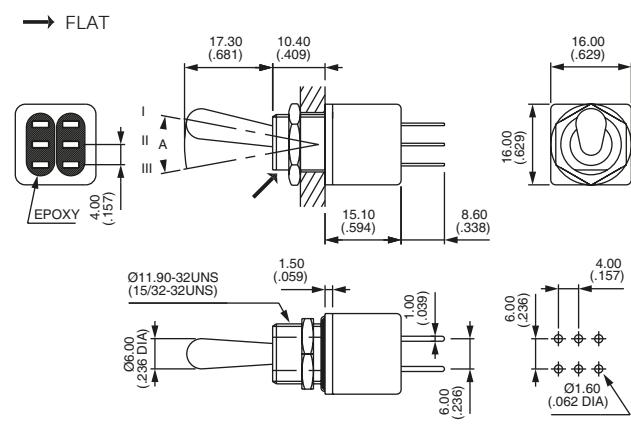
| | Angle of throw (A) | I | II | III |
|------------|--------------------|----|----|-----|
| 12246 X778 | 26° | ON | - | ON |



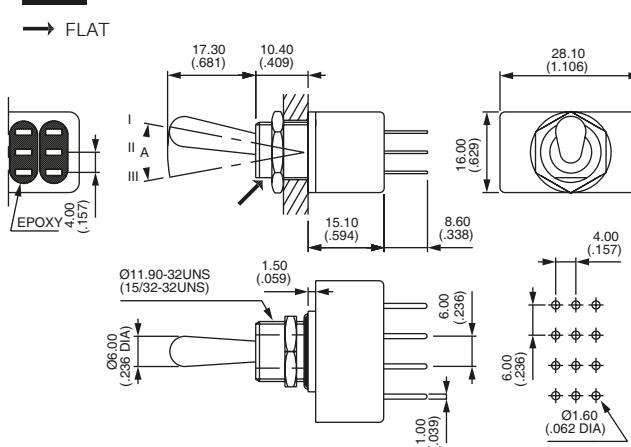
STRAIGHT PC TERMINALS - FOUR POLE ▲



| | Angle of throw (A) | I | II | III |
|------------|--------------------|----|----|-----|
| 12266 X778 | 26° | ON | - | ON |



▲ 3,5 mm (.138) short terminals available on request for function 6. Standard for functions 9, 7, 8, 4 and 5.



1000 series

Toggle switches • metal lever •
economy range



DISTINCTIVE FEATURES

Butt action contacts

Optional insulated levers (X213 and X490)



ELECTRICAL SPECIFICATIONS

- Max. current/voltage rating with resistive load :
 - silver contacts (A) : 6A 30VDC
 - silver plated copper contacts (C) : 1A 30VDC
- Initial contact resistance : 10 mΩ max.
- Insulation resistance : 1.000 MΩ min. at 500VDC
- Dielectric strength :
 - 2.000 Vrms 50 Hz min. between terminals
 - 2.500 Vrms 50 Hz min. between terminals and frame
- Electrical life : 10.000 cycles at full load



GENERAL SPECIFICATIONS

- Torque : 1,50 Nm (1.10 Ft.lb) max. applied to nut
- Panel thickness : 5 mm (.196) max.
- Operating temperature : -20°C to +55°C



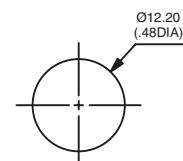
MATERIALS

- Case :
 - function 1 : phenolic resin
 - functions 6 & 9 : polyamide
- Actuator :
 - brass, nickel plated (1010 and 1020 models)
 - polyamide (1030 models)
- Bushing : brass, nickel plated
- Contacts :
 - A : silver
 - C : copper, silver plated

The company reserves the right to change specifications without notice.



PANEL CUT-OUT



1000 series

Toggle switches • metal lever • economy range



BUILD YOUR PART NUMBER

BASIC PART NUMBER

10

SERIES

TERMINALS

ELECTRICAL FUNCTIONS

- | | |
|---|---|
| 1 | Solder lug/quick-connect |
| 2 | Screw |
| 3 | Solder lug/quick-connect (models with insulated lever) |

- | | | | |
|---|----|-----|-----|
| 1 | ON | - | OFF |
| 6 | ON | - | ON |
| 9 | ON | OFF | ON |

OPTIONS

CONTACT MATERIALS

SPECIAL MODELS

- | | |
|---|-----------------------|
| A | Silver |
| C | Copper, silver plated |

- | | |
|------|---|
| X213 | Insulated lever |
| X490 | Insulated lever, case length 28 (1,102) |

Both models with solder lug/
quick connect terminals

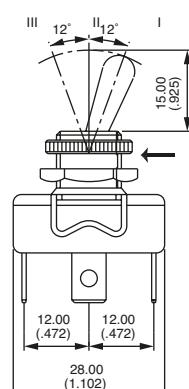
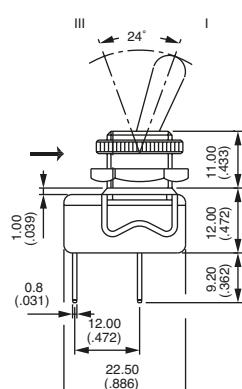
NOTICE : please note that not all combinations of above numbers are available.
Refer to www.apem.com for further information.

SOLDER LUG/QUICK-CONNECT TERMINALS



| | I | II | III |
|------|----|-----|-----|
| 1011 | ON | - | OFF |
| 1016 | ON | - | ON |
| 1019 | ON | OFF | ON |

KEYWAY



4600-4400 series

Toggle switches



DISTINCTIVE FEATURES

- High current/voltage rating in a small case
- Butt action contacts
- Insulated or metal lever
- UL, CSA and VDE (EN 61058-1) approved



ELECTRICAL SPECIFICATIONS

- Max. current/voltage rating with resistive load :
4A 250VAC - 6A 125VAC
- Approved electrical ratings : see table below
- Initial contact resistance : 10 mΩ max.
- Insulation resistance : 1.000 MΩ min. at 500VDC
- Dielectric strength :
 - 2.000 Vrms 50 Hz min. between terminals
 - 2.500 Vrms 50 Hz min. between poles and between terminals and frame
- Electrical life : 10.000 cycles at full load

| Approvals | Models | Poles | Functions | Approved Ratings |
|---------------------|--------|-------|-----------|-----------------------|
| UL/CSA | 4600A | 1-2 | 1-6-9 | 3A 250VAC - 6A 125VAC |
| VDE (EN 61058-1) | 4400A | 1-2 | 1-6 | 4(2)A 250VAC |
| | 4600A | 1-2-3 | 1-6 | 4(2)A 250VAC |



GENERAL SPECIFICATIONS

- Torque : 0,95 Nm (.70 Ft.lb) max. applied to nut
- Panel thickness : 5 mm (.196) between 2 nuts
- Operating temperature : -20°C to +55°C
- Hand soldering : 270°C max. for 10 seconds max. - iron Ø3 (.118)



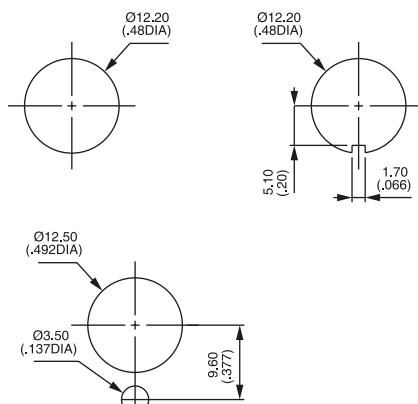
MATERIALS

- Case : melamine phenolic
- Actuator :
 - insulated : polyamide 6-6
 - non-insulated : brass, nickel plated
- Bushing :
 - insulated : polyamide 6-6
 - non-insulated : brass, nickel plated
- Contacts : silver

The company reserves the right to change specifications without notice.



PANEL CUT-OUT



AGENCY APPROVALS



EN 61058-1

Availability : see above chart.

Marking : VDE approved models are standard marked. To order switches marked UL-CSA, complete appropriate box of ordering format.

4600-4400 series

Toggle switches



BUILD YOUR PART NUMBER

BASIC PART NUMBER

4

SERIES

TERMINALS

NUMBER OF POLES

ELECTRICAL FUNCTIONS

4 Straight PC

3 Single pole

1 ON - OFF

6 Solder lug and quick-connect

4 Double pole

6 ON - ON

6./8 Quick-connect 4,7 x 0,8 mm

5 Three pole

9 ON OFF ON

OPTIONS

CONTACT MATERIALS

A Silver

ACTUATORS

1 and 2 pole models

-2 Insulated flat lever
Standard

ACTUATOR COLORS

UL
CSA
VDE
(EN 61058-1)

3 pole models

Blank Round metal lever

-32 Insulated round
lever, black

1 Blue

2 Black (std)

3 Green

4 Grey

5 Yellow

6 Red

7/1 White

9 Orange

For SP and DP models only.

NOTICE : please note that not all combinations of above numbers are available.
Refer to www.apem.com for further information.

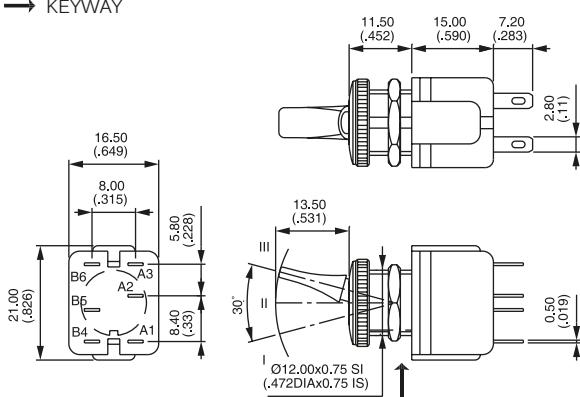
SOLDER LUG/QUICK-CONNECT TERMINALS INSULATED LEVER



Double pole

| | III | II | I |
|---------|-----|-----|-----|
| 4641 -2 | ON | - | OFF |
| 4646 -2 | ON | - | ON |
| 4649 -2 | ON | OFF | ON |

KEYWAY



600H-600NH series

Toggle switches • high amperage



DISTINCTIVE FEATURES

- Robust mechanism
- High current/voltage rating
- Insulated or metal lever
- UL, CSA and NF-VDE (EN 61058-1) approved



ELECTRICAL SPECIFICATIONS

- Max. current/voltage ratings : see tables below
- Peak current : 30A max. during 1/2 sine, 250VAC
- Initial contact resistance : 10 mΩ max.
- Insulation resistance : 1.000 MΩ min. at 500VDC
- Dielectric strength :
 - 2.000 Vrms 50 Hz min. between terminals
 - 2.500 Vrms 50 Hz min. between terminals and frame
- Electrical life : 10.000 cycles at full load

| APPROVED RATINGS | | | | | | |
|---|----------------------------|--------------------------------------|-----|-------------------------------|------------------|--|
| Models | Functions | 600H - 600NH | | | | |
| | | UL | CSA | NF-VDE | | |
| Single and double pole | ON - OFF (1) | 15A 1/2 HP 125-250VAC | | | 10(4)A 400VAC | |
| | ON - ON (6) | | | | | |
| | Other (4-5-7-8-9) | 10A 1/2 HP 125-250VAC | | | T 85/55 (600H) | |
| Three pole | ON - OFF (1) & ON - ON (6) | 15A 1/2 HP 125-250VAC | | | T 125/55 (600H) | |
| | Other (4-5-7-8-9) | 10A 1/2 HP 125-250VAC | | | | |
| FOR INFORMATION | | | | | | |
| Max. current/voltage rating w. resistive load | | | | | | |
| Functions | | Ratings | | Electrical life | | |
| ON - OFF ON - ON | | 15A 250VAC 10A 24VDC 15A 12VDC | | 10.000 cycles | | |
| ON OFF ON | | 15A 250VAC 5A 24VDC | | 6.000 cycles 10.000 cycles | | |
| Other | | 15A 125VAC 12A 250VAC 5A 24VDC | | 10.000 cycles | | |

The company reserves the right to change specifications without notice.



MATERIALS

- Case : polyester UL94-V0
- Actuator :
 - 600H : brass, nickel plated
 - 600NH : black polyamide
- Bushing : brass, nickel plated
- Contacts : silver/nickel alloy

600H-600NH series

Toggle switches • high amperage

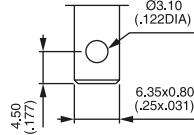


GENERAL SPECIFICATIONS

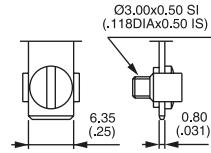
- Torque : 1,50 Nm (1.10 Ft.lb) max. applied to nut
- Panel thickness : 4,5 mm (.177) max. between 2 nuts
- Operating temperature : -20°C to +55°C



TERMINALS



600H/2

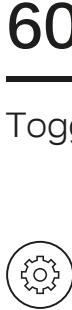
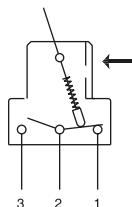


600H

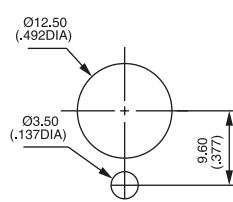
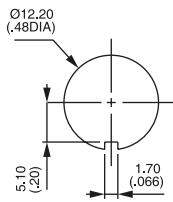
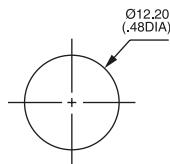


ELECTRICAL FUNCTIONS

→ KEYWAY



PANEL CUT-OUT



600H-600NH series

Toggle switches • high amperage



BUILD YOUR PART NUMBER

| BASIC PART NUMBER | | | | | | | | | |
|--|------------------------------------|----------------------|---|----------------|----------------------|------------------------|---|-----------|------------|
| SERIES | NUMBER OF POLES | ELECTRICAL FUNCTIONS | | | | ACTUATOR AND TERMINALS | | MOMENTARY | |
| 6 | | 1 | ON | - | OFF | H | Metal lever, screw terminals | -1R | ON ON MOM |
| 3 | Single pole | 5 | MOM | - | ON | H/2 | Metal lever, solder lug/quick-connect terminals | -2R | MOM ON MOM |
| 4 | Double pole | 6 | ON | - | ON | NH | Insulated lever, screw terminals | | |
| 5 | Three pole | 7 | MOM | OFF | MOM | NH/2 | Insulated lever, solder lug/quick-connect terminals | | |
| For 4 pole, see 660 series on website. | | 8 | ON | OFF | MOM | NH/3 | Insulated lever, normalized quick-connect terminals | | |
| | | 9 | ON | OFF | ON | | | | |
| | | 4 | ON ON MOM | ON ON ON | ON MOM △ MOM △ | | | | |
| | | | | | | | | | |
| | | | △ Must not have blank in "momentary" box. | | | | | | |
| OPTIONS | | | | | | | | | |
| OPTIONS | | | | | LOCKING LEVERS | | | | |
| For models with metal lever only | | | | | -1V | 1 locked position | | | |
| T | Tropicalized case | | | | -2V | 2 locked positions | | | |
| K | Front panel sealing | | | | -3V | 3 locked positions | | | |
| L | Bushing 16 mm (.629) | | | | | | | | |
| LUXE | Chrome finish | | | | | | | | |
| TKLUXE | Front panel sealing + T and LUXE | | | | | | | | |
| G | Black finish | | | | | | | | |
| GK | Black finish + front panel sealing | | | | | | | | |
| G-038 | Luminous tip on lever | | | | | | | | |

NOTICE : please note that not all combinations of above numbers are available.
Refer to www.apem.com for further information.



ABOUT THIS SERIES

Notice : please note that not all combinations of above numbers are available.
Refer to www.apem.com for further information.

Switch guards are available to prevent inadvertent lever operation. See Switch Guards section.

Sealing boots are available on 600H series to protect the switches against dust and water. See Sealing Boots section.

Mounting accessories : standard hardware supplied with all models :

- 600H and series : 1 hex nut U166 and 1 knurled nut U411
- 600NH series : 1 hex nut U166 and 1 knurled nut U522

600H-600NH series

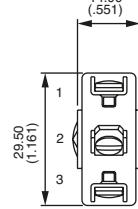
Toggle switches • high amperage

SINGLE POLE METAL LEVER

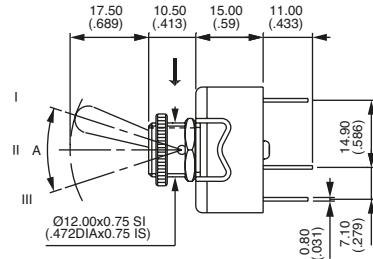


| Solder lug | Screw | A | III 2-1 | II | I 2-3 |
|------------|-------|---------|------------|-----|----------|
| 631H/2 | 631H | 30° ON | - | OFF | |
| 635H/2 | 635H | 26° MOM | - | ON | |
| 636H/2 | 636H | 30° ON | - | ON | |
| 637H/2 | 637H | 30° MOM | OFF | MOM | |
| 638H/2 | 638H | 36° ON | OFF | MOM | |
| 639H/2 | 639H | 36° ON | OFF | ON | |

→ KEYWAY



A = Angle of throw



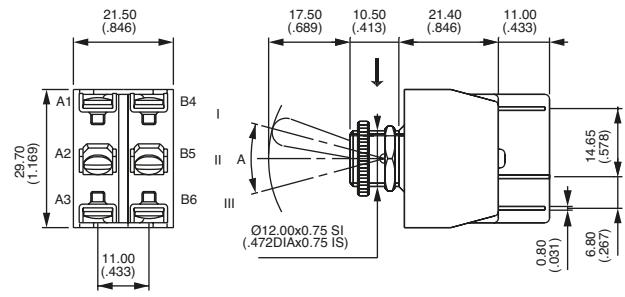
DOUBLE POLE METAL LEVER



| Solder lug | Screw | A | III 2-1 5-4 | II | I 2-3 5-6 |
|------------|----------|---------|-------------------|-----|-----------------|
| 641H/2 | 641H | 26° ON | - | OFF | |
| 644H/2 | 644H* | 33° ON | ON | ON | |
| 644H/2-1R | 644H-1R* | 33° ON | ON | MOM | |
| 644H/2-2R | 644H-2R* | 33° MOM | ON | MOM | |
| 645H/2 | 645H | 26° MOM | - | ON | |
| 646H/2 | 646H | 26° ON | - | ON | |
| 647H/2 | 647H | 26° MOM | OFF | MOM | |
| 648H/2 | 648H | 26° ON | OFF | MOM | |
| 649H/2 | 649H | 32° ON | OFF | ON | |

Angle of throw with K sealing option :
functions 1, 5, 6, 7 : 26° - functions 8, 9 : 32°

→ KEYWAY



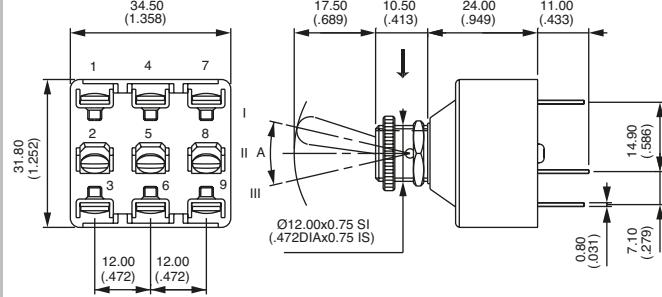
THREE POLE METAL LEVER



| Solder lug | Screw | A | III 2-1 5-4 8-7 | II | I 2-3 5-6 8-9 |
|------------|-------|---------|--------------------------|-----|------------------------|
| 651H/2 | 651H | 24° ON | - | OFF | |
| 655H/2 | 655H | 15° MOM | - | ON | |
| 656H/2 | 656H | 24° ON | - | ON | |
| 657H/2 | 657H | 24° MOM | OFF | MOM | |
| 658H/2 | 658H | 24° ON | OFF | MOM | |
| 659H/2 | 659H | 28° ON | OFF | ON | |

*Function 4 : SP in DP case - see end of catalog.

→ KEYWAY

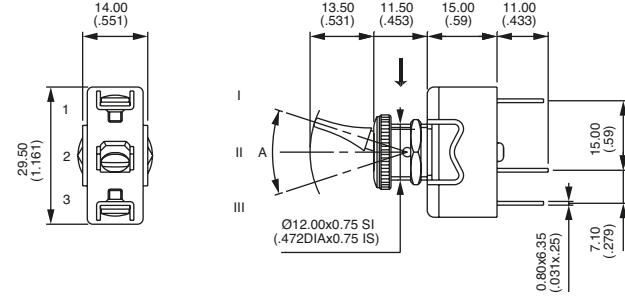


SINGLE POLE INSULATED LEVER



| Solder lug | Screw | A | III 2-1 | II | I 2-3 |
|------------|-------|---------|------------|-----|----------|
| 631NH/2 | 631NH | 28° ON | - | OFF | |
| 635NH/2 | 635NH | 24° MOM | - | ON | |
| 636NH/2 | 636NH | 28° ON | - | ON | |
| 637NH/2 | 637NH | 33° MOM | OFF | MOM | |
| 638NH/2 | 638NH | 33° ON | OFF | MOM | |
| 639NH/2 | 639NH | 33° ON | OFF | ON | |

→ KEYWAY



3500 series

High performance toggle switches •
environmentally sealed



DISTINCTIVE FEATURES

Completely sealed switches withstanding 0,1 bar pressure

Approved to European standards CECC 96000

Three types of terminals

Many lever styles available



ENVIRONMENTAL SPECIFICATIONS

- Front sealing to IP67 or IP69K by a silicone membrane
(for sealed panel mounting, add washer U60).
- Rear sealing to IP64 provided by moulded-in terminal inserts
- Operating temperature : -40°C to +85°C
- Moisture resistance : 56 days



ELECTRICAL SPECIFICATIONS

- Max. current/voltage rating with resistive load and electrical life at full load: see table below
- Initial contact resistance : 10 mΩ max. at 1A 2VDC
- Insulation resistance : 1.000 MΩ
- Dielectric strength : 2.500 Vrms 50 Hz min. between terminals 3.000 Vrms 50 Hz min. between terminals and frame

| FUNCTIONS | GENERAL PERFORMANCES |
|------------------------|---|
| ON-OFF and ON-ON | 10.000 cycles, T20°C 15A 28VDC resistive 15A 28VDC inductive 5A 28VDC lamp |
| ON OFF ON | 10.000 cycles, T20°C 15A 28VDC resistive 15A 28VDC inductive 5A 28VDC lamp |
| OTHER FUNCTIONS | 10.000 cycles, T20°C 15A 28VDC resistive 10A 28VDC inductive 3A 28VDC lamp |

The company reserves the right to change specifications without notice.

3500 series

High performance toggle switches •
environmentally sealed

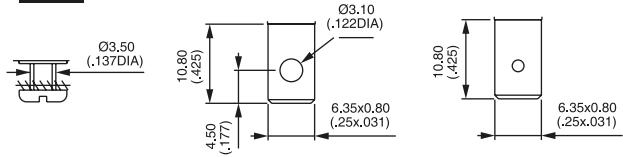


GENERAL SPECIFICATIONS

- Mechanical life : 40.000 cycles
- Torque : 2 Nm (1.47 Ft.lb) max. applied to nut
- Panel thickness :
 - For NON-SEALED mounting (panel cut-out fig. 1, 2 or 3) : 5 mm (.196) max.
 - For SEALED mounting (panel cut-out fig. 2) : 4 mm (.157) max.



TERMINALS



MATERIALS

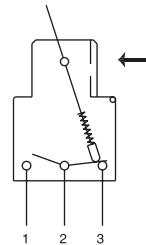
- Case : mineral filled polyester UL94-V0
- Bushing and cover : zamac
- Actuator : brass, nickel or chrome plated, or anodized aluminum
- Contacts : silver alloy



ELECTRICAL FUNCTIONS



KEYWAY



PANEL CUT-OUT

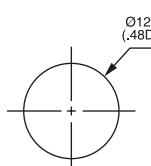


Figure 1

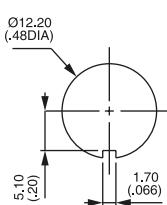


Figure 2

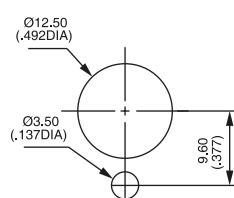


Figure 3

AGENCY APPROVAL



CECC 96201-004

Availability : consult factory for details of approved models.

Marking : to order switches marked CECC, complete appropriate box of ordering format.

3500 series

High performance toggle switches •
environmentally sealed



BUILD YOUR PART NUMBER

| BASIC PART NUMBER | | | | | | | | | | | |
|--|------------------------|-----------------------------------|--------------------------|------------------------------|---|---------------------------------|---|---|-------|--|--|
| SERIES | NUMBER OF POLES | ELECTRICAL FUNCTIONS | | | | | | TERMINALS | | | |
| 35 | | 1-0 | ON | - | OFF | 4-6 | MOM | ¹ ON ⁶ | MOM ▲ | | |
| | 3 Single pole | 2-0 | ON | - | m.OFF | 5-0 | ON | - | MOM | | |
| | 4 Double pole | 3-0 | OFF | - | MOM | 6-0 | ON | - | ON | | |
| | | 4-1 | ON | ³ ON ⁴ | ON ▲ | 7-0 | MOM | OFF | MOM | | |
| | | 4-2 | ON | ³ ON ⁴ | MOM ▲ | 8-0 | ON | OFF | MOM | | |
| | | 4-3 | MOM | ³ ON ⁴ | MOM ▲ | 9-0 | ON | OFF | ON | | |
| | | 4-4 | ON | ¹ ON ⁶ | ON ▲ | ▲ Function 4 : double pole only | | | | | |
| | | 4-5 | ON | ¹ ON ⁶ | MOM ▲ | | | | | | |
| OPTIONS | | | | | | | | | | | |
| LEVER FINISH | | | AGENCY APPROVAL | | | LOCKING LEVER SPECIAL FINISH | | | | | |
| N Bright nickel | B Satin chrome | G* Black | 0 None | 1 CECC | (blank) None | P5 Painted yellow | A6 Anodized red | | | | |
| F* Black with fluorescent tip (lever type 1 only) | C Painted or anodized | | | | Order with lever finish type C. Other colors : on request. | | | | | | |
| *Black finish on bushing too. | | | | | | | | | | | |
| LEVER STYLES | | | LEVER LOCKING STYLES | | | ACCESSORIES | | | | | |
| 1 Standard, length 17,5 mm (.688) or locking, length 20 mm (.787) | 2 Length 30 mm (1.181) | 3 Flatted, length 24 mm (.944) | 0 No locking | A Locked in 3 positions | D Locked out of center position | G Locked in keyway side | 0 2 hex nuts, 1 locking ring and 1 lockwasher (non-sealed mounting) | 2 2 hex nuts and 1 sealing washer (sealed mounting) | | | |
| 4 Length 40 mm (1.574) | 5 Length 50 mm (1.968) | 6 Locking, length 25,4 mm (1.000) | See drawings on website. | | | | | | | | |



ABOUT THIS SERIES

Notice : please note that not all combinations of above numbers are available.

Refer to www.apem.com for further information.

Switch guards are available to prevent inadvertent lever operation. See Switch Guards section.

Mounting accessories : see above.

3500 series

High performance toggle switches •
environmentally sealed

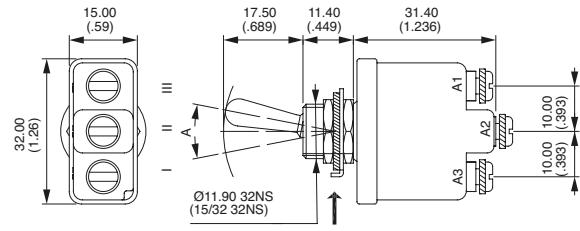
SCREW TERMINALS SINGLE POLE



| | Angle of throw (A) | III A2-A3 | II | A1-A2 |
|---------|--------------------|--------------|-----|-------|
| 3531-00 | 22° | ON | - | OFF |
| 3532-00 | 22° | ON | - | m.OFF |
| 3533-00 | 22° | OFF | - | MOM |
| 3535-00 | 22° | ON | - | MOM |
| 3536-00 | 22° | ON | - | ON |
| 3537-00 | 22° | MOM | OFF | MOM |
| 3538-00 | 30° | ON | OFF | MOM |
| 3539-00 | 30° | ON | OFF | ON |



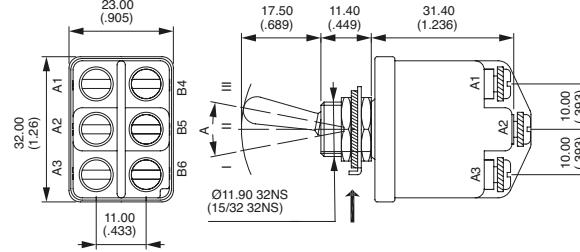
Shown with standard lever



SCREW TERMINALS DOUBLE POLE



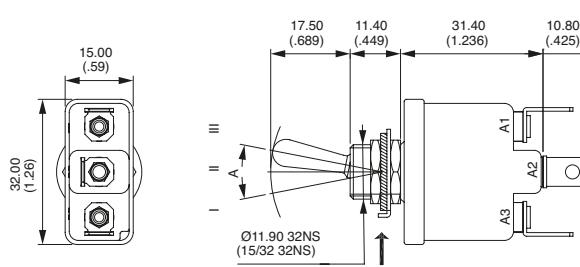
| - | Angle of throw (A) | III | | II | | A1-A2 B5-B4 |
|---------|--------------------|-------|-------|--------|--------|----------------|
| | | A2-A3 | B5-B6 | *A3-B5 | *A1-B5 | |
| 3541-00 | 22° | ON | | - | | OFF |
| 3544-10 | 22° | ON | | ON* | | ON |
| 3544-20 | 22° | ON | | ON* | | MOM |
| 3544-30 | 22° | MOM | | ON* | | MOM |
| 3545-00 | 22° | ON | | - | | MOM |
| 3546-00 | 22° | ON | | - | | ON |
| 3547-00 | 22° | MOM | | OFF | | MOM |
| 3548-00 | 30° | ON | | OFF | | MOM |
| 3549-00 | 30° | ON | | OFF | | ON |



SOLDER LUG/QUICK-CONNECT TERMINALS SINGLE POLE



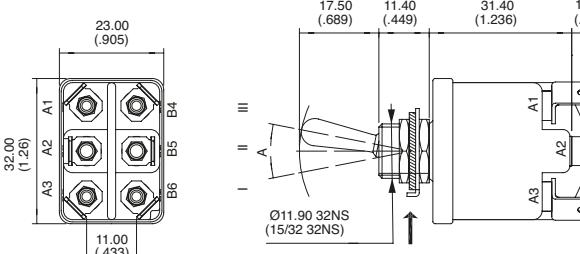
| | Angle of throw (A) | III A2-A3 | II | A1-A2 |
|---------|--------------------|--------------|-----|-------|
| 3531-02 | 22° | ON | - | OFF |
| 3532-02 | 22° | ON | - | m.OFF |
| 3533-02 | 22° | OFF | - | MOM |
| 3535-02 | 22° | ON | - | MOM |
| 3536-02 | 22° | ON | - | ON |
| 3537-02 | 22° | MOM | OFF | MOM |
| 3538-02 | 30° | ON | OFF | MOM |
| 3539-02 | 30° | ON | OFF | ON |



NORMALIZED QUICK-CONNECT DOUBLE POLE



| | Angle of throw (A) | III A2-A3 B5-B6 | II *A3-B5 **A1-B5 | A1-A2 B5-B4 |
|---------|--------------------|-----------------------|-------------------------|----------------|
| 3541-03 | 22° | ON | - | OFF |
| 3544-13 | 22° | ON | ON* | ON |
| 3544-23 | 22° | ON | ON* | MOM |
| 3544-33 | 22° | MOM | ON* | MOM |
| 3545-03 | 22° | ON | - | MOM |
| 3546-03 | 22° | ON | - | ON |
| 3547-03 | 22° | MOM | OFF | MOM |
| 3548-03 | 30° | ON | OFF | MOM |
| 3549-03 | 30° | ON | OFF | ON |



*and** : A2-B4 and A2-B6 = jumper to be wired by the user.

3600NF series

Sealed toggle switches
for outdoor applications



DISTINCTIVE FEATURES

- Sealed to IP67
- Solid silver contacts
- UL approved



ENVIRONMENTAL SPECIFICATIONS

- Sealing to IP67 according to IEC 60529 obtained by
 - O-ring between lever and bushing
 - half-length boot and nylon washer (supplied mounted)
 - elastomer gasket between cover and case
 - molded-in terminal inserts
 - sealing washer U60
- Operating temperature : -40°C to +85°C



ELECTRICAL SPECIFICATIONS

- Max. current/voltage rating with resistive load : 12A 28VDC
- Initial contact resistance : 10 mΩ max.
- Insulation resistance : 1.000 MΩ min. at 500VDC
- Dielectric strength :
 - 2.500 Vrms 50 Hz min. between terminals
 - 3.000 Vrms 50 Hz min. between terminals and frame
- Electrical life : 10.000 cycles at full load



GENERAL SPECIFICATIONS

- Torque : 1,50 Nm (1.10 Ft.lb) max. applied to nut
- Panel thickness : 2 mm (.079) max. with all accessories



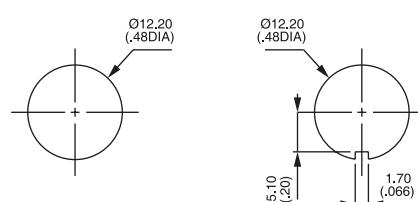
MATERIALS

- Case : phenolic resin
- Actuator : brass, nickel plated
- Bushing : brass, nickel plated
- Contacts : solid silver

The company reserves the right to change specifications without notice.



PANEL CUT-OUT



AGENCY APPROVAL



6A 125VAC/250VAC

Availability : consult factory for details or approved models.

Marking : to order switches marked UL, complete last box of ordering format.

3600NF series

Sealed toggle switches
for outdoor applications



BUILD YOUR PART NUMBER

BASIC PART NUMBER

36

SERIES

ELECTRICAL FUNCTIONS

NUMBER OF POLES

TERMINALS

| | | | |
|----------|-----|-----|-----|
| 1 | ON | - | OFF |
| 4 | ON | ON | ON |
| 5 | MOM | - | ON |
| 6 | ON | - | ON |
| 7 | MOM | OFF | MOM |
| 8 | ON | OFF | MOM |
| 9 | ON | OFF | ON |

3 Single pole

4 Double pole

NF Screw**NF/2** Solder lug

OPTIONS

FINISH

SPECIAL LEVER

APPROVAL

G Black finish on lever
and sealing boot nut

X1052 30 mm (1.181) long lever

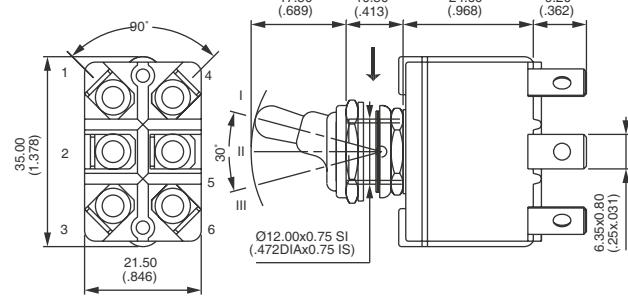
UL Consult factory for
detail of approved
models.

NOTICE : please note that not all combinations of above numbers are available.
Refer to www.apem.com for further information.

SOLDER LUG AND QUICK-CONNECT TERMINALS - DOUBLE POLE



| | III 2-1 5-4 | II | I 2-3 5-6 |
|------------------|-------------------|-----|-----------------|
| 3641NF/2 | ON | - | OFF |
| 3644NF/2* | ON | ON | ON |
| 3645NF/2 | MOM | - | ON |
| 3646NF/2 | ON | - | ON |
| 3647NF/2 | MOM | OFF | MOM |
| 3648NF/2 | ON | OFF | MOM |
| 3649NF/2 | ON | OFF | ON |



*Function 4 : DP in 4P case, see end of catalog.

6000 series

Toggle switches for military applications



DISTINCTIVE FEATURES

- Suitable for military or industrial applications
- Sealing and locking lever options available
- Black finish on actuator and bushing



ELECTRICAL SPECIFICATIONS

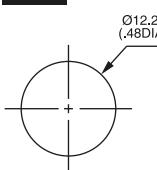
- Max. current/voltage rating : see table below
- Initial contact resistance : 10 mΩ max.
- Insulation resistance : 1.000 MΩ min. at 500VDC
- Dielectric strength :
 - 2.000 Vrms 50 Hz min. between terminals
 - 3.000 Vrms 50 Hz min. between terminals and frame
- Electrical life : 10.000 cycles at full load

Current/Voltage Rating

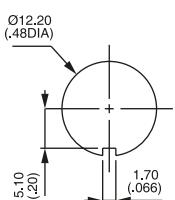
| | |
|----------------|------------|
| Resistive load | 6,5A 30VDC |
| Inductive load | 5A 30VDC |
| Lamp load | 3A 30VDC |



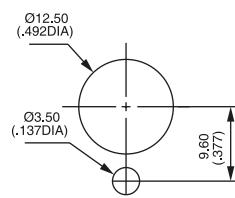
STANDARD PANEL CUT-OUT



Standard



With K sealing option

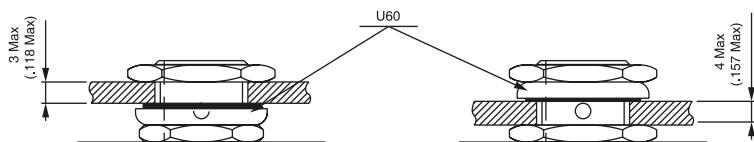


With locking ring



PANEL CUT-OUT WITH "K" SEALING

Recommended cut-out and mounting depending on panel thickness



The company reserves the right to change specifications without notice.



GENERAL SPECIFICATIONS

- Torque : 1,50 Nm (1.10 Ft.lb)
max. applied to nut
- Panel thickness : 5 mm (.196) max.
- Operating temperature :
-40°C to +85°C



MATERIALS

- Case : diallylphthalate (DAP)
- Actuator : brass, chrome plated, black
- Bushing : brass, chrome plated, black
- Contacts : A : silver

6000 series

Toggle switches for military applications



BUILD YOUR PART NUMBER

BASIC PART NUMBER

6

SERIES

CASE

NUMBER OF POLES

ELECTRICAL FUNCTIONS

4 For single pole

6 For other models

3 Single pole

4 Double pole

5 Three pole

6 Four pole

1-03 ON - OFF

2-03 ON - m.OFF

3-03 MOM - OFF

4-03 ON ON ON

5-03 MOM - ON

6-03 ON - ON

7-03 MOM OFF MOM

8-03 ON OFF MOM

9-03 ON OFF ON

OPTIONS

FINISH

SEALING

LOCKING LEVERS

TERMINALS

B Lever and bushing with grey satin chrome finish

K Front panel sealing by O-ring and sealing washer

-1V 1 locked position

-2V 2 locked positions

-3V 3 locked positions

Blank Screw

/2 Solder lug

/3 Quick-connect 6,35 x 0,8 mm

LM Nickel plated bushing - lever and upper nut bright chrome plated

8 Black lever with fluorescent tip

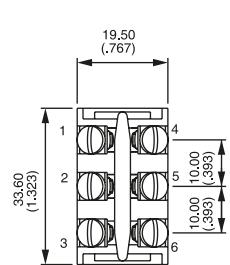
NOTICE : please note that not all combinations of above numbers are available.
Refer to www.apem.com for further information.

SCREW TERMINALS DOUBLE POLE

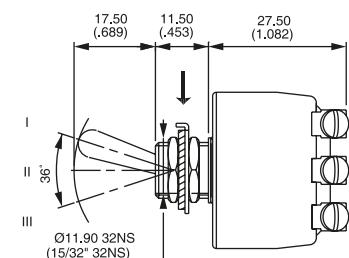


| | III 2-1 5-4 | II | I 2-3 5-6 |
|-----------|-------------------|-----|-----------------|
| 6641-03 | ON | - | OFF |
| 6642-03 | ON | - | mom.OFF |
| 6643-03 | MOM | - | OFF |
| 6644-03 ▲ | ON | ON | ON |
| 6645-03 | MOM | - | ON |
| 6646-03 | ON | - | ON |
| 6647-03 | MOM | OFF | MOM |
| 6648-03 | ON | OFF | MOM |
| 6649-03 | ON | OFF | ON |

KEYWAY



▲ Function 4 : SP in DP case, see end of catalog.



IC series

Pushbutton switches for harsh environments • short case • bushing Ø 12 mm • momentary



DISTINCTIVE FEATURES

- Momentary with short case, reduced behind-panel depth
- Tactile feedback
- Flat round actuator for optional marking
- Glossy actuator option (round curved only)
- Sealed to IP67



ENVIRONMENTAL SPECIFICATIONS

- Front panel sealing : IP67 according to IEC 60529
- Shock resistance : 100 g according to IEC 512-4, test 6c
- Vibration resistance : 10-500Hz - 10 g according to IEC 512-4, test 6d
- Salt spray : IEC 512-6, test 11f
- Robustness : IK06 according to EN 50102 (1 joule)
- Operating temperature : -40°C to +85°C



ELECTRICAL SPECIFICATIONS

- Max. current/voltage rating with resistive load :
5A 28VDC, 70.000 cycles
0,2A 48VDC, 500.000 cycles
0,5A 48VAC, 500.000 cycles
- Initial contact resistance : 50 mΩ max.
- Insulation resistance : 1 GΩ min. at 500VDC
- Dielectric strength : 1.500 Vrms 50 HZ between terminals



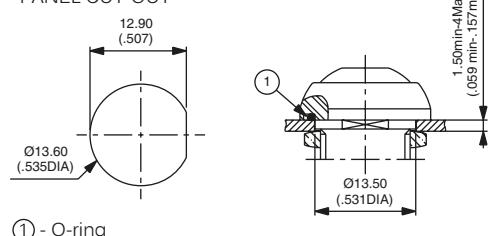
GENERAL SPECIFICATIONS

- Panel thickness : 1,5 mm (.059) min. 4 mm (.157 max.)
- Total travel : 1,7 mm (.067)+/- 0,3 mm
- Typical operating force : 4 N +/- 2 N
- Low level or mechanical life : 1.000.000 cycles
- Torque : 1,5 Nm max. applied to nut
- Soldering : 320°C max. for 3 sec.



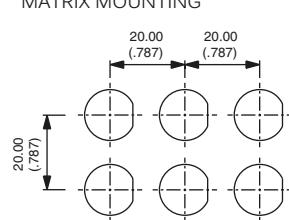
MOUNTING

PANEL CUT-OUT

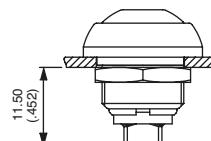


① - O-ring

MATRIX MOUNTING



BACK OF PANEL SPACE REQUIREMENT



MATERIALS

- Case : thermoplastic UL94-V0
- Actuator : polyamide 6/6
- Bushing/bezel : zinc die-cast (zamac), black painted
- Contacts : silver, gold plated
- Multi-wire leads AWG20, section 0,6 mm²
- Terminal seal : epoxy

IC series

Pushbutton switches for harsh environments •
short case • bushing Ø 12 mm • momentary



BUILD YOUR PART NUMBER

BASIC PART NUMBER

IC

SERIES

ACTUATOR SHAPES

- C** Square
- R** Round, curved
- P** Round, flat
- B** Round curved with gloss finish

ELECTRICAL FUNCTION

- 3** Normally open (NO)

TERMINALS

- S** Solder lugs
- F** Flying leads
- P** Straight PC
- Z1** Quick-connect 2,8 x 0,5 mm

- AD** Silver, gold plated

Actuator marking available on round flat models (symbol 10 mm max.). On request.

OPTIONS

ACTUATOR COLORS

| | | | |
|----------|--------|------------|---------------|
| 1 | Blue | 7/1 | White |
| 2 | Black | 8 | Bright chrome |
| 3 | Green | 9 | Orange |
| 4 | Grey | A | Satin chrome |
| 5 | Yellow | B | Dark blue |
| 6 | Red | | |

OPTIONS

| | |
|------------|---|
| 100 | Satin chrome bezel |
| 101 | Bright chrome bezel |
| 104 | High actuator (round models only, except with gloss finish) |

NOTICE : please note that not all combinations of above numbers are available. Refer to www.apem.com for further information.

ROUND - SOLDER LUG TERMINALS



Curved actuator

ICR3SAD

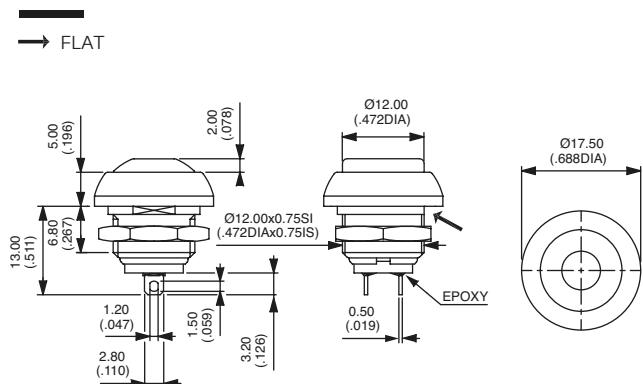
Normally Open

Flat actuator

ICP3SAD

Normally Open

Also available with straight PC terminals : **IC-3PAD**
and quick-connect terminals : **IC-3Z1AD**



IL series

Sealed pushbutton switches for thick panels •
long bushing Ø 12 mm • momentary



DISTINCTIVE FEATURES

- Momentary pushbuttons for thick panels
- Illuminated or non-illuminated
- Tactile feedback
- Flat round actuator for optional marking
- Sealed to IP67 (standard models only)



ENVIRONMENTAL SPECIFICATIONS

- Front panel sealing according to IEC 60529 : IP67 (standard models)
IP54 (options X1242 and 234)
- Shock resistance : 100 g according to IEC 512-4, test 6c
- Vibration resistance : 10-500 Hz - 10 g according to IEC 512-4, test 6d
- Salt spray : IEC 512-6, test 11f
- Operating temperature : -40°C to +85°C



ELECTRICAL SPECIFICATIONS

- Max. current/voltage rating with resistive load :
2A 24VDC, 200.000 cycles
- Initial contact resistance : 50 mΩ max.
- Insulation resistance : 1 GΩ min. at 500VDC
- Dielectric strength : 1.000 Vrms

| LED COMPONENT SPECIFICATIONS | | | |
|------------------------------|-----------------|----------------------|----------------------|
| LED color | Forward current | Typ. forward voltage | Max. forward voltage |
| Super red (L0S) | 20mA | 2,1V | 2,3V |
| Yellow (L0Y) | 20mA | 2,1V | 2,3V |
| Green (L0G) | 20mA | 2,1V | 2,3V |
| Blue (L0B) | 20mA | 3,2V | 3,8V |
| White (L0W) | 20mA | 3,35V | 4,25V |

A resistor must be series-connected by the user.

Resistor value = supply voltage - LED forward voltage

LED forward current

The company reserves the right to change specifications without notice.

IL series

Sealed pushbutton switches for thick panels • long bushing Ø 12 mm • momentary

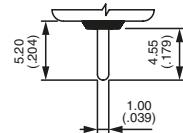


GENERAL SPECIFICATIONS

- Panel thickness : 1,50 mm (.059) min. 10 mm (.393) max.
- Total travel : 1,7 mm (.067) +/- 0,3 mm
- Typical operating force : 4 N +/- 2 N
- Low level or mechanical life : 1.000.000 cycles
- Torque (applied to nut) :
 - 1 Nm max. with metal nut U166
 - 1,5 Nm max. with plastic nut U4248
- Soldering : 300°C max. for 3 seconds



TERMINALS



Straight P

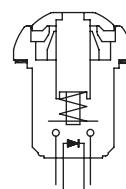


MATERIALS

- Case : thermoplastic UL94-V0
- Actuator : polyamide 6/6
- Bushing/bezel : polyamide 6/6
- Contacts : silver, gold plated
- Terminal seal : epoxy



ELECTRICAL FUNCTIONS

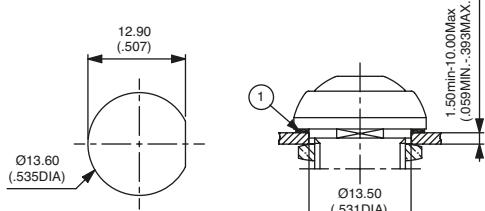


Function 3 (NO)



MOUNTING STANDARD BEZEL

PANEL CUT-OUT

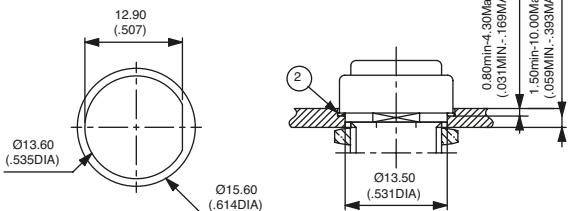


① - Flat seal



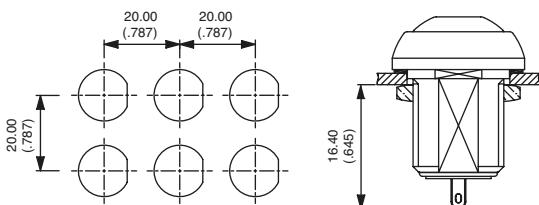
MOUNTING REDUCED MODEL

PANEL CUT-OUT

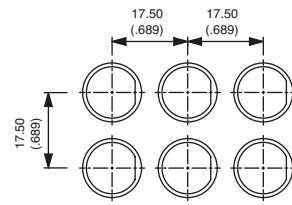


② - O-ring

MATRIX MOUNTING - BACK OF PANEL SPACE REQUIREMENT



MATRIX MOUNTING

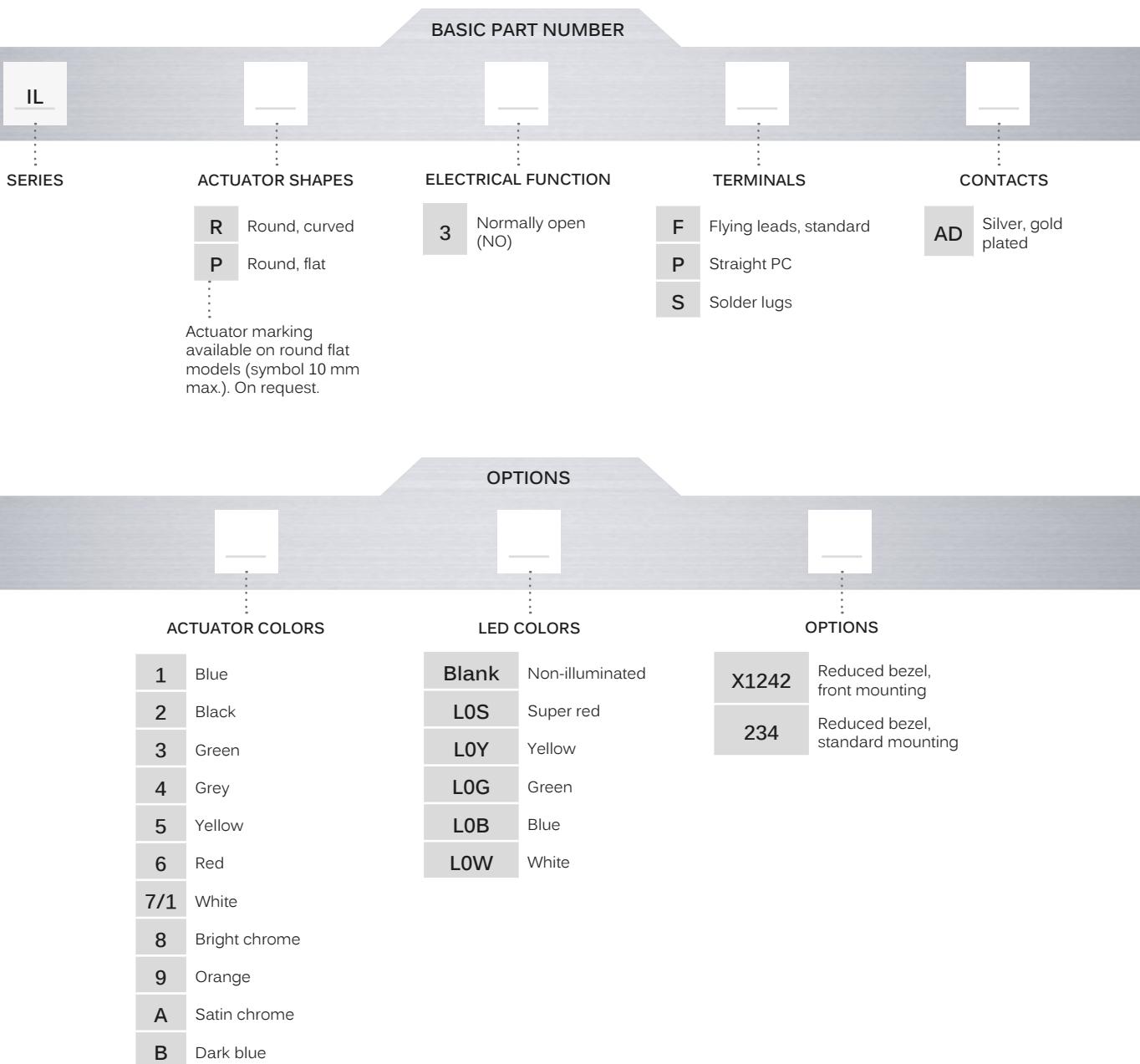


IL series

Sealed pushbutton switches for thick panels • long bushing Ø 12 mm • momentary



BUILD YOUR PART NUMBER



ABOUT THIS SERIES

- (**Notice :** please note that not all combinations of above numbers are available.
Refer to www.apem.com for further information.)
- (**A sealing boot** is available to protect the switches against frost and sand (P/N U5125). See sealing boot section.)
- (**Mounting accessories :** Standard hardware supplied : 1 flat seal (standard bezel) or 1 O-ring (reduced bezel) and 1 metal hex nut 14 mm (.551) across flats. Hex nut part number U166.
Plastic nut 17 mm (.669) across flats, thickness 4 mm (.157) available on request. Part number U4248.)

IL series

Sealed pushbutton switches for thick panels • long bushing Ø 12 mm • momentary

NON ILLUMINATED SOLDER LUG TERMINALS



- | | | |
|-----------------|----------------|---------------|
| Curved actuator | | Normally open |
| | ILR3SAD | |
-
- | | | |
|---------------|----------------|---------------|
| Flat actuator | | Normally open |
| | ILP3SAD | |

Also available with straight PC terminals : **IL•3PAD**

NON ILLUMINATED FLYING LEAD TERMINALS



- | | | |
|-----------------|----------------|---------------|
| Curved actuator | | Normally open |
| | ILR3FAD | |
-
- | | | |
|---------------|----------------|---------------|
| Flat actuator | | Normally open |
| | ILP3FAD | |

ILLUMINATED SEALED FLYING LEAD TERMINALS

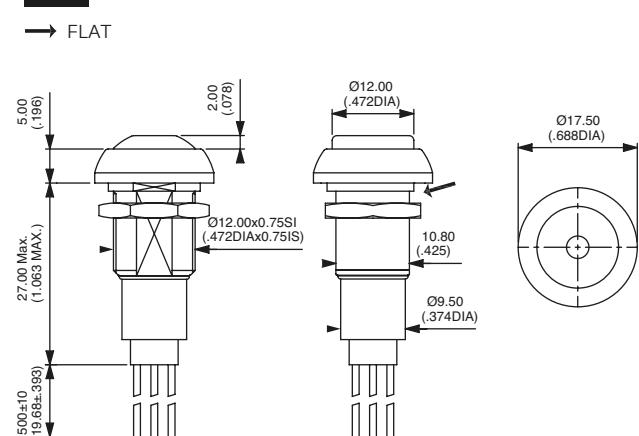
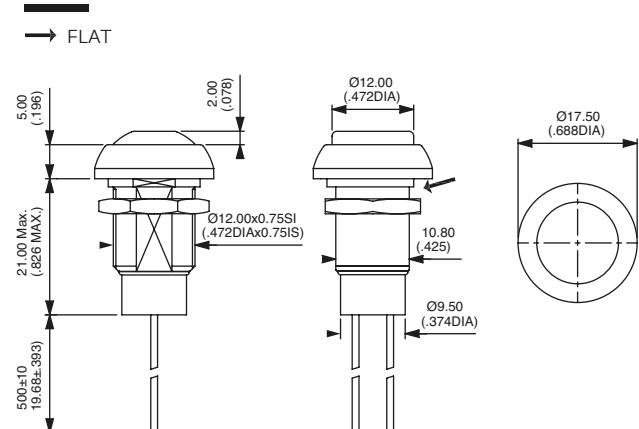
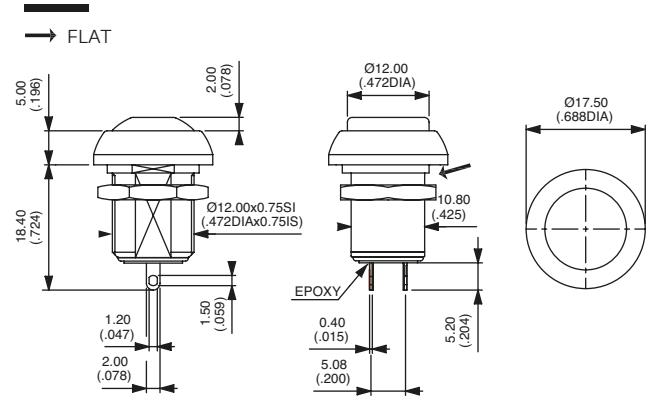


- | | | |
|-----------------|----------------|---------------|
| Curved actuator | | Normally open |
| | ILR3FAD | |
-
- | | | |
|---------------|----------------|---------------|
| Flat actuator | | Normally open |
| | ILP3FAD | |

Wire colors : black : NO contact, red : LED anode(+), blue : LED cathode(-)

REDUCED BEZEL FOR COMPACT MATRIX MOUNTING - OPTION X1242

- Dia. 15 (.590) reduced bezel
- Mounting from the front into a threaded panel cut-out
- Matrix mounting : 16 x 16 mm (.630x.630)
- Illuminated or non-illuminated
- Same terminal options and colors as standard models
- Part numbers on request.



ILP3FAD...X1242

IM series

Sealed snap-action pushbutton switches •
bushing Ø 12 mm • momentary



DISTINCTIVE FEATURES

- Snap-action : tactile feedback with audible click
- High current/voltage rating
- Sealed to IP67
- Flat round actuator for optional marking



ENVIRONMENTAL SPECIFICATIONS

- Front panel sealing : IP67 according to IEC 60529
- Shock resistance : 50 g - 11 ms according to IEC 68-2-27
- Salt spray : IEC 512-6, test 11f
- Operating temperature : -40°C to +85°C
- Storage temperature : -40°C to +85°C



ELECTRICAL SPECIFICATIONS

- Max. current/voltage rating with resistive load : 3A 28VDC
- Initial contact resistance : 100 mΩ max.
- Insulation resistance : 1 GΩ min. at 500VDC
- Dielectric strength : 500 Vrms between terminals
- Electrical life at full load : 25.000 cycles



GENERAL SPECIFICATIONS

- Panel thickness : 1,5 mm (.059) to 10 mm (.394)
- Total travel : 1,7 mm (.067) +/- 0,3 mm
- Low level or mechanical life : 1.000.000 cycles
- Torque (applied to nut) : 1 Nm max. with metal nut U166
1,5 Nm max. with plastic nut U4248



MATERIALS

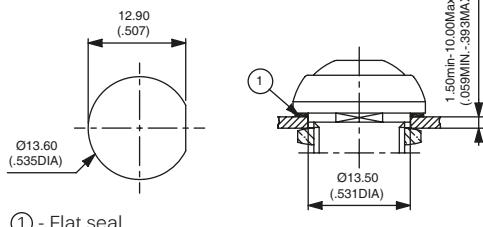
- Case : polyamide 4/6
- Actuator : polyamide 6/6
- Bushing/bezel : polyamide 6/6
- Contacts : silver, gold plated
- Terminal seal : epoxy

The company reserves the right to change specifications without notice.



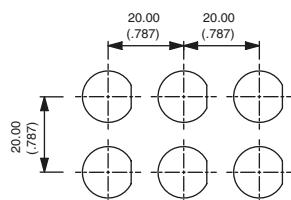
MOUNTING STANDARD BEZEL

PANEL CUT-OUT

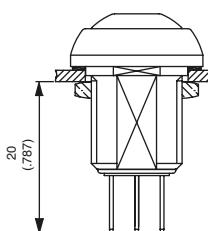


(1) - Flat seal

MATRIX MOUNTING

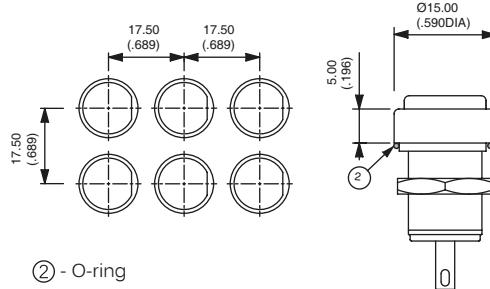


BACK OF PANEL SPACE REQUIREMENT



MOUNTING REDUCED BEZEL

MATRIX MOUNTING



(2) - O-ring

IM series

Sealed snap-action pushbutton switches •
bushing Ø 12 mm • momentary



BUILD YOUR PART NUMBER

BASIC PART NUMBER

IM

SERIES



ACTUATOR SHAPES

| | |
|---|---------------|
| R | Round, curved |
| P | Round, flat |



ELECTRICAL FUNCTION

7

NC + NO



TERMINALS

| | |
|---|---------------|
| P | Straight PC |
| Z | Quick-connect |



CONTACTS

4

Silver, gold plated (standard)

Actuator marking
available on round flat
models (symbol 10 mm
max.). On request.

OPTIONS



ACTUATOR COLORS



BUSHING & BEZEL FINISH



BEZEL OPTIONS



ACTUATOR OPTION



APPROVAL

| | |
|---|-----------|
| 1 | Blue |
| B | Dark blue |
| 2 | Black |
| 3 | Green |
| 4 | Grey |
| 5 | Yellow |
| 6 | Red |
| 7 | White |
| 9 | Orange |

| | |
|---|--------------------|
| 2 | Black |
| | Other : on request |

| | |
|-------|--|
| Blank | Standard bezel |
| 075 | Dia. 15 (.590) reduced bezel, front mounting |
| 234 | Dia. 15 (.590) reduced bezel, std mounting |

| | |
|-------|---------------|
| Blank | Std actuator |
| 104 | High actuator |

UL Consult factory for
detail of approved
models.

NOTICE : please note that not all combinations of above numbers are available.
Refer to www.apem.com for further information.

STANDARD BEZEL QUICK-CONNECT TERMINALS



Curved actuator

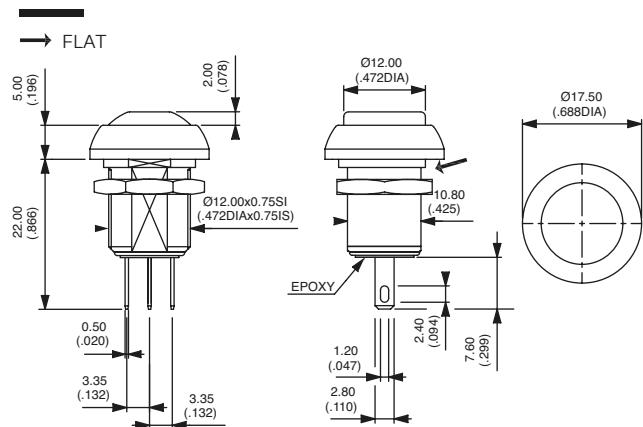
IMR7Z4

NC+NO

Flat actuator

IMP7Z4

NC+NO



AGENCY APPROVAL



1A 125VAC/250VAC
File E83438

Availability : consult factory for details of approved models.

Marking : to order switches marked UL, complete
appropriate box of ordering format.

IP series

Pushbutton switches for harsh environments •
bushing Ø 12 mm • momentary



DISTINCTIVE FEATURES

- Illuminated or non-illuminated
- Tactile feedback
- Wide variety of configurations
- Flat round actuator for optional marking
- Sealed to IP67 and IP69K



ENVIRONMENTAL SPECIFICATIONS

- Front panel sealing: IP67 according to IEC 60529
IP69K according to DIN 40050-9 (non-illuminated) with cap U5125
- Shock resistance: 100 g according to IEC 512-4, test 6c
- Vibration resistance : 10-500Hz - 10 g according to IEC 512-4, test 6d
- Salt spray: IEC 512-6, test 11f
- Robustness (non-illuminated) : IK06 according to EN 62262 (1 joule)
- Operating temperature : -40°C to +85°C



ELECTRICAL SPECIFICATIONS

- Max. current/voltage rating with resistive load (gold plated silver contacts):
5A 28VDC, 70.000 cycles
0,2A 48VDC, 500.000 cycles
0,5A 48VAC, 500.000 cycles
- For W terminals, current has to be limited to 400mA.
- Initial contact resistance : 100 mΩ max.
- Insulation resistance : 1 GΩ min. at 500VDC
- Dielectric strength : 1.500 Vrms
- Contact bounce : 10 ms

LED COMPONENT SPECIFICATIONS

| LED color | Forward current | Typ. forward voltage | Max. forward voltage |
|-----------------|-----------------|----------------------|----------------------|
| Super red (L0S) | 20mA | 2,1V | 2,3V |
| Yellow (L0Y) | 20mA | 2,1V | 2,3V |
| Green (L0G) | 20mA | 2,1V | 2,3V |
| Blue (L0B) | 20mA | 3,2V | 3,8V |
| White (L0W) | 20mA | 3,35V | 4,25V |

A resistor must be series-connected by the user.
Resistor value = supply voltage - LED forward voltage
LED forward current

IP series

Pushbutton switches for harsh environments •
bushing Ø 12 mm • momentary



GENERAL SPECIFICATIONS

- Panel thickness : 1,5 mm (.059) min.
4 mm (.157 max.)
- Total travel :
 - Function 3 : 1,7 mm (.067) +/- 0,3 mm
 - Function 5 : 1,3 mm (.051) +/- 0,3 mm
- Typical operating force : 6N +/- 2N
- Low level/mech. life : 1.000.000 cycles
- Torque : 1,5 Nm max. applied to nut
- Soldering : 320°C max. for 3 sec.



MATERIALS

- Case : thermoplastic UL94-V0
- Actuator : polyamide 6/6
- Bushing/bezel : zinc die-cast (zamac), black painted
- Contacts : silver, gold plated (std) brass, gold plated (for option 104)
- Output wires (flying lead terminals) :
 - F version** : AWG20, section 0,6 mm²
 - W version** : AWG24, section 0,23mm²
- LED wires :
 - F version** : AWG26, section 0,12 mm²
 - W version** : AWG24, section 0,23mm²
- Lens : polycarbonate
- Terminal seal : epoxy

AGENCY APPROVAL

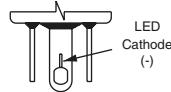


2A 125VAC/250VAC
File E83438
See following pages.

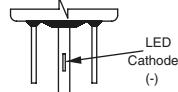


TERMINALS

ILLUMINATED MODELS

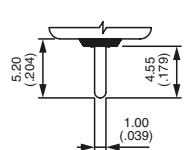


Solder lug S

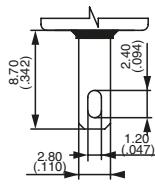


Straight P

NON-ILLUMINATED MODELS



Straight P

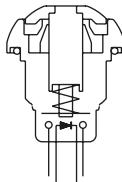


Quick-connect Z1



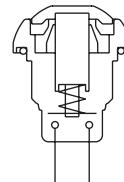
ELECTRICAL FUNCTIONS

ILLUMINATED MODELS



Function 3 (NO)

NON-ILLUMINATED MODELS

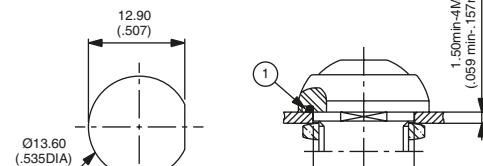


Function 3 (NO) Function 5 (NC/NO)

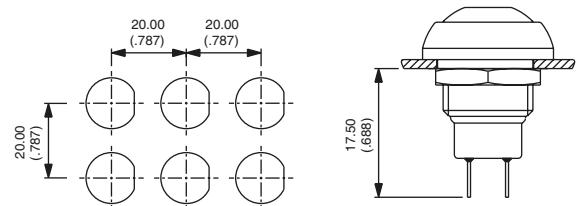


MOUNTING

PANEL CUT-OUT



MATRIX MOUNTING - BACK OF PANEL SPACE REQUIREMENT

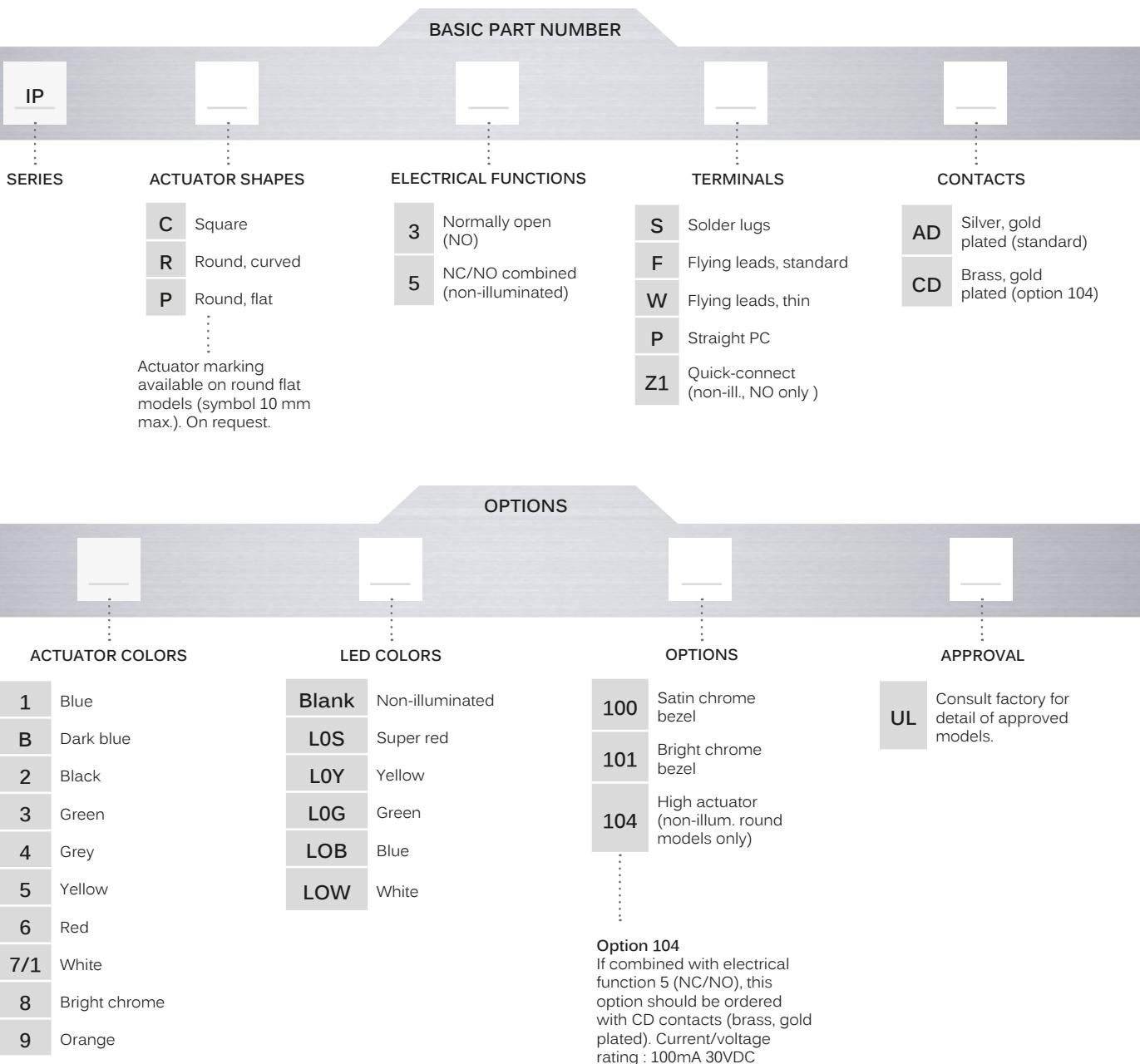


IP series

Pushbutton switches for harsh environments •
bushing Ø 12 mm • momentary



BUILD YOUR PART NUMBER



ABOUT THIS SERIES

- (1) **Notice :** please note that not all combinations of above numbers are available.
Refer to www.apem.com for further information.
- (2) **A sealing boot** is available to protect the switches against frost and sand. See Sealing Boot section.
- (3) **Mounting accessories :** Standard hardware supplied : 1 hex nut 14 mm (.551) across flats and 1 O-ring.
Hex nut part number U166.

IP series

Pushbutton switches for harsh environments •
bushing Ø 12 mm • momentary

SQUARE - ILLUMINATED SOLDER LUG TERMINALS



IPP3SAD

Normally Open

Also available with straight PC terminals : IPC3PAD
LED color is indicated by the bottom of the switch.

ROUND - ILLUMINATED FLYING LEAD TERMINALS



IPR3FAD

Normally Open

For THIN flying leads, replace F with W.
Wire colors : black : NO contact, red : LED anode(+), blue : LED cathode(-)
Shown with standard flying lead terminals.

SQUARE - NON ILLUMINATED FLYING LEAD TERMINALS



IPC3FAD

Normally Open

IPC5FAD

NC/NO combined

For THIN flying leads, replace F with W.
Wire colors (NC/NO) : black : NO, blue : NC.
Shown with standard flying lead terminals.

ROUND - NON ILLUMINATED SOLDER LUG TERMINALS



Curved actuator, NO

IPC3SAD



Curved actuator, NC/NO

IPC5SAD



Flat actuator, NO

IPP3SAD

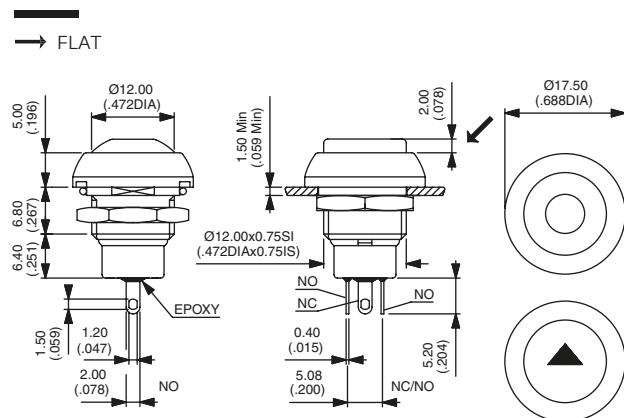
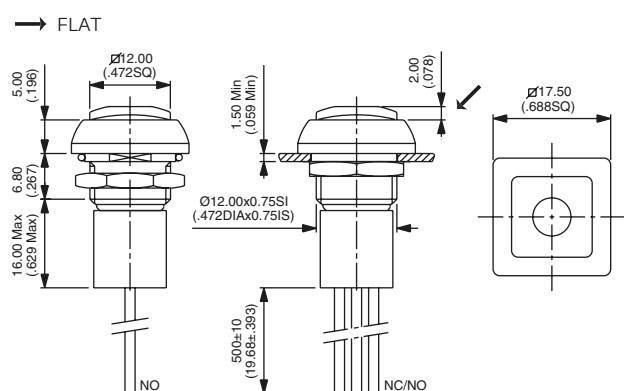
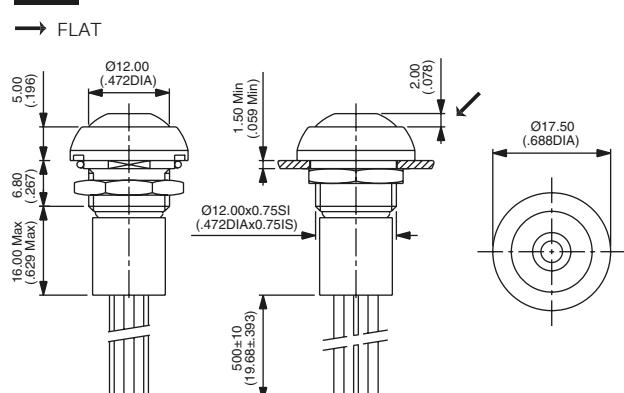
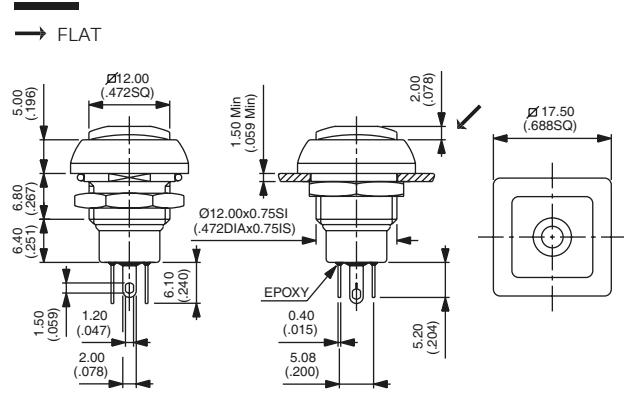


Flat actuator, NC/NO

IPP5SAD



Also available with straight PC terminals : IPC3PAD
(NO) or IPC5PAD (NC/NO) and quick-connect terminals : IPC3Z1AD (NO only)



IP series

Pushbutton switches for harsh environments •
bushing Ø 12 mm • latching



DISTINCTIVE FEATURES

- Latching action
- Illuminated or non-illuminated
- Compact
- Flat round actuator for optional marking
- Sealed to IP67



ENVIRONMENTAL SPECIFICATIONS

- Front panel sealing : IP67 according to IEC 60529
- Shock resistance : 100 g according to IEC 512-4, test 6c
- Vibration resistance : 10-500Hz - 10 g according to IEC 512-4, test 6d
- Salt spray : IEC 512-6, test 11f
- Robustness (non-illuminated) : IK06 according to EN 62262 (1 joule)
- Operating temperature : -40°C to +85°C



ELECTRICAL SPECIFICATIONS

- Max. current/voltage rating with resistive load:
4A 12VDC, 200.000 cycles
1A 48VDC, 200.000 cycles
2A 48VDC, 100.000 cycles
3A 48VDC, 75.000 cycles
1A 72VDC, 15.000 cycles
- Initial contact resistance : 100 mΩ max.
- Insulation resistance : 1 GΩ min. at 500VDC
- Dielectric strength : 1.500 Vrms between terminals
1.000 Vrms between terminals and frame

For W terminals, current has
to be limited to 400mA.

LED COMPONENT SPECIFICATIONS

| LED color | Forward current | Typ. forward voltage | Max. forward voltage |
|-----------------|-----------------|----------------------|----------------------|
| Super red (L0S) | 20mA | 1,95V | 1,95V |
| Yellow (L0Y) | 20mA | 2V | 2,05V |
| Green (L0G) | 20mA | 2,1V | 2,5V |
| Blue (L0B) | 20mA | 3,2V | 4V |

A resistor must be series-connected by the user.
Resistor value = supply voltage - LED forward voltage
LED forward current

IP series

Pushbutton switches for harsh environments •
bushing Ø 12 mm • latching

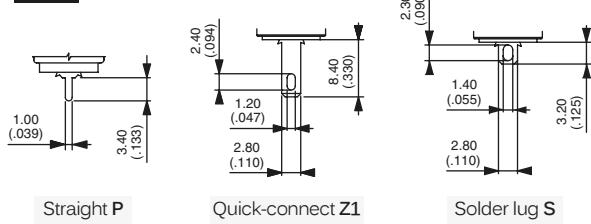


GENERAL SPECIFICATIONS

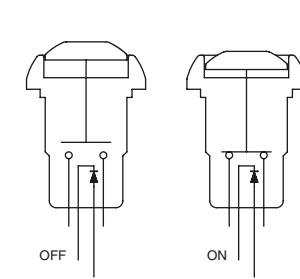
- Panel thickness : 1,5 mm (.059) min.
5,5 mm (.217) max.
- Total travel : 2,5 mm (.098) +/- 0,3 mm
- Typical operating force : 5 N +/- 2 N
- Low level/mech. life : 200.000 cycles
- Torque : 1,5 Nm max. applied to nut
- Soldering : 320°C max. for 3 sec.



TERMINALS

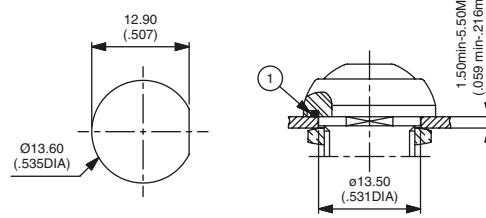


ELECTRICAL FUNCTIONS



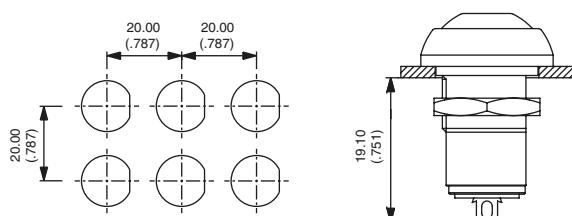
MOUNTING

PANEL CUT-OUT



(1) - Flat seal

MATRIX MOUNTING - BACK OF PANEL SPACE REQUIREMENT



MATERIALS

- Case : thermoplastic, UL 94-V0
- Actuator : polyamide 6/6
- Bushing/bezel : zinc die-cast (zamak), black painted
- Contacts : silver, gold plated
- Output wires (flying lead terminals) :
 - F version :** AWG20, section 0,6 mm²
 - W version :** AWG24, section 0,23 mm²
- LED wires :
 - F version :** AWG26, section 0,12 mm²
 - W version :** AWG24, section 0,23 mm²
- Lens : polycarbonate
- Terminal seal : epoxy

AGENCY APPROVAL



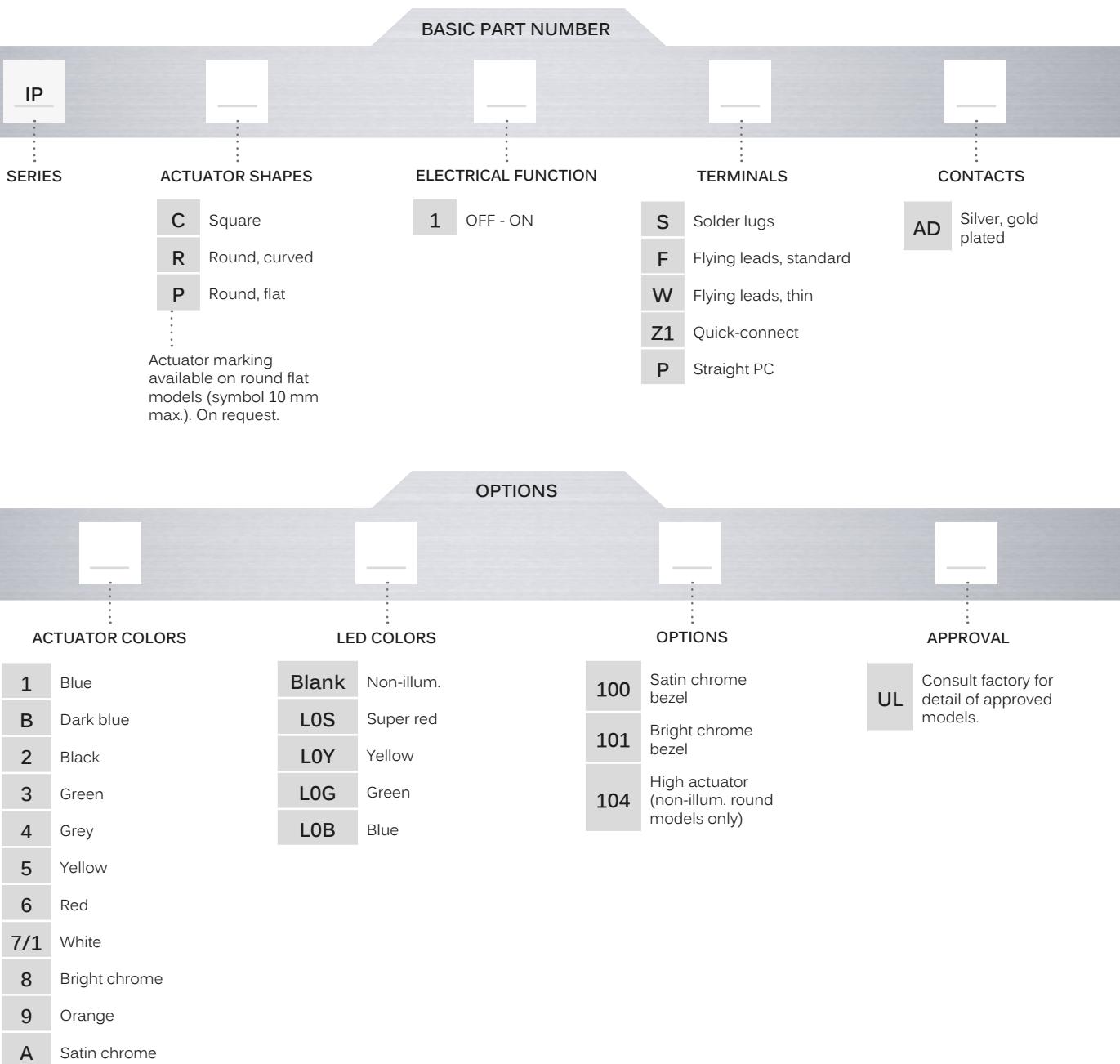
2A 125VAC/250VAC
File E83438
See following pages.

IP series

Pushbutton switches for harsh environments • bushing Ø 12 mm • latching



BUILD YOUR PART NUMBER



ABOUT THIS SERIES

| | |
|--|--|
| | Notice : please note that not all combinations of above numbers are available. Refer to www.apem.com for further information. |
| | A sealing boot is available to protect the switches against frost and sand (P/N U5125). See Sealing Boot section. |
| | Mounting accessories : Standard hardware supplied : 1 hex nut 14 mm (.551) across flats and 1 O-Ring. |

IP series

Pushbutton switches for harsh environments •
bushing Ø 12 mm • latching

ILLUMINATED - SQUARE MODELS



Solder lug terminals

IPC1SAD

OFF - ON

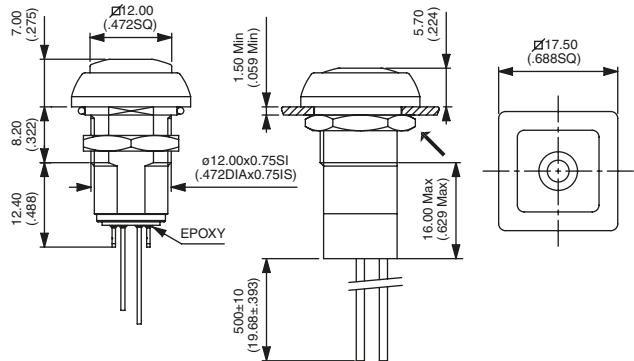
Flying lead terminals

IPC1FAD

OFF - ON

For THIN flying leads, replace F with W.
Also available with straight PC : **IPC1PAD** or quick-connect terminals : **IPC1Z1AD**.
Wire colors : black : contact, red : LED anode(+), blue : LED cathode(-)

→ FLAT All drawings with standard flying lead terminals.



ILLUMINATED - ROUND MODELS



Solder lug terminals

IPR1SAD

OFF - ON

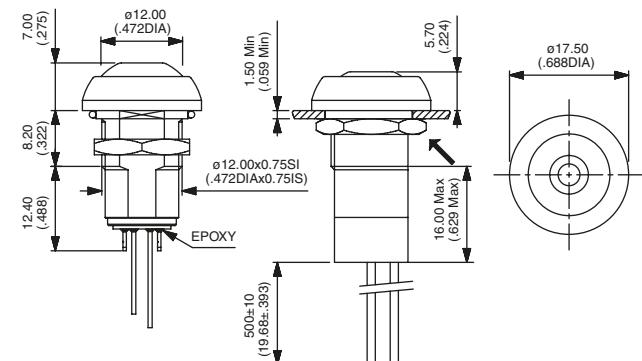
Flying lead terminals

IPR1FAD

OFF - ON

For THIN flying leads, replace F with W.
Also available with straight PC : **IPR1PAD** or quick-connect terminals : **IPR1Z1AD**.
Wire colors : black : contact, red : LED anode(+), blue : LED cathode(-)

→ FLAT



NON-ILLUMINATED - SQUARE MODELS



Solder lug terminals

IPC1SAD

OFF - ON

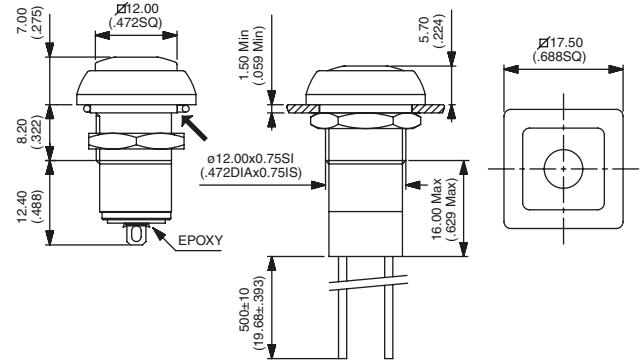
Flying lead terminals

IPC1FAD

OFF - ON

For THIN flying leads, replace F with W.
Also available with straight PC : **IPR1PAD** or quick-connect terminals : **IPR1Z1AD**.

→ FLAT



NON-ILLUMINATED - ROUND MODELS



CURVED ACTUATOR

Solder lug terminals

IPR1SAD

OFF - ON

Flying lead terminals

IPR1FAD

OFF - ON

FLAT ACTUATOR

Solder lug terminals

IPP1SAD

OFF - ON

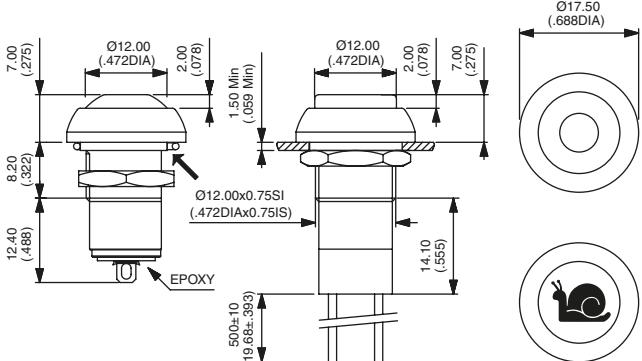
Flying lead terminals

IPP1FAD

OFF - ON

For THIN flying leads, replace F with W.
Also available with straight PC: **IP•1PAD** or quick-connect terminals: **IP•1Z1AD**

→ FLAT



IB series

Snap-in sealed pushbutton switches •
bushing Ø 12 mm • momentary



DISTINCTIVE FEATURES

- Snap-in models
- Compact, lightweight
- Tactile feedback
- Sealed to IP54



ENVIRONMENTAL SPECIFICATIONS

- Front panel sealing according to IEC 60529 : IP54
- Shock resistance : 100 g according to IEC 512-4, test 6c
- Vibration resistance : 10-500 Hz - 10 g according to IEC 512-4, test 6d
- Salt spray : IEC 512-6, test 11f
- Operating temperature : -40°C to +85°C



ELECTRICAL SPECIFICATIONS

- Max. current/voltage rating with resistive load :
400mA 32VAC - 100mA 48VDC
- Initial contact resistance : 50 mΩ max.
- Insulation resistance : 1 GΩ min. at 500VDC
- Dielectric strength : 1.000 Vrms
- Electrical life at full load : 500.000 cycles



GENERAL SPECIFICATIONS

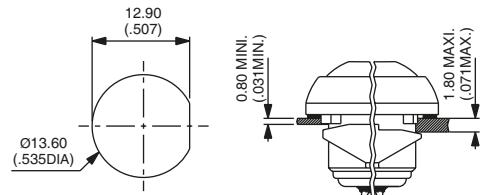
- Panel thickness : 0,8 mm (.031) min. - 1,8 mm (.071) max.
- Total travel : 1,7 mm (.066) +/- 0,3 mm
- Typical operating force : 4 N +/- 3 N
- Low level or mechanical life : 1.000.000 cycles
- Soldering : 300°C max. for 3 seconds

The company reserves the right to change specifications without notice.

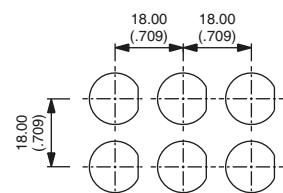


MOUNTING

PANEL CUT-OUT



MATRIX MOUNTING



MATERIALS

- Case : thermoplastic UL94-V0
- Actuator : polyamide 6/6
- Bushing/bezel : polyamide 6/6
- Contacts : silver, gold plated
- Terminal seal : epoxy

AGENCY APPROVAL



2A 125VAC/250VAC
File E83438

Availability : consult factory for details of approved models.

Marking : to order switches marked UL, complete appropriate box of ordering format.

IB series

Snap-in sealed pushbutton switches •
bushing Ø 12 mm • momentary



BUILD YOUR PART NUMBER

BASIC PART NUMBER

IB _____ _____

SERIES

ACTUATOR SHAPES

ELECTRICAL FUNCTION

TERMINALS

CONTACTS

| | |
|----------|---------------|
| R | Round, curved |
| P | Round, flat |

3 Normally open (NO)

| | |
|-----------|----------------------------|
| S | Solder lugs |
| P | Straight PC |
| Z1 | Quick-connect 2,8 x 0,5 mm |

AD Silver, gold plated

Actuator marking available on round flat models (symbol 10 mm max.). On request.

OPTIONS

ACTUATOR COLORS

BEZEL FINISH

OPTION

APPROVAL

| | |
|------------|---------------|
| 1 | Blue |
| B | Dark blue |
| 2 | Black |
| 3 | Green |
| 4 | Grey |
| 5 | Yellow |
| 6 | Red |
| 7/1 | White |
| 8 | Bright chrome |
| 9 | Orange |
| A | Satin chrome |

| | |
|-----------|-------------|
| 00 | Black (std) |
| 10 | White |

104 High actuator

UL

Consult factory for detail of approved models.

NOTICE : please note that not all combinations of above numbers are available. Refer to www.apem.com for further information.

SOLDER LUG TERMINALS



Curved actuator

IBR3SAD

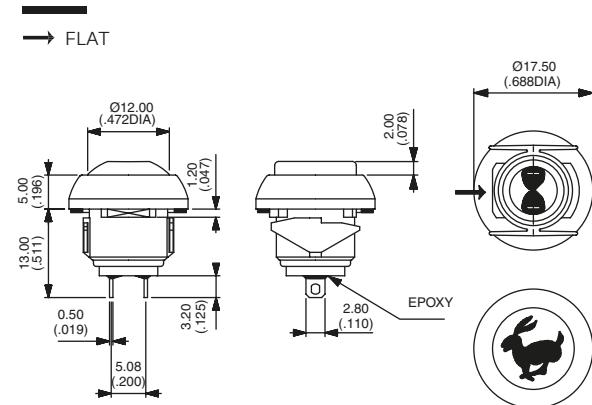
Normally Open

Flat actuator

IBP3SAD

Normally Open

Also available with straight PC : **IB•3PAD** or quick-connect terminals : **IB•3Z1AD**



IS series

Sealed pushbutton switches •
threaded bushing Ø 12 mm • momentary



DISTINCTIVE FEATURES

Threaded bushing models

Compact, lightweight

Tactile feedback

Sealed to IP67



ENVIRONMENTAL SPECIFICATIONS

- Front panel sealing according to IEC 60529 : IP67
- Shock resistance : 100 g according to IEC 512-4, test 6c
- Vibration resistance : 10-500 Hz - 10 g according to IEC 512-4, test 6d
- Salt spray : IEC 512-6, test 11f
- Operating temperature : -40°C to +85°C



ELECTRICAL SPECIFICATIONS

- Max. current/voltage rating with resistive load :
400mA 32VAC - 100mA 48VDC
- Initial contact resistance : 50 mΩ max.
- Insulation resistance : 1 GΩ min. at 500VDC
- Dielectric strength : 1.000 Vrms
- Electrical life at full load : 500.000 cycles



GENERAL SPECIFICATIONS

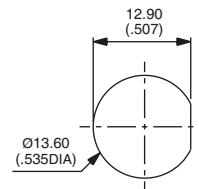
- Panel thickness : 1,5 mm (.059) min. - 4 mm (.157) max.
- Total travel : 1,7 mm (.066) +/- 0,3 mm
- Typical operating force : 4 N +/- 3 N
- Low level or mechanical life : 1.000.000 cycles
- Torque (applied to nut) : 1 Nm max. with metal nut U166
1,5 Nm max. with plastic nut U4248
- Soldering : 300°C max. for 3 seconds

The company reserves the right to change specifications without notice.

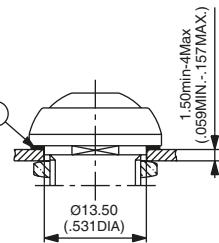


MOUNTING

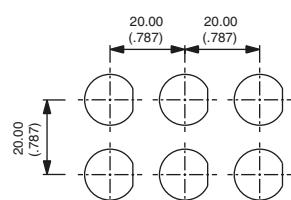
PANEL CUT-OUT



① - Flat seal



MATRIX MOUNTING



MATERIALS

- Case : thermoplastic UL94-V0
- Actuator : polyamide 6/6
- Bushing/bezel : polyamide 6/6
- Contacts : silver, gold plated
- Terminal seal : epoxy

AGENCY APPROVAL



2A 125VAC/250VAC
File E83438

Availability : consult factory for details of approved models.

Marking : to order switches marked UL, complete appropriate box of ordering format.

IS series

Sealed pushbutton switches •
threaded bushing Ø 12 mm • momentary



BUILD YOUR PART NUMBER

BASIC PART NUMBER

IS

SERIES



ACTUATOR SHAPES

| | |
|---|---------------|
| R | Round, curved |
| P | Round, flat |

Actuator marking
available on round flat
models (symbol 10 mm
max.). On request.



ELECTRICAL FUNCTION

| | |
|---|--------------------|
| 3 | Normally open (NO) |
|---|--------------------|



TERMINALS

| | |
|----|-------------------------------|
| S | Solder lugs |
| P | Straight PC |
| Z1 | Quick-connect 2,8 x 0,5 mm |



CONTACTS

| | |
|----|---------------------|
| AD | Silver, gold plated |
|----|---------------------|

OPTIONS

ACTUATOR COLORS

| | | | |
|---|-----------|-----|---------------|
| 1 | Blue | 6 | Red |
| B | Dark blue | 7/1 | White |
| 2 | Black | 8 | Bright chrome |
| 3 | Green | 9 | Orange |
| 4 | Grey | A | Satin chrome |
| 5 | Yellow | | |

BEZEL FINISH

| | |
|----|---------------|
| 00 | Black (std) |
| 08 | Bright chrome |
| 10 | White |
| 20 | Satin chrome |

OPTION

104 High actuator

UL

Consult factory for
detail of approved
models.

APPROVAL

NOTICE : please note that not all combinations of above numbers are available.
Refer to www.apem.com for further information.

SOLDER LUG TERMINALS

Curved actuator

ISR3SAD



Normally Open



Flat actuator

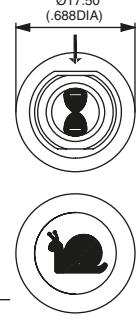
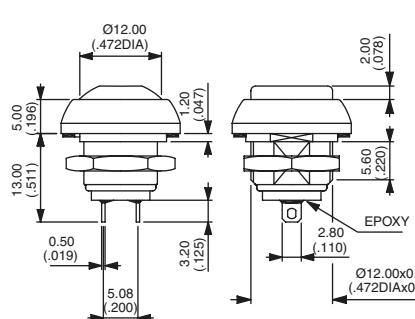
ISP3SAD



Normally Open

Also available with straight PC terminals : IS•3PAD
or quick-connect terminals : IS•3Z1AD

→ FLAT



IHS series

Hall effect pushbutton switches •
bushing Ø 12 mm • momentary



DISTINCTIVE FEATURES

- Momentary pushbutton (NO)
- 5 million cycles
- Low behind-panel depth
- Standard and high actuator
- Sealed to IP67



ENVIRONMENTAL SPECIFICATIONS

- Front panel sealing : IP67 according to IEC 60529
- Operating temperature : -40°C to +85°C



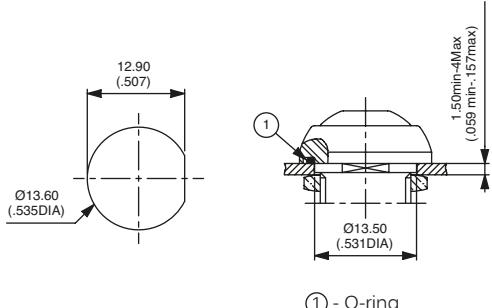
ELECTRICAL SPECIFICATIONS

- Supply voltage : 3,5VDC to 24VDC
- Supply current : VDC = 12V : 2,5mA Typ. to 5mA max.
(current consumption in OFF position)
- Max. output current : 50mA
- Max. output voltage : 24VDC
- Output type : NPN

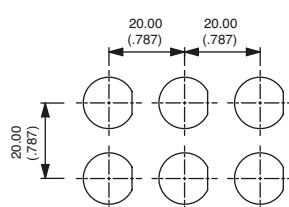


MOUNTING

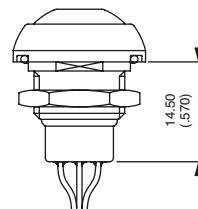
PANEL CUT-OUT



MATRIX MOUNTING



BACK OF PANEL SPACE REQUIREMENT



The company reserves the right to change specifications without notice.

IHS series

Hall effect pushbutton switches •
bushing Ø 12 mm • momentary



GENERAL SPECIFICATIONS

- Panel thickness : 1,5 mm (.059) min. 4 mm (.157) max.
- Total travel : 1,80 mm (.070) +/- 0,3 mm
- Typical operating force : 6 N +/- 2 N
- Mechanical life : 5 million cycles
- Torque : 1,5 Nm max. applied to nut



BUILD YOUR PART NUMBER

BASIC PART NUMBER

IHS

SERIES

ACTUATOR SHAPE

ELECTRICAL FUNCTION

OPERATING FORCE

TERMINALS

R Round

H Round, high

3 Normally open (NO)

6 6N

F Flying leads

OPTIONS

ACTUATOR COLORS

1 Blue

6 Red

2 Black

7 White

3 Green

9 Orange

4 Grey

B Dark blue

5 Yellow

Blank None

100 Satin chrome bezel

101 Bright chrome bezel

NOTICE : please note that not all combinations of above numbers are available. Refer to www.apem.com for further information.

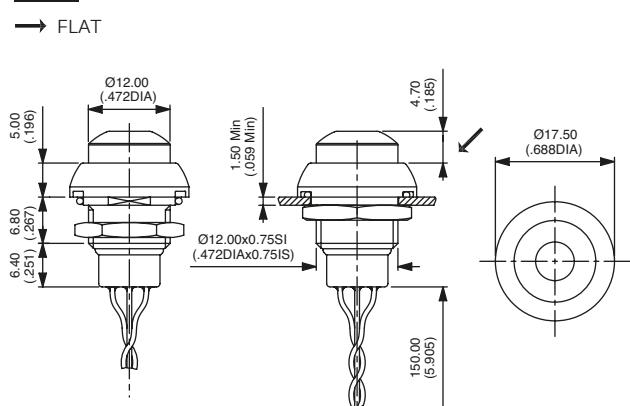
HIGH ACTUATOR



IHSH36F



Normally Open



IHL series

Hall effect pushbutton switches •
bushing Ø 12 mm • linear



DISTINCTIVE FEATURES

- Linear output pushbutton
- 0,5 to 4,5 volt output
- Different operating forces
- 5 million cycles
- Sealed to IP67

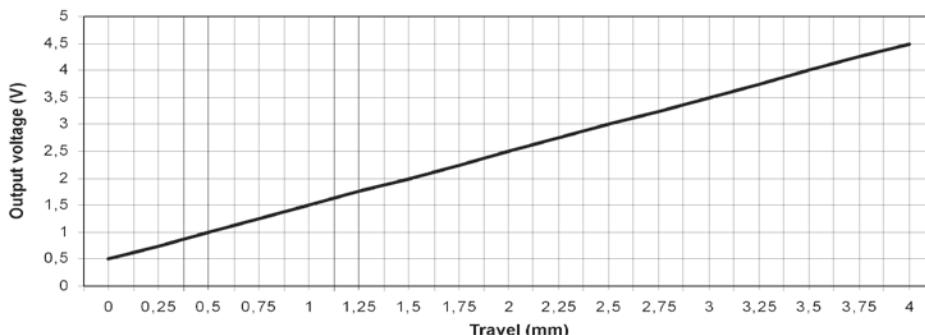


ENVIRONMENTAL SPECIFICATIONS

- Front panel sealing : IP67 according to IEC 60529
- Operating temperature : -40°C to +85°C
- EMC testing : 10V per meter extend to radiated fields in frequency range of 80 Mhz to 1.000 MHz. 1KHz 80 % sine wave modulation according to IEC/EN 61000-4-3

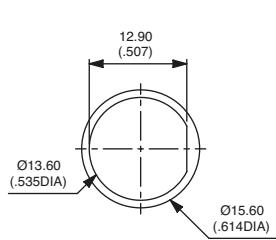


LINEAR OUTPUT GRAPH (VDC = 5V@20°C)



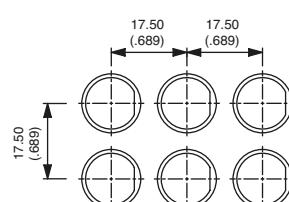
MOUNTING

PANEL CUT-OUT

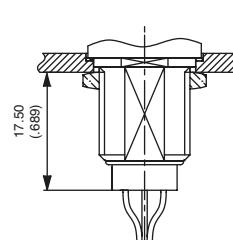


② - O-ring

MATRIX MOUNTING



BACK OF PANEL SPACE REQUIREMENT



The company reserves the right to change specifications without notice.

IHL series

Hall effect pushbutton switches •
bushing Ø 12 mm • linear



GENERAL SPECIFICATIONS

- Panel thickness : 1,5 mm (.059) min. 10 mm (.393) max.
- Total travel : 4 mm (.160) +/- 0,3 mm
- Mechanical life : 5 million cycles
- Torque : 1 Nm max. applied to nut



MATERIALS

- Case : PA46, UL94-V0
- Actuator : polyamide 6/6
- Bushing : polyamide 6/6
- Multi-wire leads : AWG26, 150 mm



BUILD YOUR PART NUMBER

BASIC PART NUMBER

| | | | | | |
|---------|--|---|---|----------------|-----------|
| IHL | | | | | |
| SERIES | ACTUATOR SHAPE | OUTPUT VOLTAGE | OPERATING FORCE | REGULATOR | TERMINALS |
| R Round | 01 0,5 to 4,5 V Other : on request. | 3 Soft 5 Standard (4N to 6N) 7 Hard | X None 5 5V regulator Other : on request. | F Flying leads | |

OPTIONS

ACTUATOR COLORS

| | |
|----------|-------------|
| 1 Blue | 6 Red |
| 2 Black | 7 White |
| 3 Green | 9 Orange |
| 4 Grey | B Dark blue |
| 5 Yellow | |

NOTICE : please note that not all combinations of above numbers are available. Refer to www.apem.com for further information.

WITHOUT REGULATOR



Soft operating force

IHLR013XF

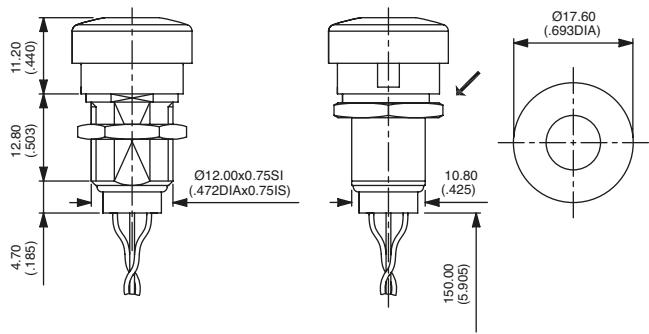
Standard operating force

IHLR015XF

Hard operating force

IHLR017XF

→ FLAT



IQ series

Sealed pushbutton switches • bushing Ø 16 mm • snap-in mounting • momentary



DISTINCTIVE FEATURES

- Snap-in mounting for easy installation
- Momentary models
- Illuminated or non-illuminated
- Flat round actuator for optional marking
- Sealed to IP54



ENVIRONMENTAL SPECIFICATIONS

- Front panel sealing : IP54 according to IEC 60529
- Shock resistance : 100 g according to IEC 512-4, test 6c
- Vibration resistance : 10-500Hz - 10 g according to IEC 512-4, test 6d
- Salt spray : IEC 512-6, test 11f
- Operating temperature : -40°C to +85°C



ELECTRICAL SPECIFICATIONS

- Max. current/voltage rating with resistive load :
 - Gold plated contacts : Code 4 : 200mA 48VDC, 500.000 cycles
 - Code 7 : 5A 28VDC, 70.000 cycles
 - Silver contacts (code 2) - screw terminals : 4A 48VDC, 500.000 cycles
- Initial contact resistance : 100 mΩ max.
- Insulation resistance : 1 GΩ min. at 500VDC
- Dielectric strength : 1.500 Vrm



LED COMPONENT SPECIFICATIONS

| LED color | Forward current | Typ. forward voltage | Max. forward voltage |
|-----------------|-----------------|----------------------|----------------------|
| Super red (L0S) | 20mA | 2,1V | 2,3V |
| Yellow (L0Y) | 20mA | 2,1V | 2,3V |
| Green (L0G) | 20mA | 2,1V | 2,3V |
| Blue (L0B) | 20mA | 3,2V | 3,8V |
| White (L0W) | 20mA | 3,35V | 4,25V |
| Red/Green (SG) | 20mA | Red:1,95V-Green:2,1V | 2,5V |

A resistor must be series-connected by the user.
Resistor value = supply voltage - LED forward voltage

LED forward current

On flying lead versions, the LED resistor can be integrated by APEM on request.

IQ series

Sealed pushbutton switches • bushing Ø 16 mm • snap-in mounting • momentary



GENERAL SPECIFICATIONS

- Panel thickness :
 - with flat seal : 2,20 mm (.088) max.
 - without flat seal : 3 mm (.118) max.
- Total travel : 1,6 mm (.062) +/- 0,3 mm
- Typical operating force : 4 N +/- 2 N
- Low level or mechanical life : 1.000.000 cycles
- Soldering : 320°C max. for 3 sec.



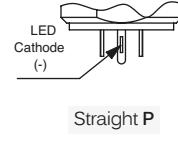
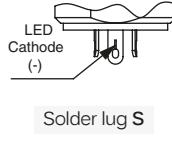
MATERIALS

- Case : thermoplastic UL94-V0
- Actuator : polyamide 6/6
- Bushing/bezel : polyamide 6/6
- Contacts :
 - 4 and 7 : silver, gold plated
 - 2 : silver (screw terminals)
- Multi-wire leads AWG20, section 0,6 mm²
- LED wire : AWG26, section 0,12 mm²
- Lens : polycarbonate
- Terminal seal : epoxy

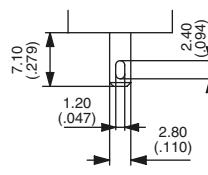
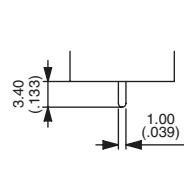


TERMINALS

ILLUMINATED MODELS

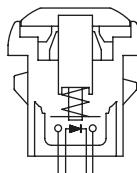


NON-ILLUMINATED MODELS



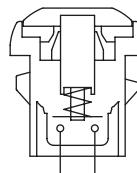
ELECTRICAL FUNCTIONS

ILLUMINATED MODELS



Function 3 (NO)

NON-ILLUMINATED MODELS

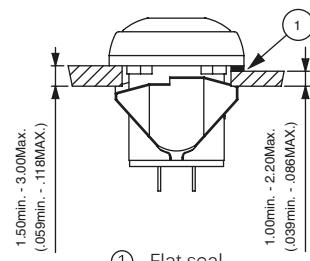
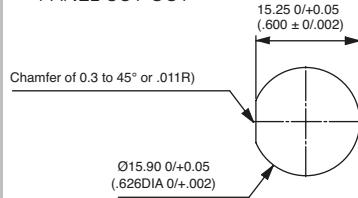


Function 3 (NO)

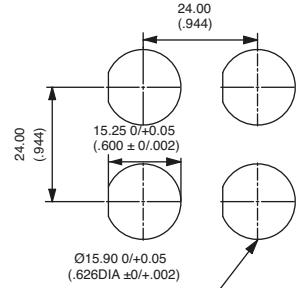
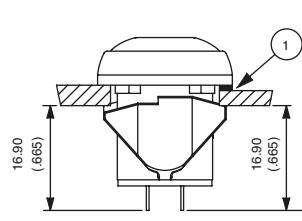


MOUNTING

PANEL CUT-OUT



BACK OF PANEL SPACE REQUIREMENT - MATRIX MOUNTING



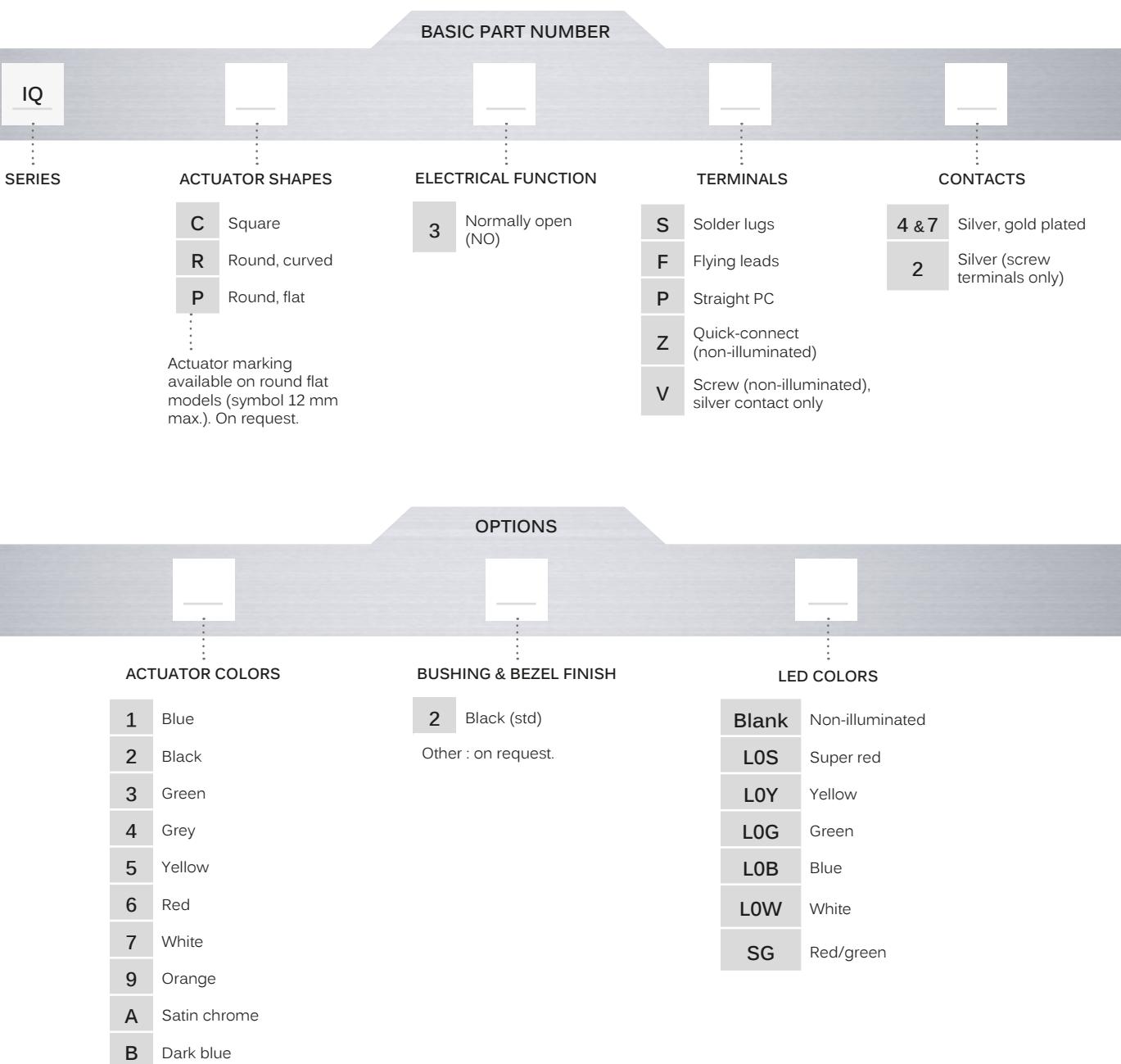
IQ series

Sealed pushbutton switches • bushing Ø 16 mm • snap-in mounting • momentary



BUILD YOUR PART NUMBER

Latching version available. See website.



ABOUT THIS SERIES

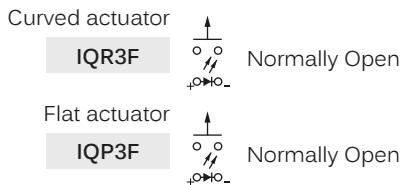
! **Notice :** please note that not all combinations of above numbers are available.
Refer to www.apem.com for further information.

! **Mounting accessories :** Standard hardware supplied : 1 flat seal

IQ series

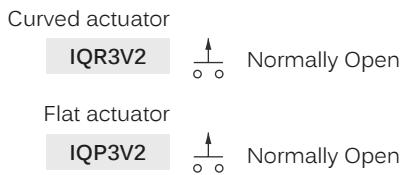
Sealed pushbutton switches • bushing Ø 16 mm • snap-in mounting • momentary

ROUND - ILLUMINATED FLYING LEAD TERMINALS

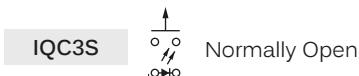


Wire colors : black : NO contact, red : LED anode (+), blue : LED cathode (-)

ROUND - NON-ILLUMINATED SCREW TERMINALS

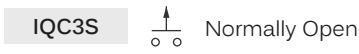


SQUARE - ILLUMINATED SOLDER LUG TERMINALS

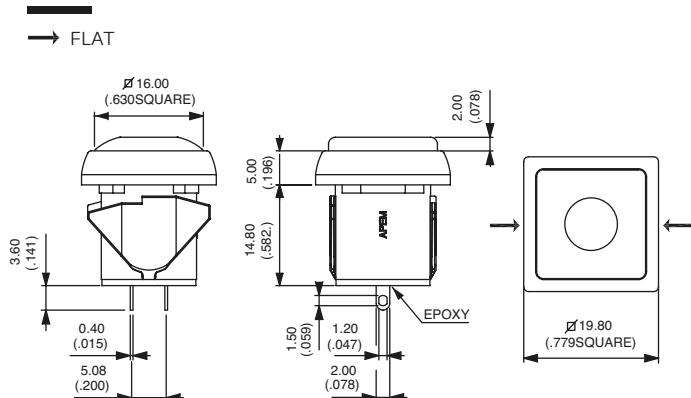
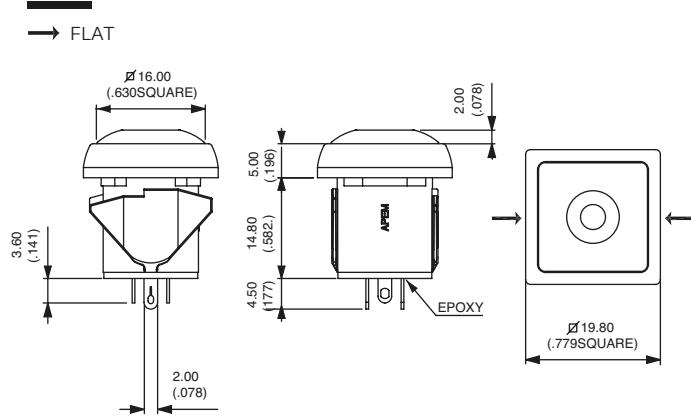
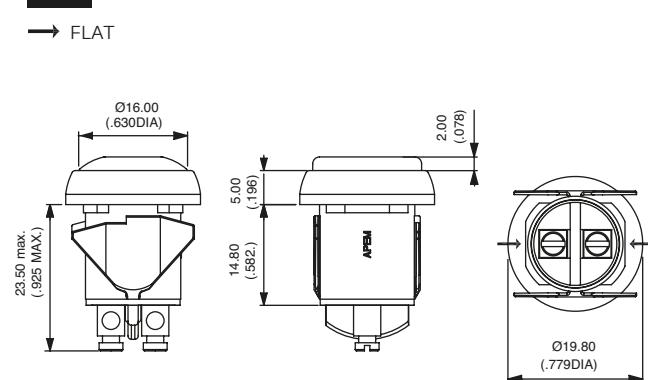
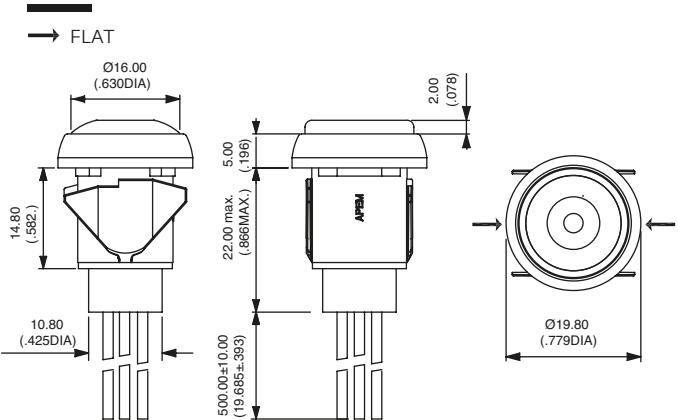


Also available with straight PC terminals : **IQC3P4**.
LED color is indicated by the bottom of the switch.

SQUARE - NON-ILLUMINATED SOLDER LUG TERMINALS



Also available with straight PC terminals :
IQC3P4 or quick-connect terminals : **IQC3Z4**.



IZ series

Rear mounted sealed pushbutton switches •
bushing Ø 16 mm • metal • momentary



DISTINCTIVE FEATURES

- Rear mounting for easier installation
- Fixed or variable panel thickness
- Screw version available up to 4A
- Sealed to IP67
- Illuminated or non-illuminated



ENVIRONMENTAL SPECIFICATIONS

- Front panel sealing : IP67 according to IEC 60529
- Shock resistance : 100 g according to IEC 512-4, test 6c
- Vibration resistance : 10-500Hz - 10 g according to IEC 512-4, test 6d
- Salt spray : IEC 512-6, test 11f
- Operating temperature : -40°C to +85°C



ELECTRICAL SPECIFICATIONS

- Max. current/voltage rating with resistive load :
 - Gold plated silver contacts (code 4) : 200mA 48VDC
 - Silver contacts (code 2) - screw terminals : 4A 48VDC
- Electrical life at full load : 500.000 cycles
- Initial contact resistance : 100 mΩ max.
- Insulation resistance : 1 GΩ min. at 500VDC
- Dielectric strength : 1.000 Vrms 50 Hz



LED COMPONENT SPECIFICATIONS

| LED color | Forward current | Typ. forward voltage | Max. forward voltage |
|-----------------|-----------------|----------------------|----------------------|
| Super red (L0S) | 20mA | 2,1V | 2,3V |
| Yellow (L0Y) | 20mA | 2,1V | 2,3V |
| Green (L0G) | 20mA | 2,1V | 2,3V |
| Blue (L0B) | 20mA | 3,2V | 3,8V |
| White (L0W) | 20mA | 3,35V | 4,25V |

A resistor must be series-connected by the user.
Resistor value = supply voltage - LED forward voltage
LED forward current

On flying lead versions, the LED resistor
can be integrated by APEM on request.

IZ series

Rear mounted sealed pushbutton switches • bushing Ø 16 mm • metal • momentary



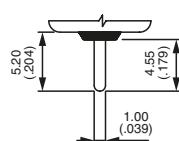
GENERAL SPECIFICATIONS

- Panel thickness :
 - IZM : 3 mm (.118) max.
 - IZN : 4 mm (.157) max.
- Total travel : 1,8 mm (.070) +/- 0,3 mm
- Typical operating force : 6 N +/- 2 N
- Low level or mechanical life : 1.000.000 cycles
- Torque : IZN : 1 Nm max.
IZM : 0,7 Nm max. applied to nut
- Soldering : 320°C max. for 3 sec.

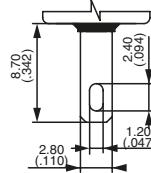


TERMINALS

MODELS FOR VARIABLE PANEL THICKNESS (IZM)

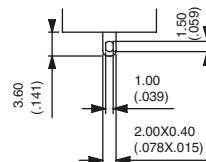


Straight P

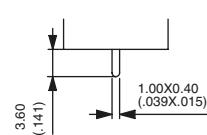


Quick-connect Z

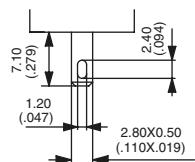
MODELS FOR FIXED PANEL THICKNESS (IZN)



Solder lug S



Straight P

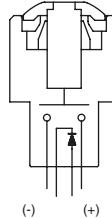


Quick-connect Z



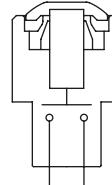
ELECTRICAL FUNCTIONS

ILLUMINATED MODELS



Function 3 (NO)

NON-ILLUMINATED MODELS

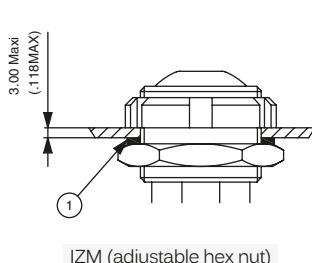


Function 3 (NO)

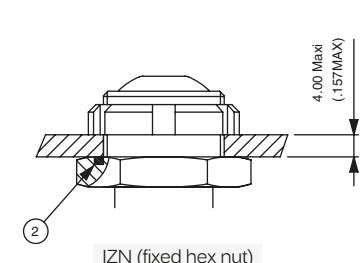
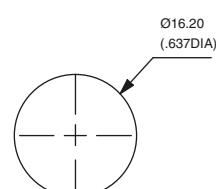


MOUNTING

PANEL CUT-OUT - MATRIX MOUNTING

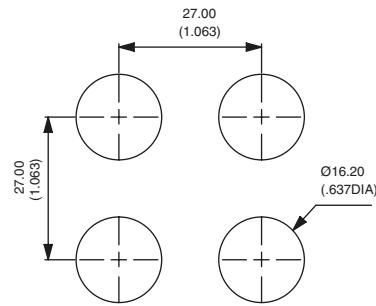


IZM (adjustable hex nut)



① - Flat seal

② - O-ring



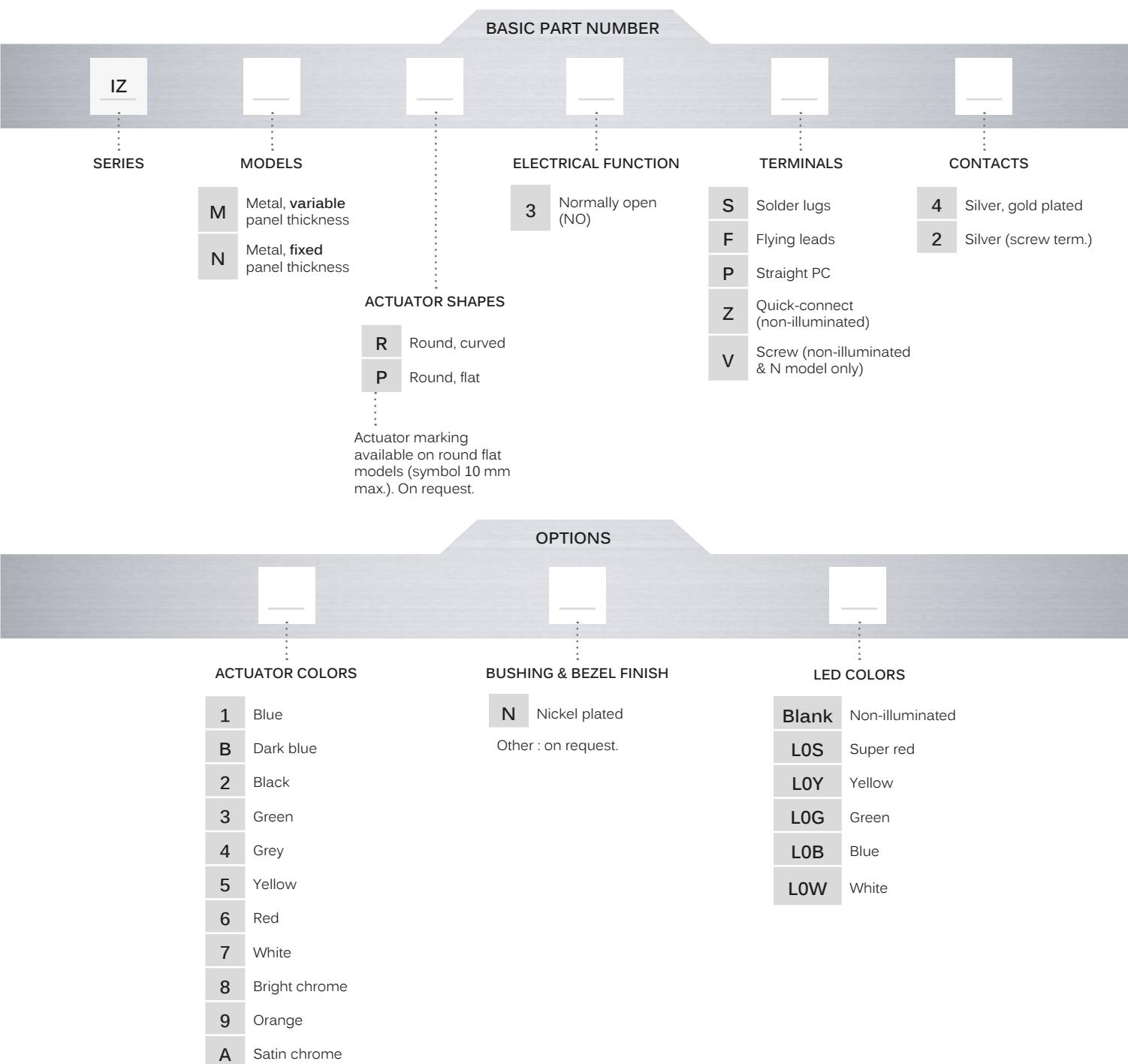
IZ series

Rear mounted sealed pushbutton switches • bushing Ø 16 mm • metal • momentary



BUILD YOUR PART NUMBER

Latching version available. See website.



ABOUT THIS SERIES



Notice : please note that not all combinations of above numbers are available.

Refer to www.apem.com for further information.



A sealing boot is available to protect the switches against frost and sand. See Sealing Boot section.



Mounting accessories : Standard hardware supplied :

- IZM : 1 castellated nickel plated brass nut U6915 + 1 silicone flat seal + 1 hex nut 19 mm (.748) across flats U4116.
- IZN : 1 castellated nickel plated brass nut U6915 + 1 O-ring

IZ series

Rear mounted sealed pushbutton switches •
bushing Ø 16 mm • metal • momentary

VARIABLE PANEL THICKNESS ILLUMINATED - SOLDER LUG TERMINALS



| | | | |
|-----------------|---|---------|---------------|
| Curved actuator |  | IZMR3S4 | Normally Open |
| Flat actuator |  | IZMP3S4 | Normally Open |

Also available with straight PC terminals : IZM•3P4.
LED color is indicated by the bottom of the switch.

VARIABLE PANEL THICKNESS ILLUMINATED - FLYING LEAD TERMINALS



| | | | |
|-----------------|--|---------|---------------|
| Curved actuator | | IZMR3F4 | Normally Open |
| Flat actuator | | IZMP3F4 | Normally Open |

Wire colors : black : NO contact, red : LED anode (+), blue : LED cathode (-)

**FIXED PANEL THICKNESS
ILLUMINATED - FLYING LEAD TERMINALS**



| | | |
|-----------------|---|---------------|
| Curved actuator |  | |
| IZNR3F4 |  | Normally Open |
| Flat actuator |  | |
| IZNP3F4 |  | Normally Open |

Wire colors : black : NO contact, red : LED anode (+), blue : LED cathode (-)

**FIXED PANEL THICKNESS
NON-ILLUMINATED - SCREW TERMINALS**



SILVER CONTACTS

Curved actuator



IZNR3V2

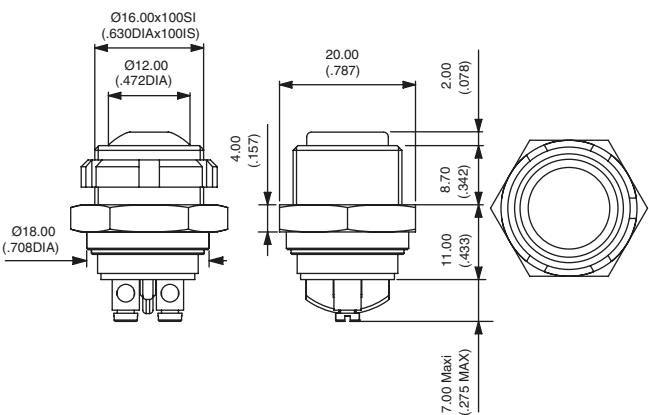
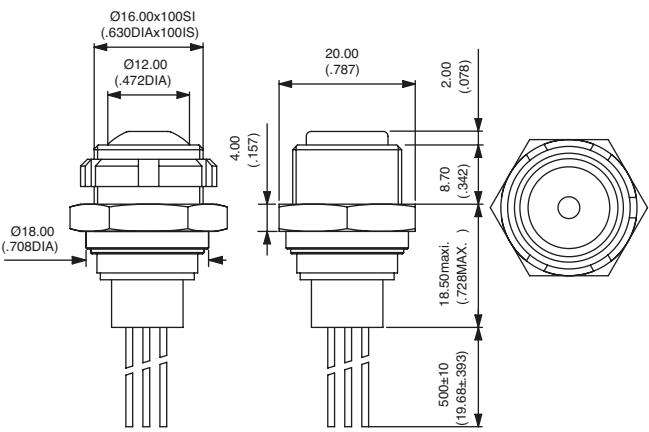
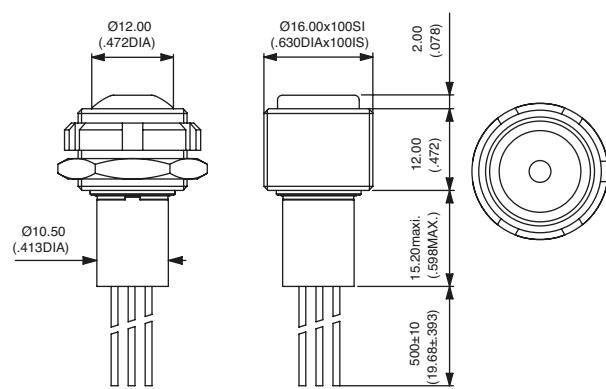
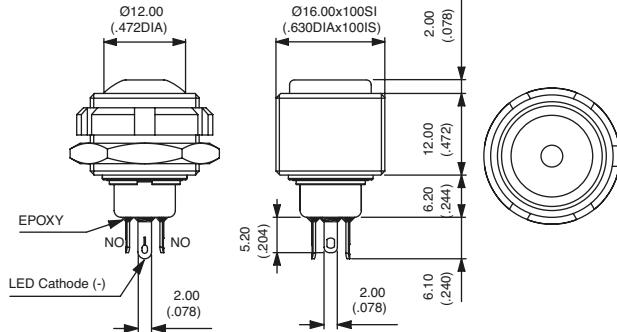
○  Normally Open

Flat actuator



IZNP3V2

○  Normally Open



IZ series

Rear mounted sealed pushbutton switches •
bushing Ø 16 mm • momentary



DISTINCTIVE FEATURES

- Rear mounting for easier installation
- Momentary models
- Screw version available up to 4A
- Sealed to IP67
- Illuminated or non-illuminated



ENVIRONMENTAL SPECIFICATIONS

- Front panel sealing : IP67 according to IEC 60529
- Shock resistance : 100 g according to IEC 512-4, test 6c
- Vibration resistance : 10-500Hz - 10 g according to IEC 512-4, test 6d
- Salt spray : IEC 512-6, test 11f
- Operating temperature : -40°C to +85°C



ELECTRICAL SPECIFICATIONS

- Max. current/voltage rating with resistive load :
 - Gold plated silver contacts (code 4) : 200mA 48VDC
 - Silver contacts (code 2) - screw terminals : 4A 48VDC
- Electrical life at full load : 500.000 cycles
- Initial contact resistance : 100 mΩ max.
- Insulation resistance : 1 GΩ min. at 500VDC
- Dielectric strength : 1.000 Vrms 50 Hz



LED COMPONENT SPECIFICATIONS

| LED color | Forward current | Typ. forward voltage | Max. forward voltage |
|-----------------|-----------------|----------------------|----------------------|
| Super red (L0S) | 20mA | 2,1V | 2,3V |
| Yellow (L0Y) | 20mA | 2,1V | 2,3V |
| Green (L0G) | 20mA | 2,1V | 2,3V |
| Blue (L0B) | 20mA | 3,2V | 3,8V |
| White (L0W) | 20mA | 3,35V | 4,25V |

A resistor must be series-connected by the user.
Resistor value = supply voltage - LED forward voltage

LED forward current

On flying lead versions, the LED resistor
can be integrated by APEM on request.

IZ series

Rear mounted sealed pushbutton switches •
bushing Ø 16 mm • momentary



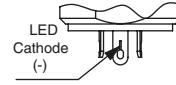
GENERAL SPECIFICATIONS

- Panel thickness : 3 mm (.118) max.
- Total travel : 1,8 mm (.070) +/- 0,3 mm
- Typical operating force : 6 N +/- 2 N
- Low level or mechanical life : 1.000.000 cycles
- Torque : 0,7 Nm max. applied to nut
- Soldering : 320°C max. for 3 sec.

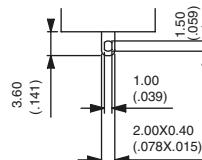


TERMINALS

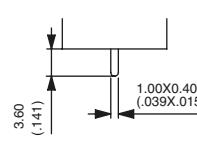
ILLUMINATED



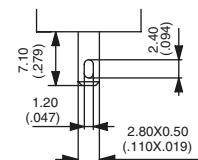
NON-ILLUMINATED



Solder lug S



Straight P



Quick-connect Z



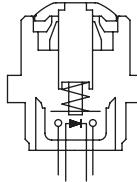
MATERIALS

- Case : thermoplastic UL94-V0
- Plunger : polyamide
- Bushing/bezel : polyamide
- Contacts :
 - 4 : silver, gold plated
 - 2 : silver (screw terminals)
- Multi-wire leads AWG20, section 0,6 mm²
- LED wire : AWG26, section 0,12 mm²
- Lens : polycarbonate
- Terminal seal : epoxy (except screw terminals)



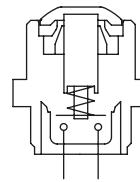
ELECTRICAL FUNCTIONS

ILLUMINATED MODELS



Function 3 (NO)

NON-ILLUMINATED MODELS

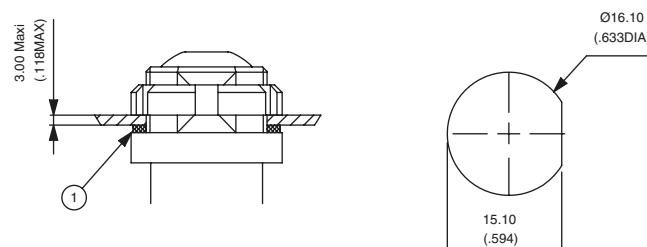


Function 3 (NO)

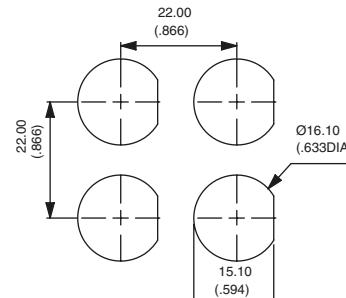


MOUNTING

PANEL CUT-OUT - MATRIX MOUNTING



① - Flat seal



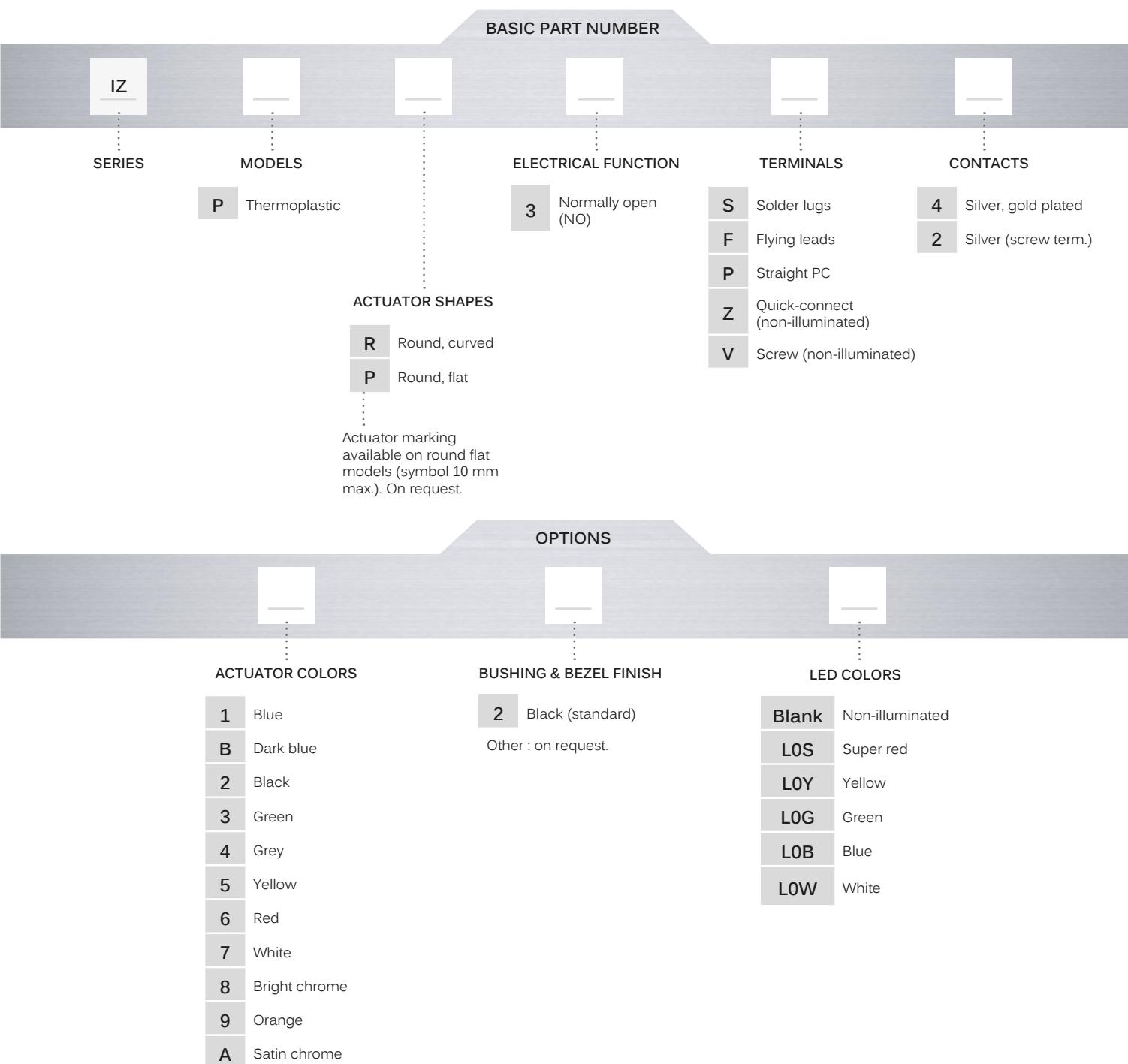
IZ series

Rear mounted sealed pushbutton switches • bushing Ø 16 mm • momentary



BUILD YOUR PART NUMBER

Latching version available. See website.



ABOUT THIS SERIES

Notice : please note that not all combinations of above numbers are available.
Refer to www.apem.com for further information.

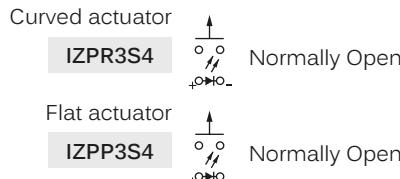
A sealing boot is available to protect the switches against frost and sand. See Sealing Boot section.

Mounting accessories : Standard hardware supplied : 1 castellated black plastic nut U4249 and 1 silicone flat seal.

I^Z series

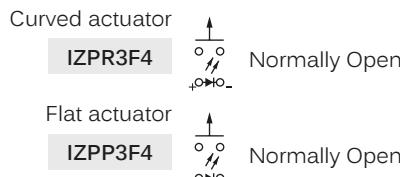
Rear mounted sealed pushbutton switches • bushing Ø 16 mm • momentary

ILLUMINATED SOLDER LUG TERMINALS



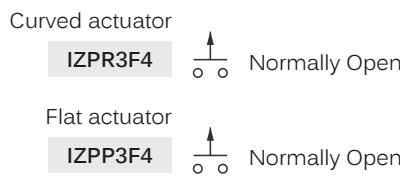
Also available with straight PC terminals : IZP•3P4.
LED color is indicated by the bottom of the switch.

ILLUMINATED FLYING LEAD TERMINALS

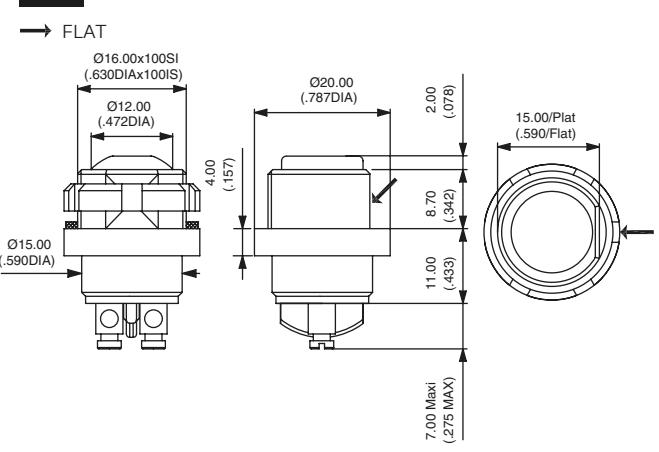
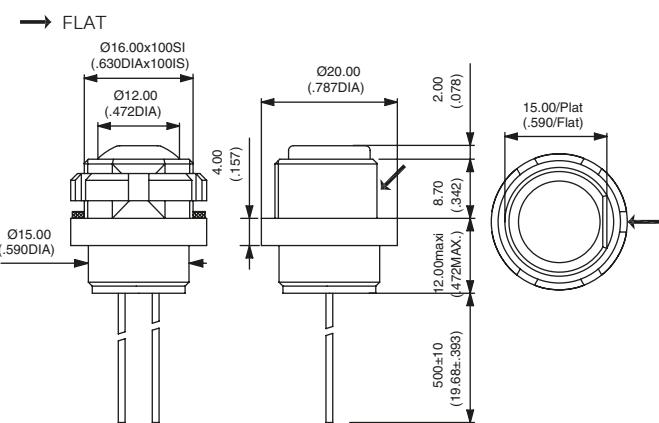
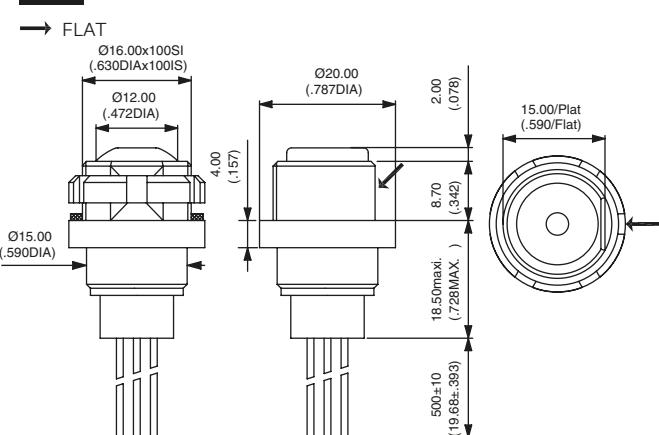
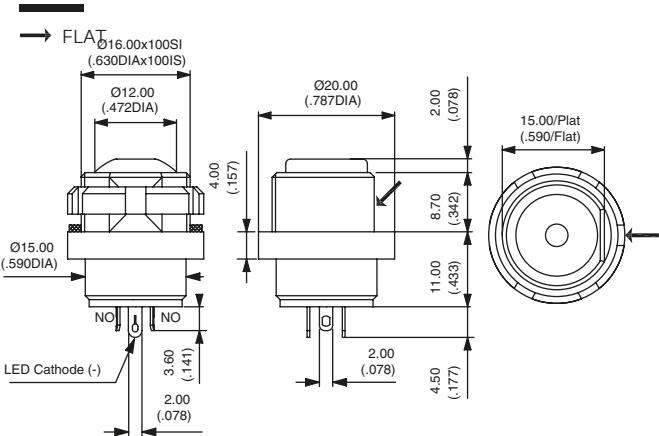
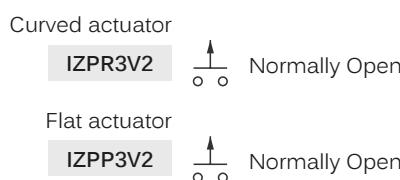


Wire colors : black : NO contact, red : LED anode(+), blue : LED cathode (-)

NON-ILLUMINATED FLYING LEAD TERMINALS



NON-ILLUMINATED SCREW TERMINALS



IR series

Sealed pushbutton switches • bushing Ø 16 mm • momentary • microswitch version



DISTINCTIVE FEATURES

- Microswitch technology up to 5A

- Tactile feedback

- Sealed to IP67

- Illuminated or non-illuminated

- Flat round actuator for optional marking



ENVIRONMENTAL SPECIFICATIONS

- Front panel sealing : IP67 according to IEC 60529
- Salt spray : IEC 512-6, test 11f
- Operating temperature : -20°C to +85°C



GENERAL SPECIFICATIONS

- Panel thickness : 3 mm (.118) max.
- Total travel : 1,6 mm (.062) +/- 0,3 mm
- Typical operating force : 4N +/- 2N
- Mechanical life : 1.000.000 cycles
- Torque : 0,8 Nm max. applied to nut
- Soldering : 320°C max. for 3 sec.



ELECTRICAL SPECIFICATIONS

- Max. current/voltage rating with resistive load (microswitch) :
 - 5A 250VAC, 50.000 cycles (function 7)
 - 5A 250VAC, 25.000 cycles (function 8)
- Initial contact resistance : 100 mΩ max.
- Insulation resistance : 1 GΩ min. at 500VDC
- Dielectric strength : 750 Vrms between terminals
2.000 Vrms between terminals and frame



MATERIALS

- Case : thermoplastic UL94-V0
- Actuator : polyamide 6/6
- Bushing/bezel : polyamide 6/6
- Contacts : silver
- Lens : polycarbonate

LED COMPONENT SPECIFICATIONS

| LED color | Forward current | Typ. forward voltage | Max. forward voltage |
|----------------|-----------------|----------------------|----------------------|
| Super red (0S) | 20mA | 2V | 2,5V |
| Yellow (0Y) | 20mA | 2V | 2,5V |
| Green (0G) | 10mA | 2V | 2,5V |
| Blue (0B) | 10mA | 3,3V | 3,8V |

A resistor must be series-connected by the user.
Resistor value = supply voltage - LED forward voltage

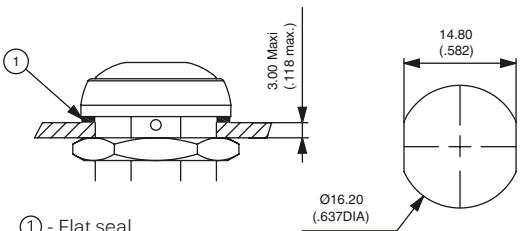
LED forward current

On flying lead versions, the LED resistor can be integrated by APEM on request.

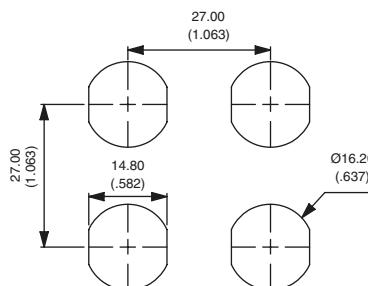


MOUNTING

PANEL CUT-OUT - MATRIX MOUNTING



The company reserves the right to change specifications without notice.



IR series

Sealed pushbutton switches • bushing Ø 16 mm •
momentary • microswitch version



BUILD YOUR PART NUMBER

BASIC PART NUMBER

| | | | | |
|-----------|---|---|-----------|--------------------------------|
| IR | | | | |
| SERIES | ACTUATOR SHAPES | ELECTRICAL FUNCTIONS | TERMINALS | CONTACTS |
| | C Square R Round, curved P Round, flat | 7 NC + NO (3 terminals) 8 NC/NO combined (4 terminals) | Z | Solder lug or quick-connect |
| | | | | 2 Silver |

Actuator marking
available on round flat
models (symbol 12 mm
max.). On request.

OPTIONS

| ACTUATOR COLORS | | BUSHING & BEZEL | | ILLUMINATION | | LED COLORS | |
|--------------------|------------------------|---------------------|--------------------------------|--------------|--------------------|--------------|-----------------|
| 1 Blue | 6 Red | 0 | Transparent (round bezel only) | Blank | Non-illuminated | Blank | Non-illuminated |
| B Dark blue | 7 White | 2 | Black (std) | L | Central lens | 0S | Super red |
| 2 Black | 8 Bright chrome | 1 | White | B | Bezel (round only) | 0Y | Yellow |
| 3 Green | 9 Orange | Other : on request. | | | | 0G | Green |
| 4 Grey | A Satin chrome | | | | | 0B | Blue |
| 5 Yellow | | | | | | | |

NOTICE : please note that not all combinations of above numbers are available. Refer to www.apem.com for further information.

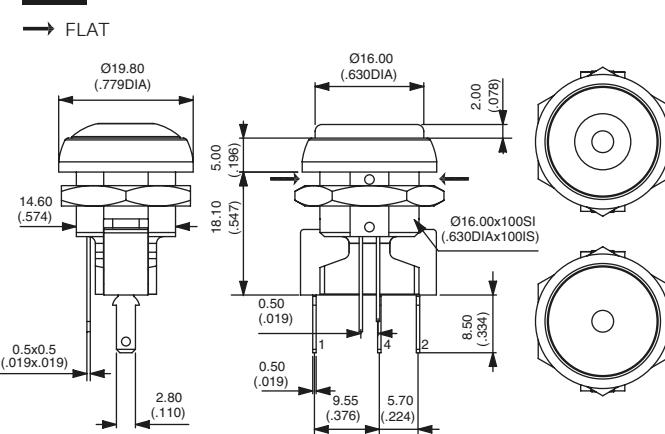
The IR series for high currents is based on a microswitch. Please note that this microswitch is supplied separately.

QUICK-CONNECT TERMINALS NC+NO - 3 TERMINALS



Curved actuator
IRR7Z2 NC+NO

Flat actuator
IRP7Z2 NC+NO



IR series

Sealed pushbutton switches • bushing Ø 16 mm •
momentary • standard version



DISTINCTIVE FEATURES

- Screw version up to 4A
- Tactile feedback
- Sealed to IP67
- Illuminated or non-illuminated
- Flat round actuator for optional marking



ENVIRONMENTAL SPECIFICATIONS

- Front panel sealing : IP67 according to IEC 60529
- Shock resistance : 100 g according to IEC 512-4, test 6c
- Vibration resistance : 10-500Hz - 10 g according to IEC 512-4, test 6d
- Salt spray : IEC 512-6, test 11f
- Operating temperature : -40°C to +85°C



ELECTRICAL SPECIFICATIONS

- Max. current/voltage rating with resistive load :
 - Gold plated contacts : Code 4 : 200mA 48VDC, 500.000 cycles
 - Code 7 : 5A 28VDC, 70.000 cycles
 - Silver contacts (code 2) - screw terminals : 4A 48VDC, 500.000 cycles
- Initial contact resistance : 100 mΩ max.
- Insulation resistance : 1 GΩ min. at 500VDC
- Dielectric strength : 1.500 Vrms



LED COMPONENT SPECIFICATIONS

| LED color | Forward current | Typ. forward voltage | Max. forward voltage |
|----------------|-----------------|----------------------|----------------------|
| Super red (0S) | 20mA | 2,1V | 2,3V |
| Yellow (0Y) | 20mA | 2,1V | 2,3V |
| Green (0G) | 20mA | 2,1V | 2,3V |
| Blue (0B) | 20mA | 3,2V | 3,8V |
| White (0W) | 20mA | 3,35V | 4,25V |
| Red/Green (SG) | 20mA | Red:1,95V-Green:2,1V | 2,5V |

A resistor must be series-connected by the user.
Resistor value = supply voltage - LED forward voltage

LED forward current

On flying lead versions, the LED resistor
can be integrated by APEM on request.

IR series

Sealed pushbutton switches • bushing Ø 16 mm • momentary • standard version



GENERAL SPECIFICATIONS

- Panel thickness : 8 mm (.314) max.
- Total travel : 1,6 mm (.062) +/- 0,3 mm
- Typical operating force : 4 N +/- 2 N
- Low level or mechanical life : 1.000.000 cycles
- Torque : 0,8 Nm max. applied to nut
- Soldering : 320°C max. for 3 sec.



MATERIALS

- Case : thermoplastic UL94-V0
- Actuator : polyamide 6/6
- Bushing/bezel : polyamide 6/6
- Contacts :
 - 4 and 7 : silver, gold plated
 - 2 : silver (screw terminals)
- Multi-wire leads AWG20, section 0,6 mm²
- LED wire : AWG26, section 0,12 mm²
- Lens : polycarbonate
- Terminal seal : epoxy

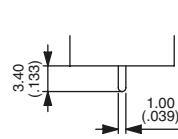


TERMINALS

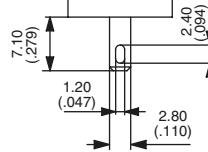
ILLUMINATED MODELS



NON-ILLUMINATED MODELS



Straight P

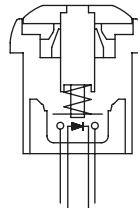


Quick-connect Z



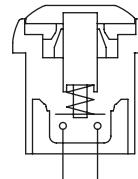
ELECTRICAL FUNCTIONS

ILLUMINATED MODELS



Function 3 (NO)

NON-ILLUMINATED MODELS

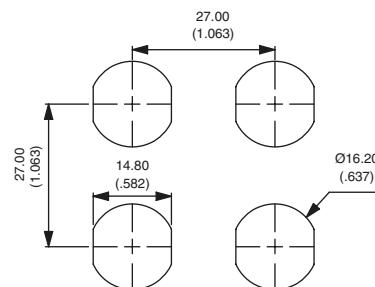
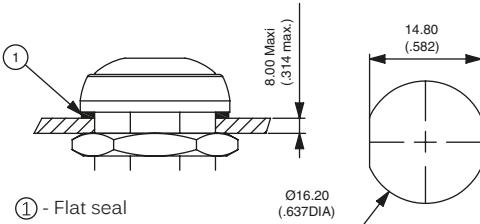


Function 3 (NO)



MOUNTING

PANEL CUT-OUT - MATRIX MOUNTING

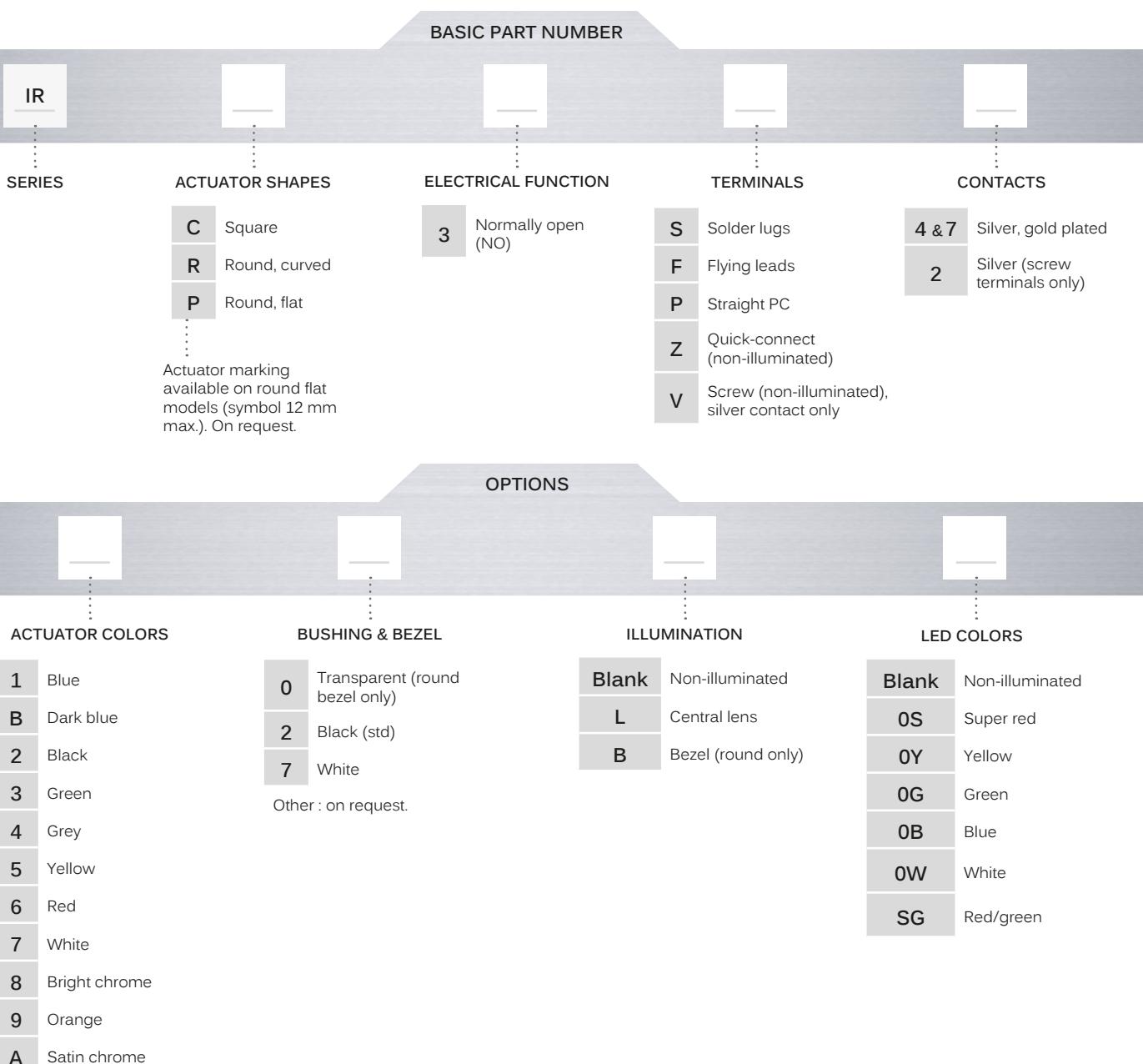


IR series

Sealed pushbutton switches • bushing Ø 16 mm •
momentary • standard version



BUILD YOUR PART NUMBER



ABOUT THIS SERIES



Notice : please note that not all combinations of above numbers are available.

Refer to www.apem.com for further information.

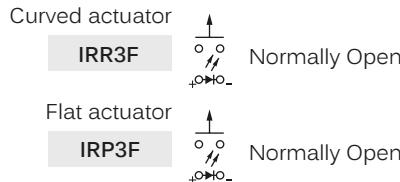


Mounting accessories : Standard hardware supplied : 1 hex nut 19 mm (.748) across flats and 1 flat seal Hex nut P/N U6715.

IR series

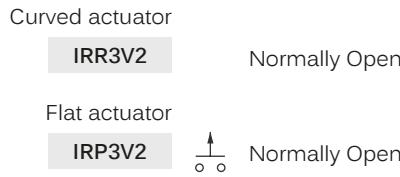
Sealed pushbutton switches • bushing Ø 16 mm •
momentary • standard version

ROUND - ILLUMINATED FLYING LEAD TERMINALS

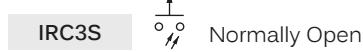


Wire colors : black : NO contact, red : LED anode (+), blue : LED cathode (-)

ROUND - NON-ILLUMINATED SCREW TERMINALS

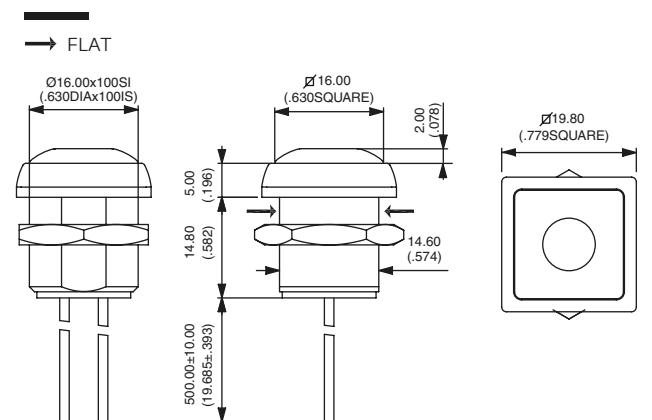
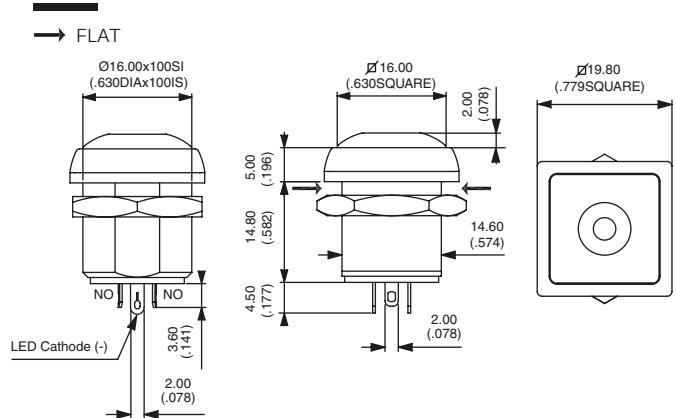
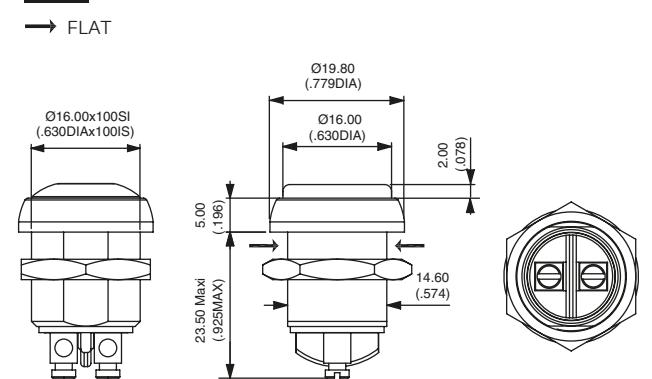
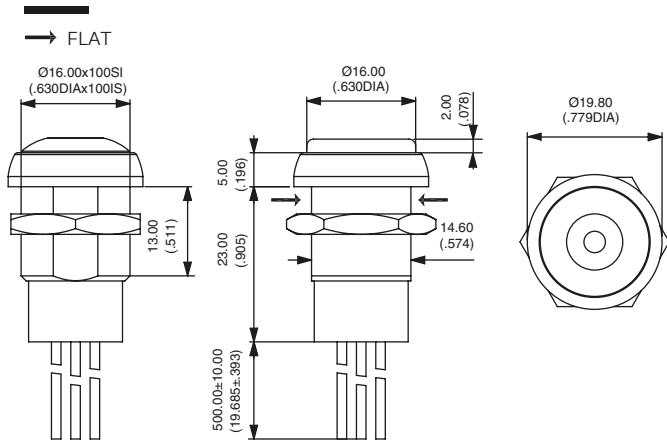
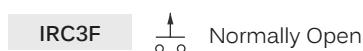


SQUARE - ILLUMINATED SOLDER LUG TERMINALS



Also available with straight PC terminals : **IRC3P4**.
LED color is indicated by the bottom of the switch.

SQUARE - NON-ILLUMINATED FLYING LEAD TERMINALS



IR series

Sealed pushbutton switches •
bushing Ø 16 mm • latching



DISTINCTIVE FEATURES

- Latching action models
- Sealed to IP67
- Illuminated or non-illuminated
- Flat round actuator for optional marking



ENVIRONMENTAL SPECIFICATIONS

- Front panel sealing : IP67 according to IEC 60529
- Shock resistance : 100 g according to IEC 512-4, test 6c
- Vibration resistance : 10-500Hz - 10 g according to IEC 512-4, test 6d
- Salt spray : IEC 512-6, test 11f
- Operating temperature : -40°C to +85°C



ELECTRICAL SPECIFICATIONS

- Max. current/voltage rating with resistive load (gold plated contacts) :
 - Code 4 : 100mA 24VDC, 200.000 cycles
 - Code 7 : 4A 12VDC, 200.000 cycles
 - 1A 48VDC, 200.000 cycles
 - 3A 48VDC, 75.000 cycles
- Initial contact resistance : 100 mΩ max.
- Insulation resistance : 1 GΩ min. at 500VDC
- Dielectric strength : 1.500 Vrms between terminals

LED COMPONENT SPECIFICATIONS

| LED color | Forward current | Typ. forward voltage | Max. forward voltage |
|----------------|-----------------|----------------------|----------------------|
| Super red (0S) | 20mA | 1,95V | 1,95V |
| Yellow (0Y) | 20mA | 2V | 2,05V |
| Green (0G) | 20mA | 2,1V | 2,5V |
| Blue (0B) | 20mA | 3,2V | 4V |

A resistor must be series-connected by the user.
Resistor value = supply voltage - LED forward voltage

LED forward current

On flying lead versions, the LED resistor
can be integrated by APEM on request.

IR series

Sealed pushbutton switches •
bushing Ø 16 mm • latching

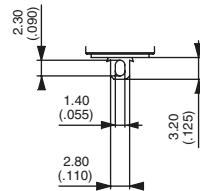


GENERAL SPECIFICATIONS

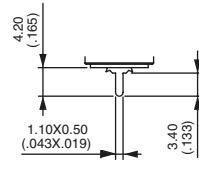
- Panel thickness : 8 mm (.314) max.
- Total travel : 2,5 mm (.098) +/- 0,3 mm
- Typical operating force : 5 N +/- 2 N
- Low level or mechanical life : 200.000 cycles
- Torque : 0,8 Nm max. applied to nut
- Soldering : 320°C max. for 3 sec.



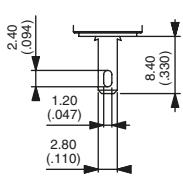
TERMINALS



Solder lug S



Straight P

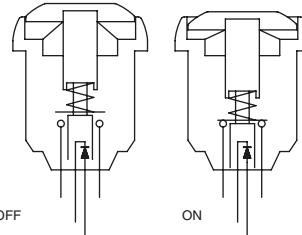


Quick-connect Z

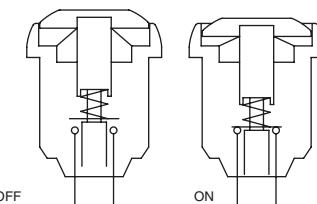


ELECTRICAL FUNCTIONS

ILLUMINATED MODELS



NON-ILLUMINATED MODELS



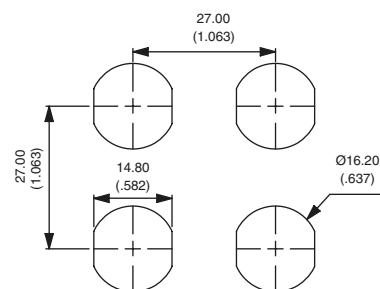
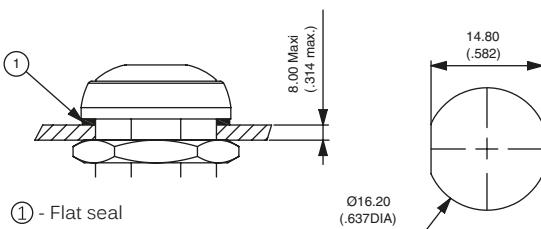
MATERIALS

- Case : thermoplastic UL94-V0
- Plunger : polyamide
- Bushing/bezel : polyamide
- Contacts : silver, gold plated (codes 4 and 7)
- Multi-wire leads AWG20, section 0,6 mm²
- LED wire : AWG26, section 0,12 mm²
- Lens : polycarbonate
- Terminal seal : epoxy



MOUNTING

PANEL CUT-OUT - MATRIX MOUNTING

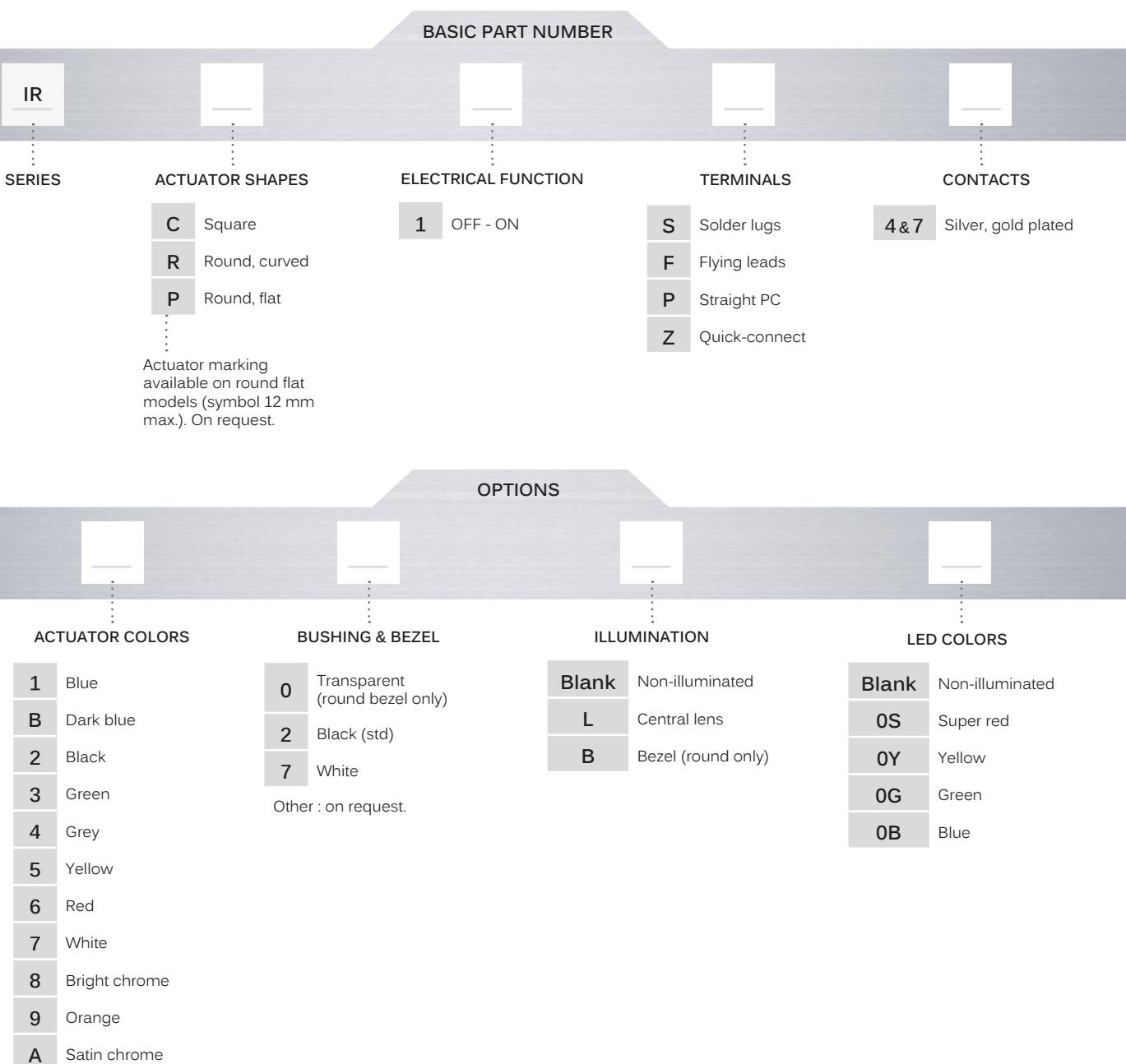


IR series

Sealed pushbutton switches •
bushing Ø 16 mm • latching



BUILD YOUR PART NUMBER



ABOUT THIS SERIES

- (!) **Notice :** please note that not all combinations of above numbers are available.
Refer to www.apem.com for further information.
- (!) **Mounting accessories :** Standard hardware supplied : 1 hex nut 19 mm (.748) across flats and 1 flat seal Hex nut P/N U6715.

IR series

Sealed pushbutton switches •
bushing Ø 16 mm • latching

ROUND - ILLUMINATED FLYING LEAD TERMINALS



| | | |
|-----------------|--------------|----------|
| Curved actuator | IRR1F | OFF - ON |
| Flat actuator | IRP1F | OFF - ON |

Wire colors : black : contact, red : LED anode (+), blue : LED cathode (-)

ROUND - NON-ILLUMINATED SOLDER LUG TERMINALS



| | | |
|-----------------|--------------|----------|
| Curved actuator | IRR1S | OFF - ON |
| Flat actuator | IRP1S | OFF - ON |

Also available with straight PC terminals : **IR•1P4**
& quick-connect terminals : **IR•1Z4**.

SQUARE - ILLUMINATED FLYING LEAD TERMINALS



| | | |
|-----------------|--------------|----------|
| Curved actuator | IRC1F | OFF - ON |
|-----------------|--------------|----------|

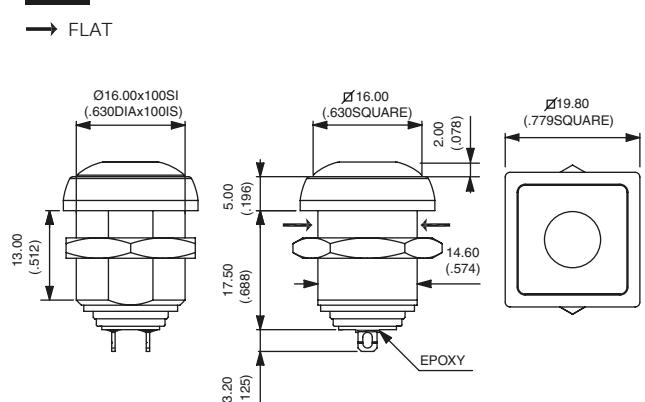
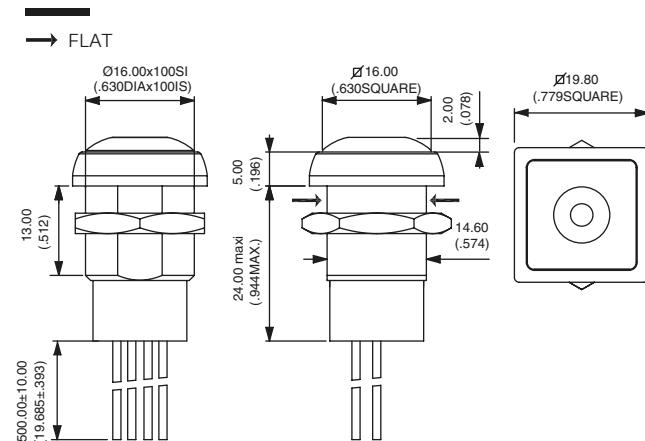
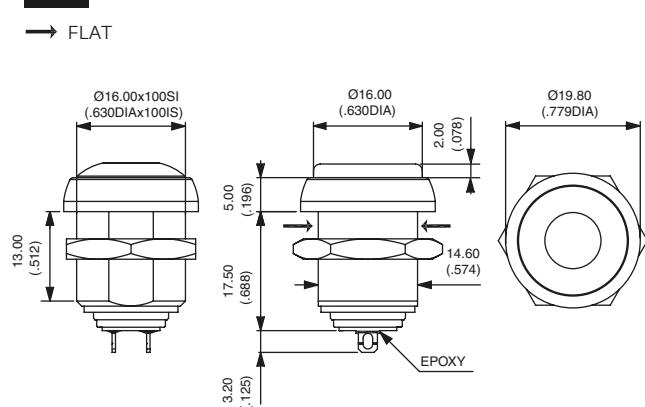
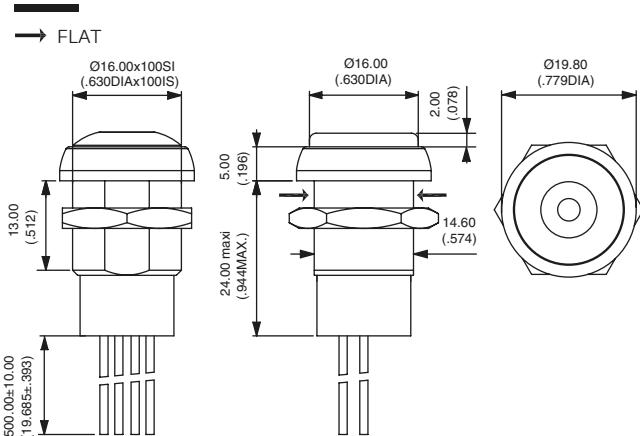
Wire colors : black : contact, red : LED anode(+), blue : LED cathode (-)

SQUARE - NON-ILLUMINATED SOLDER LUG TERMINALS



| | | |
|-----------------|--------------|----------|
| Curved actuator | IRC1S | OFF - ON |
|-----------------|--------------|----------|

Also available with straight PC terminals : **IRC1P4**
& quick-connect terminals : **IRC1Z4**.



IA series

Low profile pushbutton switches for harsh environments • bushing Ø 16 mm • momentary



DISTINCTIVE FEATURES

- Resistant to frost, sand and hydrocarbons
- Tactile feedback
- Front panel sealed to IP65 and IP67



ENVIRONMENTAL SPECIFICATIONS

- Front panel sealing :
IP65 and IP67 acc. to IEC 60529
- Salt spray : IEC 512-6, test 11f
- Operating temperature : -20°C to +65°C



ELECTRICAL SPECIFICATIONS

- Max. current/voltage rating with resistive load : 2A 24VDC
- Initial contact resistance : 100mΩ max.
- Insulation resistance : 100 MΩ min. at 500VDC
- Dielectric strength : 500 Vrms
- Electrical life at full load : 1.000.000 cycles



GENERAL SPECIFICATIONS

- Panel thickness : 7 mm (.276) max.
- Total travel : 1,5 mm (.059) +/- 0,3 mm
- Typical operating force : 7 N +/- 2 N
- Low level or mechanical life : 1.000.000 cycles
- Torque : 0,5 to 1Nm max. applied to nut



PANEL MOUNTING

- Panel cut-out Ø 16,2 mm (.657)
- Min. pitch for matrix mounting :
 - with standard hex nut : 27 x 27 mm (1.062 x 1.062)
 - with knurled nut U3327: 20 x 20 mm (.787x.787)



MATERIALS

- Case/bushing : thermoplastic
- Actuator : polyurethane
- Contacts : silver, gold plated
- Multi-wire leads AWG20, section 0,6 mm².
- Terminal seal : epoxy

The company reserves the right to change specifications without notice.

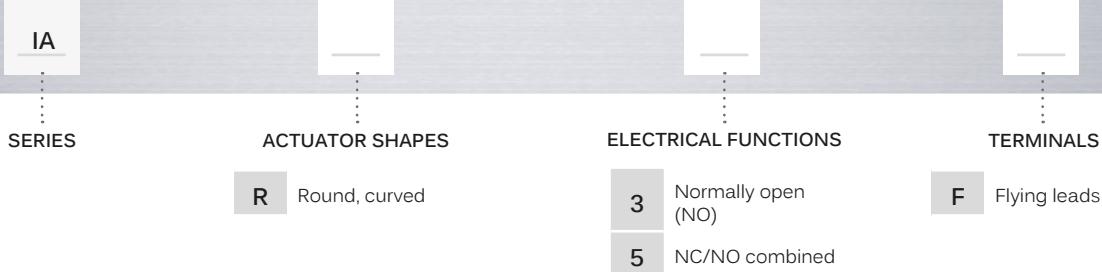
IA series

Low profile pushbutton switches for harsh environments • bushing Ø 16 mm • momentary



BUILD YOUR PART NUMBER

BASIC PART NUMBER



OPTIONS

| | | |
|-----------------------|-----------------|------------|
| CONTACTS | ACTUATOR COLORS | CASE COLOR |
| 1 Silver, gold plated | 1 Blue | 00 Black |
| | 2 Black | |
| | 3 Green | |
| | 4 Grey | |
| | 5 Yellow | |
| | 6 Red | |
| | 7/1 White | |
| | 9 Orange | |

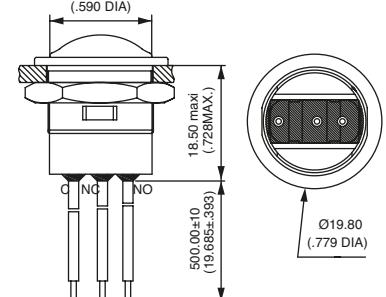
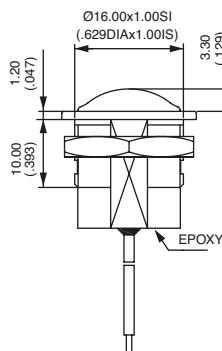
NOTICE : please note that not all combinations of above numbers are available. Refer to www.apem.com for further information.

MODELS



IAR3F Normally open (NO)

IAR5F NC/NO combined



Wire colors (NC/NO) : black = common, brown = NC, blue = NO

IF series

Sealed pushbutton switches
with Ø 25 mm actuator • bushing dia. 16 mm



DISTINCTIVE FEATURES

- Can be operated with gloved hands
- Snap-in and threaded bushing models
- Resistant to frost
- Sealed to IP54 or IP67



ENVIRONMENTAL SPECIFICATIONS

- Front panel sealing (switches mounted on panel) :
 - IP67 (threaded bushing models)
 - IP54 (snap-in models)
- Operating temperature : -20°C to +85°C



ELECTRICAL SPECIFICATIONS

- Max. current/voltage rating with resistive load :
400mA 32VAC - 100mA 48VDC
- Initial contact resistance : 50 mΩ max.
- Insulation resistance : 1 GΩ min. at 500VDC
- Dielectric strength : 1.000 VAC rms. between terminals and frame
1500 VAC between terminals
- Electrical life at full load : 500.000 cycles



GENERAL SPECIFICATIONS

- Panel thickness :
 - Snap-in models : 0,8 mm (.031) min. - 2,5 mm (.098) max.
 - Threaded bushing models : 0,8 mm (.031) min. - 5 mm (.196) max.
- Total travel : 4 mm (.157)
- Typical operating force : 6,5 N +/- 2N
- Low level or mechanical life : 1.000.000 cycles
- Torque : 1,5 Nm max. applied to nut
- Soldering : 320°C max. for 3 seconds



MATERIALS

- Case : thermoplastic UL94-V0
- Actuator : polyamide 12, rubber filled
- Bushing/bezel : polyamide 6/6
- Contacts : solid silver, gold plated
- Terminal seal : epoxy

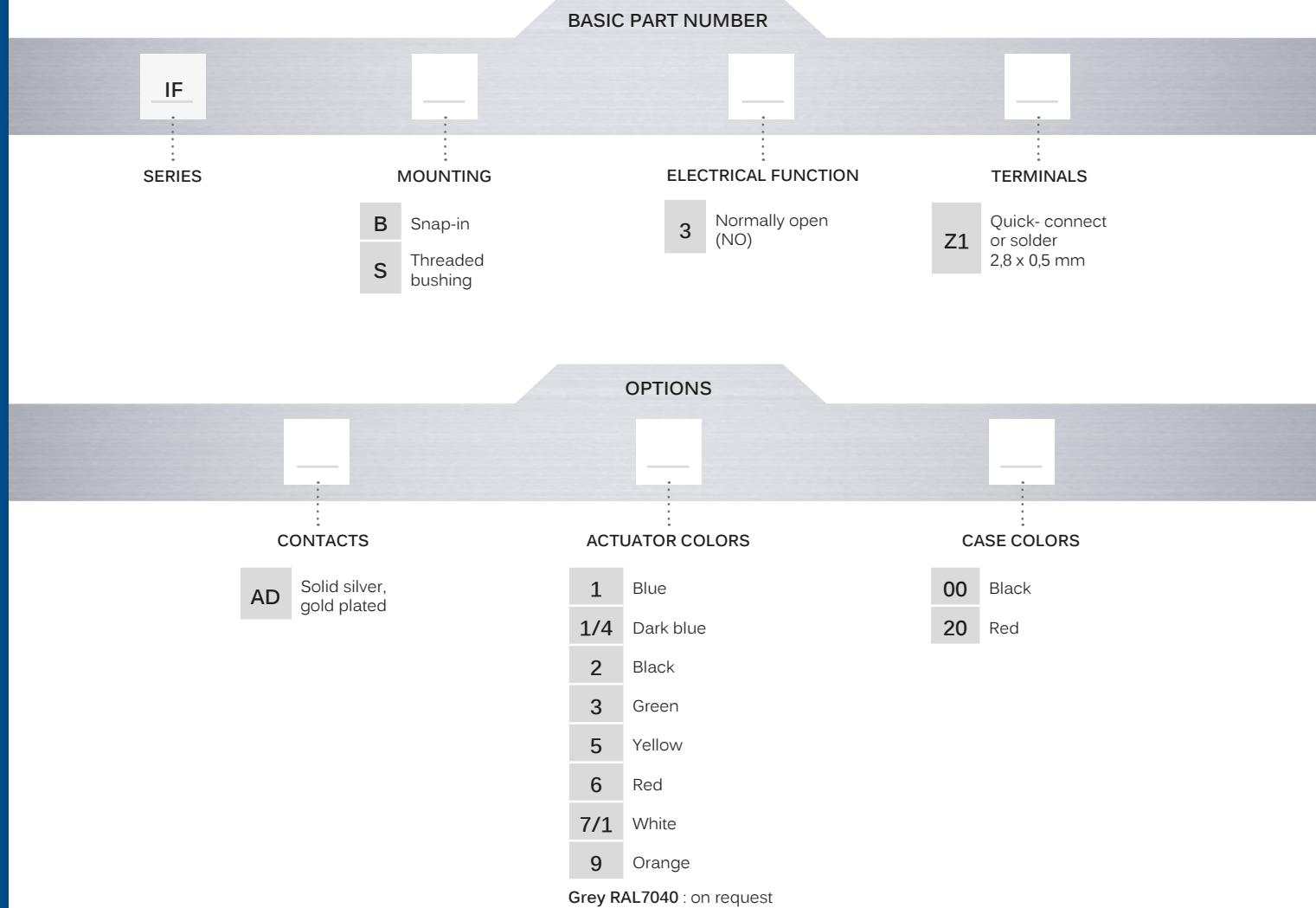
The company reserves the right to change specifications without notice.

IF series

Sealed pushbutton switches with Ø 25 mm actuator • bushing dia. 16 mm

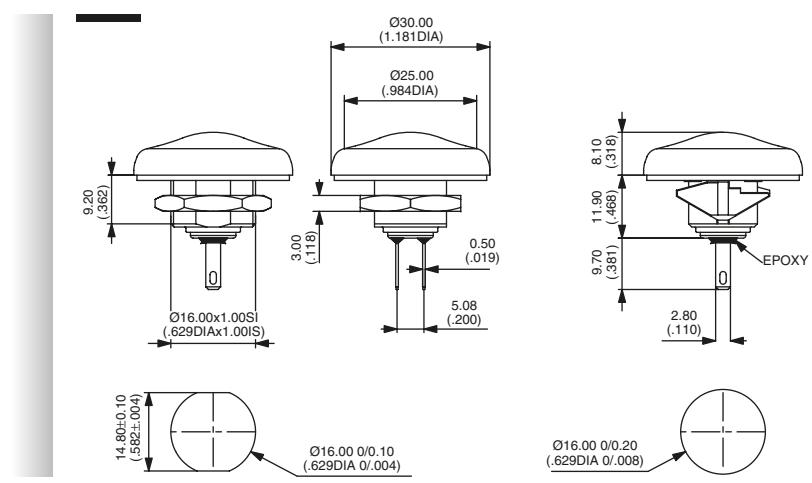


BUILD YOUR PART NUMBER



NOTICE : please note that not all combinations of above numbers are available. Refer to www.apem.com for further information.

MODELS



ZP series

Subminiature pushbutton switches • metal bushing



DISTINCTIVE FEATURES

- Ø 4,83 mm threaded bushing
- Solder lug and straight PC terminals



ELECTRICAL SPECIFICATIONS

- Max. current/voltage rating with resistive load :
 - gold plated contacts : 0,4VA 20V max. AC or DC
 - silver plated contacts : 0,5A 48V max. AC or DC
- Minimum load : 10mA 50mV - 10µA 5VDC
- Contact resistance : 50 mΩ max.
- Insulation resistance : 1.000 MΩ min. at 500VDC
- Dielectric strength: 1.000 Vrms 50 Hz min. between terminals and frame / 500 Vrms 50 Hz min. between terminals
- Electrical life at full load :
 - gold plated contacts : 60.000 cycles
 - silver plated contacts: 20.000 cycles



ENVIRONMENTAL SPECIFICATIONS

- Operating temperature : -30°C to +85°C
- Moisture : 21 days 95 % (NFC 20-603 - IEC 68-2-3)



GENERAL SPECIFICATIONS

- Travel :
 - function 2 (ON-MOM) : 1,2 mm (.047) ± 0,3 (.11)
 - function 3 (OFF-MOM) : 1 mm (.039) ± 0,3 (.11)
- Strength of terminals : pull-out force 10 N max.
- Torque : 1 Nm max. applied between the 2 nuts
- Max. panel thickness : 1,5 mm (.059) with 2 nuts



SOLDERING

- Hand soldering : 280°C max. for 5 seconds max.
- Wave soldering : 260°C max. for 5 seconds max.

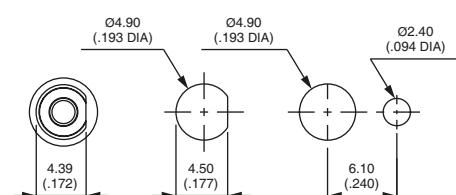


MATERIALS

- Case : thermoplastic UL94-V0
- Actuator : thermoplastic UL94-V0
- Bushing : zamac, tin plated
- Contacts and terminals :
 - 0 : brass, gold plated (standard)
 - 1 : brass, silver plated
 - 3 : brass, gold plated (1,27 micron gold)
- Terminal seal : epoxy



PANEL CUT-OUT

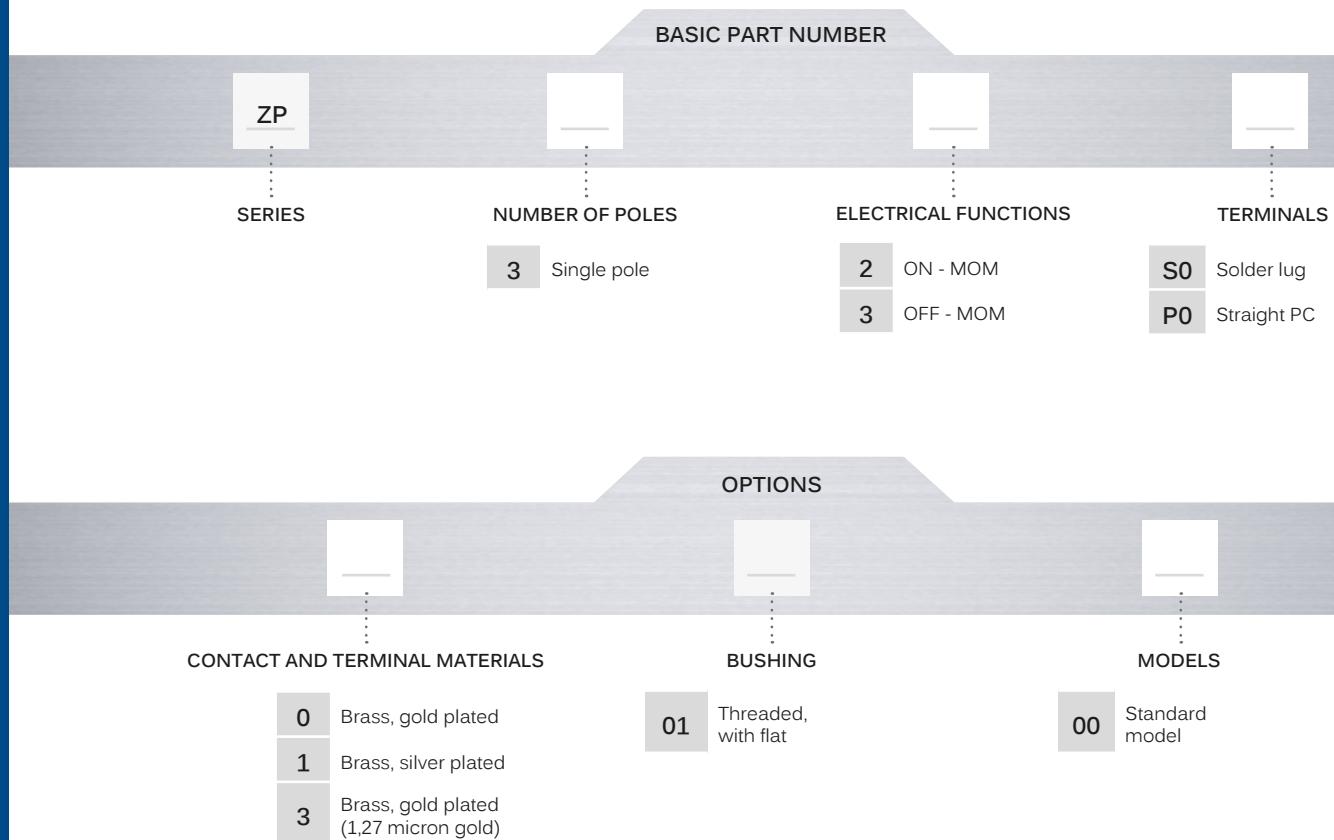


ZP series

Subminiature pushbutton switches • metal bushing



BUILD YOUR PART NUMBER

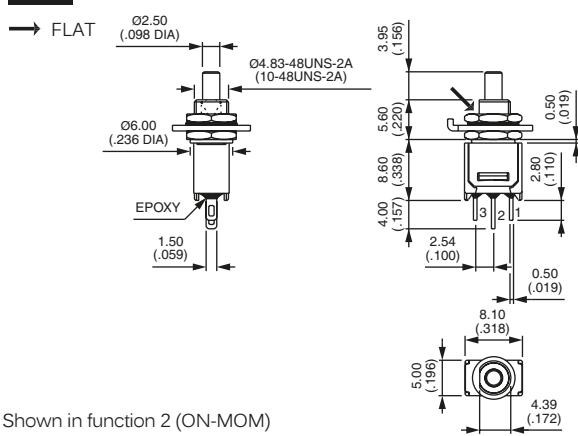


NOTICE : please note that not all combinations of above numbers are available. Refer to www.apem.com for further information.

SOLDER LUG TERMINALS : ZP..SO



| | | |
|--------|-----|-----|
| ZP32S0 | ON | MOM |
| ZP33S0 | OFF | MOM |



9100-9200-9500 series

Subminiature momentary pushbutton switches



DISTINCTIVE FEATURES

- Panel and PC mount models, horizontal or vertical
- Self-cleaning and butt action contacts
- Several plunger options



ELECTRICAL SPECIFICATIONS

- Max. current/voltage rating with resistive load : 100mA 30VDC
- Initial contact resistance : 30 mΩ max.
- Insulation resistance : 1.000 MΩ min. at 500VDC
- Dielectric strength :
 - 500 Vrms 50 Hz min. between terminals
 - 1.000 Vrms 50 Hz min. between terminals and frame
- Electrical life at full load :
 - 9100 - 9200N and 9500N : 250.000 cycles
 - 9200 - 9500 : 100.000 cycles



GENERAL SPECIFICATIONS

- Torque : 0,5 Nm (.590 Ft.lb) max. applied to nut
- Operating temperature : -30°C to +65°C
- Panel thickness : 1,50 mm (.059) max.
- Travels : see table below
Tolerance : +/- 0,3 mm (.011)

| | 9533-9233 | 9532-9232 | 9533N 9233N-9133 |
|--------------|-------------|-------------|---------------------|
| Total travel | 1,10 (.043) | 1,80 (.070) | 1 (.039) |
| Pre-travel | 0,80 (.031) | 1,00 (.039) | - |
| Over travel | 0,30 (.011) | 0,75 (.029) | - |

The company reserves the right to change specifications without notice.

9100-9200-9500 series

Subminiature momentary pushbutton switches

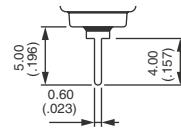
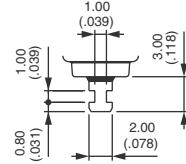


MATERIALS

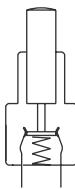
- Case : Pa6T
- Actuator : polyamide, glass filled
- Bushing : brass, nickel plated
- Contacts :
- CD : brass, gold plated
- Terminal seal : epoxy



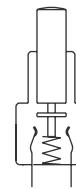
TERMINALS



ELECTRICAL FUNCTIONS



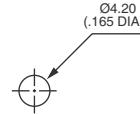
Function 2 (NC)



Function 3 (NO)



PANEL CUT-OUT

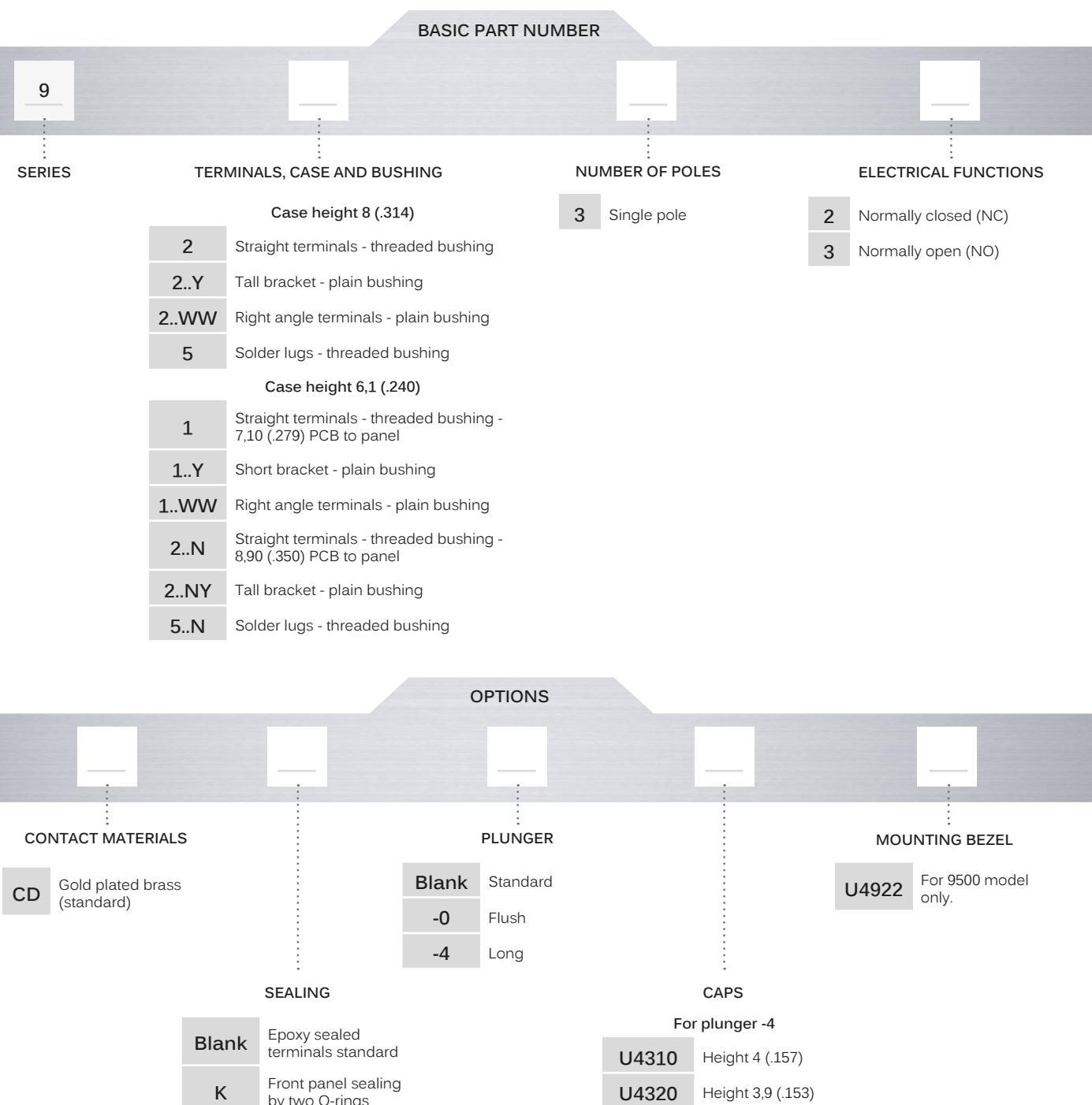


9100-9200-9500 series

Subminiature momentary pushbutton switches



BUILD YOUR PART NUMBER



ABOUT THIS SERIES

- (1) **Notice :** please note that not all combinations of above numbers are available.
Refer to www.apem.com for further information.
- (2) **Sealing boots** are available to protect the switches. See Sealing Boot section.
- (3) **Mounting accessories** : standard hardware supplied with all threaded bushing models : 1 nickel plated hex nut 5 (.196) across flats, part number U544.

9100-9200-9500 series

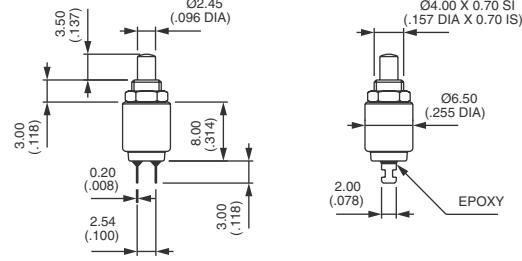
Subminiature momentary pushbutton switches

LONG CASE - SOLDER LUGS : 9500



9532 Normally Closed

9533 Normally Open

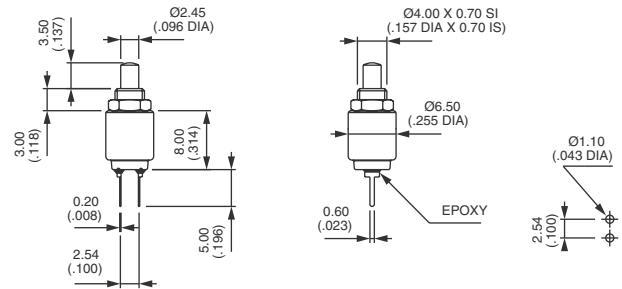


LONG CASE - STRAIGHT PC TERMINALS : 9200



9232 Normally Closed

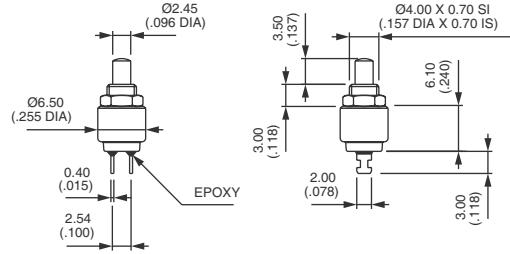
9233 Normally Open



SHORT CASE - SOLDER LUGS : 9500N



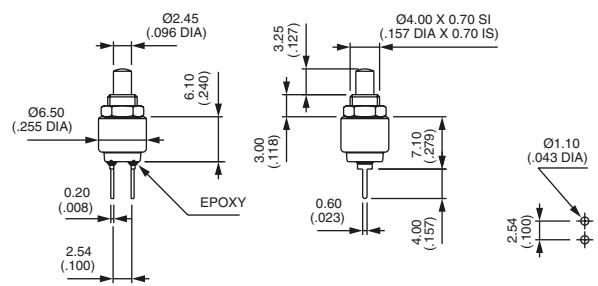
9533N Normally Open



SHORT CASE - STRAIGHT PC TERMINALS 7.10 (.279) PCB TO PANEL



9133 Normally Open



SP series

Washable snap-action pushbutton switches



DISTINCTIVE FEATURES

- Process sealed
- Front and rear sealing
- Process compatible (plain bushing models)
- Wave solderable
- Washable

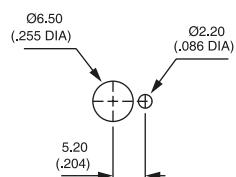


ELECTRICAL SPECIFICATIONS

- Max. current/voltage rating with resistive load :
 - gold plated brass contacts : 100mA 30VDC
 - silver or gold plated silver contacts : 1A 30VDC
- Initial contact resistance : 50 mΩ max.
- Insulation resistance : 1.000 MΩ min.
- Dielectric strength : 1.000 Vrms 50 Hz min.
- Electrical life : 60.000 cycles



PANEL CUT-OUT



ENVIRONMENTAL SPECIFICATIONS

- Operating temperature : -20°C to +85°C
- Storage temperature : -40°C to +85°C
- Moisture : The insulating materials employed and the complete seal permit the switches to withstand a 56 days moisture test (IEC 68-2-3).
- Solderability : The switches are tested at 235°C according to IEC 68-2-20 after accelerated aging.



MATERIALS

- Case and cover : UL94-V0, polyamide, glass filled or PES
- Actuator : polyamide, glass filled
- Contacts
0 : brass, gold plated
1 : silver
2 : silver, gold plated
- Terminal seal : epoxy



GENERAL SPECIFICATIONS

- Torque : 0,25 Nm (.18 Ft.lb) applied to nut (threaded bushing)
- Total travel : 0,50 mm (.019)
- Mechanical strength : Terminals are strengthened by a bracket or a ground plate ensuring the rigidity of the switch on the board. Actuator strength is 10N max.
- Soldering - thermal shock (plain bushing models only) : The switches are especially designed for flow soldering at 260°C during 5 seconds owing to high temperature polymer parts.
- Iron soldering (threaded bushing models) : 300°C max., 5 seconds max.

AGENCY APPROVAL



1A 120VAC

Availability : all models with silver or gold plated silver contacts.

Marking : to order switches marked UL, complete appropriate box of ordering format.

SP series

Washable snap-action pushbutton switches



BUILD YOUR PART NUMBER

BASIC PART NUMBER

SP

SERIES



NUMBER OF POLES

| | |
|---|-------------|
| 3 | Single pole |
| 4 | Double pole |



ELECTRICAL FUNCTION

5 ON - MOM



TERMINALS

| | |
|----|---|
| P0 | Straight PC |
| Y0 | Straight PC and bracket mounting |
| W0 | Right angle, horizontal mounting |
| WW | Right angle, vertical mounting |
| S0 | Solder lug terminals, (threaded bushing) |

OPTIONS

CONTACT AND TERMINAL MATERIALS

| | |
|---|---------------------|
| 0 | Brass, gold plated |
| 1 | Silver |
| 2 | Silver, gold plated |

PLUNGERS

| | |
|----|----------|
| 00 | Standard |
| 02 | Short |

OPTIONS/APPROVAL

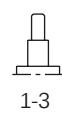
| | |
|----|--|
| 00 | Standard model |
| 01 | UL marking on standard model |
| 02 | UL marking on threaded bushing model (SP only) |
| 76 | Short bushing for plunger 02 (SP only) |
| 77 | Threaded bushing |

CAPS (MOUNTED)

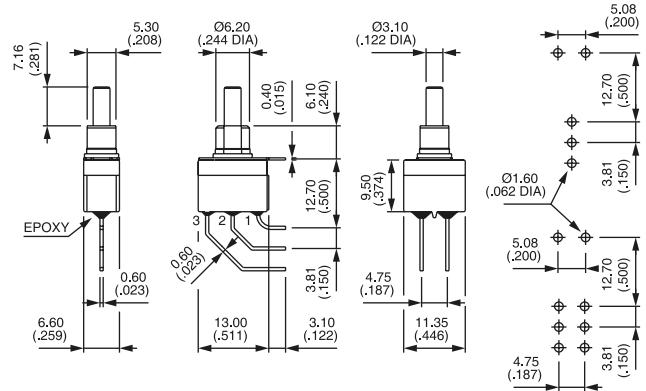
| | |
|----|------------------------|
| 10 | Ø 5 (.196) |
| 20 | Ø 8 (.314) |
| 30 | Ø 9,4 (.370) |
| 40 | Ø 10 (.393) |
| 80 | Ø 15 (.590) |
| 70 | Square Height 4 (.157) |
| 50 | Square Height 6 (.236) |

NOTICE : please note that not all combinations of above numbers are available.
Refer to www.apem.com for further information.

PLAIN BUSHING - RIGHT ANGLE TERMINALS VERTICAL

Single pole
SP35WW... 00ON MOM
1-3 1-2Double pole
SP45WW... 00ON MOM
1-3 1-2

Shown with standard plunger



8000 series

Momentary or alternate action
pushbutton switches



DISTINCTIVE FEATURES

Momentary or alternate

Bushing Ø 6,35 (1/4) and Ø 11,9 (15/32)

UL approved



ELECTRICAL SPECIFICATIONS

- Max. current/voltage rating with resistive load :
 - silver contacts : 4A 30VDC
 - gold plated contacts : 0,4VA max. 20VAC or DC
- Initial contact resistance : 10 mΩ max.
- Insulation resistance : 1.000 MΩ min. at 500VDC
- Dielectric strength :
 - 1.000 Vrms 50 Hz min. between terminals
 - 2.000 Vrms 50 Hz min. between terminals and frame
- Electrical life : 30.000 cycles at full load



GENERAL SPECIFICATIONS

- Torque : 1,25 Nm (.922 Ft.lb) max. applied to nut
- Total travel : 2,70 mm (.106)
- Operating temperature : -40°C to +85°C



MATERIALS

- Case : diallylphthalate (DAP)

- Actuator : brass, nickel plated

- Bushing : brass, nickel plated

- Housing : stainless steel

- Contacts

A : silver

AD : silver, gold plated

CD : brass, gold plated

- Terminal seal : epoxy

The company reserves the right to change specifications without notice.

8000 series

Momentary or alternate action pushbutton switches

AGENCY APPROVAL



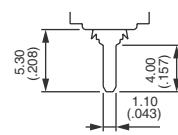
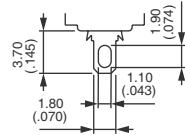
3A 250VAC,
6A 125VAC

Availability: consult factory for details of approved models.

Marking: to order switches marked UL, complete appropriate box of ordering format.



TERMINALS



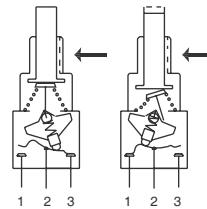
ELECTRICAL FUNCTIONS



KEYWAY



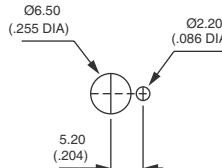
Funct. 6 (ON-ON)



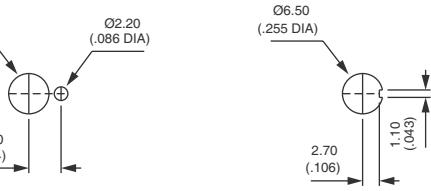
Funct. 2 (ON-MOM)



PANEL CUT-OUT



Standard



With K sealing option

8000 series

Momentary or alternate action pushbutton switches



BUILD YOUR PART NUMBER

| BASIC PART NUMBER | | | | |
|--|--------------------------------------|---|--|---|
| 8 | | | | |
| SERIES | TERMINALS AND BUSHINGS | NUMBER OF POLES | ELECTRICAL FUNCTIONS | TERMINALS |
| 4 | Straight PC or right angle terminals | 3 Single pole | 2 ON - MOM | Blank Solder lugs or straight PC depending on model |
| 6 | Solder lug terminals | 4 Double pole | 6 ON - ON | W Right angle |
| All models with Ø 6,35 (1/4) or Ø 11,9 (15/32) threaded bushing. | | | | |
| OPTIONS | | | | |
| ORDER SEPARATELY. | | | | |
| CONTACT MATERIALS | PLUNGERS | SPECIAL OPTIONS | APPROVAL | CAPS |
| A Silver | For bushing Ø 6,35 (1/4) | X718 Bushing Ø 11,9 (15/32) | UL Consult factory for details of approved models. | U900 Ø 5 (.196) |
| AD Silver, gold plated | Blank Height 6,3 (.248) | X934 Flatted bushing Ø 11,9 (15/32) + front panel sealing | | U1140 Ø 8 (.314) |
| CD Brass, gold plated | -9 Height 8,8 (.346) | | | U1720 Ø 9,4 (.370) |
| | For bushing Ø 11,9 (15/32) | | | U480 Ø 10 (.393) Standard |
| | Blank Height 8,6 (.338) | | | U630 Ø 15 (.590) |
| | -6 Height 7 (275) | | | U2430 Square Height 4 (.157) |
| SEALING | | | | |
| Blank No sealing | | | | U2020 Square Height 6 (.236) |
| B Epoxy sealed terminals | | | | |
| K Front panel sealing by O-ring and sealing washer | | | | |



ABOUT THIS SERIES

- (1) **Notice :** please note that not all combinations of above numbers are available.
Refer to www.apem.com for further information.
- (2) **Sealing boots** are available to protect the switches against dust and water. See Sealing Boot section.
- (3) **Mounting accessories** : standard hardware supplied with all models : 2 hex nuts 8 mm (.314) across flats, 1 locking ring and 1 lockwasher.

8000 series

Momentary or alternate action pushbutton switches

SOLDER LUG TERMINALS : 8600



Single pole

8632

8636

Double pole

8642

8646



2-3

1-2



2-3

5-6



1-2

4-5



MOM

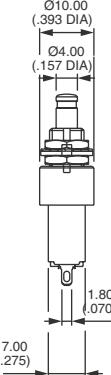
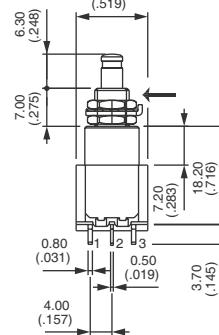
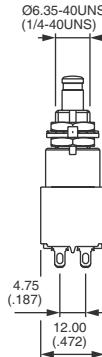
ON

ON

ON

→ KEYWAY

Shown with standard plunger



STRAIGHT PC TERMINALS : 8400



Single pole

8432

8436

Double pole

8442

8446



2-3



1-2

MOM

ON



2-3

5-6



1-2

4-5

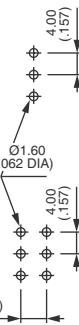
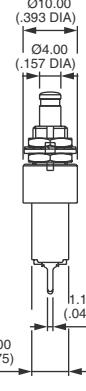
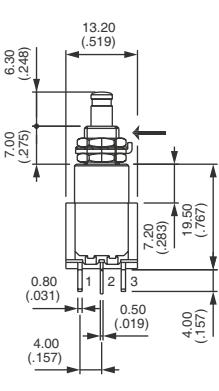
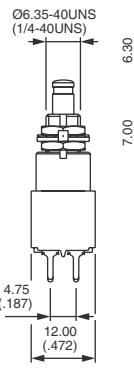


MOM

ON

ON

→ KEYWAY



RIGHT ANGLE TERMINALS HORIZONTAL : 8400W



Single pole

8432W

8436W

Double pole

8442W

8446W



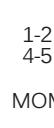
2-3



1-2

MOM

ON



2-3

5-6



1-2

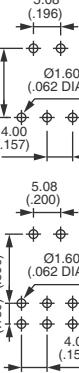
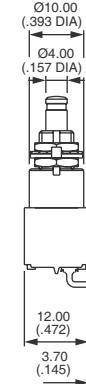
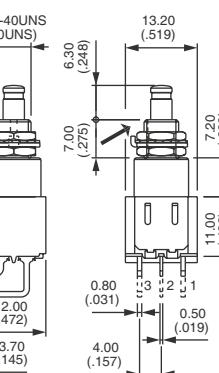
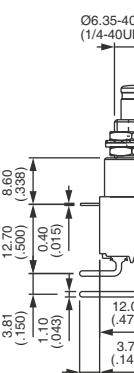
4-5



MOM

ON

→ KEYWAY



9400-9600 series

Momentary pushbutton switches



DISTINCTIVE FEATURES

- Two case lengths
- Three electrical functions
- Sealing options
- Model X1146 with Ø 16 (.630) bushing



ELECTRICAL SPECIFICATIONS

- Max. current/voltage rating with resistive load :
 - silver contact (A) : 1A 30VDC
 - gold plated contacts (CD) : 100mA 30VDC
- Initial contact resistance : 50 mΩ max.
- Insulation resistance : 1.000 MΩ min. at 500VDC
- Dielectric strength :
 - 1.000 Vrms 50 Hz min. between terminals
 - 1.500 Vrms 50 Hz min. between terminals and frame
- Electrical life : 250.000 cycles



GENERAL SPECIFICATIONS

- Total travel :
- | 9600-9400-9400Y | | 9600N-9400N |
|-------------------|------------|-------------|
| Functions 3 and 5 | Function 2 | Function 3 |
| 1,3 mm | 2 mm | 0,9 mm |
- Torque : 1,25 Nm (.922 Ft.lb) max. applied to nut
 - Operating temperature : -30°C to +65°C



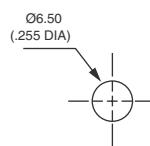
MATERIALS

- Case : thermoplastic UL94-V0
- Actuator : polyamide, glass filled
- Bushing : brass, nickel plated
- Contacts :
 - A : silver
 - CD : brass, gold plated
- Terminal seal : epoxy

The company reserves the right to change specifications without notice.



PANEL CUT-OUT



9400-9600 series

Momentary pushbutton switches



BUILD YOUR PART NUMBER

BASIC PART NUMBER

| | | | |
|---------------|---|----------------------|-------------------------------|
| 9 | | | |
| SERIES | TERMINALS, CASE AND BUSHING | NUMBER OF POLES | ELECTRICAL FUNCTIONS |
| | Case length 11,2 (.440) | 3 Single pole | 2 Normally closed (NC) |
| 4 | Straight PC terminals | | 3 Normally open (NO) |
| 6 | Solder lug terminals | | 5 Combined (NC/NO) |
| 4..Y | Straight PC terminals, bracket mounting | | |
| | Case length 8,5 (.334) | | |
| 4..N | Straight PC terminals | | |
| 6..N | Solder lug terminals | | |
| 6..NZ1 | Quick-connect terminals | | |

All models have Ø 6,35 (1/4) threaded bushing.

OPTIONS

CONTACT MATERIALS

| | |
|-----------|--------------------|
| A | Silver |
| CD | Brass, gold plated |

SEALING

| | |
|-----------|--|
| B | Epoxy sealed terminals (standard) |
| KB | Front panel sealing by two O-rings - not available with 9400Y. |

SPECIAL OPTIONS

| | |
|--------------|-------------------------------|
| X1146 | Bushing Ø 16 (.630) |
| X601 | Special contact, lower rating |

CAPS

| | |
|--------------|--------------------------|
| U900 | Ø 5 (.196) |
| U1140 | Ø 8 (.314) |
| U1720 | Ø 9,4 (.370) |
| U480 | Ø 10 (.393) standard |
| U630 | Ø 15 (.590) |
| U2430 | Square - Height 4 (.157) |
| U2020 | Square - Height 6 (.236) |

NOTICE : please note that not all combinations of above numbers are available.
Refer to www.apem.com for further information.

SOLDER LUG TERMINALS CASE LENGTH 11,2 (.440) : 9600

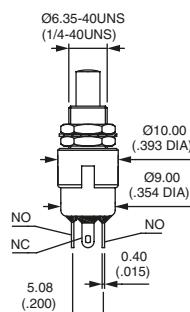
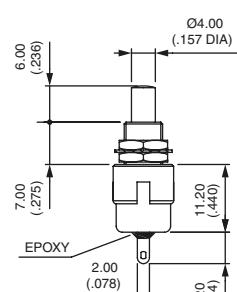


9632B

Normally Closed

9635B

Combined function



10400 series

Professional pushbutton switches •
threaded bushing Ø 10 mm



DISTINCTIVE FEATURES

Threaded bushing dia. 10 (.393)

CECC approved

Available with black finish



ELECTRICAL SPECIFICATIONS

- Max. current/voltage rating with resistive load : 3A 24VDC
- Minimum load : 100µA 10mV
- Initial contact resistance : 10 mΩ max.
- Insulation resistance : 1.000 MΩ min. at 500VDC
- Dielectric strength :
 - 1.000 Veff. 50 Hz min. between terminals of the same pole
 - 2.000 Veff. 50 Hz min. between terminals and frame
 - 2.000 Veff. 50 Hz min. between terminals of adjacent poles
- Electrical life : 50.000 cycles

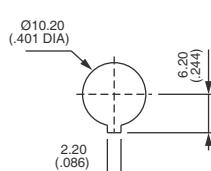


GENERAL SPECIFICATIONS

- Torque : 1,50 Nm (1.106 Ft.lb) max. applied to nut
- Operating temperature : -40°C to +85°C
- Max. panel thickness : 3,5 mm (.138)



PANEL CUT-OUT



MATERIALS

- Case : diallylphthalate (DAP)
- Actuator : brass, chrome plated
- Bushing : brass, nickel plated
- Housing : brass, nickel plated
- Contacts :
 - silver
 - gold plated silver
- Terminal seal : epoxy

AGENCY APPROVAL



CECC 96401-001

Availability : consult factory for details of approved models.

Marking : to order switches marked CECC, add "CECC" to model number.

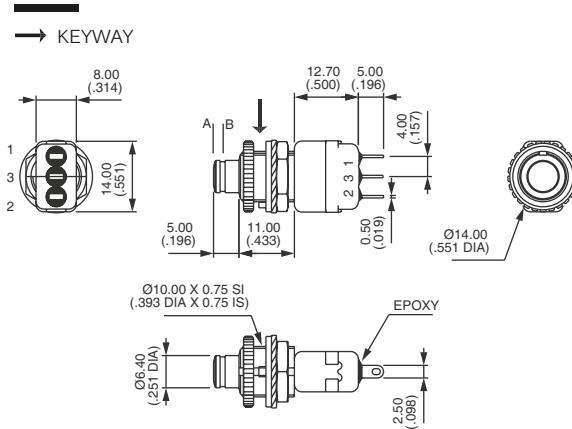
10400 series

Professional pushbutton switches •
threaded bushing Ø 10 mm

SINGLE POLE



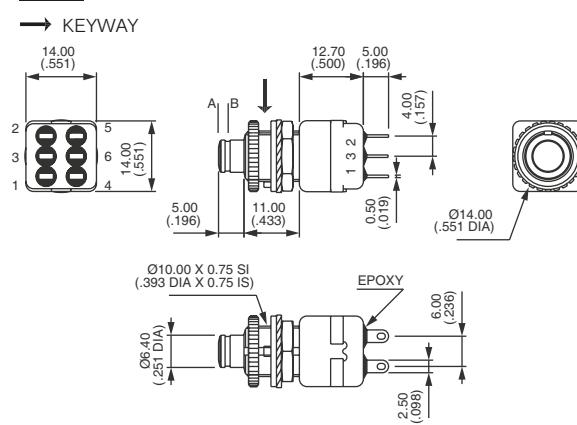
| | A 1-2 | B 1-3 |
|-----------------------------|----------|----------|
| Silver contacts | ON | MOM |
| Gold plated silver contacts | ON | MOM |



DOUBLE POLE



| | A 1-2 5-4 | B 1-3 5-6 |
|-----------------------------|-----------------|-----------------|
| Silver contacts | ON | MOM |
| Gold plated silver contacts | ON | MOM |



13000 series

Professional quick-break
momentary pushbutton switches



DISTINCTIVE FEATURES

PC and panel mount models

Bushing Ø 6,35 (1/4) and 11,9 (15/32)

UL and CECC approved



ELECTRICAL SPECIFICATIONS

- Max. current/voltage rating with resistive load :
 - silver contacts (A-AD2) : 4A 30VDC
 - gold plated contacts (CD) : 100mA 30V
- Minimum load (AD2-CD contacts) : 10mA 50mV, 10µA 5V min.
- Initial contact resistance : 10 mΩ max.
- Insulation resistance : 1.000 MΩ min. at 500VDC
- Dielectric strength :
 - 1.000 Vrms 50 Hz min. between terminals
 - 2.000 Vrms 50 Hz min. between poles and between terminals and frame
- Contact bounce : 2 ms max.
- Electrical life :

| Contacts | Max. current/voltage rating | Number of cycles |
|----------|---|------------------|
| A | 4A 30VDC | 50.000 |
| AD2 | 4A 30VDC (gold plating : 100mA 30VDC max.) | 20.000 |
| CD | 100mA 30VDC | 50.000 |
| | Low level or mechanical life | 150.000 |



GENERAL SPECIFICATIONS

- Torque : 1,25 Nm (.922 Ft.lb) max. applied to nut
- Standard panel thickness : 2 mm (.078) max.
- Total travel : 2 mm (.078)
- Operating temperature : -40°C to +85°C

The company reserves the right to change specifications without notice.

13000 series

Professional quick-break
momentary pushbutton switches



MATERIALS

- Case : diallylphthalate (DAP)
- Actuator : brass, nickel plated
- Bushing : brass, nickel plated
- Housing : brass, nickel plated
- Contacts :
 - A : silver
 - AD2 : silver, gold plated (2 micron gold)
 - CD : brass, gold plated
- Terminal seal : epoxy

Note : AD2 contacts can be used for high level applications. In this case, the gold layer is considered only as a protection against oxidation during storage.



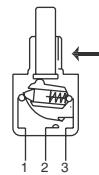
TERMINALS



ELECTRICAL FUNCTION

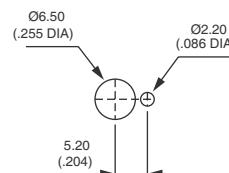


KEYWAY

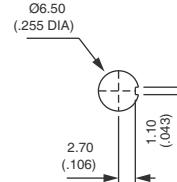


PANEL CUT-OUT

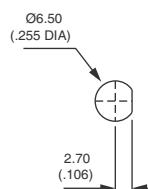
FOR Ø 6.35 (1/4") BUSHING



Standard



With K sealing option



With X640 sealing option

AGENCY APPROVALS



2A 125VAC/250VAC



CECC 96401-001

Designed to MIL specifications

Availability :

UL : all models with silver or gold plated silver contacts.
CECC : consult factory for details of approved models.

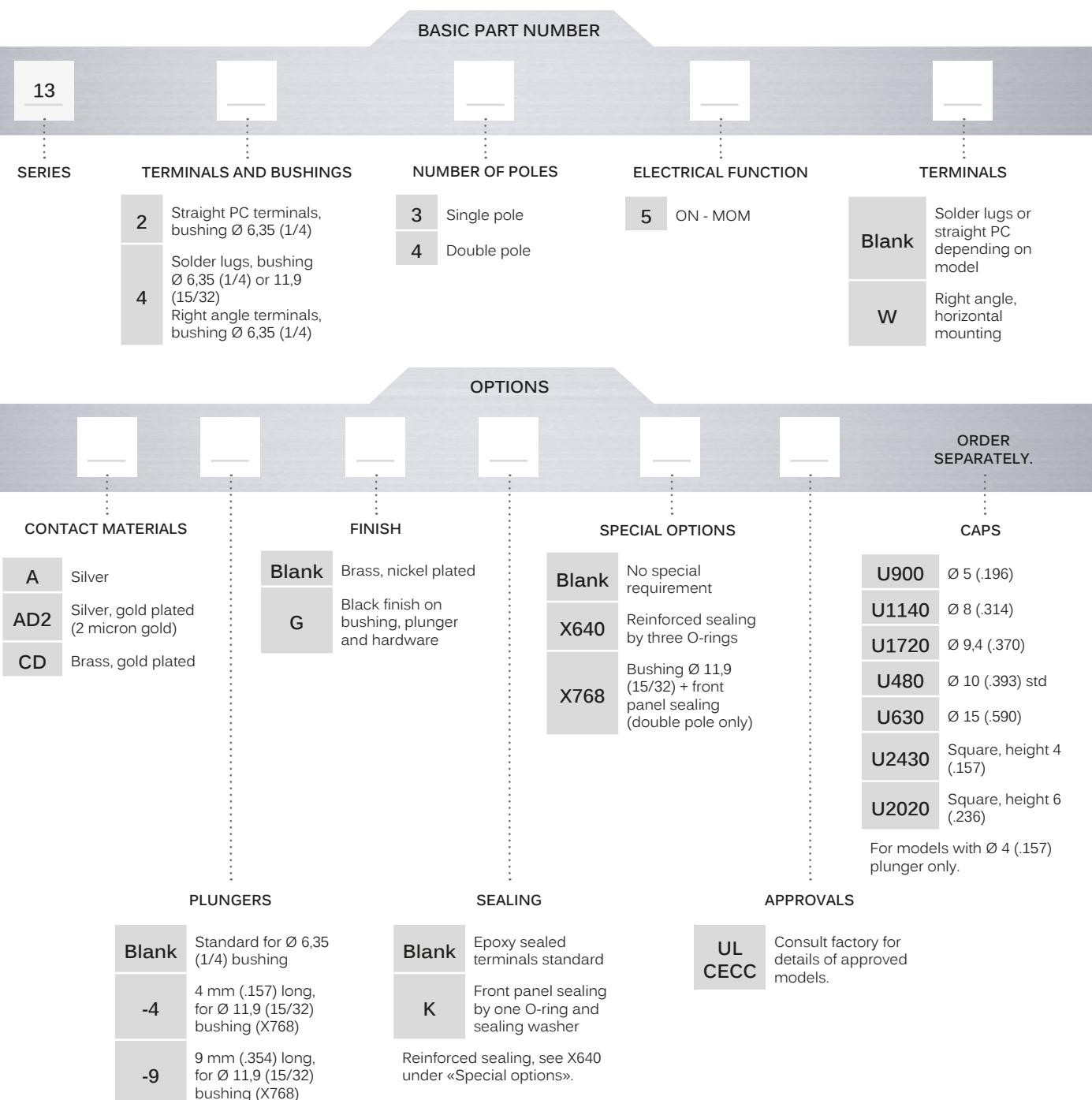
Marking : to order switches marked UL or CECC,
complete appropriate box of ordering format.

13000 series

Professional quick-break
momentary pushbutton switches



BUILD YOUR PART NUMBER



ABOUT THIS SERIES

- (1) **Notice :** please note that not all combinations of above numbers are available.
Refer to www.apem.com for further information.
- (2) **Sealing boots** are available to protect the switches against dust and water. See Sealing Boot section.
- (3) **Mounting accessories :** standard hardware supplied with all models : 2 hex nuts 8 mm (.314) across flats, 1 locking ring and 1 lockwasher.

13000 series

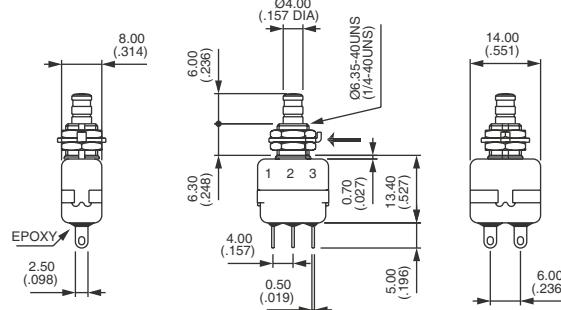
Professional quick-break
momentary pushbutton switches

**Ø 6,35 BUSHING
SOLDER LUG TERMINALS : 13400**



| | | |
|-------------|-----|-----|
| Single pole | 1-3 | 1-2 |
| 13435 | ON | MOM |
| Double pole | 1-3 | 1-2 |
| 13445 | ON | MOM |

→ KEYWAY

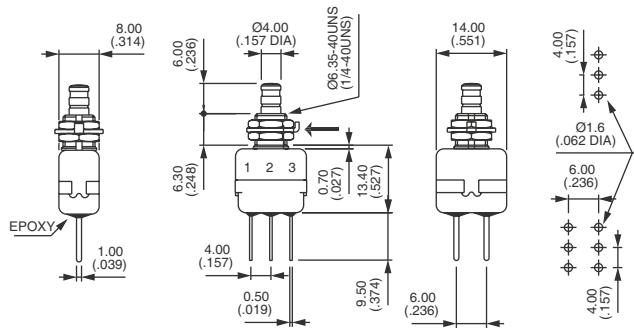


**Ø 6,35 BUSHING
STRAIGHT PC TERMINALS : 13200**



| | | |
|-------------|-----|-----|
| Single pole | 1-3 | 1-2 |
| 13235 | ON | MOM |
| Double pole | 1-3 | 1-2 |
| 13245 | ON | MOM |

→ KEYWAY

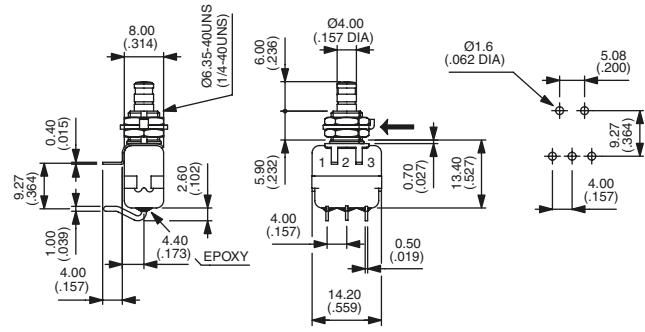


**Ø 6,35 BUSHING
RIGHT ANGLE TERMINALS - SINGLE POLE**



| | | |
|--------|----|-----|
| 13435W | ON | MOM |
|--------|----|-----|

→ KEYWAY

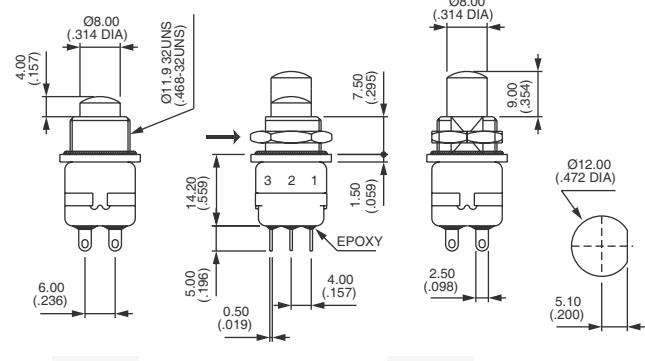


**SEALED SWITCH WITH Ø 11,9 FLATTED
BUSHING : X768**



| | | |
|--------------------|-----|-----|
| With short plunger | 1-3 | 1-2 |
| 13445-4 X768 | ON | MOM |
| With long plunger | 1-3 | 1-2 |
| 13445-9 X768 | ON | MOM |

→ FLAT



Chrome plated actuator

13000X778 series

High performance pushbutton switches •
threaded bushing Ø 11,9 mm • momentary



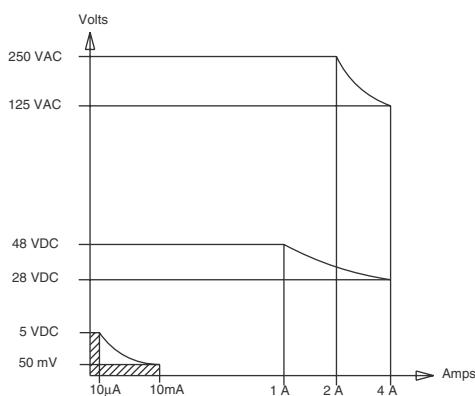
DISTINCTIVE FEATURES

- Fully sealed, black
- Double shell case for high mechanical strength and electrical insulation
- CECC approved (CECC 96401-001)
- Highly reliable contacts
- Compact size



ELECTRICAL SPECIFICATIONS

- Max. current/voltage rating with resistive load : 4A 28VDC
- Minimum load : 10mA 50mV, 10µA 5VDC
When used above 300mA 28VDC, the gold plating is removed on contact areas and is considered only as a protection against oxidation during storage.
- Initial contact resistance : 10 mΩ max.
- Insulation resistance : 1.000 MΩ min. at 500VDC
- Dielectric strength :
 - 1.000 Vrms 50 Hz min. between terminals
 - 2.000 Vrms 50 Hz min. between poles
 - 2.000 Vrms 50 Hz min. between terminals and frame
- Contact bounce : 2 ms max.
- Electrical life :
 - At 4A 28VDC : 10.000 cycles
 - At low level (50mV 10mA) : 150.000 cycles



The company reserves the right to change specifications without notice.

13000X778 series

High performance pushbutton switches •
threaded bushing Ø 11,9 mm • momentary



ENVIRONMENTAL SPECIFICATIONS

- Shock test : 50g - 11ms (IEC 68-2-27)
- Vibrations : 10-500 Hz - 10g (IEC68-2-6)
- Operating temperature : -40°C to +85°C
- Humidity test : 56 days, 93 % R.H., 40°C (IEC 68-2-3)
- Salt spray test : 96 hours (IEC 68-2-11)



GENERAL SPECIFICATIONS

- Total travel : 2 mm (.078) - Pre-travel : 1 mm (.039)
- Torque : 1,50 Nm (1.10 Ft.lb) max. applied to nut
- Panel thickness : 5 mm (.196) max.



MATERIALS

- Case : diallylphthalate (DAP)
with PBT external shell (epoxy sealed)
- Actuator : brass, black chrome plated
- Bushing : brass, black chrome plated
- Contacts : silver inlay - gold plated over nickel barrier



AGENCY APPROVALS



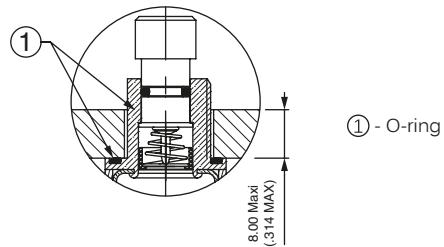
CECC 96401-001

Many double pole models have full CECC approval.
Consult factory for details of approved models. To
order switches marked CECC, complete appropriate
box of ordering format.

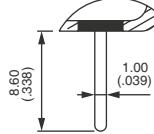
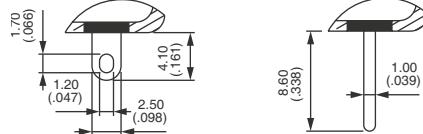


SEALING

- Front panel sealing by two O-rings
- Panel seal withstands 1 bar pressure and
remains sealed even when the switch is
operated.
- Epoxy sealed terminals
- Splash-proof case

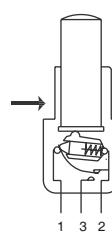


TERMINALS

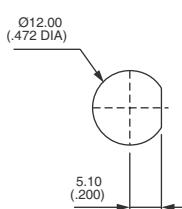


ELECTRICAL FUNCTION

→ FLAT



PANEL CUT-OUT

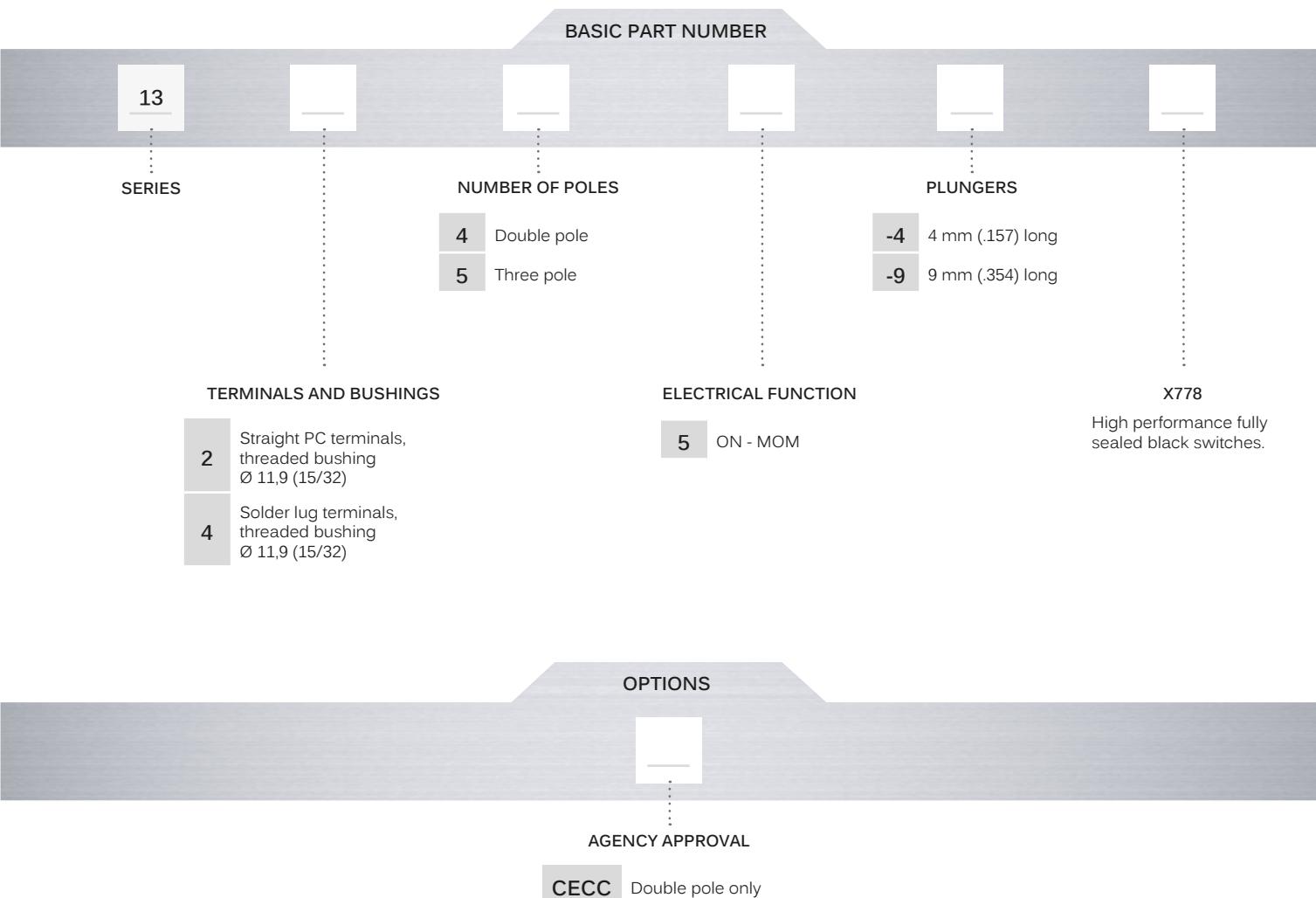


13000X778 series

High performance pushbutton switches • threaded bushing Ø 11,9 mm • momentary



BUILD YOUR PART NUMBER



ABOUT THIS SERIES

Notice : please note that not all combinations of above numbers are available.
Refer to www.apem.com for further information.

Sealing boots can be used to further protect the switches against dust and water. See Sealing Boot section.

Mounting accessories : standard hardware supplied with all models : 1 hex nut 14 (.551) across flats, part number U41.

Switch guard available to prevent inadvertent plunger operation. See Switch Guard section.

13000X778 series

High performance pushbutton switches •
threaded bushing Ø 11,9 mm • momentary

SOLDER LUG TERMINALS DOUBLE POLE - 4 MM (.157) PLUNGER



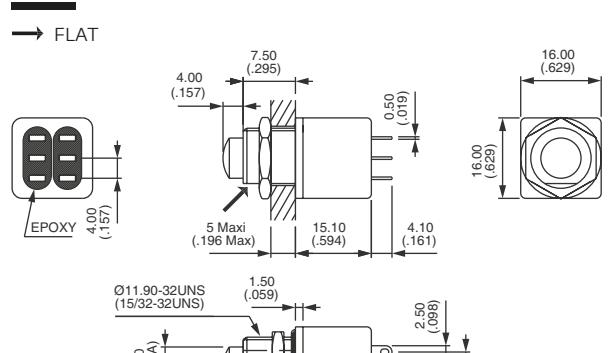
13445-4X778



ON



MOM



SOLDER LUG TERMINALS DOUBLE POLE - 9 MM (.354) PLUNGER



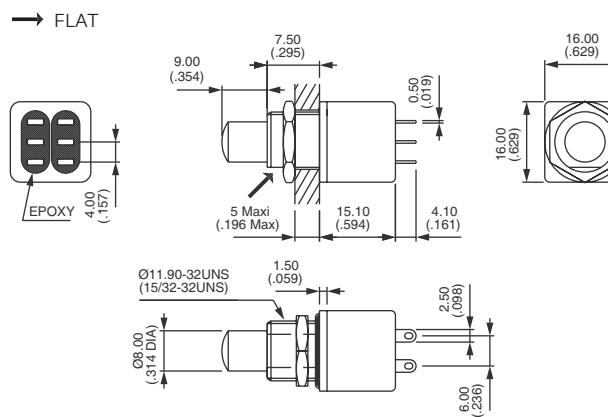
13445-9X778



ON



MOM



STRAIGHT PC TERMINALS DOUBLE POLE - 4 MM (.157) PLUNGER



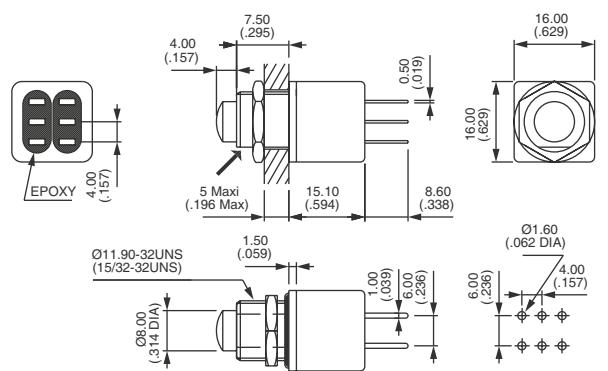
13245-4X778



ON



MOM



SOLDER LUG TERMINALS THREE POLE - 4 MM (.157) PLUNGER



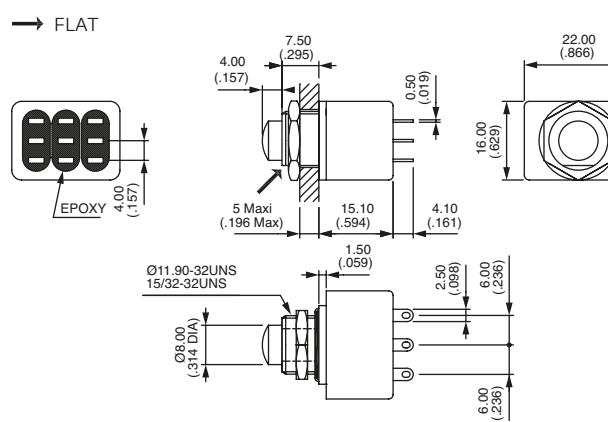
13455-4X778



ON



MOM



13000X778 series

High performance pushbutton switches •
threaded bushing Ø 11,9 mm • alternate action



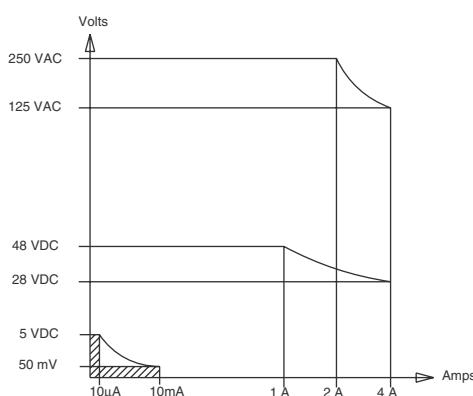
DISTINCTIVE FEATURES

- Alternate action
- Fully sealed, black
- Double shell case for high mechanical strength and electrical insulation
- Highly reliable contacts
- Compact size



ELECTRICAL SPECIFICATIONS

- Max. current/voltage rating with resistive load : 4A 28VDC
- Minimum load : 10mA 50mV, 10µA 5VDC
When used above 300mA 28VDC, the gold plating is removed on contact areas and is considered only as a protection against oxidation during storage.
- Initial contact resistance : 10 mΩ max.
- Insulation resistance : 1.000 MΩ min. at 500VDC
- Dielectric strength :
 - 1.000 Vrms 50 Hz min. between terminals
 - 2.000 Vrms 50 Hz min. between poles
 - 2.000 Vrms 50 Hz min. between terminals and frame
- Contact bounce : 2 ms max.
- Electrical life :
 - At 4A 28VDC : 10.000 cycles
 - At low level (50mV 10mA) : 150.000 cycles



The company reserves the right to change specifications without notice.



GENERAL SPECIFICATIONS

- Total travel : 2,5 mm (.098)
- Torque : 1,50 Nm (1.10 Ft.lb)
max. applied to nut
- Panel thickness : 8 mm (.315) max.



MATERIALS

- Case : diallylphthalate (DAP) with PBT external shell (epoxy sealed)
- Actuator : brass, black chrome plated
- Bushing : brass, black chrome plated
- Contacts : silver inlay - gold plated over nickel barrier

13000X778 series

High performance pushbutton switches •
threaded bushing Ø 11,9 mm • alternate action

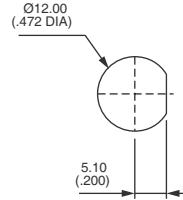


ENVIRONMENTAL SPECIFICATIONS

- Shock test : 50g - 11ms (IEC 68-2-27)
- Vibrations : 10-500 Hz - 10g (IEC68-2-6)
- Operating temperature : -40°C to +85°C
- Humidity test : 56 days, 93 % R.H., 40°C (IEC 68-2-3)
- Salt spray test : 96 hours (IEC 68-2-11)

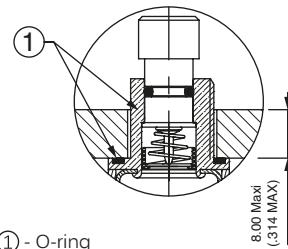


PANEL CUT-OUT



SEALING

- Front panel sealing by two O-rings
- Panel seal withstands 1 bar pressure and remains sealed even when the switch is operated.
- Epoxy sealed terminals
- Splash-proof case



(1) - O-ring



BUILD YOUR PART NUMBER

BASIC PART NUMBER

13

SERIES

TERMINALS AND BUSHING

NUMBER OF POLES

ELECTRICAL FUNCTION

PLUNGER

X778

2 Straight PC terminals,
threaded bushing
Ø 11,9 (15/32)

4 Double pole

6 ON - ON

-3 8,15 mm (.321)
long

High performance fully
sealed black switches.

4 Solder lug terminals,
threaded bushing
Ø 11,9 (15/32)

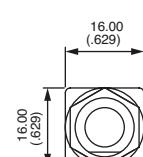
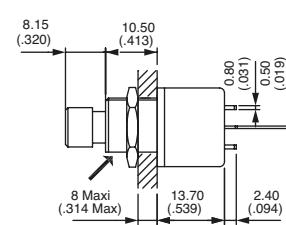
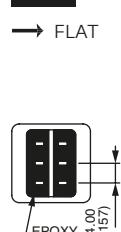
SOLDER LUG TERMINALS - DOUBLE POLE



13446-3X778

ON

ON



18000 series

Snap-action momentary pushbutton switches



DISTINCTIVE FEATURES

- Panel and PC mount models
- Snap-in panel mounting version
- Tactile feedback



ELECTRICAL SPECIFICATIONS

- Max. current/voltage rating with resistive load :
 - gold plated brass contacts : 100mA - 30VDC
 - gold plated silver contacts : 1A 30VDC
- Initial contact resistance : 50 mΩ max.
- Insulation resistance : 1.000 MΩ min.
- Dielectric strength : 1.000 Vrms 50 Hz min.
- Electrical life : 60.000 cycles at full load



GENERAL SPECIFICATIONS

- Total travel : 0,5 mm (.019)
- Torque : 1,25 Nm (.922 Ft.lb) max. applied to nut
- Operating temperature : -30°C to +65°C
- Soldering : 300°C, 3 sec. max.



MATERIALS

- Case : PBT
- Actuator : polyamide, glass filled
- Bushing : brass, nickel plated
- Housing : stainless steel
- Bracket : tin plated steel
- Contacts
AD : silver, gold plated
CD : brass, gold plated
- Terminal seal : epoxy

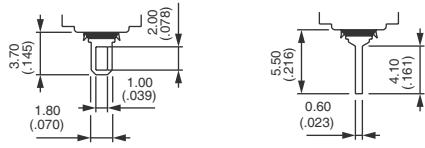
The company reserves the right to change specifications without notice.

18000 series

Snap-action momentary pushbutton switches



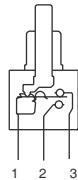
TERMINALS



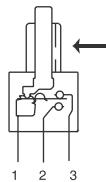
ELECTRICAL FUNCTION



→ KEYWAY



Plain bushing

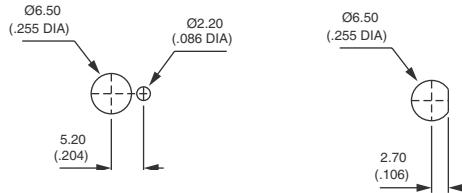


Threaded bushing

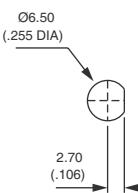


PANEL CUT-OUT

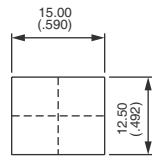
18500 - 18200



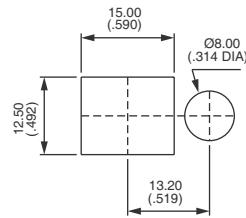
18700 - 18900



18800



With bezel U1200



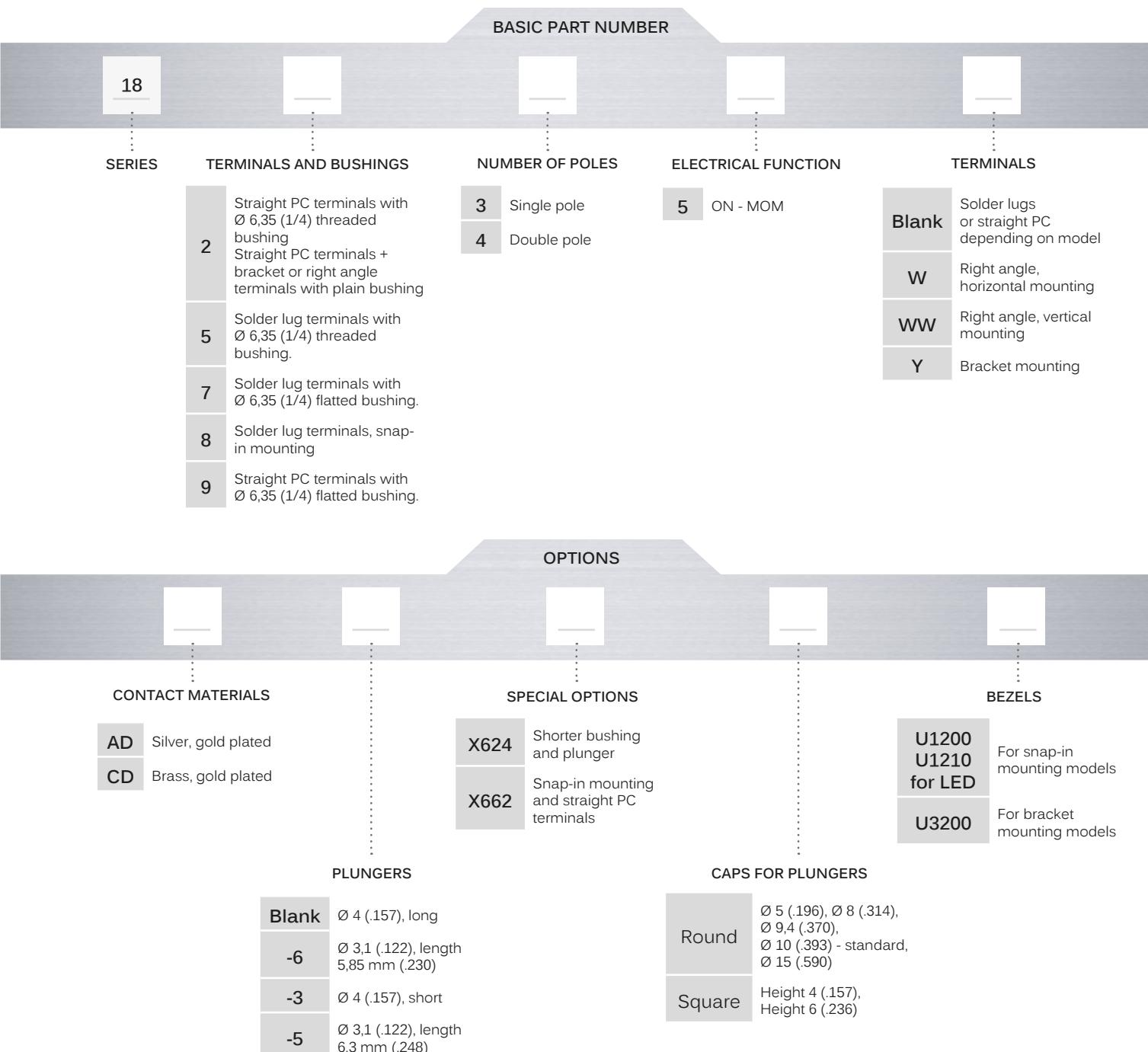
With bezel U1210 for LED

18000 series

Snap-action momentary pushbutton switches



BUILD YOUR PART NUMBER



ABOUT THIS SERIES

- (1) **Notice :** please note that not all combinations of above numbers are available.
Refer to www.apem.com for further information.
- (2) **Sealing boots** are available to protect the switches against dust and water. See Sealing Boot section.
- (3) **Mounting accessories :** standard hardware supplied with all models with Ø 6,35 (1/4) threaded bushing : 2 hex nuts 8 mm (.314) across flats, 1 locking ring and 1 lockwasher.

18000 series

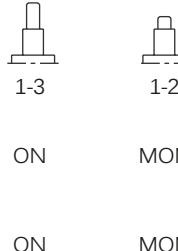
Snap-action momentary pushbutton switches

THREADED BUSHING SOLDER LUG TERMINALS : 18500



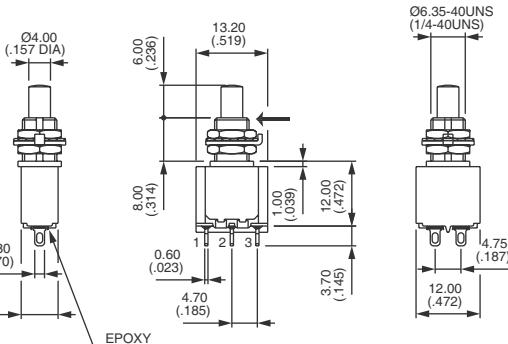
Single pole
18535

Double pole
18545



→ KEYWAY

Shown with standard plunger

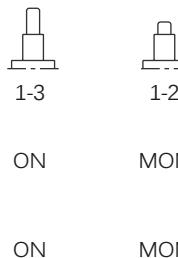


THREADED BUSHING STRAIGHT PC TERMINALS : 18200

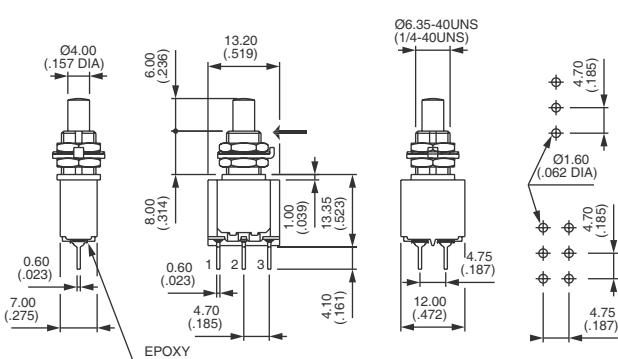


Single pole
18235

Double pole
18245



→ KEYWAY

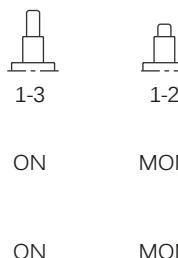


SNAP-IN MOUNTING SOLDER LUG TERMINALS : 18800



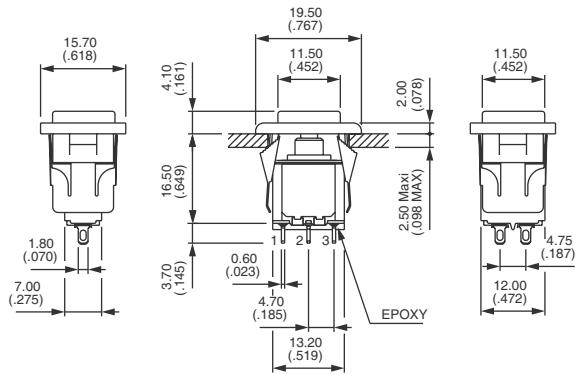
Single pole
18835

Double pole
18845



→ KEYWAY

Shown with cap U910 + U1200

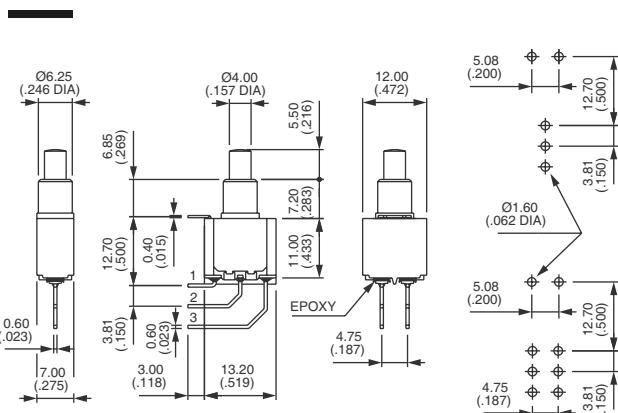
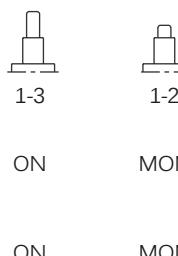


PLAIN BUSHING - RIGHT ANGLE TERMINALS VERTICAL : 18200WW



Single pole
18235WW

Double pole
18245WW



AV series

Anti-vandal pushbutton switches
Ø 19 mm or 22 mm



DISTINCTIVE FEATURES

Momentary (NO)

Impact resistance IK08 for model Ø 19 mm (.748)
and IK10 for model Ø 22 mm (.866)

Stainless steel actuator and bushing

UL-CSA approved (long case only)



ENVIRONMENTAL SPECIFICATIONS

- Impact resistance : IK08 for model Ø 19 mm, IK10 for model Ø 22 mm
- Front panel sealing : IP65 according to IEC 60529
- Operating temperature : -30°C to +70°C



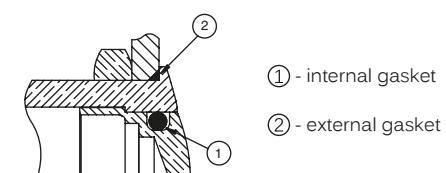
ELECTRICAL SPECIFICATIONS

- Max. current/voltage rating with resistive load :
 - A contacts : 4A 12VDC, 500.000 cycles
 - C contacts : 2A 48 VDC, 10.000 cycles
- Initial contact resistance : 10 mΩ max.
- Insulation resistance : 1.000 MΩ min. at 500VDC
- Dielectric strength :
 - 2.000 Vrms 50 Hz min. between terminals and frame
 - 2.000 Vrms 50 Hz min. between terminals



PANEL MOUNTING

- Panel cut-out :
 - Ø 19,2 mm (.755)
 - or Ø 22,2 mm (.874)
- Min. pitch for matrix mounting : 30 mm x 30 mm (1.181x1.181)
- Sealing (option T)



GENERAL SPECIFICATIONS

- Torque : 5 Nm min.- 14 Nm max. applied to nut
- Panel thickness : 1 (.039) to 11 mm (.433) max.
- Low level or mechanical life : 1.000.000 cycles
- Hand soldering : 300°C, 3 sec. max.



MATERIALS

- Case : PBT
- Contacts : silver (A) or brass, silver plated (C)
- Bushing : stainless steel
- Actuator : stainless steel

The company reserves the right to change specifications without notice.

AGENCY APPROVAL



4A 250VAC /8A 125VAC
(long case only)

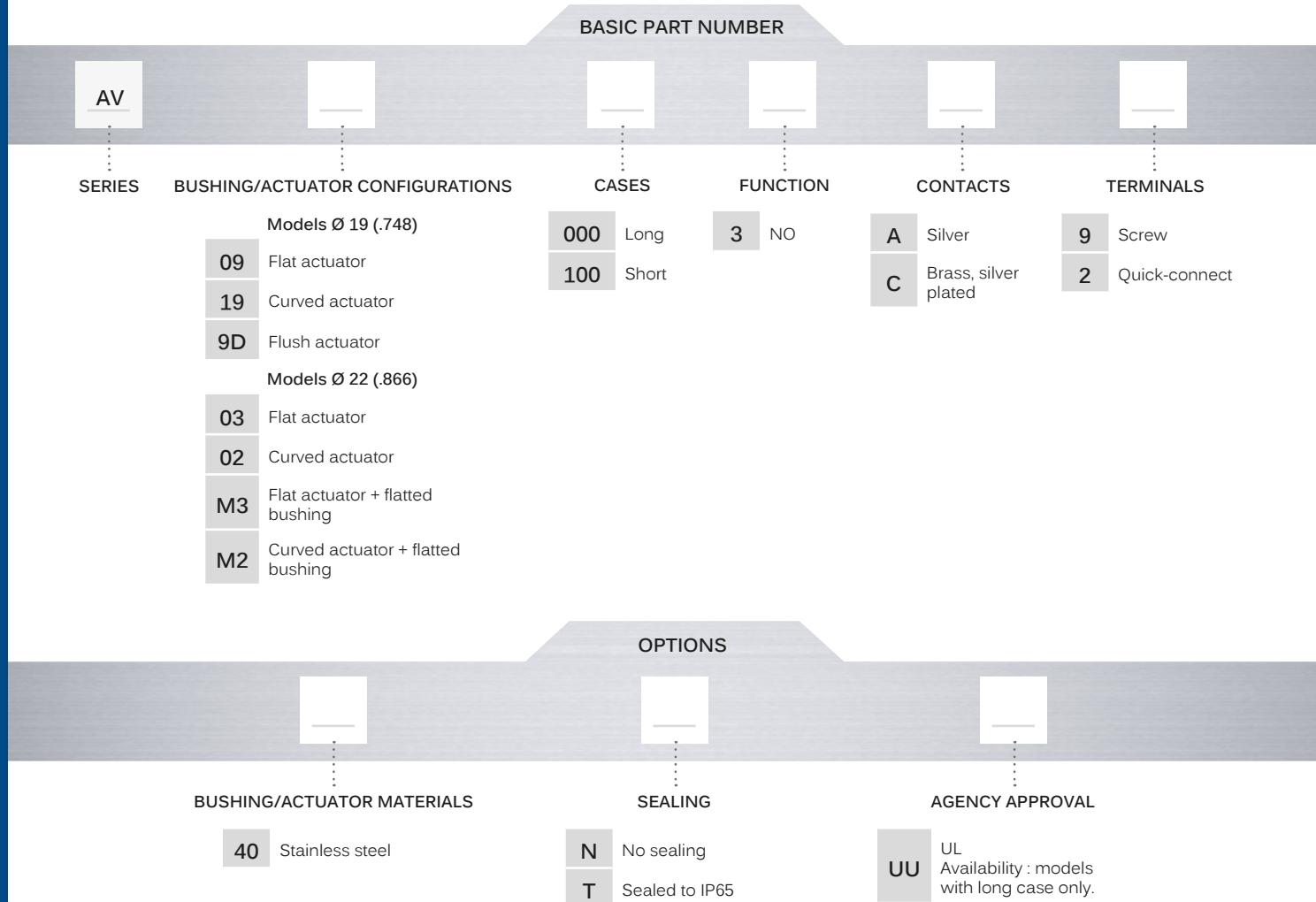
To order switches marked UL-CSA,
add "UU" at the end of model number.

AV series

Anti-vandal pushbutton switches Ø 19 mm or 22 mm



BUILD YOUR PART NUMBER



NOTICE : please note that not all combinations of above numbers are available. Refer to www.apem.com for further information.

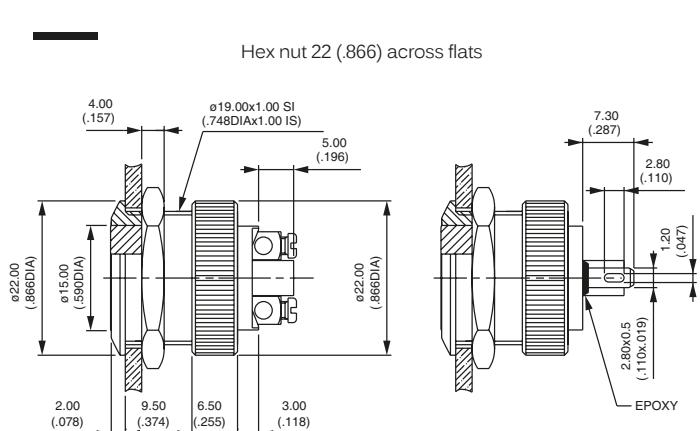
**BUSHING Ø 19 (.748) - FLAT ACTUATOR
SHORT CASE - 48VDC**



Screw terminals

Solder lug /
quick-connect term.
AV091003-240-

Screw terminals for wires 1,5 mm² max.



AV series

Security pushbutton switches suitable
for 250VAC • approved according to EN 61058-1



DISTINCTIVE FEATURES

Mains switches approved to EN61058-1

Ø 16 (.629), 19 (.748) and 22 mm (.866)

Latching

Three terminal types



ENVIRONMENTAL SPECIFICATIONS

- Front panel sealing : IP65 according to IEC 60529
- Operating temperature : -30°C to +70°C



ELECTRICAL SPECIFICATIONS

- Max. current/voltage rating with resistive load : 1A 250VAC
- Initial contact resistance : 50mΩ max.
- Insulation resistance : 1.000 MΩ min. at 500VDC
- Dielectric strength :
2.000 Vrms 50 Hz min. between terminals
500 Vrms 50 Hz between terminals and frame
- Electrical life : 10.000 cycles at 1A 250VAC



GENERAL SPECIFICATIONS

- Torque : 5 Nm min. - 14 Nm max. applied to nut
- Panel thickness :
Ø 16 : 1 (.039) to 6 mm (.236) max.
Ø 19 and Ø 22 : 1 (.039) to 9 mm (.354) max.
- Low level or mechanical life : 200.000 cycles
- Hand soldering : 300°C, 4 sec. max.



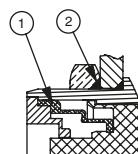
MATERIALS

- Case : PA4-6, UL94-V0
- Contacts : silver (A)
- Bushing & actuator : see next page



PANEL MOUNTING

- Panel cut-out :
Ø 16,2 mm (.755)
Ø 19,2 mm (.755)
or Ø 22,2 mm (.874)
- Sealing (option K)



① - elastomeric membrane

② - external gasket

AGENCY APPROVAL



EN61058-1 1A 250VAC
All models



marked

AV series

Security pushbutton switches suitable
for 250VAC • approved according to EN 61058-1



BUILD YOUR PART NUMBER

BASIC PART NUMBER

AV




SERIES

BUSHINGS/ACTUATORS

MODEL

FUNCTION

CONTACTS

TERMINALS

| | |
|-----------|---------------------|
| 06 | Ø 16 (.629), flat |
| 09 | Ø 19 (.748), flat |
| 03 | Ø 22 (.866), flat |
| 16 | Ø 16 (.629), curved |
| 19 | Ø 19 (.748), curved |
| 02 | Ø 22 (.866), curved |

100

1 OFF-ON

A Silver

| | |
|----------|---------------|
| 2 | Solder |
| 4 | PC |
| 8 | Quick-connect |

OPTIONS

BUSHING/ACTUATOR MATERIALS

| | |
|-----------------|---|
| 00 (std) | Nickel plated brass / Nickel plated brass |
| 10 | Nickel plated brass / Stainless steel |
| 40 | Stainless steel / Stainless steel |

SEALING

| | |
|--------------|----------------|
| Blank | No sealing |
| K | Sealed to IP65 |

NOTICE : please note that not all combinations of above numbers are available. Refer to www.apem.com for further information.

Ø 19 (.748) - FLAT OR CURVED ACTUATOR SOLDER LUG TERMINALS



Flat actuator

AV091001A2

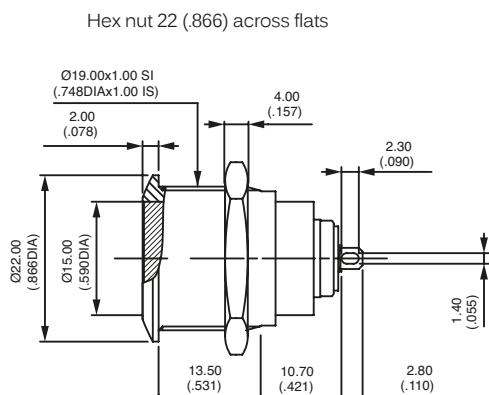
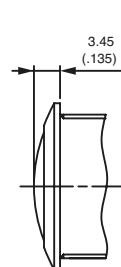
OFF ON

Curved actuator

AV191001A2

OFF ON

Product shown in OFF position.



AV series

Snap action security pushbutton
switches Ø 16 mm



DISTINCTIVE FEATURES

- Momentary (NO)
- Compact
- Long life
- Marking available



ENVIRONMENTAL SPECIFICATIONS

- Front panel sealing : IP65 according to IEC 60529
- Operating temperature : -30°C to +70°C



ELECTRICAL SPECIFICATIONS

- Max. current/voltage rating with resistive load :
200mA 48 VDC - 100mA 48VDC
- Initial contact resistance : 50 mΩ max.
- Insulation resistance : 1.000 MΩ min. at 500VDC
- Dielectric strength : 2.000 Vrms 50 Hz min.
between terminals and frame
- Electrical life : 50.000 cycles at 200mA 48VDC
100.000 cycles at 100mA 48VDC



GENERAL SPECIFICATIONS

- Travel : 1,60 mm (.063) ± 0,3 mm (.011)
- Torque : 5 Nm min.- 14 Nm max. applied to nut
- Panel thickness : 1 (.039) to 6 mm (.236) max.
- Low level or mechanical life : 1.000.000 cycles



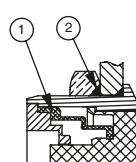
MATERIALS

- Case : PBT
- Contacts : brass, silver plated (C)
- Bushing and actuator : see next page



MOUNTING

- Panel cut-out : Ø 16,2 mm (.637)
- Min. pitch for matrix mounting :
24 mm x 24 mm (.944 x .944)
(AV6P & AV6B : 20 mm x 20 mm)
- Sealing (option K)



① - elastomeric membrane
② - external gasket

AV series

Snap action security pushbutton switches Ø 16 mm



BUILD YOUR PART NUMBER

BASIC PART NUMBER

AV

SERIES

BUSHING/ACTUATOR CONFIGURATIONS

BASIC PART NUMBER

06

Flat actuator

3

NO

0

Short

C

Brass,
silver plated

9

Screw

16

Curved actuator

08

Curved actuator +
chamfer

07

Flat actuator +
chamfer

6P

Flat actuator +
knurled nut

6B

Curved actuator +
knurled nut

CASE

CONTACTS

TERMINALS

OPTIONS

BUSHING/ACTUATOR MATERIALS

00 (std)

Nickel plated brass / Nickel plated brass

10

Nickel plated brass / Stainless steel

40

Stainless steel / Stainless steel

SEALING

Blank

No sealing

K

Sealed to IP65

NOTICE : please note that not all combinations of above numbers are available. Refer to www.apem.com for further information.

FLAT OR CURVED ACTUATOR SCREW TERMINALS



Flat actuator

AV0630C9

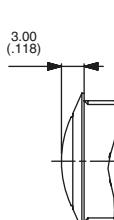


Curved actuator

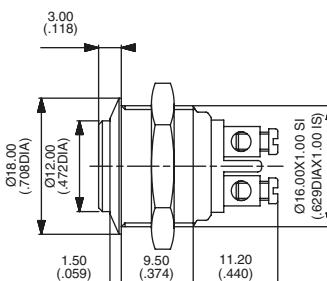
AV1630C9



Screw terminals for wires 1,5 mm² max.



Hex nut 19 (.748) across flats



AV series

Security pushbutton switches
Ø 19 mm or 22 mm



DISTINCTIVE FEATURES

- Momentary (NO)

- Long life

- UL-CSA approved (long case only)

- Marking available



MATERIALS

- Case : PBT
- Contacts : silver (A)
or brass, silver plated (C)
- Bushing and actuator : see next page



ENVIRONMENTAL SPECIFICATIONS

- Front panel sealing : IP65 according to IEC 60529
- Operating temperature : -30°C to +70°C



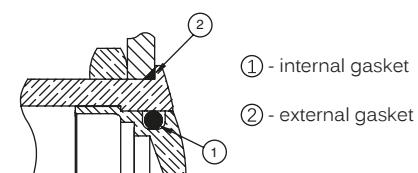
ELECTRICAL SPECIFICATIONS

- Max. current/voltage rating with resistive load :
 - A contacts : 4A 12VDC, 500.000 cycles
 - C contacts : 2A 48 VDC, 10.000 cycles
- Approved ratings of models with long case and A contacts (AV..000) :
UL-CSA : 4A 250VAC - 8A 125VAC - 6.000 cycles
- Initial contact resistance : 10 mΩ max.
- Insulation resistance : 1.000 MΩ min. at 500VDC
- Dielectric strength :
2.000 Vrms 50 Hz min. between terminals and frame
2.000 Vrms 50 Hz min. between terminals



PANEL MOUNTING

- Panel cut-out :
 - Ø 19,2 mm (.755)
 - or Ø 22 mm (.874)
- Min. pitch for matrix mounting :
30 mm x 30 mm (1.181x1.181)
(AV9P & AV9B : 25 mm x 25 mm)
- Sealing (option K)



GENERAL SPECIFICATIONS

- Torque : 5 Nm min.- 14 Nm max. applied to nut
- Panel thickness : 1 (.039) to 11 mm (.433) max.
- Low level or mechanical life : 1.000.000 cycles
- Hand soldering : 300°C, 3 sec. max.

The company reserves the right to change specifications without notice.

AGENCY APPROVAL



4A 250VAC /8A 125VAC
(long case only)

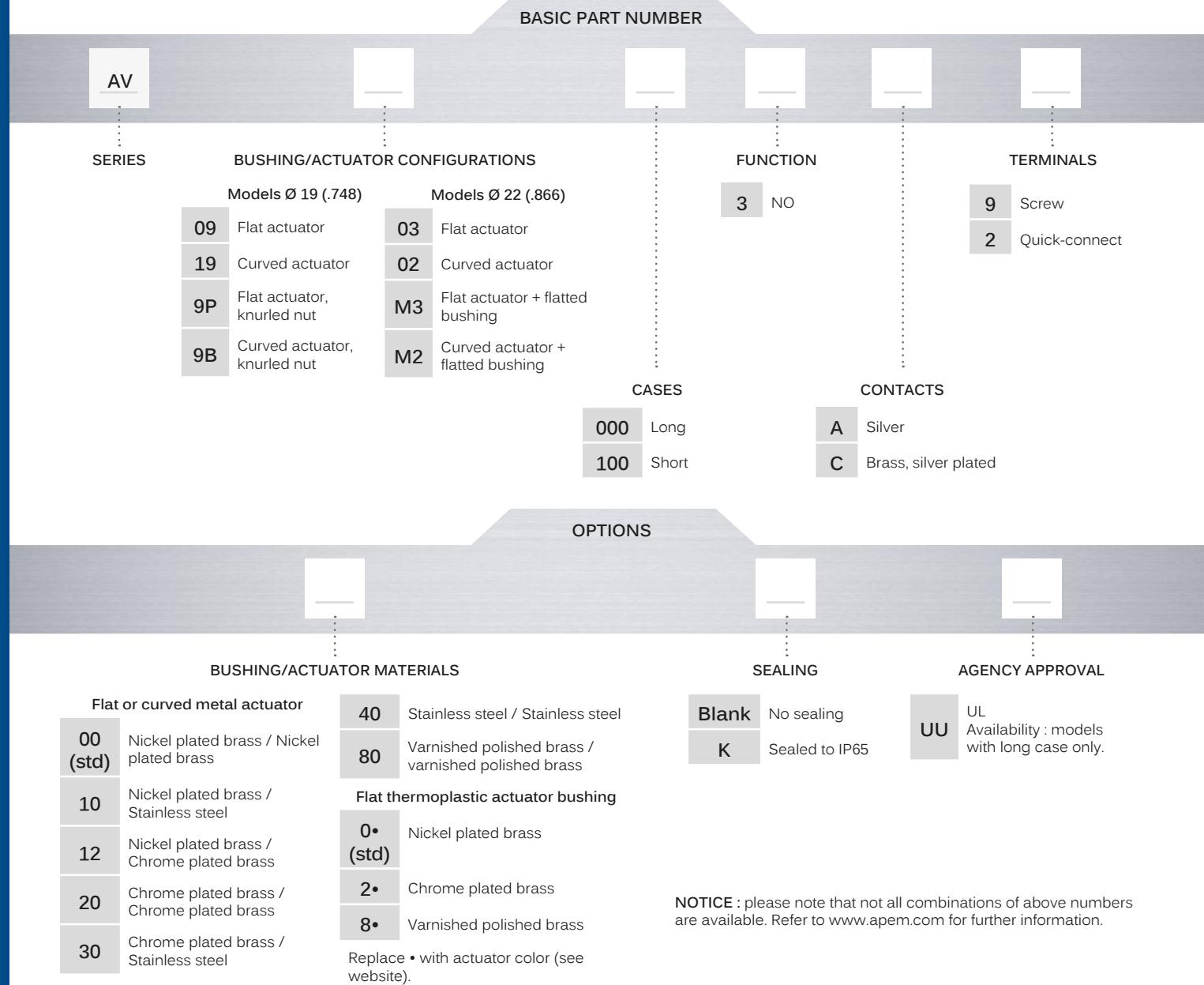
To order switches marked UL-CSA,
add "UU" at the end of model number.

AV series

Security pushbutton switches Ø 19 mm or 22 mm



BUILD YOUR PART NUMBER



**BUSHING Ø 19 (.748) - FLAT ACTUATOR
SHORT CASE - 48VDC**



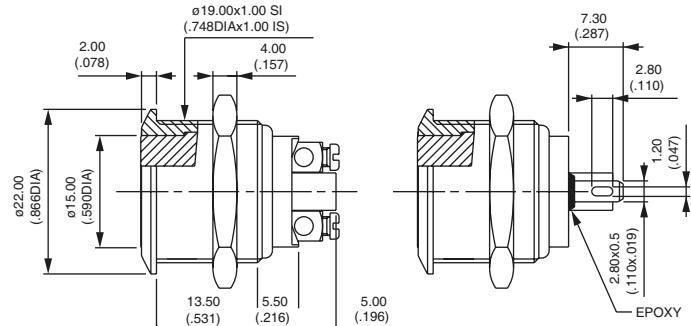
Screw terminals

AV091003•9

Solder lug /
quick-connect term.

AV091003•2

Screw terminals for wires 1,5 mm² max.



AV series

Security pushbutton switches
Ø 19 mm or 22 mm • momentary NC/NO



DISTINCTIVE FEATURES

- With illuminated ring
- Momentary NC/NO
- Solder lug, flying lead or cable terminals
- Marking available



ENVIRONMENTAL SPECIFICATIONS

- Front panel sealing : IP67 according to IEC 60529
- Operating temperature : -30°C to +85°C



ELECTRICAL SPECIFICATIONS

- Max. current/voltage rating with resistive load : 1A 30VDC
- LED voltage : 12VDC, 24VDC or 48VDC (If not supplied by APEM, a resistor must be series-connected by the user)**
- Initial contact resistance : 100 mΩ max.
- Insulation resistance : 10 MΩ min. at 500VDC
- Dielectric strength : 500 Vrms 50 Hz min. between terminals
1.000 Vrms 50 Hz min. between terminals and frame
- Electrical life : 250.000 cycles at full load

**Resistor value = supply voltage - LED forward voltage

LED forward current



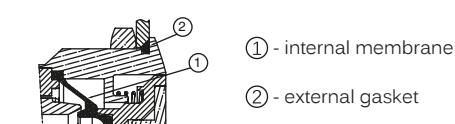
MATERIALS

- Case : polyamide, glass filled
- Contacts : silver
- Bushing : see next page
- Actuator : see next page
- Elastomeric membrane : silicone
- LED



MOUNTING

- Panel cut-out :
Ø 19,2 mm (.755)
or Ø 22,2 mm (.874)
- Min. pitch for matrix mounting :
30 mm x 30 mm (1.181x1.181)
- Sealing (option K)



GENERAL SPECIFICATIONS

- Travel : 2 mm ± 0,3 mm (.003)
- Operating force : 5N ± 2N
- Torque : 5 Nm min.- 14 Nm max. applied to nut
- Panel thickness : 1 (.039) to 6 mm (.236) max.
- Low level or mechanical life : 1.000.000 cycles
- Hand soldering : 350°C, 5 seconds max.

The company reserves the right to change specifications without notice.

AV series

Security pushbutton switches
Ø 19 mm or 22 mm • momentary NC/NO



BUILD YOUR PART NUMBER

BASIC PART NUMBER

| | | | | | |
|----------------------|-----------------|-------------------------------|-----------------|-------------------------------|-----------|
| AV | | | | | |
| SERIES | BUSHING | LED COLORS | LED RESISTORS | CONTACTS | TERMINALS |
| 9 Ø 19 (.748) | 0 No LED | 0 No resistor supplied | 2 Silver | 2 Solder/quick-connect | |
| 3 Ø 22 (.866) | 1 Blue | 1 12VDC resistor | | F Flying leads | |
| | V Green | 2 24VDC resistor | | C Cable | |
| | 5 Yellow | 4 48VDC resistor | | | |
| | 6 Red | | | | |
| | 7 White | | | | |
| | 9 Amber | | | | |

OPTIONS

FLYING LEAD PROTECTION

| | |
|----------|--------------------------------------|
| 0 | No protection and/or no flying leads |
| 1 | Heat-shrink sleeves |
| 2 | Tube + epoxy |

*non-illuminated only

RING COLORS

| | | |
|-----------------|-----------------|----------------------|
| 1 Blue | 4 Grey* | 7 Opal white |
| 2 Black* | 5 Yellow | 8 Translucent |
| 3 Green | 6 Red | 9 Orange |

SEALING

| | |
|--------------|----------------|
| Blank | No sealing |
| K | Sealed to IP67 |

FLYING LEAD/CABLE LENGTH

| | |
|------------|----------------------------|
| 000 | No flying leads / no cable |
| 020 | Length 20 cm (std) |
| XXX | Length in centimeters |

BUSHING/ACTUATOR MATERIALS

| | |
|-----------|---|
| 00 | Nickel plated brass / Nickel plated brass |
| 40 | Stainless steel / Stainless steel |
| 4B | Stainless steel 316 / Stainless steel 316 |
| 70 | Chrome pl. brass, black / Chrome pl. brass, black |

Other : on request.

NOTICE : please note that not all combinations of above numbers are available. Refer to www.apem.com for further information.

BUSHING Ø 19 (.748) - FLAT ACTUATOR SOLDER LUG TERMINALS



Illuminated (select LED color above)*

AV9•022

ON

MOM

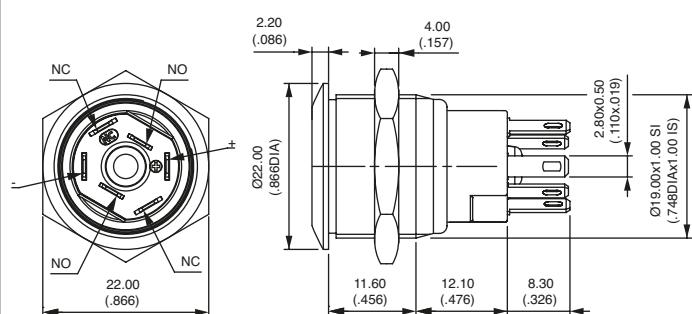
Non-illuminated

AV90022

ON

MOM

Hex nut 22 (.866) across flats



*No LED resistor supplied on this model.

AV series

Security pushbutton switches
Ø 19 mm or 22 mm • latching



DISTINCTIVE FEATURES

Latching

Illuminated or non-illuminated

Three terminal types



ENVIRONMENTAL SPECIFICATIONS

- Front panel sealing : IP65
- Operating temperature : -30°C to +70°C



ELECTRICAL SPECIFICATIONS

- Max. current/voltage rating with resistive load : 2A 48 VDC
- LED voltage and consumption : blue 3,5V 10mA, green : 2V 10mA, yellow & red : 2V 20mA (a resistor must be series-connected by the user)**
- Initial contact resistance : 50 mΩ max.
- Insulation resistance : 1.000 MΩ min. at 500VDC
- Dielectric strength : 1 000 Vrms 50 Hz min. between terminals 500 Vrms 50 Hz min. between terminals and frame
- Electrical life : 500.000 cycles at 2A 48VDC

**Resistor value = supply voltage - LED forward voltage

LED forward current



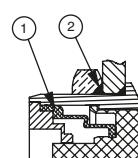
MATERIALS

- Case : PA6T UL94-V0
- Contacts : silver
- Bushing and actuator : see next page
- LED



MOUNTING

- Panel cut-out : Ø 19,2 mm (.755) or Ø 22,2 mm (.874)
- Min. pitch for matrix mounting : 30 mm x 30 mm (1.181 x 1.181)
- Sealing (option K)



(1) - elastomeric membrane
(2) - external gasket



GENERAL SPECIFICATIONS

- Torque : 5 Nm min. - 14 Nm max. applied to nut
- Panel thickness : 1 (.039) to 9 mm (.354) max.
- Low level or mechanical life : 1.000.000 cycles
- Hand soldering : 300°C, 4 seconds max.

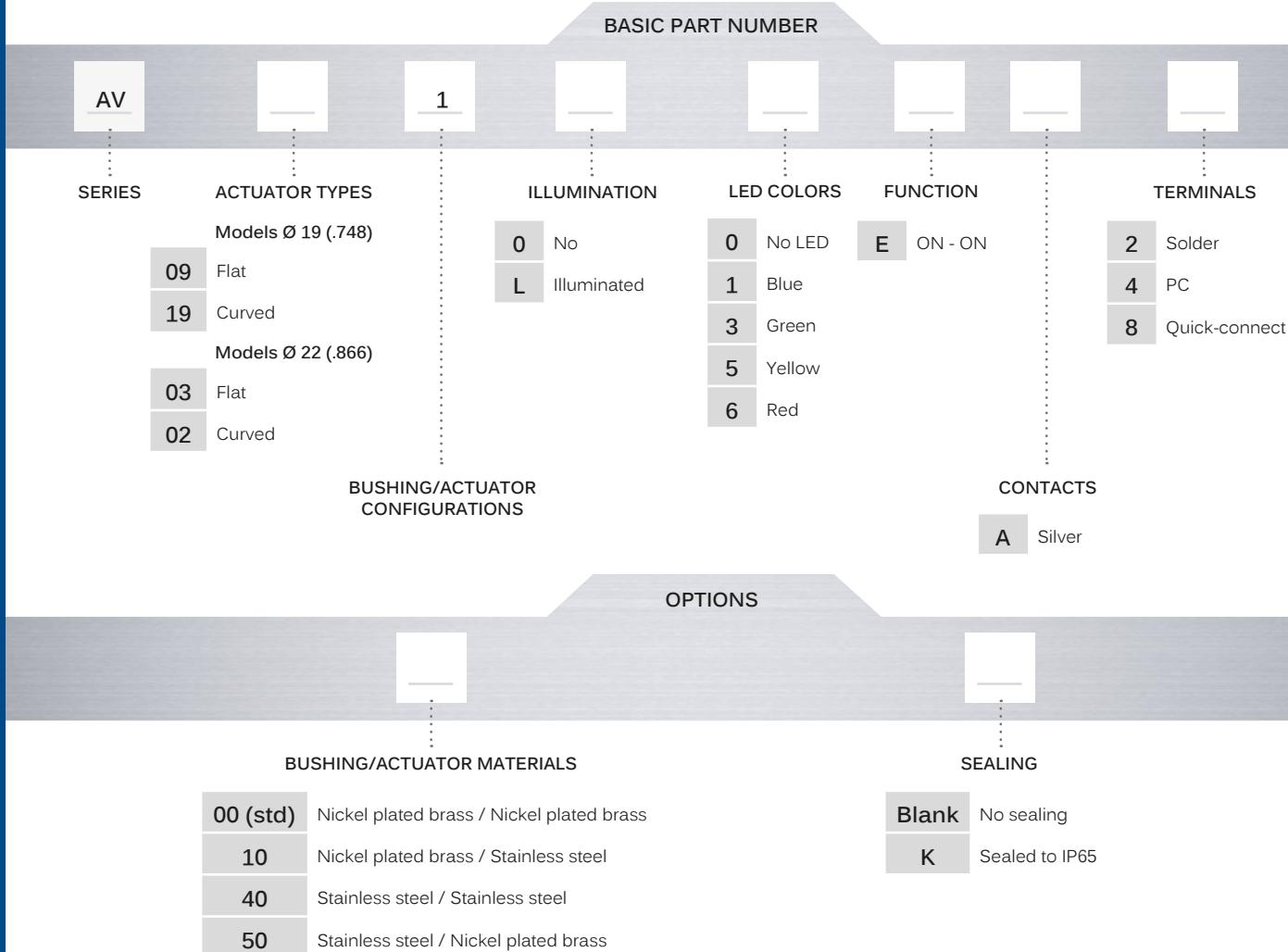
The company reserves the right to change specifications without notice.

AV series

Security pushbutton switches
Ø 19 mm or 22 mm • latching



BUILD YOUR PART NUMBER



NOTICE : please note that not all combinations of above numbers are available. Refer to www.apem.com for further information.

BUSHING Ø 19 (.748) - NON-ILLUMINATED SOLDER LUG TERMINALS



Flat actuator

AV09100EA2

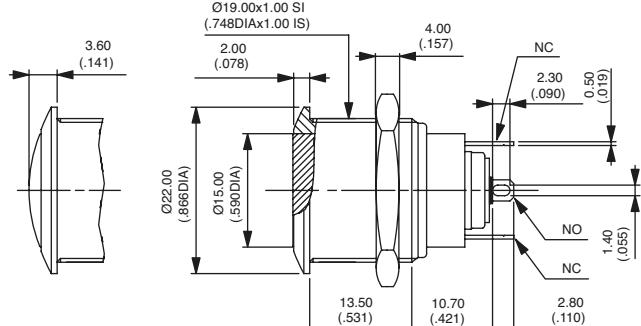
ON ON

Curved actuator

AV19100EA2

ON ON

Standard actuator position : the actuator is flush in the non-latched position and recessed in the latched position.



AV series

Tactile security pushbutton switches Ø 19 mm



DISTINCTIVE FEATURES

- Tactile feedback
- Illuminated or non-illuminated
- Momentary (NO)
- Marking available



ENVIRONMENTAL SPECIFICATIONS

- Front panel sealing : IP 65 according to IEC 60529
- Operating temperature : -30°C to +70°C



ELECTRICAL SPECIFICATIONS

- Max. current/voltage rating with resistive load : 50mA 24VDC
- LED voltage and consumption : 2-color LED : 2V (3V max.) 20mA
Other colors : 2V (3V max.) 10mA
A resistor must be series-connected by the user**
- Initial contact resistance : 100 mΩ max.
- Insulation resistance : 1.000 MΩ min. at 500VDC
- Dielectric strength : 500 Vrms 50 Hz min. between terminals
2.000 Vrms 50 Hz min. between terminals and frame
- Electrical life : 1.000.000 cycles at full load

**Resistor value = supply voltage - LED forward voltage

LED forward current



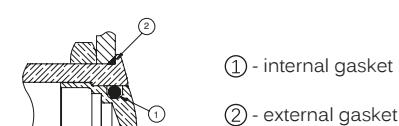
MATERIALS

- Case : PBT UL94-V0
- Terminals : brass, gold plated
- Contacts : gold plated dome
- Bushing and actuator : see next page
- LED



MOUNTING

- Panel cut-out : Ø 19,2 mm (.755)
- Min. pitch for matrix mounting : 30 mm x 30 mm (1.181x1.181)
- Sealing (option K)



GENERAL SPECIFICATIONS

- Travel : 0,7 mm (.027) ± 0,1 mm (.003)
- Operating force : 7 N ±2N
- Torque : 5 Nm min.- 14 Nm max. applied to nut
- Panel thickness : 1 (.039) to 6 mm (.236) max.
- Hand soldering : 270°C, 3 seconds max.

The company reserves the right to change specifications without notice.

AV series

Tactile security pushbutton switches Ø 19 mm



BUILD YOUR PART NUMBER

BASIC PART NUMBER

| | | | | | | | |
|-----------|----------------|-----------|-----------------------|----------------------|--------------------|---------------------|--|
| AV | | C7 | | | | | |
| SERIES | ACTUATOR TYPES | CASE | ILLUMINATION | FUNCTION | CONTACTS | TERMINALS | |
| 09 Flat | 19 Curved | | 0 No L Illuminated | 3 Normally open (NO) | D Gold plated dome | 2 Solder 9 Screw | |

OPTIONS

BUSHING/ACTUATOR MATERIALS

Non-illuminated models

| | |
|-----------------|---|
| 00 (std) | Nickel plated brass / Nickel plated brass |
| 10 | Nickel plated brass / Stainless steel |
| 30 | Chrome plated brass / Stainless steel |
| 40 | Stainless steel / Stainless steel |
| 80 | Varnished polished brass / Varnished polished brass |

Illuminated models

| | |
|-----------------|---|
| 00 (std) | Nickel plated brass / Nickel plated brass |
| 20 | Chrome plated brass / Chrome plated brass |
| 40 | Stainless steel / Stainless steel |
| 50 | Stainless steel / Nickel plated brass |
| 80 | Varnished polished brass / Varnished polished brass |

LED COLORS

| | |
|--------------|-----------|
| Blank | No LED |
| 1 | Blue |
| 3 | Green |
| 5 | Yellow |
| 6 | Red |
| 7 | White |
| 9 | Amber |
| 2 | Red/green |

SEALING

| | |
|--------------|----------------|
| Blank | No sealing |
| K | Sealed to IP65 |

NOTICE : please note that not all combinations of above numbers are available. Refer to www.apem.com for further information.

FLAT ACTUATOR - NON-ILLUMINATED



Solder lug terminals

AV09C703D2

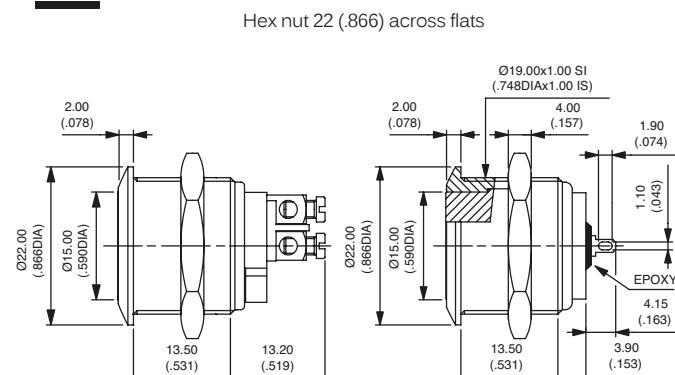


Screw terminals

AV09C703D9



Also available with curved actuator : AV19C703D2 or AV19C703D9



Hex nut 22 (.866) across flats

AV series

Tactile security pushbuttons with overmolded actuator • Ø 19 mm or 22 mm



DISTINCTIVE FEATURES

- Tactile feedback
- Illuminated or non-illuminated
- Momentary (NO)
- Overmolded marking available



ENVIRONMENTAL SPECIFICATIONS

- Front panel sealing : IP67 or IP69K according to IEC 60529
- Operating temperature : -30°C to +70°C



ELECTRICAL SPECIFICATIONS

- Max. current/voltage rating with resistive load : 50mA 24VDC
- LED voltage and consumption : 2-color LED : 2V (3V max.) 20mA
Other colors : 2V (3V max.) 10mA
(a resistor must be series-connected by the user)**
- Initial contact resistance : 100 mΩ max.
- Insulation resistance : 1.000 MΩ min. at 500VDC
- Dielectric strength : 500 Vrms 50 Hz min. between terminals
2.000 Vrms 50 Hz min. between terminals and frame
- Electrical life : 1.000.000 cycles at full load

**Resistor value = supply voltage - LED forward voltage

LED forward current



GENERAL SPECIFICATIONS

- Travel : 0,7 mm (.027) ± 0,1 mm (.003)
- Operating force : 7 N ±2N - Sealing option K will increase the operating force.
- Torque : 5 Nm min.- 14 Nm max. applied to nut
- Panel thickness : 1 (.039) to 6 mm (.236) max.
- Hand soldering : 270°C, 3 sec. max.

The company reserves the right to change specifications without notice.



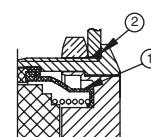
MATERIALS

- Case : PBT UL94-V0
- Terminals : brass, gold plated
- Contacts : gold plated dome
- Bushing : see next page
- Actuator : stainless steel, with thermoplastic overmolding
- LED



MOUNTING

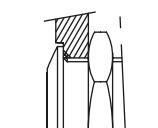
- Panel cut-out :
Ø 19,2 mm (.755)
or Ø 22,2 mm (.874)
- Min. pitch for matrix mounting :
30 mm x 30 mm (1.181x1.181)
- Sealing to IP67 (option K)



① - internal membrane

② - external gasket

- Recommended mounting for IP69K (option K)



AV series

Tactile security pushbuttons with overmolded actuator • Ø 19 mm or 22 mm



BUILD YOUR PART NUMBER

BASIC PART NUMBER

| | | | | |
|-----------|----------------------------------|-------------------------|--------------------|---------------------|
| AV | | | | |
| SERIES | BUSHING DIAMETERS | ILLUMINATION | CONTACTS | TERMINALS |
| | 9 19 mm (.748) 3 22 mm (.866) | S0 No SL Illuminated | D Gold plated dome | 2 Solder 9 Screw |

OPTIONS

BUSHING MATERIALS

| | |
|--------------------|----------------------------|
| 0 (std) | Nickel plated brass |
| 2 | Chrome plated brass |
| 4 | Stainless steel |
| 5 | Gold plated brass |
| 6 | Chrome plated brass, satin |
| 7 | Chrome plated brass, black |

OVERMOLDING COLORS

| | |
|----------|-------------|
| 1 | Blue |
| 2 | Black* |
| 3 | Green |
| 4 | Grey* |
| 5 | Yellow |
| 6 | Red |
| 7 | White |
| 8 | Translucent |
| 9 | Orange |

*non-illuminated only

LED COLORS

| | | | |
|----------|-----------------------|----------|--------|
| 1 | Blue | 5 | Yellow |
| 2 | Red/green | 6 | Red |
| 3** | Green | 7 | White |
| V** | Green, high intensity | 9 | Amber |

** To order a green LED for actuator style 002, always use code V.
Other actuator styles can be ordered with LED code 3 or V.

SEALING

| | |
|--------------|-------------------------|
| Blank | No sealing |
| K | Sealed to IP67 or IP69K |

ACTUATOR STYLES

| | |
|------------|------------------|
| 002 | Illuminated ring |
| 006 | Validation |
| 009 | Standby |
| 010 | Cancel |
| 011 | Power |

Other styles : see website.

NOTICE : please note that not all combinations of above numbers are available. Refer to www.apem.com for further information.

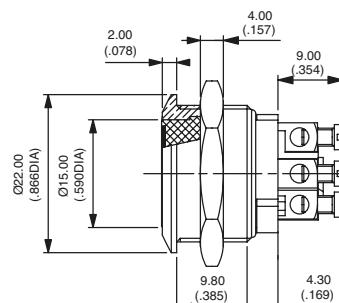
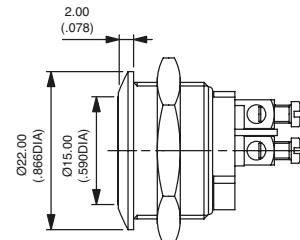
BUSHING Ø 19 (.748) - FLAT ACTUATOR SCREW TERMINALS



Illuminated
AV9SLD9

Non-illuminated
AV9S0D9

Hex nut 22 (.866) across flats



AV series

Security pushbutton switches Ø 22 mm
or 24 mm with large actuator



DISTINCTIVE FEATURES

- Large actuator
- Low profile option
- Momentary (combined NC+NO)
- Anodized actuators



ENVIRONMENTAL SPECIFICATIONS

- Front panel sealing : IP65 according to IEC 60529
- Operating temperature : -20°C to +55°C



ELECTRICAL SPECIFICATIONS

- Max. current/voltage rating with resistive load (microswitch) : 5A 250VAC
- Initial contact resistance : 100 mΩ max.
- Insulation resistance : 1.000 MΩ min. at 500VDC
- Dielectric strength : 2.000 Vrms 50 Hz min. between terminals and frame
- Electrical life : 1.000.000 cycles at 1A 250VAC
100.000 cycles at full load



GENERAL SPECIFICATIONS

- Torque : 5 Nm min.- 14 Nm max. applied to nut
- Panel thickness : 1 (.039) to 6 mm (.236) max.
- Low level or mechanical life : 3.000.000 cycles
- Hand soldering : 300°C, 5 sec. max.



MATERIALS

- Case : polyester, glass filled
- Contacts : silver/nickel alloy
- Bushing and actuator : see next page.

The company reserves the right to change specifications without notice.



MOUNTING

- Panel cut-out : Ø 22,2 mm (.874) or Ø 24,2 mm (.952)
- Min. pitch for matrix mounting :
30 mm x 30 mm (1.181x1.181)
or 33 mm x 33 mm (1.299x1.299)

AV series

Security pushbutton switches Ø 22 mm or 24 mm with large actuator



BUILD YOUR PART NUMBER

BASIC PART NUMBER

AV

L

SERIES

BUSHING DIAMETERS

BUSHING/ACTUATOR CONFIGURATION

ACTUATOR STYLES

TERMINALS

22 22 mm (.866)

24 24 mm (944)

P Flat

B Curved

C Recessed

4 Quick-connect

2 Solder lug

OPTIONS

Bushing/actuator materials : see below.

OPTIONS

BUSHING/ACTUATOR MATERIALS

ACTUATOR COLORS

SEALING

Models with non-anodized actuator

40
(std)

Stainless steel / Stainless steel

1 Blue

Blank IP65

20

Chrome plated brass / Chrome plated brass

2 Black

1•

Black chrome plated brass

3 Pale green

2•

Chrome plated brass

3F Dark green

4•

Stainless steel

4 Natural

5 Gold yellow

6 Red

6B Maroon

• Colors see table opposite.

NOTICE : please note that not all combinations of above numbers are available. Refer to www.apem.com for further information.

BUSHING Ø 22 (.866) - FLAT ACTUATOR

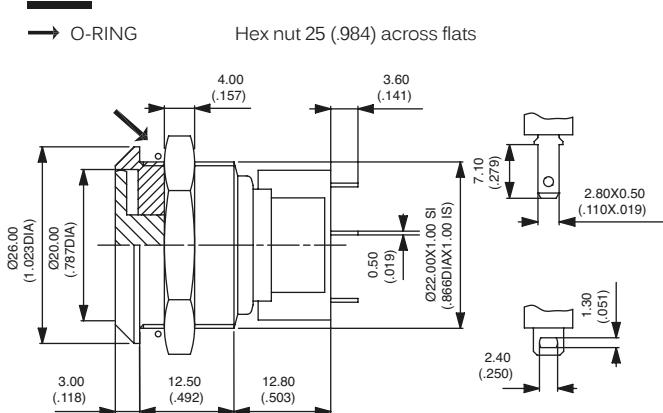


Quick-connect terminals

AV22LP••4

Solder lug terminals

AV22LP••2



AV series

Security pushbutton switches Ø 30 mm •
momentary NC/NO



DISTINCTIVE FEATURES

- Large actuator
- With illuminated ring
- Momentary NC/NO
- Solder lug, flying lead or cable terminals
- Marking available



ENVIRONMENTAL SPECIFICATIONS

- Front panel sealing : IP67 according to IEC 60529
- Robustness : IK06 according to EN 62262 (1 joule)
- Operating temperature : -30°C to +85°C



ELECTRICAL SPECIFICATIONS

- Max. current/voltage rating with resistive load : 1A 30VDC
- LED voltage : 12VDC, 24VDC or 48VDC
(If not supplied by APEM, a resistor must be series-connected by the user)**
- Initial contact resistance : 100 mΩ max.
- Insulation resistance : 10 MΩ min. at 500VDC
- Dielectric strength : 500 Vrms 50 Hz min. between terminals
1.000 Vrms 50 Hz min. between terminals and frame
- Electrical life : 250.000 cycles at full load

**Resistor value = supply voltage - LED forward voltage

LED forward current



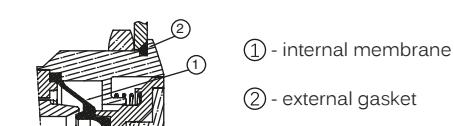
MATERIALS

- Case : polyamide, glass filled
- Contacts : silver
- Bushing : see next page
- Actuator : see next page
- Elastomeric membrane : silicone
- LED



MOUNTING

- Panel cut-out : Ø 30,2 mm (1.189)
- Min. pitch for matrix mounting : 44 mm x 44 mm (1.732x1.732)
- Sealing (option K) :



GENERAL SPECIFICATIONS

- Travel : 2,5 mm ± 0,3 mm (.003)
- Operating force : 5N ± 2N
- Torque : 10Nm max.
- Panel thickness : 1 (.039) to 6 mm (.236) max.
- Low level or mechanical life : 1.000.000 cycles
- Hand soldering : 350°C, 5 seconds max.

The company reserves the right to change specifications without notice.

AV series

Security pushbutton switches Ø 30 mm •
momentary NC/NO



BUILD YOUR PART NUMBER

BASIC PART NUMBER

| AV | | | | | | |
|--------|------------------|--|--|----------|---|--|
| SERIES | BUSHING DIAMETER | LED COLORS | LED RESISTORS | CONTACTS | TERMINALS | |
| 5 | 30 mm (1.181) | 0 No LED 1 Blue V Green 5 Yellow 6 Red 7 White 9 Amber | 0 No resistor supplied 1 12VDC resistor 2 24VDC resistor 4 48VDC resistor | 2 Silver | 2 Solder/quick-connect F Flying leads C Cable | |

OPTIONS

FLYING LEAD PROTECTION

| | |
|---|--------------------------------------|
| 0 | No protection and/or no flying leads |
| 1 | Heat-shrink sleeves |
| 2 | Tube + epoxy |

*non-illuminated only

RING COLORS

| | | | | | |
|---|--------|---|--------|---|-------------|
| 1 | Blue | 4 | Grey* | 7 | Opal white |
| 2 | Black* | 5 | Yellow | 8 | Translucent |
| 3 | Green | 6 | Red | 9 | Orange |

SEALING

| | |
|-------|----------------|
| Blank | No sealing |
| K | Sealed to IP67 |

FLYING LEAD/CABLE LENGTH

| | |
|-----|----------------------------|
| 000 | No flying leads / no cable |
| 020 | Length 20 cm (std) |
| XXX | Length in centimeters |

BUSHING/ACTUATOR MATERIALS

| | |
|----|---|
| 00 | Nickel plated brass / Nickel plated brass |
| 4B | Stainless steel 316 / Stainless steel 316 |

Other : on request.

NOTICE : please note that not all combinations of above numbers are available. Refer to www.apem.com for further information.

FLAT ACTUATOR - SOLDER LUG TERMINALS



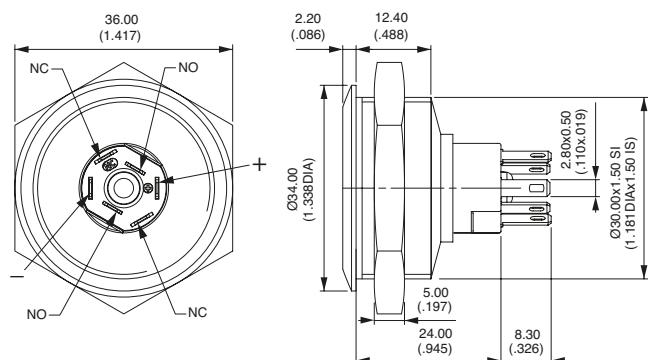
Illuminated (select LED color above)*

AV5•022 ON MOM

Non-illuminated

AV50022 ON MOM

Plastic hex nut 36 (1.417) across flats



*No LED resistor supplied on this model.

1200 series

Momentary pushbutton switches •
round plunger



DISTINCTIVE FEATURES

- Butt action contacts
- Double break
- NF (EN 61058-1), UL and CSA approved



ELECTRICAL SPECIFICATIONS

- Max. current/voltage rating with resistive load :
 - silver contacts (A) : 4A 250VAC - 8A 125VAC - 4A 24VDC - 8A 12VDC
 - silver plated copper contacts (C) : 2A 250VAC - 3A 125VAC - 2A 24VDC - 3A 12VDC
- Initial contact resistance : 10 mΩ
- Insulation resistance : 1.000 MΩ min. at 500VDC
- Dielectric strength :
 - 2.000 Vrms 50 Hz min. between terminals
 - 3.000 Vrms 50 Hz min. between terminals and frame
- Electrical life : 10.000 cycles at full load



GENERAL SPECIFICATIONS

- Torque : 1,50 Nm (1.10 Ft.lb) max. applied to nut
- Panel thickness : 5 mm (.196) max.
- Total travel :
 - NO : 4,5 (.177) +/- 0,3 (.011)
 - NC : 3,5 (.137) +/- 0,3 (.011)
- Operating temperature : -20°C to +55°C



MATERIALS

- Case : polyamide
- Plunger : polyamide
- Bushing : brass, nickel plated
- Contacts :
 - A : silver
 - C : copper, silver plated

The company reserves the right to change specifications without notice.

1200 series

Momentary pushbutton switches •
round plunger



MOUNTING

- Panel cut-out : Ø 12,2 (.480)

AGENCY APPROVALS



EN 61058-1

2A 250VAC or 4A 250VAC,
T55/125°C
All models

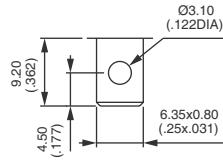


4A 250VAC - 8A 125VAC
All models function 3 (NO)

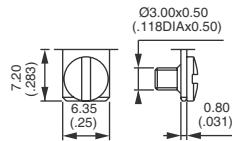
Models 1233X209 and 1233X209L are standard marked NF. To order switches marked NF, UL or CSA, complete appropriate box of ordering format.



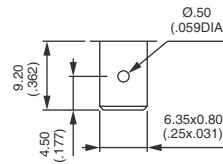
TERMINALS



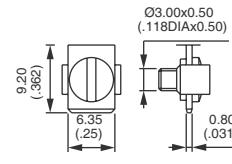
121.



122.



123.



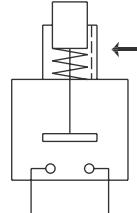
120.



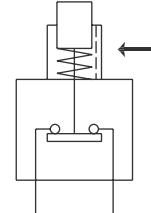
ELECTRICAL FUNCTIONS



→ KEYWAY



NO (function 3)



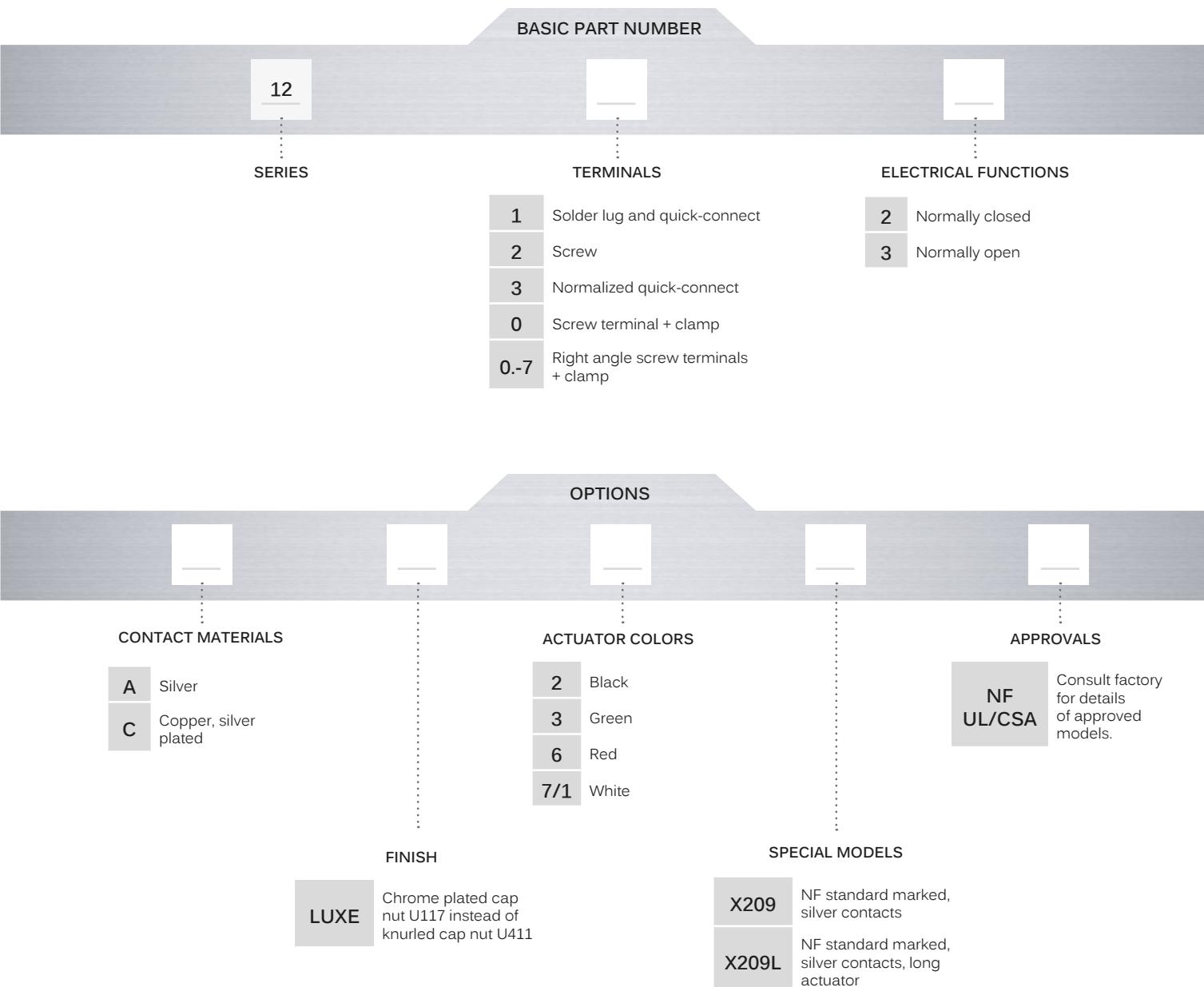
NC (function 2)

1200 series

Momentary pushbutton switches • round plunger



BUILD YOUR PART NUMBER



ABOUT THIS SERIES

Notice : please note that not all combinations of above numbers are available.
Refer to www.apem.com for further information.

Sealing boots are available to protect the switches against dust and water. See Sealing Boot section.

Mounting accessories : standard hardware supplied :
- silver contact models : 1 hex nut U166 and 1 knurled nut U411
- copper contact models : 1 hex nut U42 and 1 knurled nut U411

1200 series

Momentary pushbutton switches •
round plunger

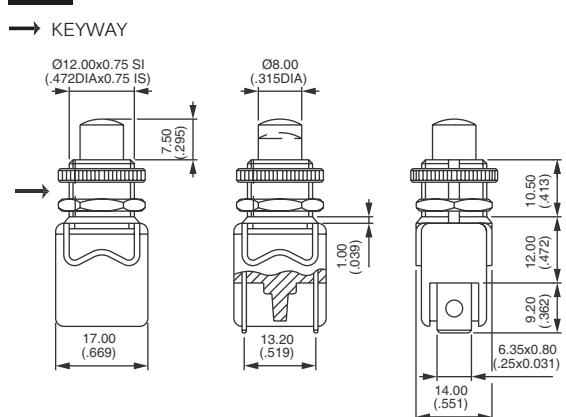
SOLDER LUG/QUICK-CONNECT TERMINALS



1212 Normally Closed

1213 Normally Open

Plunger height : NO model : 7,50 mm, NC model : 5,80 mm



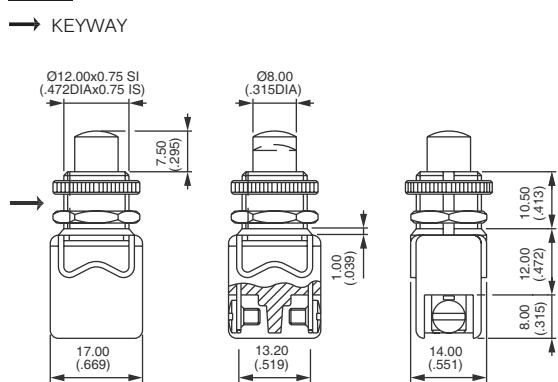
SCREW TERMINALS



1222 Normally Closed

1223 Normally Open

Plunger height : NO model : 7,50 mm, NC model : 5,80 mm



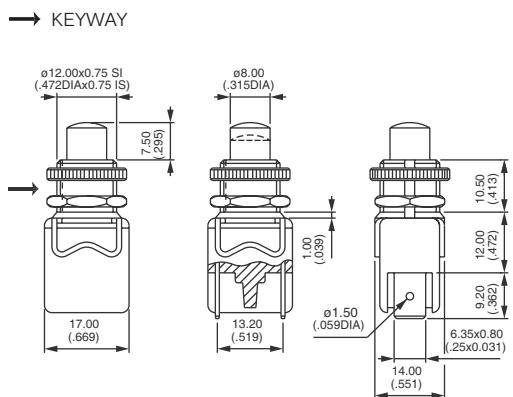
NORMALIZED QUICK-CONNECT TERMINALS



1232 Normally Closed

1233 Normally Open

Plunger height : NO model : 7,50 mm, NC model : 5,80 mm



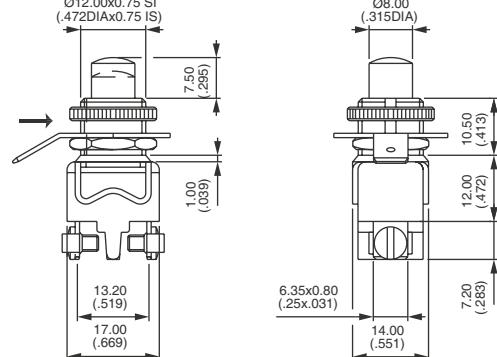
STRAIGHT SCREW TERMINALS + CLAMP



1202 Normally Closed

1203 Normally Open

Plunger height : NO model : 7,50 mm, NC model : 5,80 mm



4700-4800 series

Momentary or alternate action
pushbutton switches



DISTINCTIVE FEATURES

- Momentary or alternate
- Butt action contacts
- UL, CSA and VDE (EN 61058-1) approved



ELECTRICAL SPECIFICATIONS

- Max. current/voltage rating with resistive load :
 - silver contacts (A) : 3A 250VAC - 6A 125VAC
 - copper contacts (C) : 2A 250VAC - 4A 125VAC
- Initial contact resistance : 10 mΩ max.
- Insulation resistance : 1.000 MΩ min. at 500VDC
- Dielectric strength : 2.000 Vrms 50 Hz min. between terminals
3.000 Vrms 50 Hz min. between terminals and frame
- Electrical life : 10.000 cycles at full load



GENERAL SPECIFICATIONS

- Torque : 0,95 Nm (.70 Ft.lb) max. applied to nut
- Panel thickness : 5 mm (.196) max. between 2 nuts
- Total travel : 4,5 mm (.177) +/- 0,5 (.019)
- Operating temperature : -20°C to +65°C
- Hand soldering : 270°C max. for 10 seconds max. - Iron Ø 3 mm (.118)



MOUNTING

- Panel cut-out : Ø 12,2 (.480)



MATERIALS

- Case : melamine-phenolic
- Plunger : polyamide
- Bushing : polyamide
- Contacts :
 - A : silver
 - C : copper, silver plated

AGENCY APPROVALS



Models 4731A, 4736A, 4741A, 4746A are UL, CSA and VDE (EN 61058-1) approved.

Models 4831A, 4836A, 4841A, 4846A are VDE (EN 61058-1) approved.

Marking : to order switches marked UL/CSA, complete appropriate box of ordering format. VDE is standard marked.

4700-4800 series

Momentary or alternate action pushbutton switches



BUILD YOUR PART NUMBER

BASIC PART NUMBER

4

SERIES

MODELS / TERMINALS

NUMBER OF POLES

ELECTRICAL FUNCTIONS

| | |
|-------|---|
| 7 | Solder lug / quick-connect |
| 8 | Straight PC terminals |
| 7../8 | Quick-connect 4.7 x 0.8 (.185 x .031) - single pole, silver contacts only |

| | |
|---|-------------|
| 3 | Single pole |
| 4 | Double pole |

| | |
|---|-----------|
| 1 | ON - OFF |
| 6 | ON - ON |
| 3 | OFF - MOM |

OPTIONS

CONTACT MATERIALS

| | |
|---|-----------------------|
| A | Silver |
| C | Copper, silver plated |

ACTUATOR COLORS

| | |
|------|--------|
| 01 | Blue |
| 02 | Black |
| 03 | Green |
| 05 | Yellow |
| 06 | Red |
| 07/1 | White |
| 09 | Orange |

AGENCY APPROVALS

| | |
|----|--|
| UU | UL/CSA See Specifications for details of approved models. |
|----|--|

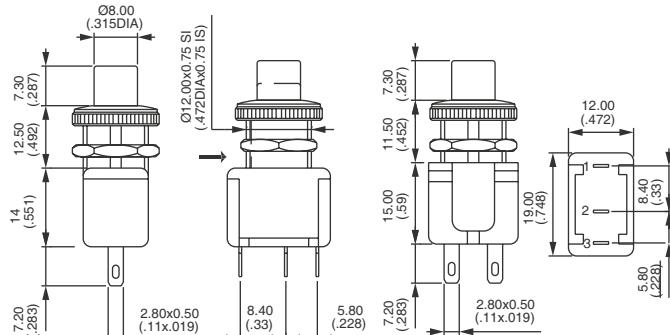
NOTICE : please note that not all combinations of above numbers are available. Refer to www.apem.com for further information.

SOLDER LUG/QUICK-CONNECT TERMINALS



| Single pole | Double pole | | |
|-------------|-------------|-----|-----|
| 4731 | 4741 | ON | OFF |
| 4736 | 4746 | ON | ON |
| 4733 | 4743 | OFF | MOM |

KEYWAY



CG series

Capacitive switches for underlay applications



DISTINCTIVE FEATURES

- Activated by the touch of a finger
- 50 million cycles
- Auto-calibration function
- Mounting under non-conductive surfaces
- Mating harness on request



ENVIRONMENTAL SPECIFICATIONS

- Triggered by flowing water
- Temperature range : -40°C to +70°C
- Adhesive and connector resistant to vibrations

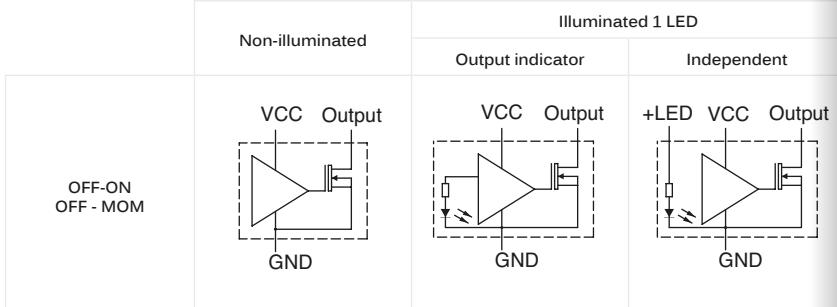


ELECTRICAL AND GENERAL SPECIFICATIONS

- Supply voltage : 5VDC, 12VDC or 24VDC
- Supply current : 15mA max. (12V)
- Max. current/voltage rating : 200mA 24VDC
- Life expectancy : 50 million cycles
- Switch resistance ON : 1 Ohm max.
- Power consumption : 10mA max. mode OFF
- Output type : NPN



WIRING DIAGRAMS



The company reserves the right to change specifications without notice.



MATERIALS

- Case : ABS
- Sealing : epoxy



WIRING FOR MATING CONNECTOR HARWIN M30-1100400

- Pin 1 : output
- Pin 2 : GND
- Pin 3 : +LED
- Pin 4 : +VCC
- Mating harness (connector + wires) available on request.



This switch should not be used in safety applications.

CG series

Capacitive switches for underlay applications



BUILD YOUR PART NUMBER

BASIC PART NUMBER

CG

SERIES

ELECTRICAL FUNCTION

- | | |
|---|-----------|
| 1 | OFF - MOM |
| 2 | OFF - ON |

OPTIONS

TERMINALS

- | | |
|---|--|
| 1 | Connector Different length, gauge or connector : on request |
|---|--|

SURFACE ADHESIVE

- | | |
|---|--|
| A | For common glass or polycarbonate For a specific surface, contact APEM. |
|---|--|

TYPES OF ILLUMINATION/VOLTAGE

- | | |
|---|-------------------------|
| 0 | Non-illuminated - 5VDC |
| 1 | Non-illuminated - 12VDC |
| 2 | Non-illuminated - 24VDC |
| L | Dot - 5VDC |
| P | Dot - 12VDC |
| J | Dot - 24VDC |

LED FUNCTIONS

- | | |
|-------|------------------|
| Blank | Non-illuminated |
| S | Independent |
| C | Output indicator |

SENSITIVITY

- | | |
|---|--|
| 1 | Medium (6 mm glass or 4 mm polycarbonate) Other on request. |
|---|--|

LED COLORS

- | | |
|-------|-----------------|
| Blank | Non-illuminated |
| 0B | Blue |
| 0G | Green |
| 0R | Red |
| 0Y | Amber |

Other on request.

NOTICE : please note that not all combinations of above numbers are available. Refer to www.apem.com for further information.

CONNECTOR OUTPUT

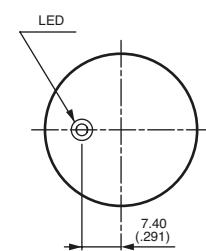
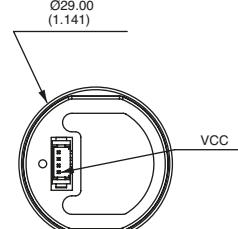


Momentary

CG1 OFF ON

Latching

CG2 OFF ON



CP series

Capacitive switches



DISTINCTIVE FEATURES

- Activated by the touch of a finger
- 50 million cycles
- Auto-calibration function
- Bushing diameter 16 (.630), 19 (.748) or 22 (.866)
- Momentary or latching



ENVIRONMENTAL SPECIFICATIONS

- Sealing : IP68 and IP69K according to IEC 60529
- Triggered by flowing water
- Impact resistance : IK10
- Operating temperature : -20°C to +65°C
- ESD : complies with EN61000-4-2 (extended) ± 8KV (20 contacts) and ± 15KV (20 air discharges)



ELECTRICAL AND GENERAL SPECIFICATIONS

- Max. current/voltage rating : 200mA 24VDC
- Supply voltage : 5VDC, 12VDC or 24VDC
- Life expectancy : 50 million cycles
- Power consumption non-illuminated : 7mA
- Power consumption illuminated : 25mA
- Operating force : 0 N
- LED state for output image option :
 - 1 LED : the LED is ON when the output is closed.
 - 2 LEDs : first color is ON when the output is open. Second color is ON when the output is closed.
- Output type : NPN



MATERIALS

- Case : aluminum, anodized
- Multi-wire leads section 0,22 mm² length 300 mm
- Cable, length 300 mm, section depending on switch model
- Connector : HE14 6V compatible with AMP/TYCO281839-3

The company reserves the right to change specifications without notice.



ADJUSTABLE SENSITIVITY

- Connection to ground by means of the yellow wire increases sensitivity (momentary version only).



PANEL CUT-OUT



This switch should not be used in safety applications.

CP series

Capacitive switches



BUILD YOUR PART NUMBER

BASIC PART NUMBER

CP

SERIES

BUSHING DIAMETERS

- | | |
|-----------|--------------|
| B1 | 16 mm (.630) |
| B2 | 19 mm (.748) |
| B3 | 22 mm (.866) |

ELECTRICAL FUNCTIONS

- | | |
|----------|-----------|
| 1 | OFF - MOM |
| 2 | OFF - ON |

OPTIONS

TERMINALS

000

TYPES OF ILLUMINATION/VOLTAGE

- | | |
|----------|-------------------------|
| 0 | Non-illuminated - 5VDC |
| 1 | Non-illuminated - 12VDC |
| 2 | Non-illuminated - 24VDC |
| A | Standard ring - 5VDC |

- | | |
|----------|-----------------------|
| N | Standard ring - 12VDC |
| K | Standard ring - 24VDC |
| C | Thin ring - 5VDC |
| D | Thin ring - 12VDC |

- | | |
|----------|--------------------|
| E | Thin ring - 24VDC |
| F | Large ring - 5VDC |
| G | Large ring - 12VDC |
| H | Large ring - 24VDC |

LED FUNCTIONS

- | | |
|----------|------------------|
| S | Independent |
| C | Output indicator |

A, N, K for dia. 16 & 19 only. C, D, E, F, G, H for dia 22 only

COLORS / MATERIALS

- | | |
|----------|------------------|
| 0 | Natural anodized |
| 1 | Blue anodized |
| 2 | Black anodized |
| 3 | Green anodized |
| 5 | Gold anodized |
| 6 | Red anodized |

LED COLORS

- | | |
|--------------|------------|
| Blank | Non-illum. |
| 0B | Blue* |
| 0G | Green* |
| OS | Red |
| OY | Amber |
| GS | Green/red* |

Bold = standard

*For 12VDC and 24VDC models only

NOTICE : please note that not all combinations of above numbers are available. Refer to www.apem.com for further information.

BUSHING Ø16 MM (.630) - STANDARD RING

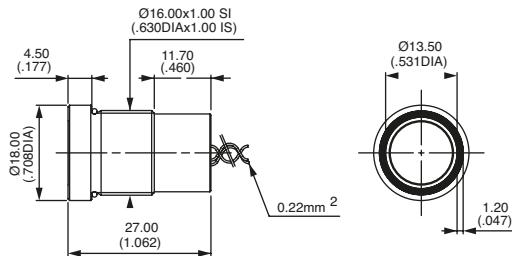


Momentary

CPB11 OFF MOM

Latching

CPB12 OFF ON



Shown with flying lead terminals

PBA series

Piezo switches



DISTINCTIVE FEATURES

- Bushing diameter 16 (.630), 19 (.748) or 22 (.866)
- Sealed to IP68 and IP69K (switches mounted on panel)
- Easy to clean metal surface
- Very long life expectancy
- Ring or dot illumination



ENVIRONMENTAL SPECIFICATIONS

- Sealing : IP68 per IEC 60529, IP69K per DIN 40050-9 (switches mounted on panel)
- Vibration resistance : 10-500 Hz / 10 g per IEC 60068-2-6
- Operating temperature : -40°C to +75°C
- EMC compatibility according to EN 61058-1 for the whole range
- EMC compatibility according to EN 61000-4 & EN61000-6-2 for model 1A (code 002)



ELECTRICAL SPECIFICATIONS

- Max. current/voltage rating with resistive load :
 - Function A : standard 200mA 24VAC/DC - option 1A 24VAC/DC
 - Function B : standard 100mA 24VAC/DC
- Switch resistance ON : 10 Ω max.
- Switch resistance OFF : 5 MΩ min.
- Life expectancy : 50 million cycles
- LED consumption : Illuminated dot 10mA - Illuminated ring 20mA (functions A-B-C)
- Power consumption for function 1 :
 - non-illuminated 10mA - illuminated 30mA



MATERIALS

- Case : aluminum, anodized or stainless steel 316L
- Multi-wire leads section 0,22 mm² length 300 mm, twisted by pair
- Cable, length 300 mm, section depending on switch model
- PC terminals : bronze, tin plated

Note : to maintain the ESD performance, always add a ground washer when the panel is made of non-conductive material (PVC, polycarbonate). For part numbers, see "Mounting accessories" on the following pages.



GENERAL SPECIFICATIONS

- Operating force : 2 to 6 N
- Torque : 2,5 Nm min. - 3 Nm max.

The company reserves the right to change specifications without notice.

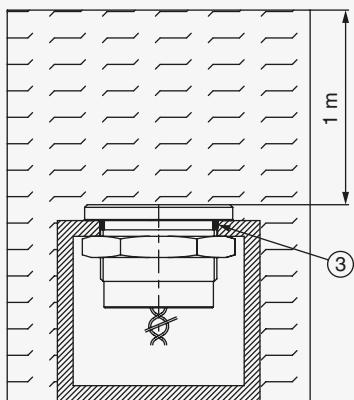
PBA series

Piezo switches



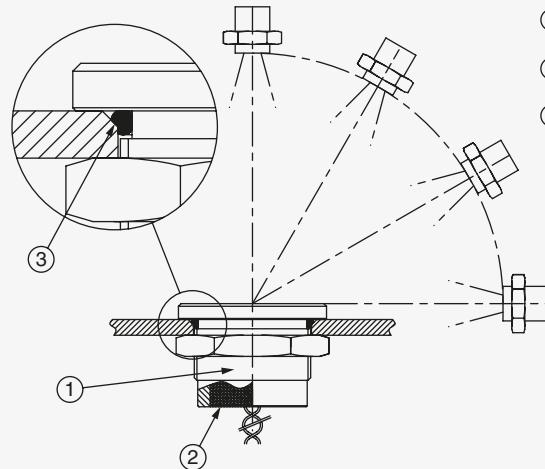
SEALING

SEALING IP68



Continuous immersion in water
IP68 test conditions
Continuous immersion in water
(1m, 24 hours)

SEALING IP69K



- ① - One-piece bushing
- ② - Epoxy sealed terminals
- ③ - O-ring

High pressure, high temperature wash down

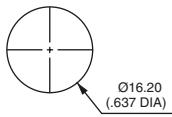
IP69K test conditions

- . Pressure : 80 - 120 bars
- . Distance : 15 cm
- . Temperature : $80^{\circ}\text{C} \pm 5^{\circ}\text{C}$
- . Flow : 14 - 16 l/mn
- . Duration : 30 seconds per position

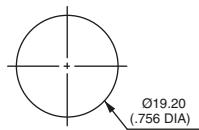


PANEL CUT-OUT

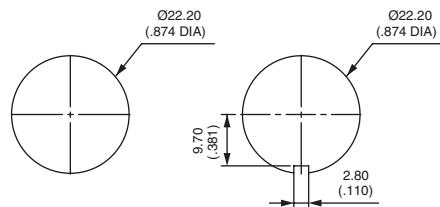
MODELS Ø16 (.630)



MODELS Ø19 (.748)



MODELS Ø22 (.866)

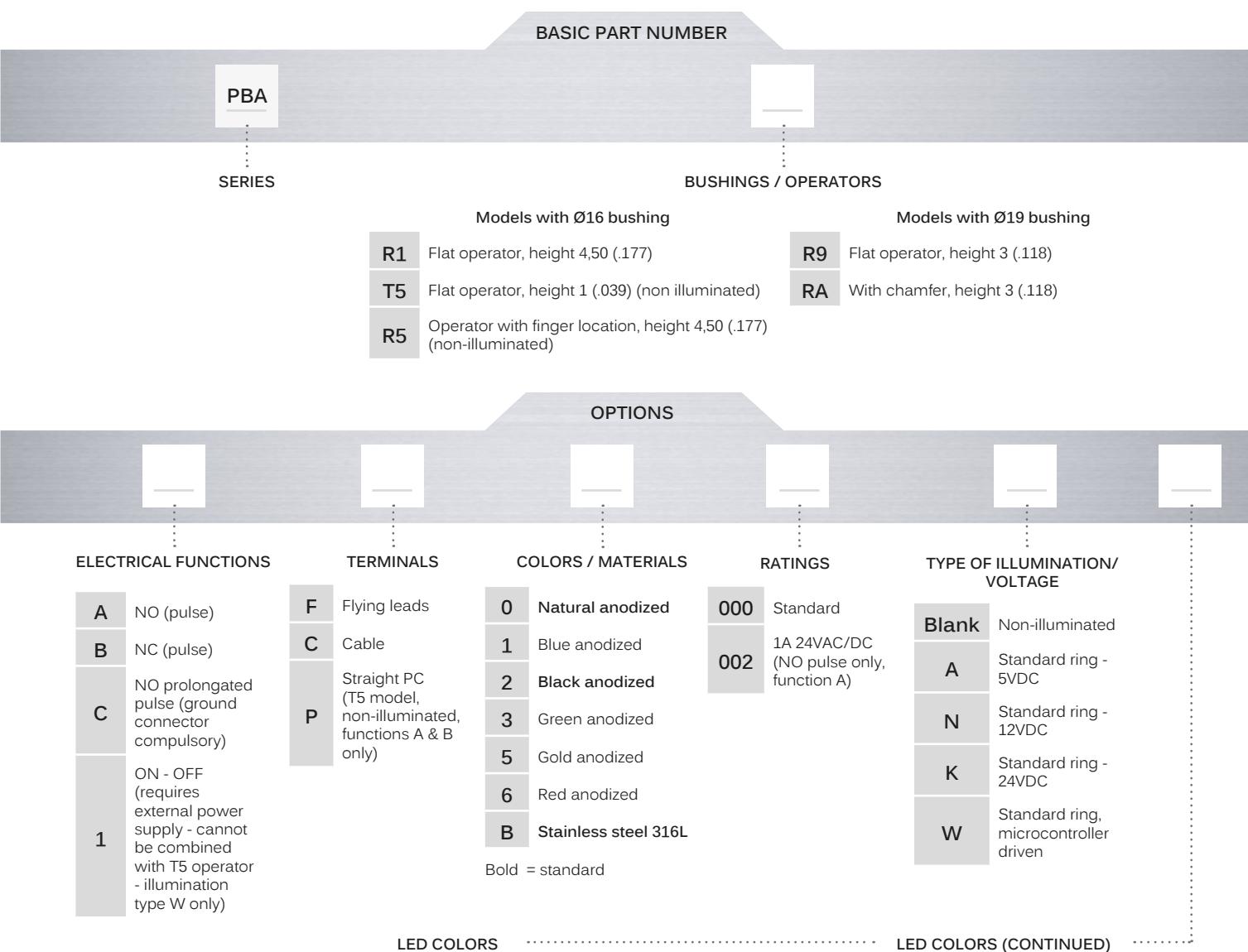


PBA series

Piezo switches Ø 16 or Ø 19 mm



BUILD YOUR PART NUMBER



LED COLORS

| | | | | | | | | | |
|-------|------------|----|--------------|----|--------------|----|------------------|----|------------------------|
| Blank | Non-illum. | 2A | Red/green | 2G | Green/white | 3A | Red/green/blue | 3H | Green/blue/ yellow |
| 0B | Blue | 2B | Red/yellow | 2H | Blue/yellow | 3B | Red/green/yellow | 3I | Green/blue/white |
| 0G | Green | 2C | Red/blue | 2I | Blue/white | 3D | Red/green/white | 3J | Green/yellow/ white |
| 0S | Red | 2D | Red/white | 2K | Yellow/white | 3E | Red/blue/white | 3K | Blue/yellow/white |
| 0Y | Yellow | 2E | Green/blue | | | 3F | Red/blue/white | | |
| 0W | White | 2F | Green/yellow | | | 3G | Red/yellow/white | | |

For options not listed above, please contact APEM.



ABOUT THIS SERIES



Notice : please note that not all combinations of above numbers are available.

Refer to www.apem.com for further information.



Mounting accessories : standard hardware supplied : 1 hex nut 10-621 (19 mm ac. flats) and 1 O-ring.

Always add a ground washer U5735 (Ø16 mm) or U5736 (Ø19 mm) when the panel is non-conductive (PVC, polycarbonate).

PBA series

Piezo switches Ø 16 or Ø 19 mm

Ø16 (.630) - NON-ILLUMINATED
OPERATOR HEIGHT 4,50 MM



Flat

PBAR1

With finger location

PBAR5

Ø16 (.630) - NON-ILLUMINATED
OPERATOR HEIGHT 1 MM



Flat

PBAT5

Ø19 (.748) - NON-ILLUMINATED
OPERATOR HEIGHT 3 MM



Flat

PBAR9

With chamfer

PBARA

Ø19 (.748) - ILLUMINATED RING
OPERATOR HEIGHT 3 MM



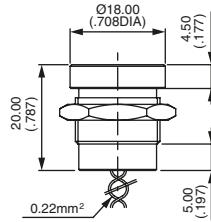
Flat

PBAR9

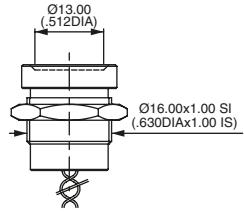
With chamfer

PBARA

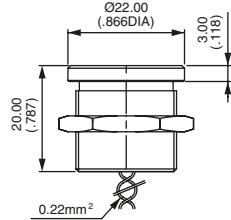
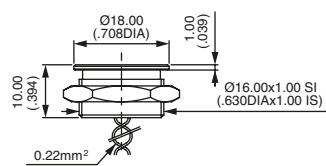
Wire colors : see "Electrical functions" page on website.



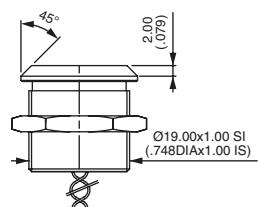
R1



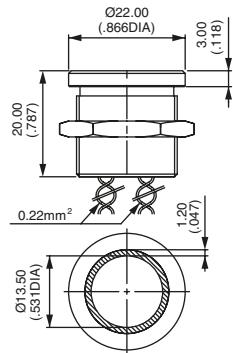
R5



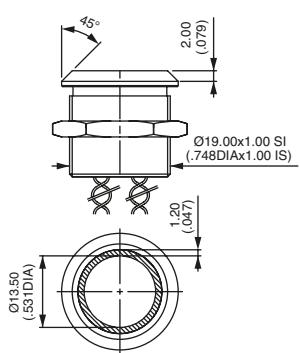
R9



RA



R9



RA

PBA series

Piezo switches Ø 22 mm



BUILD YOUR PART NUMBER

| BASIC PART NUMBER | | | | | |
|--|-------------------------|------------------------|---|-----------------------------------|--|
| SERIES | | BUSHINGS / OPERATORS | | | |
| PBA | | R2 | Flat, operator height 3 mm (.118) - Not available w. illuminated ring. | RY | With chamfer, operator height 4.5 mm (.177). Available with thin or large illuminated ring only. |
| | | R6 | With finger location, operator height 3 mm (.118). Not available with illuminated ring. | RZ | Flat, operator height 4.5 mm (.177). Available with thin or large illuminated ring only. |
| OPTIONS | | | | | |
| ELECTRICAL FUNCTIONS | TERMINALS | COLORS / MATERIALS | RATINGS | TYPE OF ILLUMINATION/VOLTAGE | |
| A NO (pulse) | F Flying leads | 0 Natural anodized | 000 Standard | Blank Non-illuminated | |
| B NC (pulse) | C Cable | 1 Blue anodized | 002 1A 24VAC/DC (NO pulse only, function A) | C thin ring - 5VDC | |
| C NO prolonged pulse (illuminated ring only - ground connector compulsory) | | 2 Black anodized | | D thin ring - 12VDC | |
| | | 3 Green anodized | | E thin ring - 24VDC | |
| 1 ON - OFF (requires external power supply - Illumination types V, Y and Z only - only one LED color) | | 5 Gold anodized | | F large ring - 5VDC | |
| | | 6 Red anodized | | G large ring - 12VDC | |
| | | B Stainless steel 316L | | H large ring - 24VDC | |
| | | | | L* dot - 5VDC | |
| | | | | P* dot - 12VDC | |
| | | | | J* dot - 24VDC | |
| | | | | V* dot - µcontroller driven | |
| | | | | Y thin ring - µcontroller driven | |
| | | | | Z large ring - µcontroller driven | |
| LED COLORS | | | | | |
| Blank Non-illum. | SG Red/green (dot only) | 2E Green/blue | 3A Red/green/blue | 3H Green/blue/yellow | |
| 0B Blue | 2A Red/green | 2F Green/yellow | 3B Red/green/yellow | 3I Green/blue/white | |
| 0G Green | 2B Red/yellow | 2G Green/white | 3D Red/green/white | 3J Green/yellow/white | |
| 0S Red | 2C Red/blue | 2H Blue/yellow | 3E Red/blue/yellow | 3K Blue/yellow/white | |
| 0Y Yellow | 2D Red/white | 2I Blue/white | 3F Red/blue/white | 3G Red/yellow/white | |
| 0W White | | 2K Yellow/white | | | |
| LED COLORS (CONTINUED) | | | | | |



ABOUT THIS SERIES



Mounting accessories : standard hardware supplied : 1 hex nut 10-856-0 (25 mm ac. flats) and 1 O-ring
Always add a ground washer U5737 when the panel is non-conductive (PVC, polycarbonate).

PBA series

Piezo switches Ø 22 mm

**NON-ILLUMINATED
OPERATOR HEIGHT 3 MM**

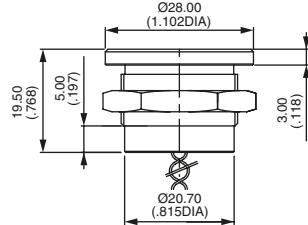


Flat

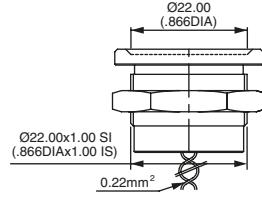
PBAR2

With finger location

PBAR6



R2



R6

**WITH ILLUMINATED DOT
OPERATOR HEIGHT 3 MM**

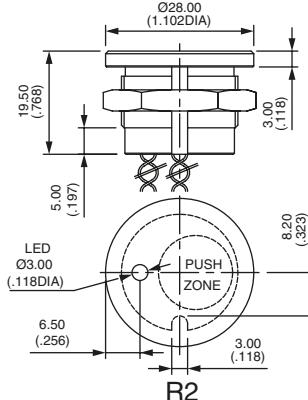


Flat

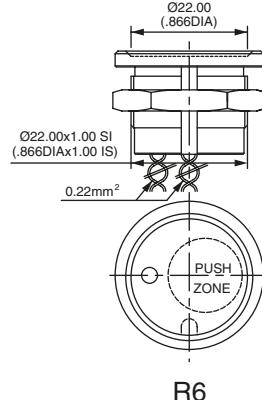
PBAR2

With finger location

PBAR6



R2



R6

**WITH THIN ILLUMINATED RING
OPERATOR HEIGHT 4,50**



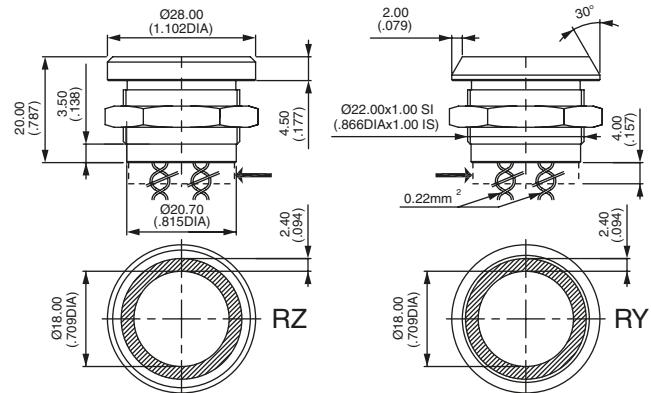
Flat

PBARZ

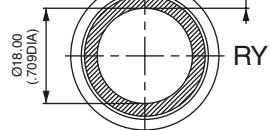
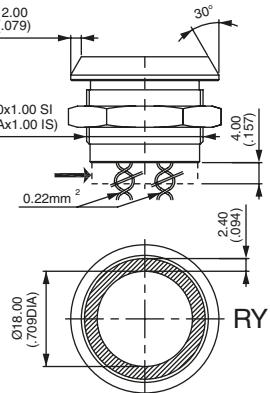
With chamfer

PBARY

→ DIMENSION OF ON-OFF MODELS



RZ



**WITH LARGE ILLUMINATED RING
OPERATOR HEIGHT 4,50**



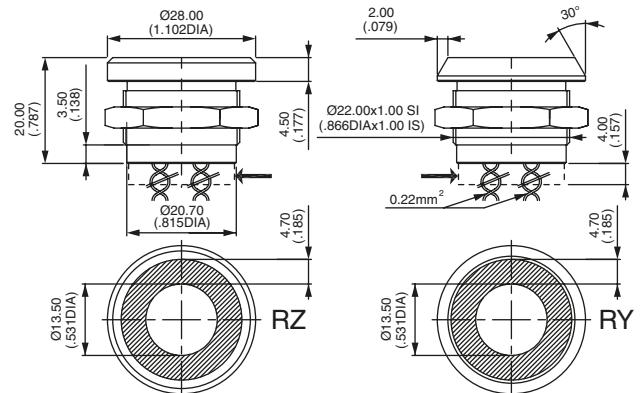
Flat

PBARZ

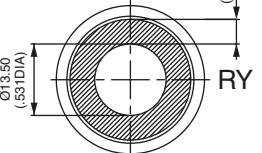
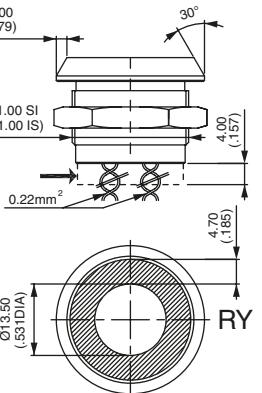
With chamfer

PBARY

→ DIMENSION OF ON-OFF MODELS



RZ



PBA series

ATEX approved piezo switches



DISTINCTIVE FEATURES

- Approved according to the ATEX 2014/34/EU directive
- Sealed to IP66 (mounted on panel)
- Easy to clean metal surface
- Long life
- Illuminated models



ENVIRONMENTAL SPECIFICATIONS

- Sealing : IP66 per IEC 60529 (switches mounted on panel)
- Operating temperature : -40°C to +55°C



ELECTRICAL SPECIFICATIONS

- Rated voltage : 5V to 24VAC/DC max.
- Rated current : 200mA max. at 6VAC/DC
50mA max. at 24VAC/DC (power limited to 1,2W for user group II)
- Contact resistance (ON) : 10 Ω max.
- Insulation resistance (OFF) : 5 MΩ min.
- Make impulse time : depending on actuating force and speed
- LED : 5VDC, 10mA to 20mA depending on model



GENERAL SPECIFICATIONS

- Operating force : 2 to 6 N
- Torque : 2,5 Nm max.
- Life expectancy : 50 million cycles
- EMC compatibility according to EN 61058-1
- In accordance with EN 60079:2009* ; EN 60079-26:2007 ; EN 60079-11:2012 ; EN 50303:2000

*Changes to the latest standards EN 60079-0:2012 do not affect compliance with the essential requirements.



MATERIALS

- Case : 316L stainless steel
- Terminals : multi-wire leads
0,22 mm², length 300 mm (11.81)



ABOUT THIS SERIES

- Instructions for use : see instruction notice NTPBA007.
- Mounting accessories : Standard hardware supplied : 1 hex nut 10-621 (19 mm ac. flats), 10-855-0 (22 mm ac. flats) or 10-856-0 (25 mm ac. flats), 1 O-Ring and 1 ground connector

The company reserves the right to change specifications without notice.

PBA series

ATEX approved piezo switches



BUILD YOUR PART NUMBER

BASIC PART NUMBER

PBA

SERIES

MODELS

R1 Bushing Ø 16 (.630), flat

R2 Bushing Ø 22 (.866), flat

R9 Bushing Ø 19 (.748), flat

R5 Bushing Ø 16 (.630), with finger location (non-illuminated only)

R6 Bushing Ø 22 (.866), with finger location

R2 and R6 not available with illuminated ring.

OPTIONS

A

F

B

000

X

TERMINALS

F Flying leads

RATINGS

000
200mA max. at 6VAC/DC - 50mA max. at 24VAC/DC

LED COLORS

0B Blue
0G Green
0S Red
0Y Yellow

ELECTRICAL FUNCTION

A NO (pulse)

COLORS/MATERIALS

B 316L stainless steel

TYPE

M One-piece bushing (non-illuminated)
A Illuminated ring (Ø 16 and 19 mm)
L Illuminated dot (Ø 22 mm)

APPROVAL

X ATEX

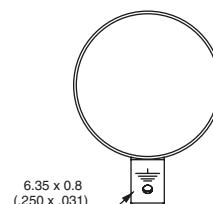
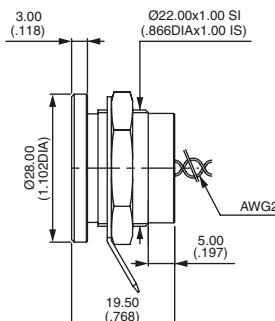
NOTICE : please note that not all combinations of above numbers are available.
Refer to www.apem.com for further information.

DIA. 22 (866) BUSHING - NON-ILLUMINATED



Stainless steel 316L

PBAR2AFB000MX



FP series

Fully illuminated pushbutton switches •
bushing Ø 24 mm • momentary or latching



DISTINCTIVE FEATURES

- Threaded bushing
- Full actuator or symbol illumination
- Large but lightweight
- Sealed to IP69K
- Pad printed or laser etched symbols



ENVIRONMENTAL SPECIFICATIONS

- Front panel sealing : IP69K according to DIN 40050-9
- Operating temperature : -40°C to +75°C



MATERIALS

- Case : PA46
- Actuator : PA12
- Bushing/ bezel : PA66
- Contacts : silver (code 2) or silver, gold plated (code 4)
- Cable : length 300 mm, section depending on switch model
- Terminal seal : epoxy or overmolding

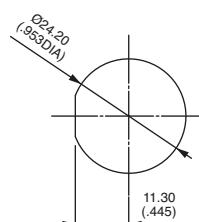


ELECTRICAL SPECIFICATIONS

- Max. current/voltage rating with resistive load :
 - silver contacts (code 2) : 4A 12VDC
 - gold plated contacts (code 4) : 200mA 12VDC
- Initial contact resistance : 50 mΩ max.
- Insulation resistance : 1 GΩ min. at 500VDC
- Dielectric strength : 1.000 Vrms 50 Hz min.
- Electrical life at full load :
 - Momentary models : 1 million cycles (gold plated contacts)
400.000 cycles (silver contacts)
 - Latching models : 200.000 cycles



PANEL CUT-OUT

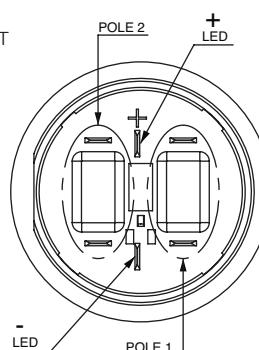


GENERAL SPECIFICATIONS

- Panel thickness : 1(.039) to 18 mm (.708) max.
- Total travel : 2,5 mm ± 0,5 mm
- Typical operating force : 8 N ± 2 N
- Low level or mechanical life :
 - Momentary models : 1 million cycles
 - Latching models : 200.000 cycles
- Torque : 3 Nm max. applied to nut



WIRING DIAGRAM

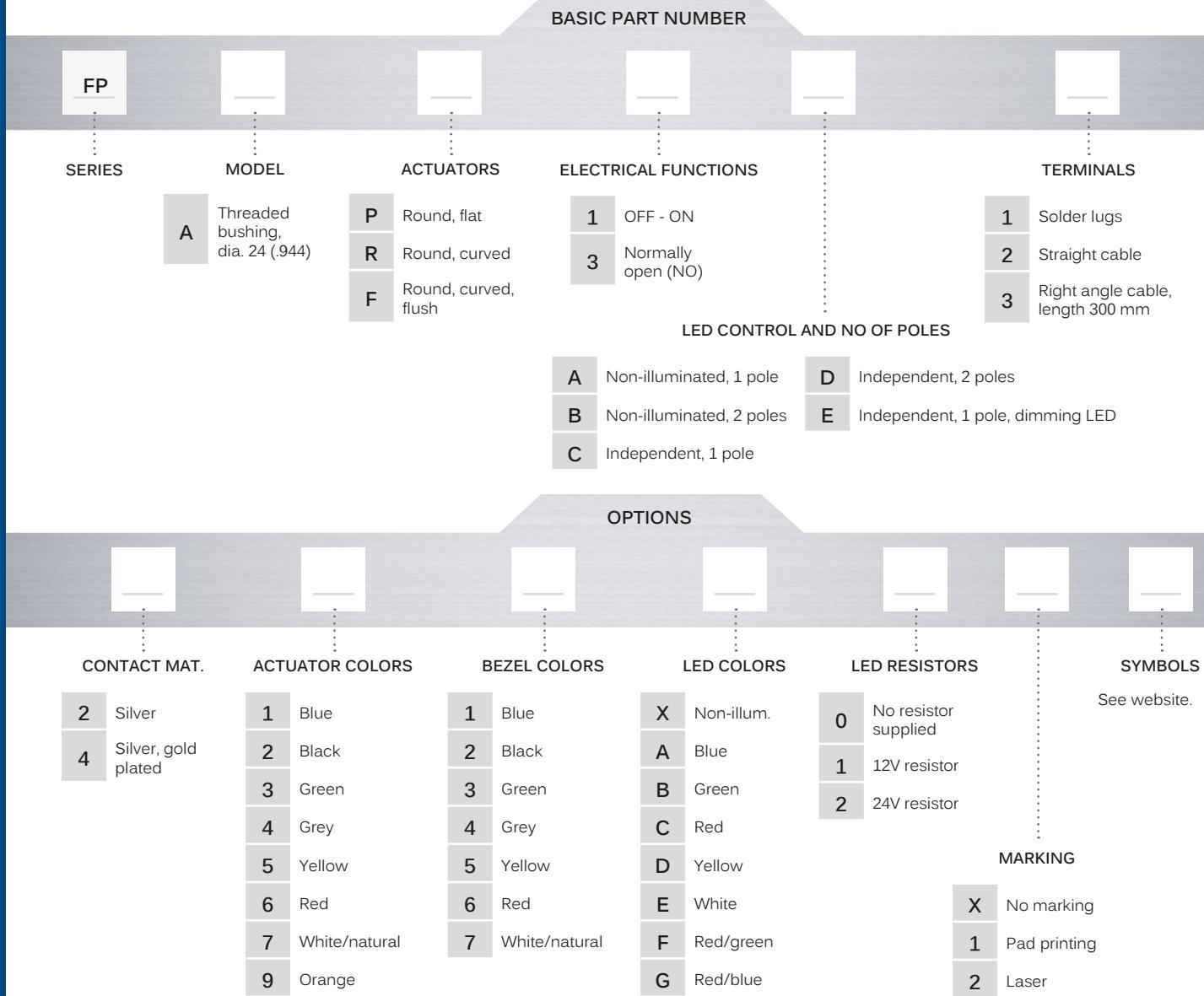


FP series

Fully illuminated pushbutton switches • bushing Ø 24 mm • momentary or latching



BUILD YOUR PART NUMBER

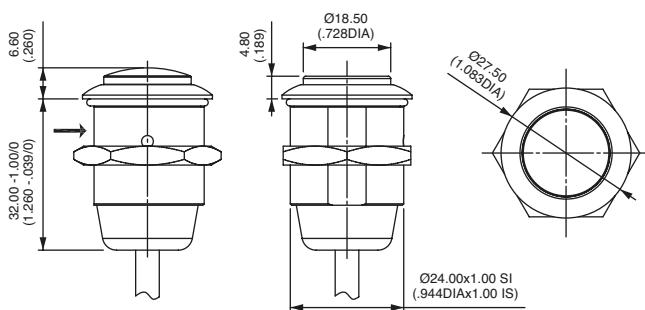


NOTICE : please note that not all combinations of above numbers are available. Refer to www.apem.com for further information.

SOLDER LUG TERMINALS



| | LATCHING | MOMENTARY (NO) |
|-----------------|---------------|----------------|
| Curved actuator | FPA1•1 | OFF |
| Flat actuator | FPA1•1 | OFF |
| | | ↑ |
| Curved actuator | FPA3•1 | OFF |
| Flat actuator | FPA3•1 | OFF |
| | | ↑ |



FP series

Fully illuminated pushbutton switches •
bushing Ø 26 mm • momentary or latching



DISTINCTIVE FEATURES

- Snap-in mounting
- Full actuator or symbol illumination
- Large but lightweight
- Pad printed or laser etched symbols



ENVIRONMENTAL SPECIFICATIONS

- Front panel sealing : IP54 according to IEC 60529 with panel gasket and 2 mm panel thickness
- Operating temperature : -40°C to +75°C



ELECTRICAL SPECIFICATIONS

- Max. current/voltage rating with resistive load :
 - silver contacts (code 2) : 4A 12VDC
 - gold plated contacts (code 4) : 200mA 12VDC
- Initial contact resistance : 50 mΩ max.
- Insulation resistance : 1 GΩ min. at 500VDC
- Dielectric strength : 1.000 Vrms 50 Hz min.
- Electrical life at full load :
 - Momentary models : 1 million cycles (gold plated contacts)
400.000 cycles (silver contacts)
 - Latching models : 200.000 cycles



GENERAL SPECIFICATIONS

- Panel thickness : 1,5 (.059) to 2 mm (.078) with panel gasket
2 (.078) to 2,5 mm (.885) without panel gasket
- Total travel : 2,5 mm ± 0,5 mm
- Typical operating force : 8 N ± 2 N
- Low level or mechanical life :
 - Momentary models : 1 million cycles
 - Latching models : 200.000 cycles

The company reserves the right to change specifications without notice.

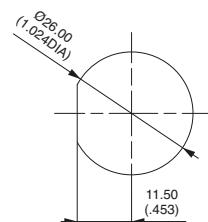


MATERIALS

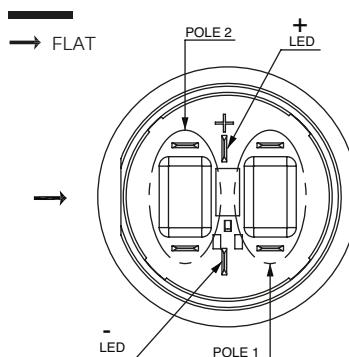
- Case : PA46
- Actuator : PA12
- Bushing/ bezel : ABS
- Contacts : silver (code 2)
or silver, gold plated (code 4)



PANEL CUT-OUT



WIRING DIAGRAM



FP series

Fully illuminated pushbutton switches •
bushing Ø 26 mm • momentary or latching



BUILD YOUR PART NUMBER

BASIC PART NUMBER

| | | | | | |
|-----------|-----------------------------|---|---|--|-------------------------|
| FP | | | | | |
| SERIES | MODEL | ACTUATORS | ELECTRICAL FUNCTIONS | | TERMINALS |
| B | Snap-in, dia. 26 (1.023) | P Round, flat R Round, curved F Round, curved, flush | 1 OFF - ON 3 Normally open (NO) | | 1 Solder lugs |

LED CONTROL AND NO OF POLES

| | | | |
|----------|--------------------------|----------|----------------------------------|
| A | Non-illuminated, 1 pole | D | Independent, 2 poles |
| B | Non-illuminated, 2 poles | E | Independent, 1 pole, dimming LED |
| C | Independent, 1 pole | | |

OPTIONS

| CONTACT MAT. | ACTUATOR COLORS | BEZEL COLORS | LED COLORS | LED RESISTORS | SYMBOLS |
|---------------------------------|------------------------|------------------------|---------------------|----------------------------------|--------------|
| 2 Silver | 1 Blue | 1 Blue | X Non-illum. | 0 No resistor supplied | See website. |
| 4 Silver, gold plated | 2 Black | 2 Black | A Blue | 1 12V resistor | |
| | 3 Green | 3 Green | B Green | 2 24V resistor | |
| | 4 Grey | 4 Grey | C Red | | |
| | 5 Yellow | 5 Yellow | D Yellow | | |
| | 6 Red | 6 Red | E White | | |
| | 7 White/natural | 7 White/natural | F Red/green | | |
| | 9 Orange | | G Red/blue | | |
| | | | | | |

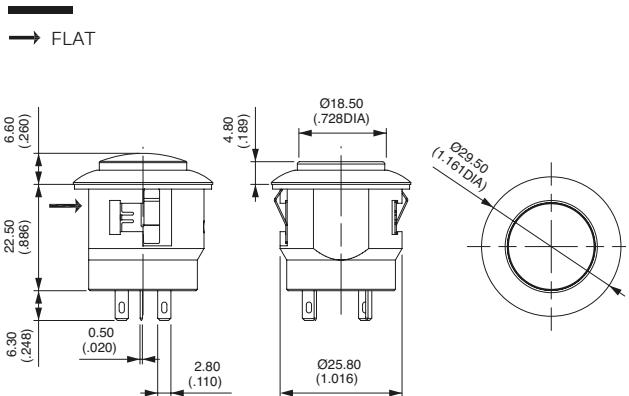
NOTICE : please note that not all combinations of above numbers are available. Refer to www.apem.com for further information.

SOLDER LUG TERMINALS



| LATCHING | | | |
|-----------------|----------------|-----|----|
| Curved actuator | FPBR1•1 | OFF | ON |
| Flat actuator | FPBP1•1 | OFF | ON |

| MOMENTARY (NO) | | | |
|-----------------|----------------|--|--|
| Curved actuator | FPBR3•1 | | |
| Flat actuator | FPBP3•1 | | |



FP series

Fully illuminated pushbutton switches •
bushing Ø 30 mm • momentary or latching



DISTINCTIVE FEATURES

- Full actuator or symbol illumination
- Snap-in and threaded bushing models
- Large but lightweight
- Pad printed or laser etched symbols



ELECTRICAL SPECIFICATIONS

- Max. current/voltage rating with resistive load :
 - silver contacts (code 2) : 4A 12VDC
 - gold plated contacts (code 4) : 200mA 12VDC
- Initial contact resistance : 50 mΩ max.
- Insulation resistance : 1 GΩ min. at 500VDC
- Dielectric strength : 1.000 Vrms 50 Hz min.
- Electrical life at full load :
 - Momentary models : 1 million cycles (gold plated contacts)
400.000 cycles (silver contacts)
 - Latching models : 200.000 cycles



GENERAL SPECIFICATIONS

- Panel thickness :
 - Snap-in version : 1,5 (.059) to 2 mm (.078) with panel gasket
2 (.078) to 2,5 mm (.885) without panel gasket
 - Threaded bushing version : 1(.039) to 9 mm (.354) max.
- Total travel : 2,8 mm ± 0,5 mm
- Typical operating force : 8 N ± 2 N
- Low level or mechanical life :
 - Momentary models : 1 million cycles
 - Latching models : 200.000 cycles
- Torque : 2 Nm max. applied to nut
- Operating temperature : -40°C to +75°C

The company reserves the right to change specifications without notice.

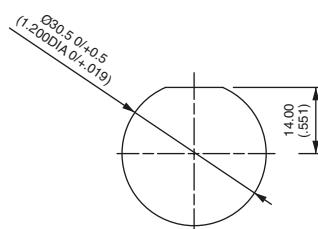


MATERIALS

- Case : PA46
- Actuator : PA12, gloss finish
- Bushing/ bezel : ABS, gloss finish
- Contacts :
 - Silver (code 2)
 - or silver, gold plated (code 4)

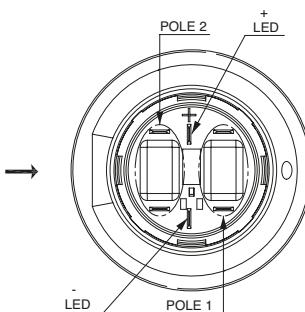


PANEL CUT-OUT



WIRING DIAGRAM

→ FLAT



FP series

Fully illuminated pushbutton switches •
bushing Ø 30 mm • momentary or latching



BUILD YOUR PART NUMBER

BASIC PART NUMBER

| | | | | | | |
|--------------------------------------|-----------------|----------|------------------------------------|--|--|---------------|
| FP | | | | | | |
| SERIES | MODELS | ACTUATOR | ELECTRICAL FUNCTIONS | | | TERMINALS |
| C Snap-in, dia. 30 mm | R Round, curved | | 1 OFF - ON 3 Normally open (NO) | | | 1 Solder lugs |
| D Threaded bushing, dia. 30 mm | | | | | | |

LED CONTROL AND NO OF POLES

| | |
|----------------------------|------------------------------------|
| A Non-illuminated, 1 pole | D Independent, 2 poles |
| B Non-illuminated, 2 poles | E Independent, 1 pole, dimming LED |
| C Independent, 1 pole | |

OPTIONS

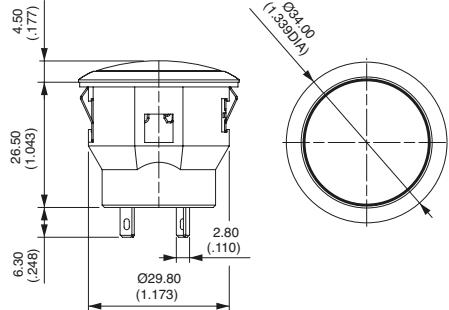
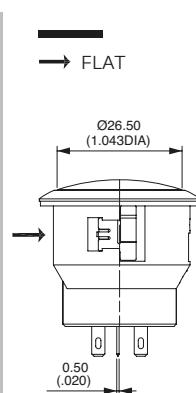
| CONTACT MAT. | ACTUATOR COLORS | BEZEL COLORS | LED COLORS | LED RESISTORS | SYMBOLS |
|-----------------------|-----------------|-----------------|--------------|------------------------|--------------|
| 2 Silver | 1 Blue | 1 Blue | X Non-illum. | 0 No resistor supplied | See website. |
| 4 Silver, gold plated | 2 Black | 2 Black | A Blue | 1 12V resistor | |
| | 3 Green | 3 Green | B Green | 2 24V resistor | |
| | 4 Grey | 4 Grey | C Red | | |
| | 5 Yellow | 5 Yellow | D Yellow | | |
| | 6 Red | 6 Red | E White | | |
| | 7 White/natural | 7 White/natural | F Red/green | | |
| | 9 Orange | 8 Bright chrome | G Red/blue | | |

MARKING

| | |
|---|--------------|
| X | No marking |
| 1 | Pad printing |
| 2 | Laser |

NOTICE : please note that not all combinations of above numbers are available. Refer to www.apem.com for further information.

SNAP-IN MOUNTING SOLDER LUG TERMINALS



FD series

Double icon illuminated pushbuttons •
bushing Ø 24 or 26 mm • momentary or latching



DISTINCTIVE FEATURES

- Double icon actuator
- Snap-in and threaded bushing models
- Large but lightweight
- Sealed to IP69K (threaded bushing version)



ENVIRONMENTAL SPECIFICATIONS

- Front panel sealing :
 - Threaded bushing version : IP69K according to DIN 40050-9
 - Snap-in version : IP54 according to IEC 60529 with panel gasket and 2 mm panel thickness
- Operating temperature : -40°C to +75°C



ELECTRICAL SPECIFICATIONS

- Max. current/voltage rating with resistive load :
 - silver contacts (code 2) : 4A 12VDC
 - gold plated contacts (code 4) : 200mA 12VDC
- Initial contact resistance : 50 mΩ max.
- Insulation resistance : 1 GΩ min. at 500VDC
- Dielectric strength : 1.000 Vrms 50 Hz min.
- Electrical life at full load :
 - Momentary models : 1 million cycles (gold plated contacts)
400.000 cycles (silver contacts)
 - Latching models : 200.000 cycles



GENERAL SPECIFICATIONS

- Panel thickness :
 - Snap-in version : 1,5 (.059) to 2 mm (.078) with panel gasket
2 (.078) to 2,5 mm (.885) without panel gasket
 - Threaded bushing version : 1 (.039) to 18 mm (.708) max.
- Total travel : 2,5 mm ± 0,5 mm
- Typical operating force : 8 N ± 2 N
- Low level or mechanical life :
 - Momentary models : 1 million cycles
 - Latching models : 200.000 cycles
- Torque : 3 Nm max. applied to nut

The company reserves the right to change specifications without notice.

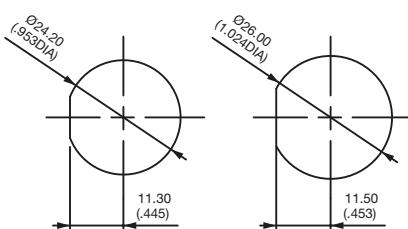


MATERIALS

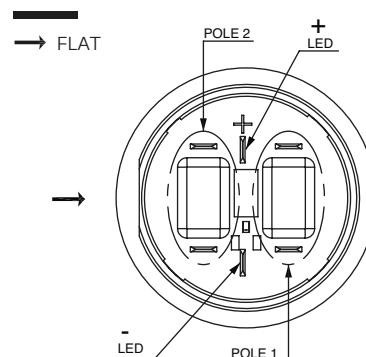
- Case : PA46
- Actuator : PA12
- Bushing/ bezel : PA66
- Contacts : silver (code 2)
or silver, gold plated (code 4)



PANEL CUT-OUT



WIRING DIAGRAM



FD series

Double icon illuminated pushbuttons •
bushing Ø 24 or 26 mm • momentary or latching



BUILD YOUR PART NUMBER

BASIC PART NUMBER

| | | | | | |
|-----------|--|------------------|--|--|------------------|
| FD | | | | | |
| SERIES | MODELS | ACTUATOR | ELECTRICAL FUNCTIONS | | TERMINALS |
| A B | Threaded bushing, dia. 24 (.944) Snap-in, dia. 26 (1.016) | P Round, flat | 1 OFF - ON 3 Normally open (NO) | | 1 Solder lugs |

LED CONTROL AND NO OF POLES

| | |
|---|---|
| C | Independent LED, 1 pole |
| D | Independent LED, 2 poles |
| F | LED linked to actuator, green if switch in ON position, single pole |
| G | LED linked to actuator, red if switch in ON position, single pole |

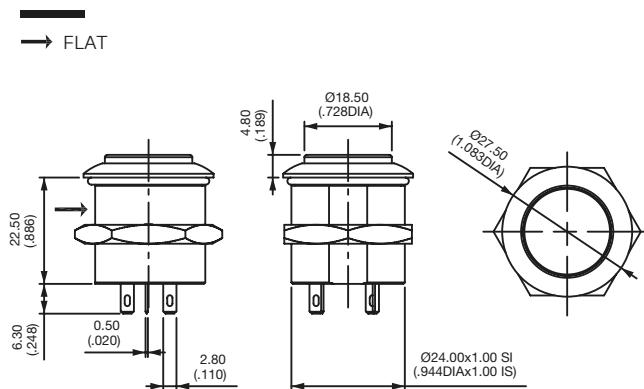
F and G for OFF - ON models only.

OPTIONS

| CONTACT MAT. | ACTUATOR COLOR | BEZEL COLOR | LED COLOR | LED RESISTORS | SYMBOLS |
|-----------------------------------|----------------|-------------|-------------|--|---|
| 2 Silver 4 Silver, gold plated | 8 Smoke black | 2 Black | F Red/green | 0 No resistor supplied 1 12V resistor 2 24V resistor | 3 START (green) / STOP (red) with ring 4 ON (green) / OFF (red) with ring 5 I (green) / O (red) with ring |

NOTICE : please note that not all combinations of above numbers are available. Refer to www.apem.com for further information.

MOUNTING BY THREADED BUSHING Ø 24 (.944)



MP series

Two-step pushbutton switches
for harsh environments



DISTINCTIVE FEATURES

SIL 2

Easy to integrate

Sealed to IP68

UV and hydrocarbon resistant



ENVIRONMENTAL SPECIFICATIONS

- SIL 2 according to IEC 61508
- Sealing to IP68 according to IEC 60529
- Operating temperature : -20°C to +70°C
- Static resistance : 10KV

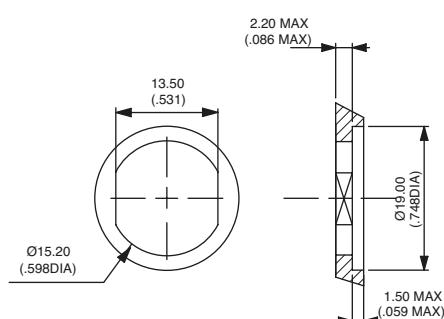
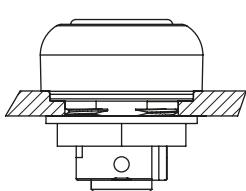


ELECTRICAL AND GENERAL SPECIFICATIONS

- Current/voltage rating : 20mA 5VDC max. / 3,3VDC min.
- Idling current : 20 to 80mA 5VDC - 11 to 44mA 3,3VDC
- NPN output signal : 20mA with 12VDC max. commutation voltage
- Operating force :
 - step 1 : 11,5 N ± 1,5 N
 - step 2 : 14,5 N ± 1,5 N
- Travel :
 - 1 step : 4 mm ± 0,4 mm
 - 2 steps : 6,65 mm ± 0,4 mm
- Mechanical life expectancy : 1 million cycles on each position



PANEL CUT-OUT RECOMMENDED MOUNTING



The company reserves the right to change specifications without notice.



MATERIALS

- Case + plungers : POM
- Bezel membrane : UV and hydrocarbon resistant nitrile
- Bushing + actuator : polyamide 6/6
- Connector : disconnectable crimp-style JST SM09B-SRSS-TB

Note : mating connector JST09SR-3S

MP series

Two-step pushbutton switches
for harsh environments



BUILD YOUR PART NUMBER

BASIC PART NUMBER

MP

SERIES

MODEL

ASSEMBLY ELEMENTS

POSITIONS

A Standard

F Full product (T + L)

Blank Cap only

T Cap only

1 1 step

L Base only

2 2 steps

OPTIONS

PCB

MARKING

ACTUATOR COLORS

CONNECTOR

Blank Cap only

Blank Base only

Blank Base only

| No of barriers | No of steps | Contact Redundancy |
|----------------|-------------|--------------------|
| 01 | 4 | 2 yes |
| 02 | 2 | 1 yes |
| 03 | 2 | 2 no |
| 04 | 1 | 1 no |

Blank Without marking

Blank Base only

Blank Base only

1 Blue

0 JST SM09B-SRSS-TB

B Dark blue

2 Black

3 Green

5 Yellow

6 Red

7 White

9 Orange

NOTICE : please note that not all combinations of above numbers are available. Refer to www.apem.com for further information.

FULL PRODUCT



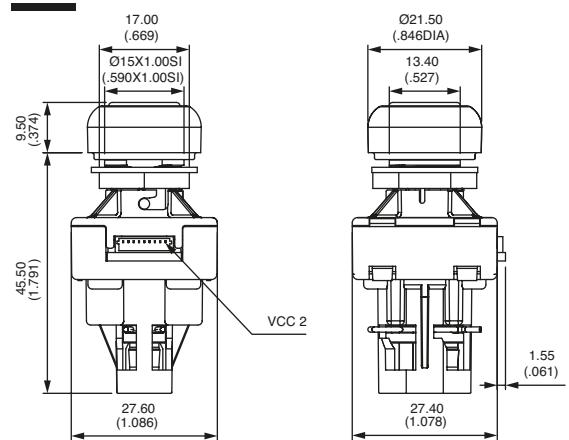
One-step switch

MPAF1 OFF

MOM

Two-step switch

MPAF2 OFF MOM MOM



LPI series

Tactile pushbutton switches
with large actuator



DISTINCTIVE FEATURES

- Large ergonomic actuator Ø 35 (1.378)
- Tactile feedback
- Low behind-panel depth 21 (.827) max.
- Wide choice of markings
- Ring or dot illumination



ENVIRONMENTAL SPECIFICATIONS

- Environmental protection :
IP53 for sealed version - IP40 for unsealed version
- Impact resistance : IK06 for NO/NC version - IK04 for NO version
- Operating temperature : - 20°C to +65°C
- Storage temperature : - 40°C to +70°C



GENERAL SPECIFICATIONS

- Operating force : 2,5 to 5 N (unsealed)
- Total travel : 2 mm ±0,3 mm
- Panel thickness :
1 to 4 mm (.039 to .157)



ELECTRICAL SPECIFICATIONS

- Snap-action, momentary function
- Mechanical life : 1.000.000 cycles min. for 5A NO/NC
5.000.000 cycles min. for 50mA NO
- Max. current/voltage rating with resistive load :

| 5A NO/NC version | 50mA NO version |
|--|--------------------------------|
| 5A 12VDC - 50.000 cycles 100mA 12VDC - 1.000.000 cycles | 50mA 24 VDC - 5.000.000 cycles |

- Min. current with resistive load : 0,5mA at 24VDC for NO version
- Contact resistance : 100mΩ max.
- Dielectric strength : 500 Vrms 50Hz between terminals
1.000 Vrms 50 Hz between terminals and ground
- Insulation resistance : 10 MΩ at 500VDC
- Integrated resistors for illuminated versions
- LED current : 20mA typical for dot or ring (30mA max.)
- LED protected from reverse polarity
- Stand-by consumption : 0,5VA max.

The company reserves the right to change specifications without notice.



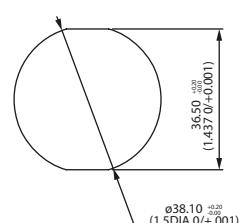
MATERIALS

- Switch block : thermoplastic
for 5A NO/NC
- Contacts :
5A NO/NC : silver, gold plated
50mA NO : silver
- Actuator crimped symbol :
304L stainless steel



PANEL CUT-OUT

FRONT MOUNTING



LPI series

Tactile pushbutton switches
with large actuator



BUILD YOUR PART NUMBER

| SWITCH BLOCK | | | | | |
|--------------|----------------------|--------------|-------------|------------|---|
| 1 LPI | 2 | 3 | 4 | 5 | 6 |
| SERIES | ELECTRICAL FUNCTIONS | ILLUMINATION | LED VOLTAGE | LED COLORS | |
| 3 50mA NO | 0 No illumination | XX None | X None | B Blue | |
| 5 5A NO/NC | 1 Dot | 06 6V | R Red | A Amber | |
| | 4 Ring | 12 12V | G Green | W White | |
| | | 24 24V | | | |

| OPERATOR | | | | | |
|------------------|------------|-------------------------------|-------------------------|----------------|------------------|
| 1 | 2 | 3 | 4 | 5 | 6 |
| MOUNTING | SEALING | BEZEL COLORS | ACTUATOR TYPES | ACTUATOR COLOR | ACTUATOR MARKING |
| 1 Front mounting | X Unsealed | X No bezel | 1 Raised crimped | 7 White | 14 Open |
| 2 Rear mounting | K Sealed | 1 Blue | 2 Raised moulded | | 15 Close |
| | | 2 Black | 3 Raised screen printed | | 16 Up |
| | | 3 Green | 4 Without symbol | | 17 Down |
| | | 4 Grey | 5 Screen printed | | 18 Left |
| | | 5 Yellow | | | 19 Right |
| | | 6 Red | | | |
| | | 7 White | | | |
| | | 9 Amber | | | |
| | | N Satin grey Consult APEM. | | | |

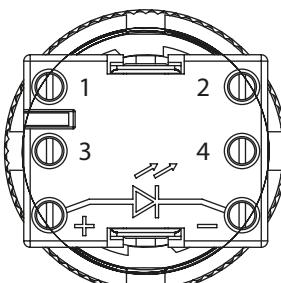
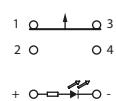
Other symbols :
see website.

NOTICE : please note that not all combinations of above numbers are available. Refer to www.apem.com for further information.

5A MOMENTARY NC/NO COMBINED



LPI5



Terminal block

Wire size : AWG20-15 - 0,5 to 1,5 mm²

Rated torque : 0,5 Nm

Screw size : M3

PR and V series

Stainless steel keys



DISTINCTIVE FEATURES

- Rear mounting
- Recessed, flush or raised, depending on panel thickness
- Square, round, with or without halo
- Illuminated or non-illuminated
- Custom marking on request



ENVIRONMENTAL SPECIFICATIONS

- Front sealing : IP65 according to NFC 21-010, IEC 60529 and DIN 40050
- Operating temperature : -20°C to +70°C
- Storage temperature : -40°C to +85°C
- Impact resistance : IK07 for PR series, IK09 for V series
- Flame resistance : 30 seconds. With lighters, matches, cigarettes (vertical position with direct flame on keys)
- Salt spray : 96 hours at +35°C NaCl 5 %
- Washable : most commonly used detergents and solvents



ELECTRICAL SPECIFICATIONS

- Output type : matrix
- Max. current/voltage rating : 50mA at 24VDC
- Switch resistance ON : < 10 ohms
- Switch resistance OFF : > 1 Gohm at 500V
- Life expectancy : > 1 million
- LED backlight : 12VDC (standard)



MATERIALS

- Keytop : 316L stainless steel
- Keys : ABS or PA6 nylon (illuminated versions)
- Key holder : ABS or PA6
- Frame : 316L stainless steel
- PCB : FR4
- Seal : 0,4 mm thick silicone
- Actuator : stainless steel snap domes AISI 304



GENERAL SPECIFICATIONS

- Operating force : 4 N +/- 0,5 N
- Panel thickness : 1,5 mm (.059) to 3 mm (.118) max.

The company reserves the right to change specifications without notice.

PR and V series

Stainless steel keys



BUILD YOUR PART NUMBER

BASIC PART NUMBER

MODELS

| | |
|------------|--|
| PRO | 82 series |
| V00 | 9 series, dia. 20 mm round key |
| VH0 | 9 series, dia. 20 mm round key with halo |
| VQ0 | 9 series, 22x22 mm square key |
| VQR | 9 series, 17x17 mm square key |
| VR0 | 9 series, dia. 17 mm round key |

NO OF KEYS

| | |
|-----------|-------|
| 01 | 1 key |
|-----------|-------|

OPTIONS

FRAME

| | |
|----------|----------|
| 0 | No frame |
|----------|----------|

ILLUMINATION

| | |
|----------|-----------------|
| 0 | Non-illuminated |
| L | Illuminated |

LED COLORS

| | |
|-----------|-----------|
| 0R | Red |
| 0B | Blue |
| 0G | Green |
| 0Y | Yellow |
| 0W | White* |
| RB | Red/blue |
| RG | Red/green |

| | |
|-----------|-----------|
| 05 | 5V |
| 12 | 12V (std) |
| 24 | 24V |

VOLTAGE

Options available on request:
Custom marking - Keypads (4, 12, 16 keys)

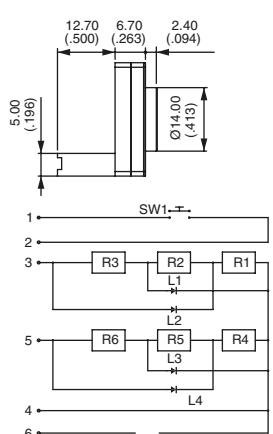
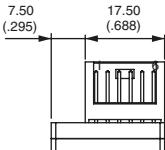
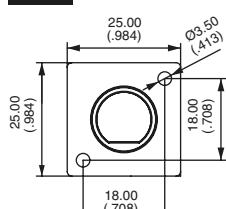
Other on request.
*Except for VH0

NOTICE : please note that not all combinations of above numbers are available. Refer to www.apem.com for further information.

PR SERIES - ILLUMINATED



Illuminated, blue
PR0010L0B12



S series

Washable rocker and paddle switches



DISTINCTIVE FEATURES

- Process sealed
- Front and rear sealing
- Process compatible
- Wave solderable
- Washable



ENVIRONMENTAL SPECIFICATIONS

- Operating temperature : -20°C to +85°C
- Storage temperature : -40°C to +85°C
- Moisture : The insulating materials employed and the complete seal permit the switches to withstand a 56 days moisture test (IEC 68-2-3).
- Solderability : The switches are tested at 235°C according to IEC 68-2-20 after accelerated aging.



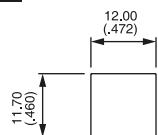
ELECTRICAL SPECIFICATIONS

- Max. current/voltage rating with resistive load :
 - silver contacts (A) : 4A 30VDC
 - brass, gold plated contacts (CD) : 0,4VA 20VAC or DC
 - silver, gold plated contacts (AD) : 4A 30VDC (300mA 30VDC for gold plating)
- Initial contact resistance : 10 mΩ max.
- Insulation resistance : 1.000 MΩ min.
- Dielectric strength : 1.000 Vrms 50 Hz min.
- Electrical life with nominal load :

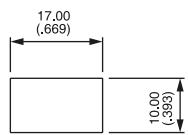
| Contacts | Number of cycles | |
|----------|------------------|-------------|
| | 2 positions | 3 positions |
| A | 40.000 | 40.000 |
| CD | 100.000 | 50.000 |
| AD | 40.000 | 40.000 |



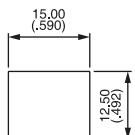
PANEL CUT-OUT



With rocker U730 or paddle U700



With rocker U620 or paddle U610



For SK only

The company reserves the right to change specifications without notice.



GENERAL SPECIFICATIONS

- Mechanical strength : Terminals are strengthened by a bracket or a ground plate ensuring the rigidity of the switch on the board. Actuator strength is 10 N max.
- Soldering - thermal shock : The switches are especially designed for flow soldering at 260°C during 5 seconds owing to high temperature polymer parts.



MATERIALS

- Case and cover : UL94-V0, polyamide, glass filled or PES
- Actuator : polyamide
- Contacts
 - CD : brass, gold plated
 - A : silver
 - AD : silver, gold plated
- Terminal seal : epoxy

AGENCY APPROVAL



2A 250VAC
4A 125VAC

Availability : consult factory for details of approved models.

Marking : to order switches marked UL, complete appropriate box of ordering format.

S series

Washable rocker and paddle switches



BUILD YOUR PART NUMBER

BASIC PART NUMBER

| | | | | |
|----------|-----------|------------------|-----------------|----------------------|
| S | | | | |
| SERIES | TERMINALS | TERMINAL SPACING | NUMBER OF POLES | ELECTRICAL FUNCTIONS |

| | |
|-----------|-------------------------------------|
| W | Right angle, horizontal mounting |
| WW | Right angle, vertical mounting |
| Y | Bracket mounting |

| | |
|----------|------------------------------|
| 2 | 4.7 (.185) or 3.81 (.150) |
| 0 | 5.08 (.200) (SW switches) |

| | |
|----------|-------------|
| 3 | Single pole |
| 4 | Double pole |

| | | | |
|------------|-----|-----|-----|
| 6 | ON | - | ON |
| 9 | ON | OFF | ON |
| 7 | MOM | OFF | MOM |
| 8 | ON | OFF | MOM |
| 2 | ON | - | MOM |
| 4TH | ON | ON | ON |

OPTIONS

CONTACT MATERIALS

| | |
|-----------|---------------------|
| A | Silver |
| AD | Silver, gold plated |
| CD | Brass, gold plated |

LEVER

-6 For rocker and paddle.

APPROVALS

UL

Availability :
Consult
factory for
details of
approved
models.

SPECIAL OPTIONS / INSULATED MODELS

| | |
|--------------|---|
| Blank | No special requirement |
| X653 | Vertical right angle with stand-off plate |
| X1159 | Insulated models |

See website.

ACTUATORS

Rockers

U620 Large

U730 Small

BEZELS

For SK models

U1200

For LED

For SW, SWW and SY models

U4602

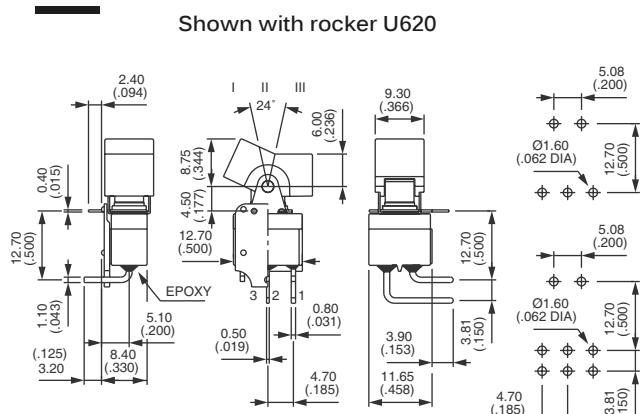
NOTICE : please note that not all combinations of above numbers are available.
Refer to www.apem.com for further information.

RIGHT ANGLE TERMINALS - HORIZONTAL SPACING 4,7 (.185)



| Single pole | Double pole | III | II | I |
|----------------|-------------------|-----|-----|-----|
| SW236-6 | SW246-6 | ON | - | ON |
| SW239-6 | SW249-6 | ON | OFF | ON |
| SW237-6 | SW247-6 | MOM | OFF | MOM |
| SW238-6 | SW248-6 | ON | OFF | MOM |
| SW232-6 | SW242-6 | ON | - | MOM |
| | SW244TH-6* | ON | ON | ON |

*Function 4 : SP in DP case - TH connection, see end of catalog.
Single pole with stand-off plate, double pole without.



AS series

Snap-in rocker switches



DISTINCTIVE FEATURES

- Double insulation
- Epoxy sealed terminals
- UL and CSA approved



ELECTRICAL SPECIFICATIONS

- Max. current/voltage rating with resistive load :
 - silver contacts (code 1) and gold plated silver contacts (code 2) : 4A 30VDC
 - gold plated brass contacts (code 0) : 0,4VA 20V AC or DC
- Initial contact resistance : 10 mΩ max.
- Insulation resistance : 10.000 MΩ min.
- Dielectric strength :
 - 1.000 Vrms 50 Hz min. between terminals
 - 4.000 Vrms 50 Hz min. between terminals and metal panel
- Electrical life : 50.000 cycles

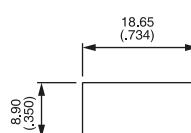


GENERAL SPECIFICATIONS

- Panel thickness : 1 (.039) to 3 mm (.118) max.
- Operating temperature : -40°C to +85°C



PANEL CUT-OUT



MATERIALS

- Case : PES
- Actuator : polyamide
- Contacts
 - 0 : brass, gold plated
 - 1 : silver
 - 2 : silver, gold plated
 - 5 : special contact, lower rating
- Minimum quantity : consult factory.
- Terminal seal : epoxy

The company reserves the right to change specifications without notice.

AGENCY APPROVALS



2A 250VAC
4A 125VAC

Availability : consult factory for details on approved models.

Marking : to order switches marked with above approvals, complete last box of ordering format.

AS series

Snap-in rocker switches



BUILD YOUR PART NUMBER

BASIC PART NUMBER

AS

SERIES

NUMBER OF POLES

ELECTRICAL FUNCTIONS

TERMINALS

3 Single pole

| | | | |
|---|-----|-----|-----|
| 6 | ON | - | ON |
| 9 | ON | OFF | ON |
| 7 | MOM | OFF | MOM |
| 8 | ON | OFF | MOM |
| 2 | ON | - | MOM |

S0 Solder lug

P0 Straight PC

OPTIONS

CONTACT MATERIALS

ACTUATORS

OTHER OPTIONS

0 Brass, gold plated

00 Black

10 With UL-CSA marking

1 Silver

01 Red

20 10 mm long straight PC terminals

2 Silver, gold plated

02 Grey

5 Special contact, lower rating.
On request.

03 Blue

04 Ivory

07 White

09 Dark blue

Actuator marking
on request.

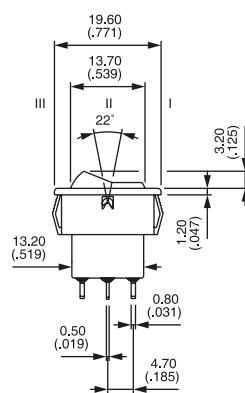
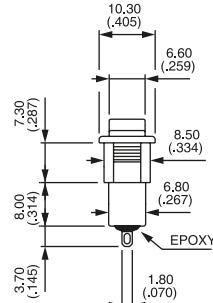
NOTICE : please note that not all combinations of above numbers are available.
Refer to www.apem.com for further information.

SOLDER LUG TERMINALS



| | | | |
|--------|-----|-----|-----|
| AS36S0 | ON | - | ON |
| AS39S0 | ON | OFF | ON |
| AS37S0 | MOM | OFF | MOM |
| AS38S0 | ON | OFF | MOM |
| AS32S0 | ON | - | MOM |

| | | |
|--------|-----|-----|
| III | II | I |
| AS36S0 | ON | - |
| AS39S0 | ON | OFF |
| AS37S0 | MOM | OFF |
| AS38S0 | ON | OFF |
| AS32S0 | ON | - |



MT series

Sealed selector switches



DISTINCTIVE FEATURES

- Environmentally sealed (IP68)
- Multiple single functions available
- Various contact materials that allow usage from dry circuit applications up to 4A



ELECTRICAL SPECIFICATIONS

- Max. current/voltage rating with resistive load :
 - Silver contacts (A) : 4A 30VDC
 - Gold plated silver contacts (AD) : 4A 30VDC (gold plating withstands up to 100mA 30VDC)
 - Gold plated brass contacts (CD) : 0,4VA 20VAC or DC
- Minimal load :
 - A contacts : 50mA 10VDC
 - AD and CD contacts : 10mA 50mV - 10µA 5V
- Initial contact resistance : 10mΩ max.
- Insulation resistance : 1.000 MΩ min. at 500VDC
- Dielectric strength : 1.000 Vrms 50Hz min. between terminals
1.500 Vrms 50Hz min. between terminals and frame
- Contact bounce : 2ms max.
- Electrical life at full load : 50.000 cycles
- Low level or mechanical life : 100.000 cycles



GENERAL SPECIFICATIONS

- Panel thickness : 11,5 mm (.452) max.
- Operating temperature : -40°C to +85°C



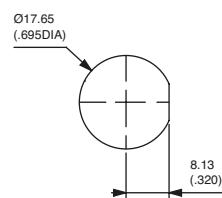
MATERIALS

- Actuator : 6/6 nylon
Soft touch : thermoplastic elastomer over 6/6 nylon
- Bushing : brass, chrome plated
- Contacts :
 - A : silver
 - AD : silver, gold plated
 - CD : brass, gold plated
- Terminal seal : epoxy

The company reserves the right to change specifications without notice.



PANEL CUT-OUT



MT series

Sealed selector switches



BUILD YOUR PART NUMBER

BASIC PART NUMBER

MT

SERIES

BUSHING FINISH

ELECTRICAL FUNCTIONS

TERMINALS

Blank Bright chrome

6 ON - ON

1 Straight PC

G Black (std)

9 ON OFF ON

2 Solder lug

7 MOM OFF MOM

8 ON OFF MOM

2 ON - MOM

OPTIONS

CONTACT MATERIALS

ACTUATORS

A Silver

2 Rocker, black

AD Gold plated silver

3 Winged, black

CD Gold plated brass

4 Paddle, black

5 Winged, soft touch, black

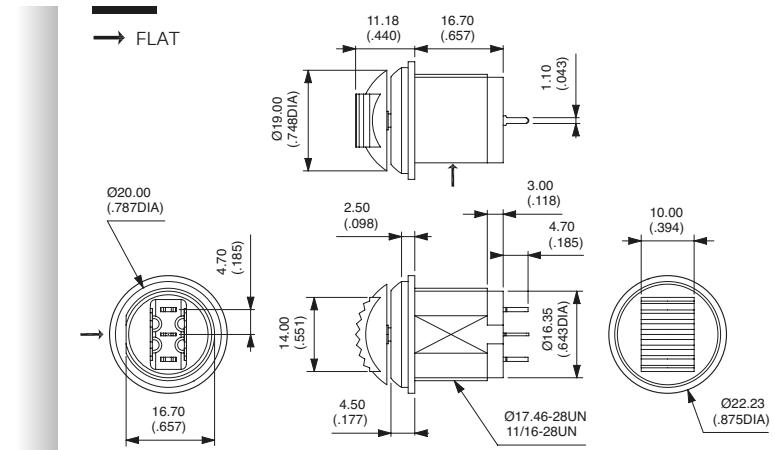
6 Paddle, soft touch, black

Other : on request.

ROCKER ACTUATOR STRAIGHT PC TERMINALS



To order a product, select the desired codes in the above overview.



FM series

Snap-in rocker switches •
panel cut-out 19 x 13 (.750 x .508)



DISTINCTIVE FEATURES

- For class II appliances
- VDE and UL approved
- Protection against moisture by double-shell case
- Non-illuminated
- Optional sealing boot

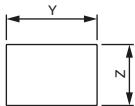


ELECTRICAL AND GENERAL SPECIFICATIONS

- Approved ratings (functions 1 and 6) :
VDE : 10(4)A 250VAC T85°C - UL : 6A 250VAC & 125VAC T65°C
- Max. contact rating :
 - functions 1 and 6 : see above.
 - function 3 : 4A 250VAC
 - functions 8 and 9 : 6A 250VAC
- Initial contact resistance : 20mΩ max.
- Insulation resistance : 1.000 MΩ min. at 500VDC
- Dielectric strength :
 - functions 1 and 6 : 2.500 Vrms between terminals
 - functions 3, 8 and 9 : 1.500 Vrms between terminals
- Electrical life at full load : 10 000 cycles
- Operating temperature : -20°C to +85°C



PANEL CUT-OUT



| Panel thickness | Dim. Y | Dim. Z |
|-----------------|--------------|---------------|
| 0,75 to 1,25 mm | 19,2 +0/-0,1 | 12,9 +0,15/-0 |
| 1,25 to 2 mm | 19,4 +0/-0,1 | 12,9 +0,15/-0 |
| 2 to 3 mm | 19,8 +0/-0,1 | 12,9 +0,15/-0 |



MATERIALS

- Case, frame, rocker : PA6/6
- Contacts : silver
- Terminals : silver plated

The company reserves the right to change specifications without notice.

AGENCY APPROVALS



EN 61058-1

Availability : functions 1 and 6.

Marking : approved models are standard marked.

FM series

Snap-in rocker switches •
panel cut-out 19 x 13 (.750 x .508)



BUILD YOUR PART NUMBER

BASIC PART NUMBER

FM

C

ELECTRICAL FUNCTIONS

C Non illuminated
Concave

Illuminated version
also available. See
website.

| | | | |
|----------|-----|-----|-----|
| 1 | ON | - | OFF |
| 3 | MOM | - | OFF |
| 6 | ON | - | ON |
| 8 | ON | OFF | MOM |
| 9 | ON | OFF | ON |

TERMINALS

| | |
|----------|-------------------------------|
| 2 | Solder lug |
| 8 | Quick-connect |
| 9 | Straight PC (funct. 1 & 6) |

OPTIONS

A

0

0

CONTACTS

A Silver

FRAME COLOR

2 Black

Others : on request.

ROCKER COLORS

| | |
|------------|-------------|
| 1 | Blue |
| 2 | Black (std) |
| 3 | Green |
| 4 | Grey |
| 5 | Yellow |
| 6 | Red (std) |
| 7 | Ivory |
| 7/1 | White |
| 9 | Orange |

LENS COLOR

0 No lens

LAMP

0 None

MARKING

000 NoneSymbols and colors :
see website.

NOTICE : please note that not all combinations of above numbers are available.
Refer to www.apem.com for further information.

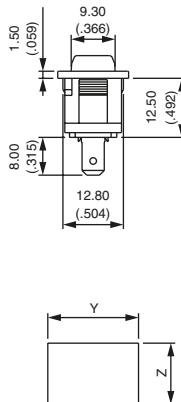
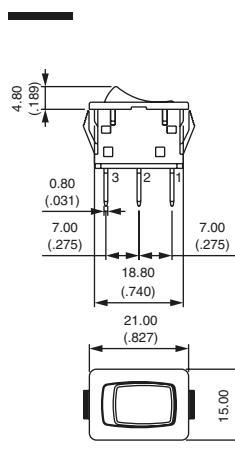
NON-ILLUMINATED QUICK-CONNECT TERMINALS



1-2

2-3

| | | | |
|-------|-----|-----|-----|
| FMC18 | ON | - | OFF |
| FMC38 | MOM | - | OFF |
| FMC68 | ON | - | ON |
| FMC88 | ON | OFF | MOM |
| FMC98 | ON | OFF | ON |



2600 series

Power rocker switches



DISTINCTIVE FEATURES

Three rocker shapes : plain, V-shaped or concave

Various rocker colors

Frame with protection guard on 2600LP models

Illuminated or non-illuminated

UL, CSA, VDE and NF (EN 61058-1) approved



ELECTRICAL SPECIFICATIONS

- Max. current/voltage rating with resistive load and approved ratings : see table below.
- Initial contact resistance : 10mΩ max.
- Insulation resistance : 1.000 MΩ min. at 500VDC
- Dielectric strength : 2.500 Vrms 50 Hz min. between terminals
3.000 Vrms 50 Hz min. between terminals and metal panel
- Electrical life : 10.000 cycles at full load

| Functions | APPROVED RATINGS | | | | DIRECT CURRENT | |
|---------------------|--|--|-----------------------------|-----------------------------|----------------|-----------|
| | CSA (double pole) | UL (double pole) | VDE | NF | 24 VDC | 12 VDC |
| | CSA 22-2 | UL 1054 | EN 61058-1 | EN 61058-1 | | |
| ON - OFF ON - ON | 1/6 HP 125VAC 16A 125VAC 16A 250VAC 1/3 HP 250VAC | 1/6 HP 125VAC 16A 125VAC 16A 250VAC 1/3 HP 250VAC | 10(4)A 250VAC T 85/55 | - | 10A | 15A |
| ON - OFF - ON | 10A 125VAC 10A 250VAC 1/6 HP 125/250VAC | 10A 125VAC 10A 250VAC 1/6 HP 125/250VAC | L I option 10(4)A 250VAC | L I option 10(4)A 250VAC | 8A | 10A |
| ON - ON - ON | - | - | - | - | 5A | 8A |
| OTHERS | 10A 125VAC 10A 250VAC 1/6 HP 250VAC | - | L I option 10(4)A 250VAC | L I option 10(4)A 250VAC | 8A | 10A |

AGENCY APPROVALS



EN 61058-1 EN 61058-1

Availability : consult factory for details of approved models.
Marking : approved models are standard marked.

The company reserves the right to change specifications without notice.



GENERAL SPECIFICATIONS

- Panel thickness : 0,8 mm to 4 mm (.031 to .157)
- Operating temperature :
 - silver contacts (A) : -20°C to +85°C
 - silver plated contacts (C) : -10°C to +55°C

2600 series

Power rocker switches

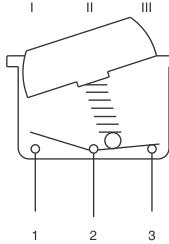


MATERIALS

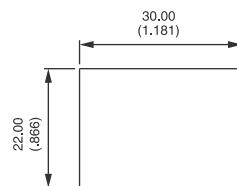
- Case : melamine/polyester
- Frame : polyamide
- Actuator : polyamide
- Contacts :
 - A : silver
 - C : copper, silver plated



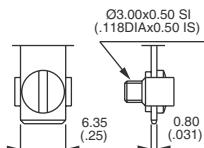
ELECTRICAL FUNCTIONS



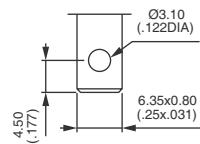
PANEL CUT-OUT



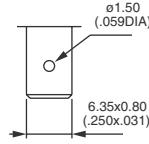
TERMINALS



Screw



Solder lug / quick-connect



Normalized quick-connect

2600 series

Power rocker switches



BUILD YOUR PART NUMBER

| BASIC PART NUMBER | | | | | | | | | | | | | |
|---|---|-------------------------------------|----------------|---|--|--------|---------|--------------------|-------|------------|---|--------|-----------------------------|
| 26 | | | | | | | | | | | | | |
| SERIES | NUMBER OF POLES | | | ELECTRICAL FUNCTIONS | | | | TERMINALS | | | | | |
| 3 | Single pole | | | 1 | ON | - | OFF | 7 | MOM | OFF | MOM | (none) | Screw + clamp |
| 4 | Double pole | | | 4 | ON | ON | ON ▲ | 8 | ON | OFF | MOM | /2 | Solder lugs / quick-connect |
| | | | | 5 | MOM | - | ON | 9 | ON | OFF | ON | /3 | Normalized quick-connect |
| | | | | 6 | ON | - | ON | | | | | | |
| ▲ double pole only | | | | | | | | | | FRAME TYPE | | | |
| | | | | | | | | | | LH | Plain | | |
| | | | | | | | | | | LP | With protection guard | | |
| OPTIONS | | | | | | | | | | | | | |
| FRAME COLORS | | ROCKER SHAPES | | ROCKER MARKING | | | | ILLUMINATED WINDOW | | | | | |
| 1 | dark blue | 1 | Plain | 00 | 00 | (none) | | /3 | green | | | | |
| 2 | black (standard) | 2 | V-shaped | 01 | 21 | O | - | /6 | red | | | | |
| 4 | grey | 3 | Concave | 07 | 27 | O | I | | | | | | |
| 7/1 | white | | | 08 | 28 | ON | OFF | | | | | | |
| 8 | chrome plated | | | Complete table at the end of the series. See website. | | | | | | | | | |
| B | light brown | | | | | | | | | LAMPS | | | |
| E | dark brown | | | | | | | | | L0 | Without lamp | | |
| | | | | | | | | | | L6V | 6V filament lamp | | |
| | | | | | | | | | | L12V | 12V filament lamp | | |
| | | | | | | | | | | L24V | 24V filament lamp | | |
| | | | | | | | | | | L110V | 110VAC neon lamp | | |
| | | | | | | | | | | L110V1 | 110VAC blue fluor. lamp | | |
| | | | | | | | | | | L110V3 | 110VAC green fluor. lamp | | |
| | | | | | | | | | | L220V | 220VAC neon lamp | | |
| | | | | | | | | | | L220V1 | 220VAC blue fluor. lamp | | |
| | | | | | | | | | | L220V3 | 220VAC green fluor. lamp | | |
| | | | | | | | | | | L1 OPTION | | | |
| | | | | | | | | | | L1 | EN 61058-1 approved version, without lamp (3 position switches) | | |
| CONTACT MATERIALS | | | | | | | | | | | | | |
| A | Silver | Illuminated rocker (without window) | | | Non-illuminated rocker or rocker with illum. window* | | | | | | | | |
| C | Copper, silver plated (functions 1, 6 and 9 only) | 0 | Without rocker | 0 | Without rocker | 30 | green • | | | | | | |
| | | 1 | blue | 02 | light brown | 40 | grey | | | | | | |
| | | 3 | green | 04 | dark brown | 50 | yellow | | | | | | |
| | | 5 | yellow | 03 | beige | 60 | red • | | | | | | |
| | | 6 | red | 10 | blue | 70 | white | | | | | | |
| | | 7/1 | white | 14 | dark blue | 90 | orange | | | | | | |
| | | 9 | orange | 20 | black • | | | | | | | | |
| With green or blue rocker, use fluorescent lamp only. | | | | | | | | | | | | | |

NOTICE : please note that not all combinations of above numbers are available.
Refer to www.apem.com for further information.

2600 series

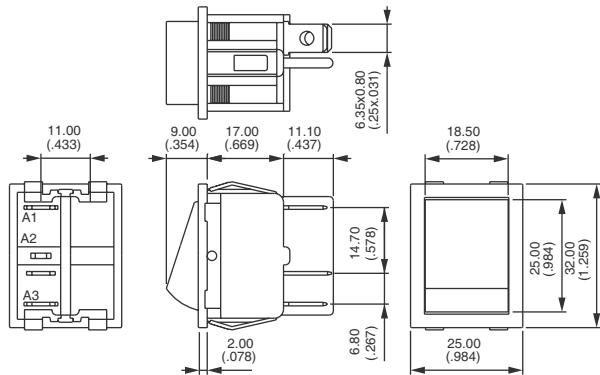
Power rocker switches

2600LH - SINGLE POLE



| | | III A2-A1 | II A2-A3 | I |
|------------------------|------------------------------|--------------|-------------|-----|
| Screw term. + clamp | Solder lug/ quick-connect | | | |
| 2631LH | 2631LH/2 | ON | - | OFF |
| 2635LH | 2635LH/2 | MOM | - | ON |
| 2636LH | 2636LH/2 | ON | - | ON |
| 2637LH | 2637LH/2 | MOM | OFF | MOM |
| 2638LH | 2638LH/2 | ON | OFF | MOM |
| 2639LH | 2639LH/2 | ON | OFF | ON |

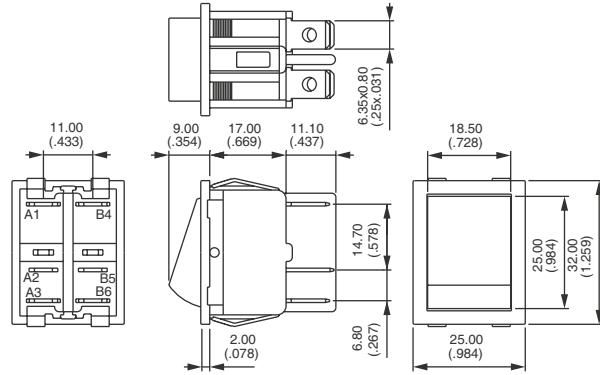
Shown with plain rocker



2600LH - DOUBLE POLE



| | | III A2-A1 B5-B4 | II A2-A3 B5-B6 | I |
|------------------------|------------------------------|-----------------------|----------------------|-----|
| Screw term. + clamp | Solder lug/ quick-connect | | | |
| 2641LH | 2641LH/2 | ON | - | OFF |
| 2644LH* | 2644LH/2* | ON | ON | ON |
| 2645LH | 2645LH/2 | MOM | - | ON |
| 2646LH | 2646LH/2 | ON | - | ON |
| 2647LH | 2647LH/2 | MOM | OFF | MOM |
| 2648LH | 2648LH/2 | ON | OFF | MOM |
| 2649LH | 2649LH/2 | ON | OFF | ON |

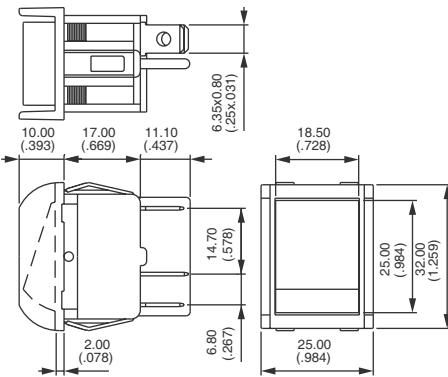


*Function 4 : SP in DP case, see end of catalog.

2600LP - WITH PROTECTION GUARD SINGLE POLE



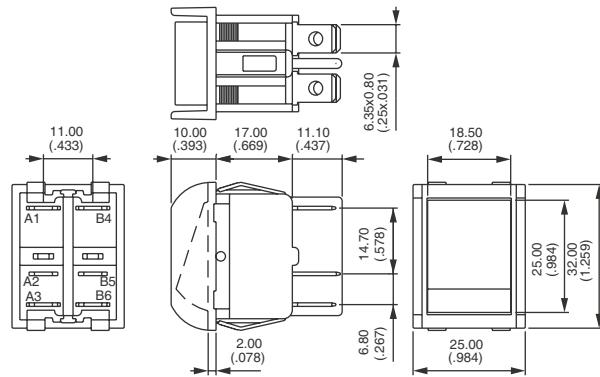
| | | III A2-A1 | II A2-A3 | I |
|------------------------|------------------------------|--------------|-------------|-----|
| Screw term. + clamp | Solder lug/ quick-connect | | | |
| 2631LP | 2631LP/2 | ON | - | OFF |
| 2635LP | 2635LP/2 | MOM | - | ON |
| 2636LP | 2636LP/2 | ON | - | ON |
| 2637LP | 2637LP/2 | MOM | OFF | MOM |
| 2638LP | 2638LP/2 | ON | OFF | MOM |
| 2639LP | 2639LP/2 | ON | OFF | ON |



2600LP - WITH PROTECTION GUARD DOUBLE POLE



| | | III A2-A1 B5-B4 | II A2-A3 B5-B6 | I |
|------------------------|------------------------------|-----------------------|----------------------|-----|
| Screw term. + clamp | Solder lug/ quick-connect | | | |
| 2641LP | 2641LP/2 | ON | - | OFF |
| 2644LP* | 2644LP/2* | ON | ON | ON |
| 2645LP | 2645LP/2 | MOM | - | ON |
| 2646LP | 2646LP/2 | ON | - | ON |
| 2647LP | 2647LP/2 | MOM | OFF | MOM |
| 2648LP | 2648LP/2 | ON | OFF | MOM |
| 2649LP | 2649LP/2 | ON | OFF | ON |



*Function 4 : SP in DP case, see end of catalog.

KR series

Power rocker switches



DISTINCTIVE FEATURES

- Unique rocker design
- Wide choice of colors
- Laser etched symbols
- Illuminated or non-illuminated
- Optionally sealed to IP68 or IP69K



ENVIRONMENTAL SPECIFICATIONS

- Sealing options :
K : IP68 to front panel components of switch only according to IEC 60529
Z : IP69K panel sealing according to DIN 40050-9
- Salt spray resistance : 96 hours according to IEC 512-6, test 11f
- Vibration resistance : 10-500 Hz / 10 g per IEC 60068-2-6
- Operating temperature : -40°C to +85°C



MATERIALS

- Case : PA 6-6
- Actuator : ABS
- Bezel : PA 6-6
- Contacts & terminals : brass, solid silver grain, silver plated (A or S) or brass, solid silver grain, gold plated (D)
- Contact roller : brass, nickel plated



ELECTRICAL SPECIFICATIONS

- Current/voltage rating with resistive load :
 - Silver plated contacts :
A : 5A 24VDC, 100.000 cycles - 10A 24VDC, 10.000 cycles (terminals 6.35 x 0.8 only)
S : 20A 12V, 10.000 cycles (see "Build your part number")
Gold plated contacts (D) : 20mA 12V, 150.000 cycles
- Current/voltage rating with lamp load - silver contacts (A) :
 - functions 1 & 6 : 100W 24VDC, 10.000 cycles
 - other functions : 60W 24VDC, 10.000 cycles
- Initial contact resistance : 10 mΩ max.
- Insulation resistance : 1.000 MΩ min. at 500VDC
- Dielectric strength : 2.000 Vrms 50 Hz min. between terminals

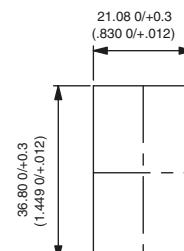


SEALING

- Sealing is optional.
To order a sealed product, complete the appropriate box of ordering format on the following pages.



PANEL CUT-OUT



GENERAL SPECIFICATIONS

- Mechanical life : 150.000 cycles min.
- Panel thickness : 0,8 mm to 4,6 mm
- Recommended panel thickness : between 2 mm and 3,5 mm

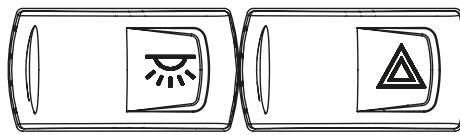
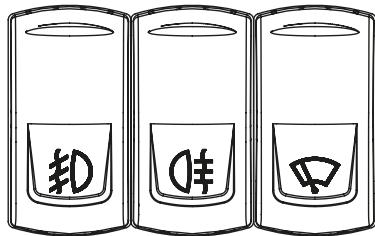
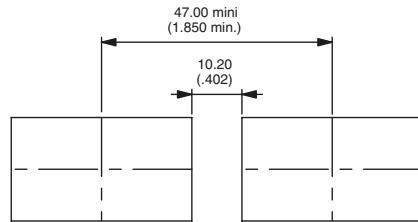
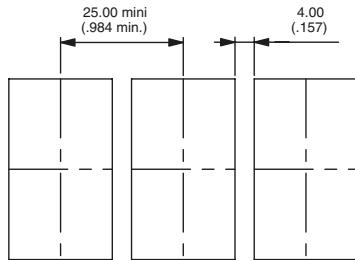
The company reserves the right to change specifications without notice.

KR series

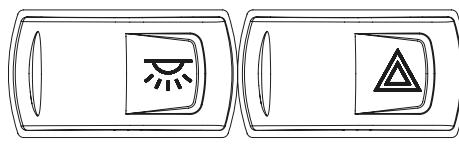
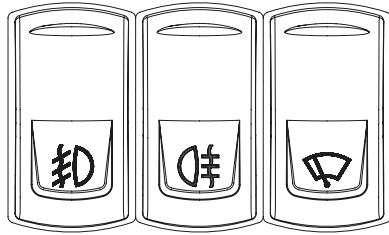
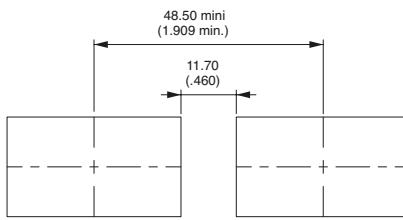
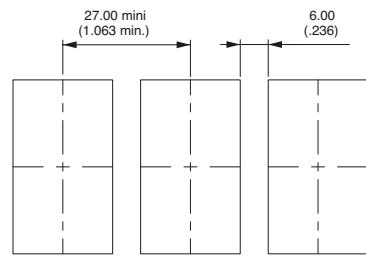
Power rocker switches



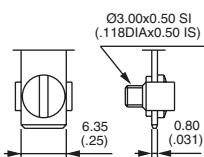
MATRIX MOUNTING



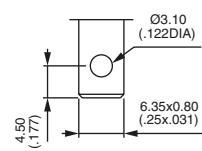
SPECIFIC MATRIX MOUNTING FOR Z VERSION



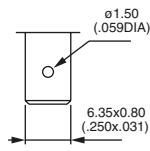
TERMINALS



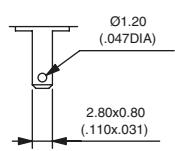
Screw



Solder lug / quick-connect



Normalized quick-connect 6.35x0.8



Normalized quick-connect 2.8x0.8

KR series

Power rocker switches



BUILD YOUR PART NUMBER

- To order a complete product, fill in all the boxes of the following order guide.
- To order case only (without actuator), finish your order number with the LED wiring code.
- To order actuator only (without case), begin the order number with code KRR, then follow the order format from "actuator type" until the end of the options.

| CASE + LEDS | | | | | | | | | |
|-------------|---|--|-----------------------------------|---------------------------------------|---------------|----------------------------------|---------------|---|----------------|
| KR | | | | | | | Side A | Side B | |
| SERIES | ELECTRICAL FUNCTIONS | | | CONTACTS | | SEALING | | WIRING | |
| | | | | A | Silver | X | No | | See website. |
| | | | | D | Gold plated | K | IP68 | | |
| | | | | S | Silver 20A*** | Z | IP69K | | |
| | | | | | | X | None | F | LED 12V yellow |
| | | | | | | A | LED 6V red | N | LED 12V blue |
| | | | | | | B | LED 6V green | S | LED 12V white |
| | | | | | | C | LED 6V yellow | J | LED 24V red |
| | | | | | | M | LED 6V blue | K | LED 24V green |
| | | | | | | R | LED 6V white | L | LED 24V yellow |
| | | | | | | D | LED 12V red | P | LED 24V blue |
| | | | | | | E | LED 12V green | T | LED 24V white |
| | Function 1 only for 6-terminal versions. Functions 5 and 6 cannot be combined with "H" wiring. | | | | | | | | |
| TERMINALS | | | | | | | | | |
| | Screw | | Normalized quick-connect 6,35x0,8 | | | Normalized quick-connect 2,8x0,8 | | | |
| 0 | 6 terminals with barrier | | 3 | 6 terminals with barrier | | | G | 10 term. with barrier | |
| | Solder lug/quick-connect | | 5 | 6 terminals w/o barrier | | | H | 10 term. w/o barrier | |
| 2 | 6 terminals with barrier | | D | 10 term. with barrier | | | J | 10 terminals for use with connector U2282 | |
| 4 | 6 terminals w/o barrier | | E | 10 term. w/o barrier | | | | | |
| A | 10 term. with barrier | | F | 10 term. for use with connector U2292 | | | | | |
| B | 10 term. w/o barrier | | | | | | | | |
| C | 10 terminals for use with connector U2292 | | | | | | | | |
| | ***S contacts for all functions except 5 and 4-1R - for normalized quick-connect terminals 6,35x0,8 only. | | | | | | | | |
| ACTUATOR | | | | | | | | | |
| | | | | | | | | | |
| TYPE | COLOR | | | MARKING ORIENTATION | | | SYMBOLS | | |
| 1 | For non-illuminated application | | 1 | Blue | 5 | Yellow | N | North | |
| 2 | For illuminated application | | 1/4 | Dark blue | 6 | Red | O | West | |
| | | | 2 | Black | 7 | Ivory | S | South | |
| | | | 3 | Green | 9 | Orange | E | East | |
| | | | 4 | Grey | A | Aluminum bright | | Drawings on website. | |
| | | | | | | | | Symbols & Accessories : see website. | |

NOTICE : please note that not all combinations of above numbers are available. Refer to www.apem.com for further information.

KR series

Power rocker switches

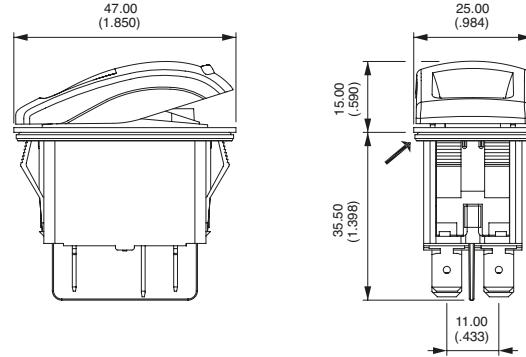
6 TERMINAL VERSION



| Single pole | Double pole | 2-3 5-6 | 1-2 4-5 |
|-------------|-------------|------------|------------|
| KR31 | KR41 | ON | - OFF |
| | KR44* | ON | ON ON |
| | KR44-1R* | ON | ON MOM |
| KR35 | KR45 | MOM | - ON |
| KR36 | KR46 | ON | - ON |
| KR37 | KR47 | MOM | OFF MOM |
| KR38 | KR48 | ON | OFF MOM |
| KR39 | KR49 | ON | OFF ON |

*Function 4 : single pole in double pole case

→ FLAT SEAL



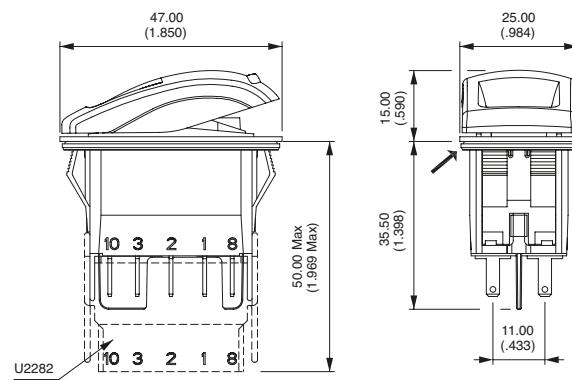
10 TERMINAL VERSION



| Single pole | Double pole | 2-3 5-6 | 1-2 4-5 |
|-------------|-------------|------------|------------|
| KR31 | KR41 | ON | - OFF |
| | KR44* | ON | ON ON |
| | KR44-1R* | ON | ON MOM |
| KR35 | KR45 | MOM | - ON |
| KR36 | KR46 | ON | - ON |
| KR37 | KR47 | MOM | OFF MOM |
| KR38 | KR48 | ON | OFF MOM |
| KR39 | KR49 | ON | OFF ON |

*Function 4 : single pole in double pole case

→ FLAT SEAL



To order, please refer to «Build your part number» on previous page.

KL series

Locking power rocker switches



DISTINCTIVE FEATURES

- One protected position
- Patented intuitive ergonomics
- Laser etched symbols
- Illuminated or non-illuminated
- Optionally sealed to IP69K



ENVIRONMENTAL SPECIFICATIONS

- Sealing options :
K : IP68 to front panel components of switch only according to IEC 60529
Z : IP69K panel sealing according to DIN 40050-9
- Salt spray resistance : 96 hours according to IEC 512-6, test 11f
- Operating temperature : -40°C to +85°C



MATERIALS

- Case : PA 6-6
- Actuator : ABS
- Unlocking actuator : ABS or elastomeric membrane
- Bezel : PA 6-6
- Contacts & terminals : brass, solid silver grain, silver plated (A or S) or brass, solid silver grain, gold plated (D)
- Contact roller : brass, nickel plated



ELECTRICAL SPECIFICATIONS

- Current/voltage rating with resistive load :
 - Silver plated contacts :
A : 5A 24VDC, 100.000 cycles - 10A 24VDC, 10.000 cycles (terminals 6.35 x 0.8 only)
S : 20A 12V, 10.000 cycles (see "Build your part number")
 - Gold plated contacts (D) : 20mA 12V, 150.000 cycles
- Initial contact resistance : 10 mΩ max.
- Insulation resistance : 1.000 MΩ min. at 500VDC
- Dielectric strength : 2.000 Vrms 50 Hz min. between terminals
- Mechanical life : 150.000 cycles min.

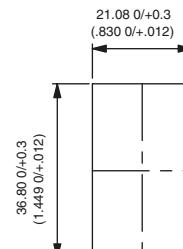


SEALING

- Sealing is optional.
To order a sealed product, complete the appropriate box of ordering format on the following pages.



PANEL CUT-OUT



GENERAL SPECIFICATIONS

- Mechanical life : 150.000 cycles min.
- Panel thickness : 0,8 mm to 4,6 mm
- Recommended panel thickness : between 2 mm and 3,5 mm

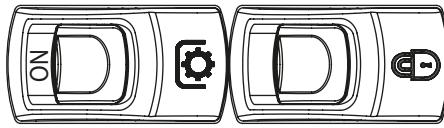
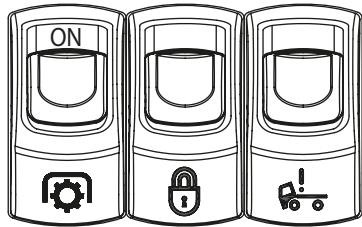
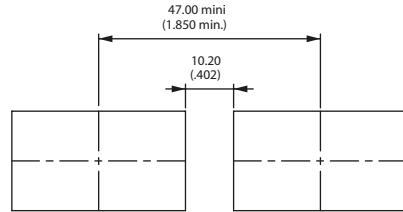
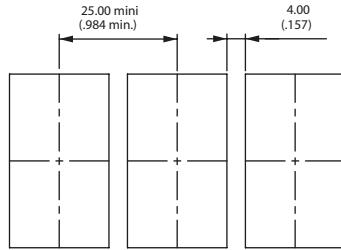
The company reserves the right to change specifications without notice.

KL series

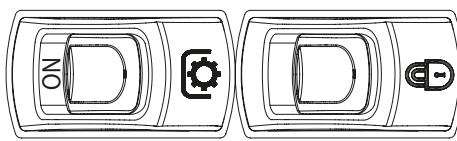
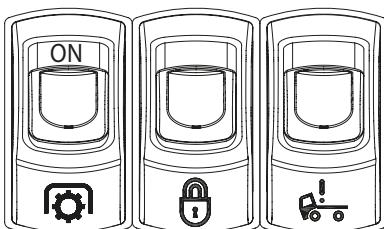
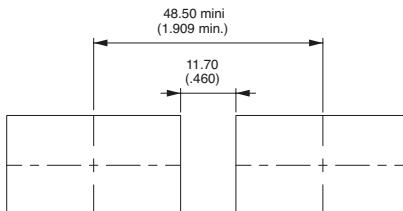
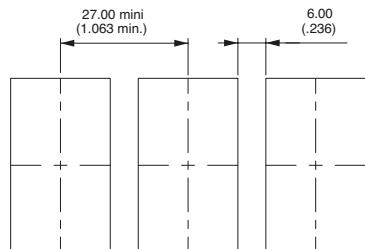
Locking power rocker switches



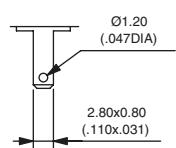
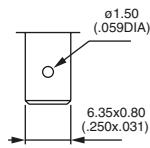
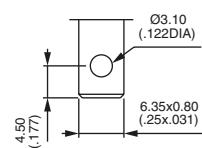
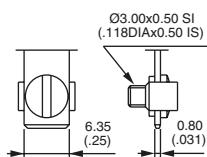
MATRIX MOUNTING



SPECIFIC MATRIX MOUNTING FOR Z VERSION



TERMINALS



Screw

Solder lug / quick-connect

Normalized quick-connect 6.35x0.8

Normalized quick-connect 2.8x0.8

KL series

Locking power rocker switches



BUILD YOUR PART NUMBER

To order a complete product, fill in all the boxes of the following order guide.

| CASE + LEDS | | | | | | | | | |
|---|---------------------------------|--------------------------|---|--------------------------|-----------------------------------|----------------|---------------------------------------|-------------|---|
| KL | | | | | | | Side B | | |
| SERIES | | | | | | | | | |
| | ELECTRICAL FUNCTIONS | | | CONTACTS | | SEALING | | LEDS | |
| | POLES | 1 | ON | - | OFF | A | Silver | X | No |
| 3 | Single pole | 4 | ON | ON | ON | D | Gold plated | K | IP68 |
| 4 | Double pole | 4-1R | ON | ON | MOM | S | Silver 20A*** | Z | IP69K |
| | | 5 | MOM | - | ON | | | X | None |
| | | 6 | ON | - | ON | | | A | LED 6V red |
| | | 7 | MOM | OFF | MOM | | | B | LED 6V green |
| | | 8 | ON | OFF | MOM | | | C | LED 6V yellow |
| | | 9 | ON | OFF | ON | | | M | LED 6V blue |
| | | | | | | | | R | LED 6V white |
| | | | | | | | | D | LED 12V red |
| | | | | | | | | E | LED 12V green |
| | | | | | | | | F | LED 12V yellow |
| | | | | | | | | N | LED 12V blue |
| | | | | | | | | S | LED 12V white |
| | | | | | | | | J | LED 24V red |
| | | | | | | | | K | LED 24V green |
| | | | | | | | | L | LED 24V yellow |
| | | | | | | | | P | LED 24V blue |
| | | | | | | | | T | LED 24V white |
| Function 1 only for 6-terminal versions. Functions 5 and 6 cannot be combined with "H" wiring. | | | | | | | | | |
| TERMINALS | | | | | | | | | |
| | Screw | Solder lug/quick-connect | | | Normalized quick-connect 6,35x0,8 | | Normalized quick-connect 2,8x0,8 | | |
| 0 | 6 terminals with barrier | 2 | 6 terminals with barrier | | | 3 | 6 terminals with barrier | | |
| | | 4 | 6 terminals w/o barrier | | | 5 | 6 terminals w/o barrier | | |
| | | A | 10 term. with barrier | | | D | 10 term. with barrier | | |
| | | B | 10 term. w/o barrier | | | E | 10 term. w/o barrier | | |
| | | C | 10 terminals for use with connector U2292 | | | F | 10 term. for use with connector U2292 | | |
| | | | | | | | | G | 10 term. with barrier |
| | | | | | | | | H | 10 term. w/o barrier |
| | | | | | | | | J | 10 terminals for use with connector U2282 |
| ***S contacts for all functions except 5 and 4-1R - for normalized quick-connect terminals 6,35x0,8 only. | | | | | | | | | |
| ACTUATOR | | | | | | | | | |
| | | | | | | | Area A | | Area B |
| | | | | | | | | | |
| | | | | | | | | | |
| TYPE | | | | | | | | | |
| 1 | For non-illuminated application | | | UNLOCKING ACTUATOR COLOR | | | SYMBOLS | | MARKING COLOR |
| 2 | For illuminated application | | | Hard plastic (ABS) | | | Illuminated models | | |
| | | | | 1 | Blue | 5 | Yellow | Y | Blank White |
| | | | | 1/4 | Dark blue | 6 | Red | R | Non-illuminated |
| | | | | 2 | Black | 7 | Ivory | G | |
| | | | | 3 | Green | 9 | Orange | | |
| | | | | 4 | Grey | | | | |
| ROCKER COLOR | | | | | | | | | |
| 1 | Blue | 3 | Green | 6 | Red | | | | |
| 1/4 | Dark blue | 4 | Grey | 7 | Ivory | | | | |
| 2 | Black | 5 | Yellow | 9 | Orange | | | | |
| MARKING ORIENTATION | | | | | | | | | |
| | N | | | | | | | | |
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KL series

Locking power rocker switches

6 TERMINAL VERSION



| Single pole | Double pole | 2-3 | 5-6 | 1-2 | 4-5 |
|-------------|-------------|-----|-----|-----|-----|
| KL31 | KL41 | ON | - | OFF | |
| | KL44* | ON | ON | ON | |
| | KL44-1R* | ON | ON | MOM | |
| KL35 | KL45 | MOM | - | ON | |
| KL36 | KL46 | ON | - | ON | |
| KL37 | KL47 | MOM | OFF | MOM | |
| KL38 | KL48 | ON | OFF | MOM | |
| KL39 | KL49 | ON | OFF | ON | |

*Function 4 : single pole in double pole case

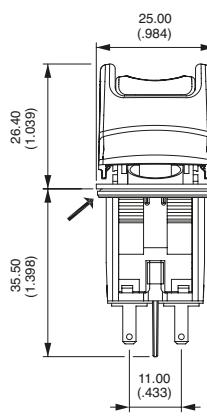
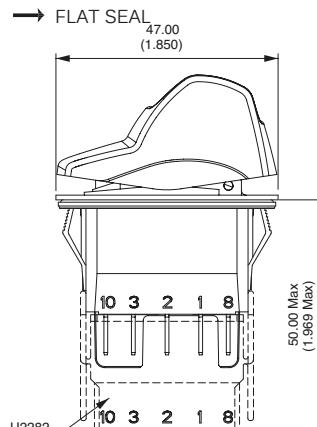
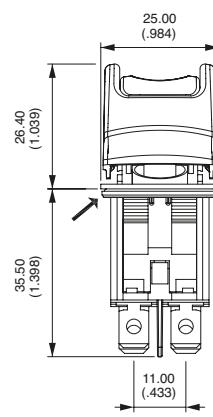
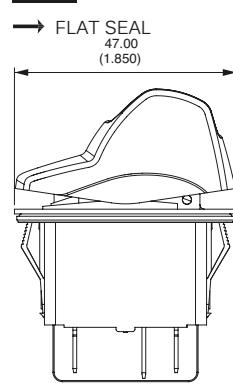
10 TERMINAL VERSION



| Single pole | Double pole | 2-3 | 5-6 | 1-2 | 4-5 |
|-------------|-------------|-----|-----|-----|-----|
| KL31 | KL41 | ON | - | OFF | |
| | KL44* | ON | ON | ON | |
| | KL44-1R* | ON | ON | MOM | |
| KL35 | KL45 | MOM | - | ON | |
| KL36 | KL46 | ON | - | ON | |
| KL37 | KL47 | MOM | OFF | MOM | |
| KL38 | KL48 | ON | OFF | MOM | |
| KL39 | KL49 | ON | OFF | ON | |

*Function 4 : single pole in double pole case

To order, please refer to «Build your part number» on previous page.



KI series

LED indicators



DISTINCTIVE FEATURES

- Wide choice of bezel colors
- Wide choice of LEDs
- Laser etched symbols
- Long life expectancy
- Optionally sealed to IP68



ENVIRONMENTAL SPECIFICATIONS

- Degree of protection of sealed versions : front sealing to IP68 according to IEC 60529 (submersion under 1 meter of water for more than 30 minutes)
- Salt spray resistance : 96 hours according to IEC 512-6, test 11f
- Operating temperature : -40°C to +85°C



MATERIALS

- Case : ABS
- Bezel : ABS
- Terminals : brass, silver plated



ELECTRICAL AND GENERAL SPECIFICATIONS

- Operating voltage : 6VDC, 12VDC or 24VDC
- Nominal current : 20mA per LED
- Panel thickness : 0,8 mm to 4,6 mm
- Recommended panel thickness : between 2 mm and 3,5 mm

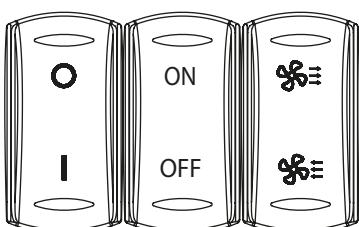
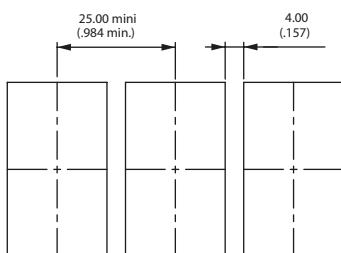


SEALING

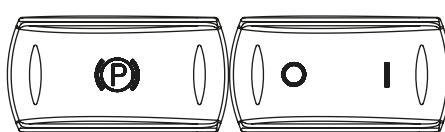
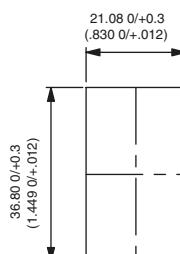
- Sealing is optional.
To order a sealed product,
complete the appropriate box of
ordering format on the following pages.



MATRIX MOUNTING



PANEL CUT-OUT



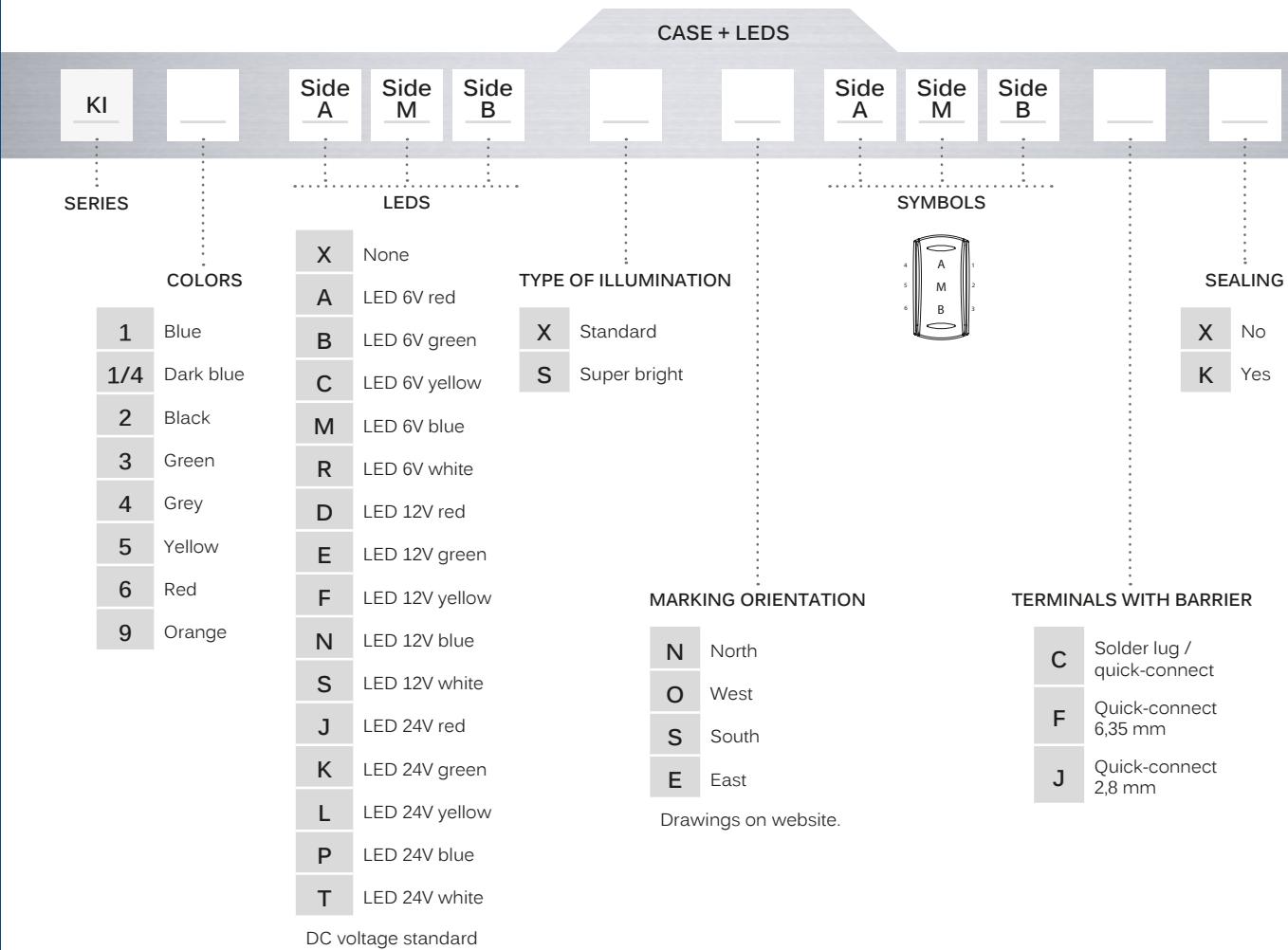
The company reserves the right to change specifications without notice.

KI series

LED indicators



BUILD YOUR PART NUMBER

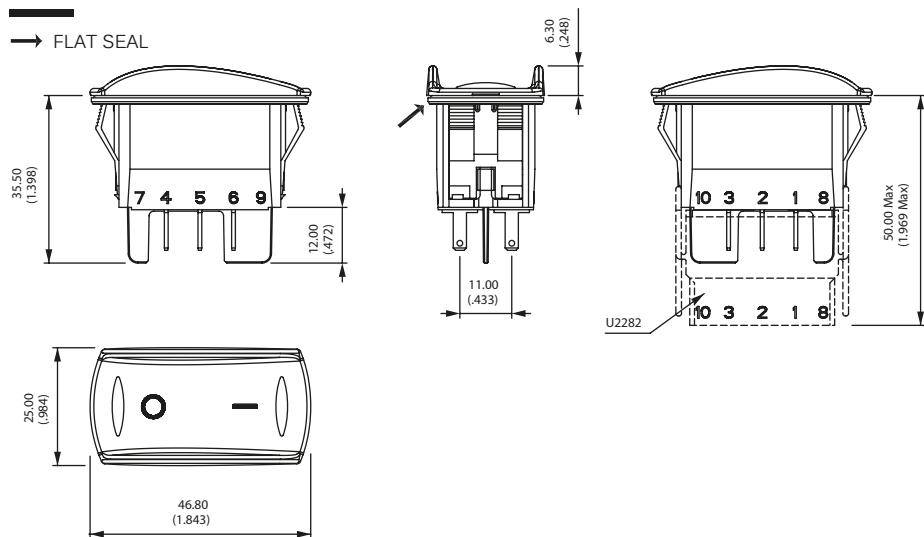


NOTICE : please note that not all combinations of above numbers are available.
Refer to www.apem.com for further information.

On request : 48VDC voltage - AC voltage - new design.
Symbols & Accessories : see website.



DIMENSIONS



KG series

Power rocker switches



DISTINCTIVE FEATURES

- Protected rocker
- Illuminated or non-illuminated
- VDE (EN 61058-1) approved
- Sealed to IP65



ENVIRONMENTAL SPECIFICATIONS

- Degree of protection : IP65 according to IEC 60529
- Shock resistance : 100 g according to IEC 512-4, test 6c
- Vibration resistance : 10-500 Hz - 10 g according to IEC 512-4, test 6d
- Salt spray resistance : 96 hours according to IEC 512-6, test 11f
- Operating temperature : 2 position models : -40°C to + 85°C
3 position models : -10°C to + 65°C



ELECTRICAL AND GENERAL SPECIFICATIONS

- Current/voltage rating :
 - functions 1 (ON-OFF) and 6 (ON-ON) : 15A 12VDC, 10A 24VDC max., 10mA 14VDC min.
 - functions 4 (ON ON ON) and 4-1R (ON ON MOM) : 8A 12VDC, 5A 24VDC max.
 - other functions : 10A 12VDC, 8A 24VDC max.
- Initial contact resistance : 10 mΩ max. at 1A 2VDC
- Insulation resistance : 1.000 MΩ min. at 500VDC
- Dielectric strength : 2.000 Vrms 50 Hz min. between terminals
- Electrical life : 10.000 cycles min.
- Mechanical life : 2 position models : 100.000 cycles min.
3 position models : 30.000 cycles min.
- Panel cut-out : 36,80 x 21,08 mm (1.149 x .830)
- Panel thickness : 0,8 mm to 4,6 mm
- Recommended thickness : between 2 mm and 3,5 mm



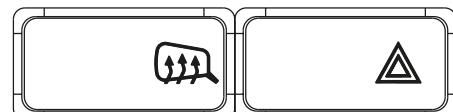
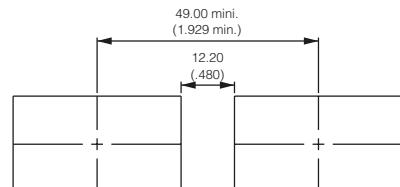
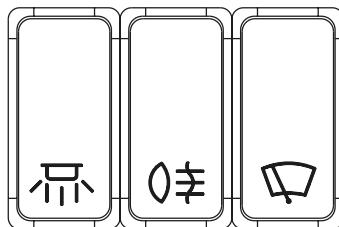
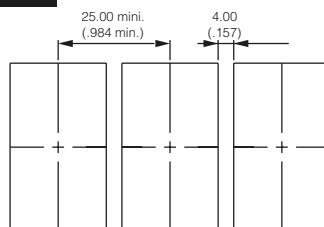
MATERIALS

- Case : thermoplastic UL94-V0
- Terminals : brass, silver plated
- Contacts : silver grain
- Contact roller : brass, nickel plated

The company reserves the right to change specifications without notice.



MATRIX MOUNTING



AGENCY APPROVAL



12(4)A 250VAC
T85/55°C

EN 61058-1

Availability : double pole models,
functions ON-OFF and ON-ON.

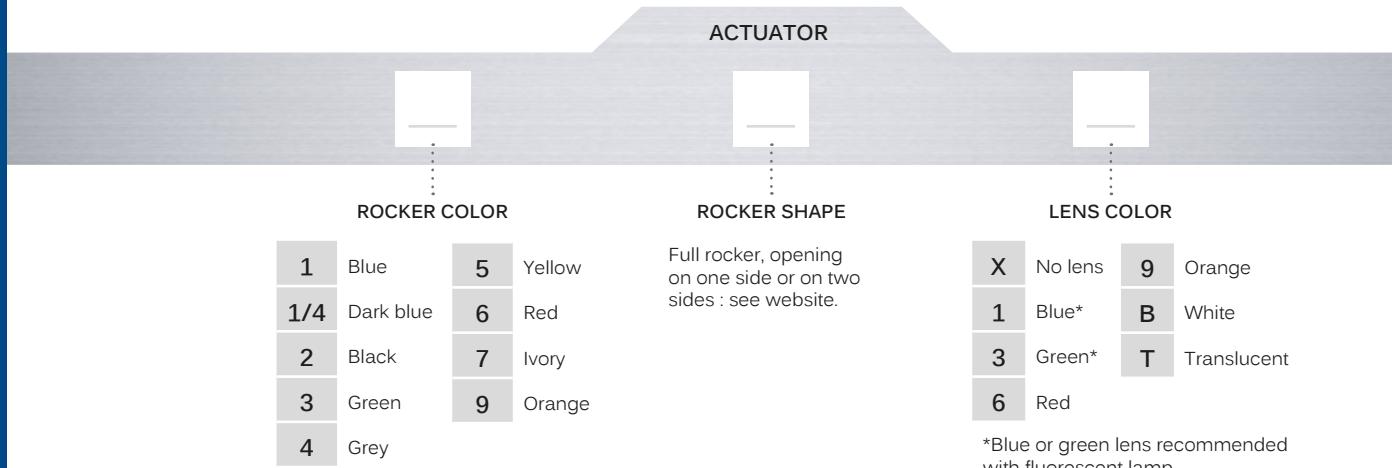
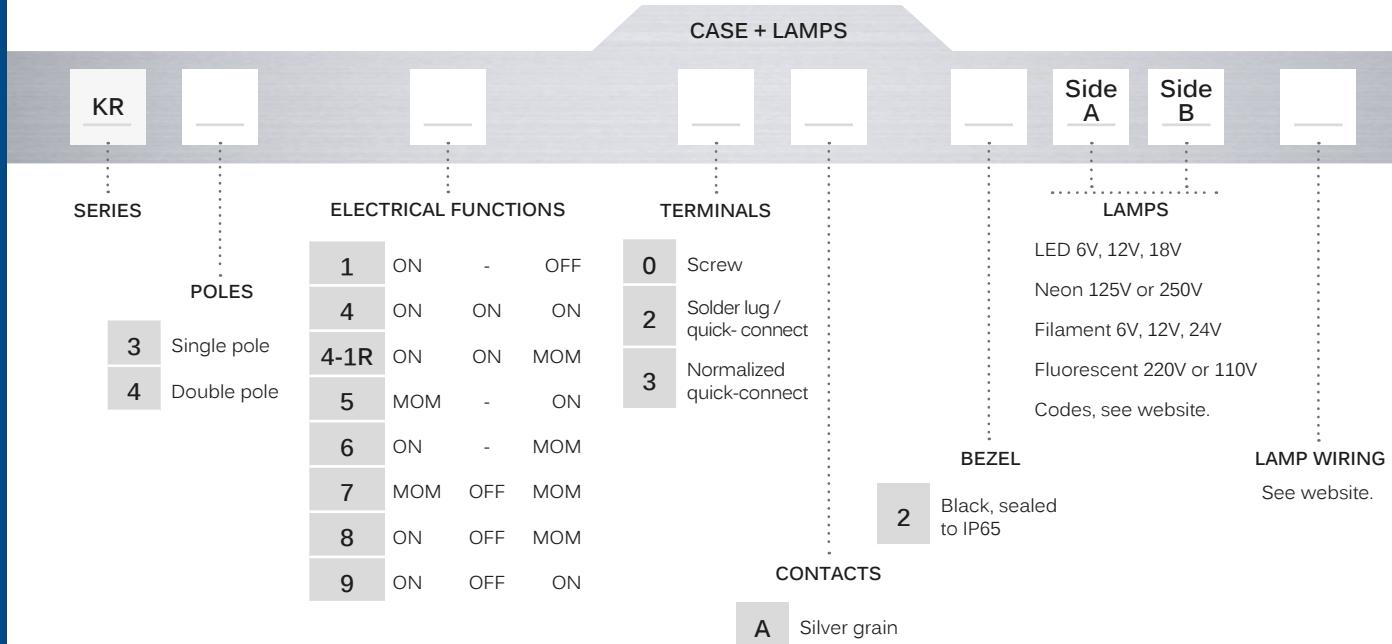
Marking : to order switches marked VDE,
add "VDE" at the end of model number..

KG series

Power rocker switches



BUILD YOUR PART NUMBER



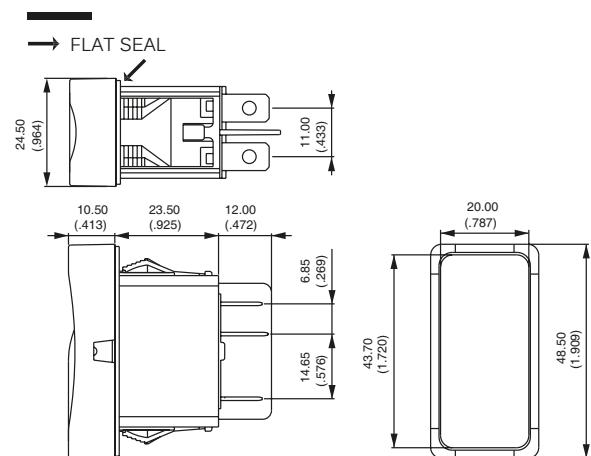
NOTICE : please note that not all combinations of above numbers are available.
Refer to www.apem.com for further information.

Actuator marking and symbols : see website.

SOLDER LUG / QUICK-CONNECT TERMINALS



| | | 2-3 5-6 | 1-2 4-5 | |
|-------------|-------------|------------|------------|-----|
| Single pole | Double pole | | | |
| KG31 | KG41 | ON | - | OFF |
| | KG44* | ON | ON | ON |
| | KG44-1R* | ON | ON | MOM |
| KG35 | KG45 | MOM | - | ON |
| KG36 | KG46 | ON | - | ON |
| KG37 | KG47 | MOM | OFF | MOM |
| KG38 | KG48 | ON | OFF | MOM |
| KG39 | KG49 | ON | OFF | ON |



*Function 4 : SP in DP case, see end of catalog.

A1 series

Industrial controls • Ø22mm panel mounting pushbutton switches and indicators



DISTINCTIVE FEATURES

- Single pole to four pole changeover
- Custom chemically etched actuator
- 6A 250VAC



ENVIRONMENTAL SPECIFICATIONS

- Operating Temperature : -20°C to +55°C
- Solder Heat Resistance : 350°C for 5 seconds
- Sealing : Panel sealed to IP65, rear of panel IP40

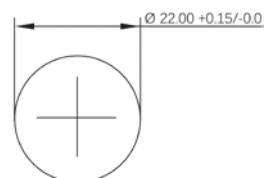


ELECTRICAL SPECIFICATIONS

- Current/Voltage Rating : 10mA 5VAC min, 6A 250VAC max, 6A 12VDC max
- Initial Contact Resistance : 10mΩ max at 1A 4VDC
- Insulation Resistance : 50MΩ min
- Dielectric Strength : 750V between open contacts, 5KV live to accessible
- Electrical Life : 50.000 cycles min
- Insulation : Class 2
- Lamp Life : LED : 60.000 hours to 75% relative luminosity, Filament : approx. 5000 hours, Neon : approx. 10.000 hours



PANEL CUT-OUT



GENERAL SPECIFICATIONS

- Contact Gap : >1mm (0.039)
- Mechanical Life : Momentary 1 million cycles, Maintained 100.000 cycles
- Terminals : Solder/quick connect 2,8mm (0.110)



MATERIALS

- Screen : Anodized aluminum
- Reflector : PC
- Operator : PBT
- Nut : ABS
- Camtrack Momentary : PPE
- Camtrack Maintained : PPSU
- Switch Block 1 & 2 Pole : PBT
- Switch Block 3 & 4 Pole : PEI
- Contacts : Gold plated silver

AGENCY APPROVALS



EN 61058-1

The company reserves the right to change specifications without notice.

A1 series

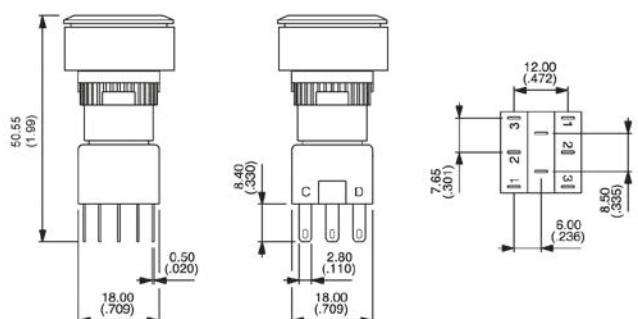
Industrial controls • Ø22mm panel mounting pushbutton switches and indicators



BUILD YOUR PART NUMBER

| A1 | | | | | | | | | | | | | | | |
|-------------------------|-----------------------|--------------|---------------------|----------|---------------|----|---------------|--------------|-------------|--|--|--|-------------|------------|--|
| SERIES | | BEZEL | | SEALING | | | | SWITCH BLOCK | | | | | ACCESSORIES | | |
| C | Round | | | 0 | Unsealed | | | 0 | Indicator | | | | 03 | Flushmount | |
| | | | | 1 | Sealed IP65 | | | 1 | Single pole | | | | | | |
| SWITCH TYPE | | ILLUMINATION | | FUNCTION | | | | 2 | Double pole | | | | | | |
| P | Pushbutton | A | Illuminated | A | Indicator | | | 5 | Three pole | | | | | | |
| I | Indicator | B | Non-Illuminated | X | Latching | | | 3 | Four pole | | | | | | |
| | | | | Y | Momentary | | | | | | | | | | |
| ENGRAVED SCREEN OPTIONS | | | | | | | | | | | | | | | |
| 01 | Front Fog Lights | 11 | 'Lock' | A1 | Filament 6.3V | J2 | Led 12V green | | | | | | | | |
| 02 | Rear Fog Lights | 12 | 'Unlock' | B1 | Filament 14V | J3 | Led 12V amber | | | | | | | | |
| 03 | 'Start' | 13 | Rear Window Heating | C1 | Filament 28V | J4 | Led 12V blue | | | | | | | | |
| 04 | Interior Light | 14 | Cooling | D1 | Filament 36V | J5 | Led 12V white | | | | | | | | |
| 05 | Boot Release | 15 | Wipers | E1 | Filament 48V | K1 | Led 24V red | | | | | | | | |
| 06 | Hazard Warning | 16 | Washers | F1 | Filament 60V | K2 | Led 24V green | | | | | | | | |
| 07 | Lights | 17 | Fan | G1 | Neon 110V | K3 | Led 24V amber | | | | | | | | |
| 08 | Heating & Ventilation | 18 | Horn | H1 | Neon 220V | K4 | Led 24V blue | | | | | | | | |
| 09 | Map Lights | 19 | Air recirculation | I1 | Led 6V red | K5 | Led 24V white | | | | | | | | |
| 10 | Side Lights | 20 | Blank | I2 | Led 6V green | L1 | Led 48V red | | | | | | | | |
| | | | | I3 | Led 6V amber | L2 | Led 48V green | | | | | | | | |
| | | | | J1 | Led 12V red | J1 | Led 48V amber | | | | | | | | |
| BULB | | | | | | | | | | | | | | | |

RED ILLUMINATED MAINTAINED PUSHBUTTON DOUBLE POLE CHANGEOVER



A01 series

Industrial controls • Ø16mm panel mounting pushbutton switches and indicators



DISTINCTIVE FEATURES

- Single pole to four pole changeover
- Custom engraving or film legends options
- 6A 250VAC



ENVIRONMENTAL SPECIFICATIONS

- Operating Temperature : -20°C to +55°C
- Solder Heat Resistance : 350°C for 5 seconds
- Sealing : Panel sealed to IP65, rear of panel IP40

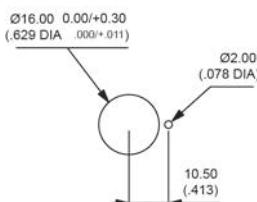
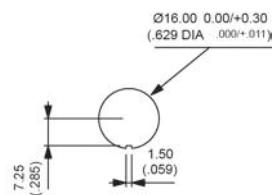


ELECTRICAL SPECIFICATIONS

- Current/Voltage Rating : 10mA 5VAC min, 6A 250VAC max, 6A 12VDC max
- Initial Contact Resistance : 10mΩ max at 1A 4VDC
- Insulation Resistance : 50MΩ min
- Dielectric Strength : 750V between open contacts, 5KV live to accessible
- Electrical Life : 50.000 cycles min
- Insulation : Class 2
- Lamp Life : LED : 60.000 hours to 75% relative luminosity, Filament : approx. 5000 hours, Neon : approx. 10.000 hours



PANEL CUT-OUT



GENERAL SPECIFICATIONS

- Contact Gap : >1mm (0.039)
- Mechanical Life : Momentary 1 million cycles, Maintained 100.000 cycles
- Terminals : Solder/quick connect 2,8mm (0.110)



MATERIALS

- Screen : PC
- Reflector : PC
- Operator : PBT
- Nut : ABS
- Camtrack Momentary : PPE
- Camtrack Maintained : PPSU
- Switch Block 1 & 2 Pole : PBT
- Switch Block 3 & 4 Pole : PEI
- Contacts : Gold plated silver

AGENCY APPROVALS



EN 61058-1

The company reserves the right to change specifications without notice.

A01 series

Industrial controls • Ø16mm panel mounting
pushbutton switches and indicators



BUILD YOUR PART NUMBER

A pushbutton assembly requires : screen + lamp (if illuminated) + operator + switch block.

To order these elements, select desired model numbers from tables below. Example : IP65 rectangular pushbutton, single pole, maintained, red screen and 12V red LED = A0161B, A0142M1, A0101X and A0151B.

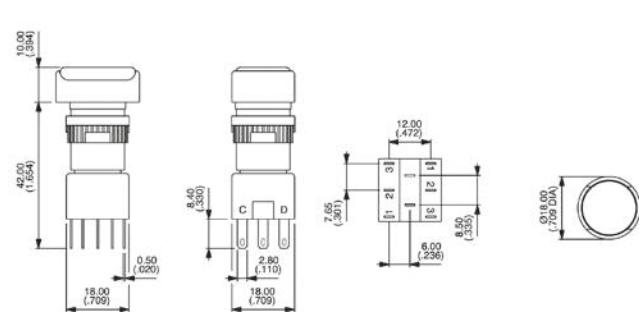
| SCREEN | | | LAMP (IF REQUIRED) | | | OPERATOR | | | |
|--------|--------|---------|--------------------|-----------|---------|----------|-------|-----------------------------|---------|
| BEZEL | COLOR | PART NO | LAMP | VOLTAGE | PART NO | POLE | BEZEL | DESCRIPTION | PART NO |
| □ | black | A0161A | Filament | 6.3V | A0141A | 1 or 2 | □ | Illum, momentary | A0101Y |
| □ | red | A0161B | Filament | 14V | A0141B | 1 or 2 | □ | Illum, maintained | A0101X |
| □ | amber | A0161C | Filament | 28V | A0141C | 1 or 2 | □ | Non-illuminated, momentary | A0102Y |
| □ | yellow | A0161D | Filament | 36V | A0141D | 1 or 2 | □ | Non-illuminated, maintained | A0102X |
| □ | green | A0161E | Filament | 48V | A0141E | 3 or 4 | □ | Illum, momentary | A0103Y |
| □ | blue | A0161F | Filament | 60V | A0141F | 3 or 4 | □ | Illum, maintained | A0103X |
| □ | clear | A0161G | Neon | 110V | A0143G | 3 or 4 | □ | Non-illuminated, momentary | A0104Y |
| □ | white | A0161J | Neon | 220V | A0143H | 3 or 4 | □ | Non-illuminated, maintained | A0104X |
| □ | black | A0162A | LED | 6V red | A0142L1 | 1 or 2 | □ | Illum, momentary | A0105Y |
| □ | red | A0162B | LED | 6V green | A0142L2 | 1 or 2 | □ | Illum, maintained | A0105X |
| □ | amber | A0162C | LED | 6V amber | A0142L3 | 1 or 2 | □ | Non-illuminated, momentary | A0106Y |
| □ | yellow | A0162D | LED | 12V red | A0142M1 | 1 or 2 | □ | Non-illuminated, maintained | A0106X |
| □ | green | A0162E | LED | 12V green | A0142M2 | 3 or 4 | □ | Illum, momentary | A0107Y |
| □ | blue | A0162F | LED | 12V amber | A0142M3 | 3 or 4 | □ | Illum, maintained | A0107X |
| □ | clear | A0162G | LED | 12V blue | A0142M4 | 3 or 4 | □ | Non-illuminated, momentary | A0108Y |
| □ | white | A0162J | LED | 12V white | A0142M5 | 3 or 4 | □ | Non-illuminated, maintained | A0108X |
| ○ | black | A0163A | LED | 24V red | A0142N1 | 1 or 2 | ○ | Illum, momentary | A0109Y |
| ○ | red | A0163B | LED | 24V green | A0142N2 | 1 or 2 | ○ | Illum, maintained | A0109X |
| ○ | amber | A0163C | LED | 24V amber | A0142N3 | 1 or 2 | ○ | Non-illuminated, momentary | A0110Y |
| ○ | yellow | A0163D | LED | 24V blue | A0142N4 | 1 or 2 | ○ | Non-illuminated, maintained | A0110X |
| ○ | green | A0163E | LED | 24V white | A0142N5 | 3 or 4 | ○ | Illum, momentary | A0111Y |
| ○ | blue | A0163F | LED | 48V red | A0142P1 | 3 or 4 | ○ | Illum, maintained | A0111X |
| ○ | clear | A0163G | LED | 48V green | A0142P2 | 3 or 4 | ○ | Non-illuminated, momentary | A0112Y |
| ○ | white | A0163J | LED | 48V amber | A0142P3 | 3 or 4 | ○ | Non-illuminated, maintained | A0112X |

Bezel: □ rectangular, □ square, ○ round. 'Illum'-illuminated, 'Non-illum'-non illuminated

SWITCH BLOCK

| NO OF POLES | PART NO |
|-------------|---------|
| Single pole | A0151B |
| Double pole | A0152B |
| Three pole | A0155B |
| Four pole | A0153B |

RED ILLUMINATED MAINTAINED PUSHBUTTON WITH ROUND BEZEL DOUBLE POLE CHANGEOVER



A01 series

Industrial controls • Ø16mm panel mounting
keylock switches



DISTINCTIVE FEATURES

- Single pole to four pole changeover
- Push on tab terminals
- 6A 250VAC



ENVIRONMENTAL SPECIFICATIONS

- Operating Temperature : -20°C to +55°C
- Solder Heat Resistance : 350°C for 5 seconds
- Sealing : Panel sealed to IP65, rear of panel IP40



ELECTRICAL SPECIFICATIONS

- Current/Voltage Rating : 10mA 5VAC min, 6A 250VAC max, 6A 12VDC max
- Initial Contact Resistance : 10mΩ max at 1A 4VDC
- Insulation Resistance : 50MΩ min
- Dielectric Strength : 750V between open contacts,
5KV live to accessible
- Electrical Life : 50.000 cycles min
- Insulation : Class 2

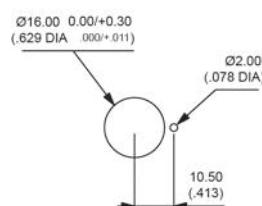
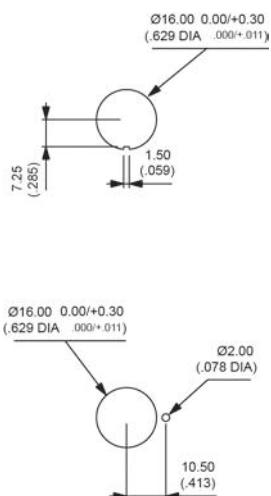


GENERAL SPECIFICATIONS

- Contact Gap : >1mm (0.039)
- Mechanical Life : 100.000 lifecycles (momentary and maintained)
- Terminals : Solder/quick connect 2,8mm (0.110)



PANEL CUT-OUT



MATERIALS

- Key Nickel : Plated steel
- Key Barrel : Chrome plated alloy
- Operator : PBT
- Nut : ABS
- Camtrack Momentary : PPE
- Camtrack Maintained : PPSU
- Switch Block 1 & 2 Pole : PBT
- Switch Block 3 & 4 Pole : PEI
- Contacts : Gold plated silver

AGENCY APPROVALS



EN 61058-1

The company reserves the right to change specifications without notice.

A01 series

Industrial controls • Ø16mm panel mounting
keylock switches

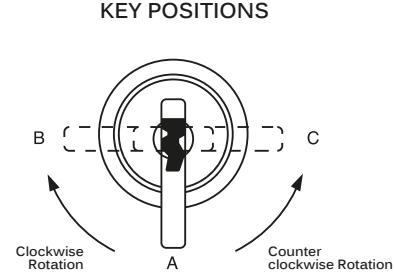


BUILD YOUR PART NUMBER

A keylock switch assembly requires : operator + switch block. To order these elements, select desired model number from tables below. Example : IP65 rectangular keyswitch, clockwise rotation, single pole, 2 positions, maintained = A018125 and A0151B.

OPERATOR

| POLE | BEZEL | DESCRIPTION | PART N° | KEY REMOVABLE |
|--------|-------|--------------------|---------|---------------|
| 1 or 2 | □ | 2 pos. maintained | A018125 | A-B |
| 1 or 2 | □ | 2 pos. momentary | A018124 | A |
| 3 or 4 | □ | 2 pos. maintained | A018127 | A-B |
| 3 or 4 | □ | 2 pos. momentary | A018128 | A |
| 1 or 2 | □ | 3 pos. maintained | A018105 | A-B-C |
| 1 or 2 | □ | 3 pos. momentary | A018106 | A |
| 1 or 2 | □ | 3 pos. mainL, momR | A018107 | A-B |
| 1 or 2 | □ | 3 pos. momL, mainR | A018108 | A-C |
| 1 or 2 | □ | 2 pos. maintained | A018225 | A-C |
| 1 or 2 | □ | 2 pos. momentary | A018224 | A |
| 3 or 4 | □ | 2 pos. maintained | A018227 | A-B |
| 3 or 4 | □ | 2 pos. momentary | A018228 | A |
| 1 or 2 | □ | 3 pos. maintained | A018205 | A-B-C |
| 1 or 2 | □ | 3 pos. momentary | A018206 | A |
| 1 or 2 | □ | 3 pos. mainL, momR | A018207 | A-B |
| 1 or 2 | □ | 3 pos. momL, mainR | A018208 | A-C |
| 1 or 2 | ○ | 2 pos. maintained | A018325 | A-B |
| 1 or 2 | ○ | 2 pos. momentary | A018324 | A |
| 3 or 4 | ○ | 2 pos. maintained | A018327 | A-B |
| 3 or 4 | ○ | 2 pos. momentary | A018328 | A |
| 1 or 2 | ○ | 3 pos. maintained | A018305 | A-B-C |
| 1 or 2 | ○ | 3 pos. momentary | A018306 | A |
| 1 or 2 | ○ | 3 pos. mainL, momR | A018307 | A-B |
| 1 or 2 | ○ | 3 pos. momL, mainR | A018308 | A-C |



KEY ROTATION - 2 POSITION SWITCHES

The model numbers shown are for switches with counter clockwise key rotation.

For clockwise rotation, replace : **25 with 01**
24 with 02 at the end of the model number.
27 with 03
28 with 04

Unsealed switches (IP40) suffix 01 to the end of the part number.

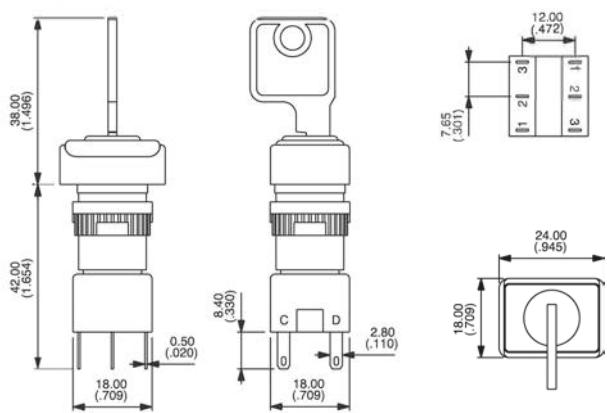
Bezel: □ rectangular, □ square, ○ round. 'pos'-position, 'mainL'-maintained left, 'momR'-momentary right, etc

SWITCH BLOCK

| NO OF POLES | PART NO |
|-------------|---------|
| Single pole | A0151B |
| Double pole | A0152B |
| Three pole | A0155B |
| Four pole | A0153B |

- Non removable key position: contact APEM
- 2 standard keys are supplied
- 20 key barrel types available from stock
- For ON-ON-ON function contact APEM
- Note: 3/4 pole switch block for use only with 2 position key switches

THREE POSITION KEY SWITCH WITH DOUBLE POLE CHANGEOVER CONTACT BLOCK



A01 series

Industrial controls • Ø16mm panel mounting selector switches



DISTINCTIVE FEATURES

- Panel sealed to IP65
- Single pole to four pole changeover
- 6A 250VAC



ENVIRONMENTAL SPECIFICATIONS

- Operating Temperature : -20°C to +55°C
- Solder Heat Resistance : 350°C for 5 seconds
- Sealing : Panel sealed to IP65, rear of panel IP40



ELECTRICAL SPECIFICATIONS

- Current/Voltage Rating : 10mA 5VAC min, 6A 250VAC max, 6A 12VDC max
- Initial Contact Resistance : 10mΩ max at 1A 4VDC
- Insulation Resistance : 50MΩ min
- Dielectric Strength : 750V between open contacts, 5KV live to accessible
- Electrical Life : 50.000 cycles min
- Insulation : Class 2

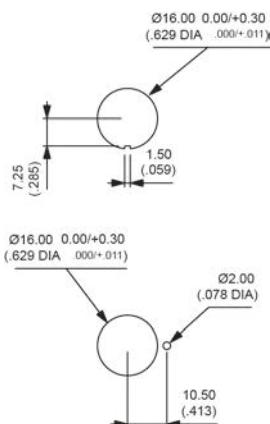


GENERAL SPECIFICATIONS

- Contact Gap : >1mm (0.039)
- Mechanical Life : 100.000 lifecycles (momentary and maintained)
- Terminals : Solder/quick connect 2,8mm (0.110)



PANEL CUT-OUT



MATERIALS

- Operator : PBT
- Nut : ABS
- Camtrack Momentary : PPE
- Camtrack Maintained : PPSU
- Switch Block 1 & 2 Pole : PBT
- Switch Block 3 & 4 Pole : PEI
- Contacts : Gold plated silver

AGENCY APPROVALS



EN 61058-1

The company reserves the right to change specifications without notice.

A01 series

Industrial controls • Ø16mm panel mounting selector switches



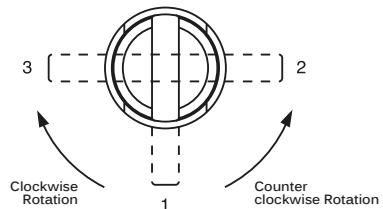
BUILD YOUR PART NUMBER

A rotary lever switch assembly requires : operator + switch block. To order these elements, select desired model numbers from tables below. Example : IP65 rectangular rotary switch with long lever, clockwise rotation, single pole, 2 positions, maintained = A019109 and A0151B.

OPERATOR

| POLE | BEZEL | DESCRIPTION | SHORT LEVER | LONG LEVER |
|--------|-------|--------------------|-------------|------------|
| 1 or 2 | □ | 2 pos. maintained | A019209 | A019109 |
| 1 or 2 | □ | 2 pos. momentary | A019210 | A019110 |
| 3 or 4 | □ | 2 pos. maintained | A019211 | A019111 |
| 3 or 4 | □ | 2 pos. momentary | A019212 | A019112 |
| 1 or 2 | □ | 3 pos. maintained | A019205 | A019105 |
| 1 or 2 | □ | 3 pos. momentary | A019206 | A019106 |
| 1 or 2 | □ | 3 pos. mainL, momR | A019207 | A019107 |
| 1 or 2 | □ | 3 pos. momL, mainR | A019208 | A019108 |
| 1 or 2 | □ | 2 pos. maintained | A019409 | A019309 |
| 1 or 2 | □ | 2 pos. momentary | A019410 | A019310 |
| 3 or 4 | □ | 2 pos. maintained | A019411 | A019311 |
| 3 or 4 | □ | 2 pos. momentary | A019412 | A019312 |
| 1 or 2 | □ | 3 pos. maintained | A019405 | A019305 |
| 1 or 2 | □ | 3 pos. momentary | A019406 | A019306 |
| 1 or 2 | □ | 3 pos. mainL, momR | A019407 | A019307 |
| 1 or 2 | □ | 3 pos. momL, mainR | A019408 | A019308 |
| 1 or 2 | ○ | 2 pos. maintained | A019609 | A019509 |
| 1 or 2 | ○ | 2 pos. momentary | A019610 | A019510 |
| 3 or 4 | ○ | 2 pos. maintained | A019611 | A019511 |
| 3 or 4 | ○ | 2 pos. momentary | A019612 | A019512 |
| 1 or 2 | ○ | 3 pos. maintained | A019605 | A019505 |
| 1 or 2 | ○ | 3 pos. momentary | A019606 | A019506 |
| 1 or 2 | ○ | 3 pos. mainL, momR | A019607 | A019507 |
| 1 or 2 | ○ | 3 pos. momL, mainR | A019608 | A019508 |

LEVER POSITION



LEVER ROTATION - 2 POSITION SWITCHES

The model numbers shown are for switches with counter clockwise lever rotation.

For clockwise rotation, replace : **09 with 01**
10 with 02
11 with 03
12 with 04 at the end of the model number.

Unsealed switches (IP40) suffix 01 to the end of the part number.

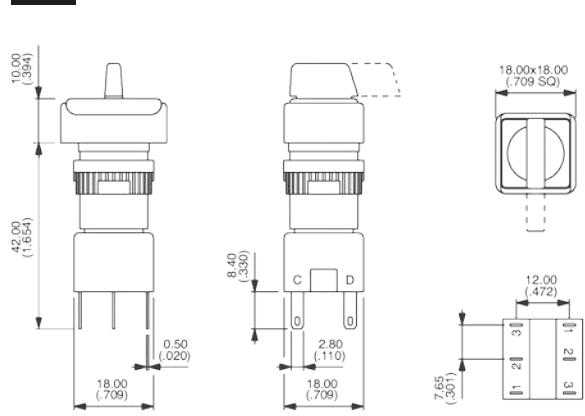
Bezel: □ rectangular, □ square, ○ round. 'pos'-position, 'mainL'-maintained left, 'momR'-momentary right, etc

SWITCH BLOCK

| NO OF POLES | PART NO |
|-------------|---------|
| Single pole | A0151B |
| Double pole | A0152B |
| Three pole | A0155B |
| Four pole | A0153B |

• Note: 3/4 pole switch block for use only with 2 position rotary lever

TWO POSITION MAINTAINED SELECTOR SQUARE BEZEL, LONG LEVER DOUBLE POLE CONTACT BLOCK



A02 series

Industrial controls • Ø22mm panel mounting pushbutton switches and indicators



DISTINCTIVE FEATURES

- Single pole to four pole
- Engraving and film legends
- 12A 250VAC

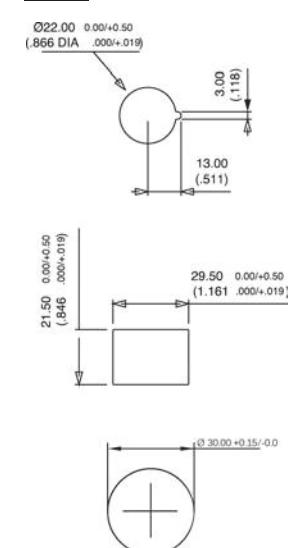


ENVIRONMENTAL SPECIFICATIONS

- Operating temperature : -20°C to +85°C
- Sealing : Panel sealed to IP65, rear of panel IP40



PANEL CUT-OUT



ELECTRICAL SPECIFICATIONS

- Current/Voltage Rating : 25mA 5VAC min, 16A 250VAC max, 12A 12VDC max
- Initial Contact Resistance : 10mΩ max at 1A 4VDC
- Insulation Resistance : 50MΩ min
- Dielectric Strength : 2KV between open contacts, 4KV live to accessible
- Electrical life 50.000 cycles min
- Insulation : Class 2
- Lamp Life : LED : 60.000 hours to 75% relative luminosity, Filament : approx. 5000 hours, Neon : approx. 10.000 hours



GENERAL SPECIFICATIONS

- Contact Gap : Double break 2 x 1,5mm (0.059)
- Mechanical Life : Momentary 1 million cycles, Maintained 100.000 cycles
- Lamp : Midget grove T1 3/4 filament, neon or LED
- Terminals : M3 captive screw and push on tab terminal



MATERIALS

- Screen : PC
- Reflector : PC
- Metal Bezel : Chrome plated brass
- Operator : PBT
- Nut : ABS
- Camtrack Momentary : PPE
- Camtrack Maintained : PPSU
- Switch Block 1 & 2 Pole : PBT
- Switch Block 3 & 4 Pole : PEI
- Contacts : Silver

AGENCY APPROVALS



EN 61058-1

The company reserves the right to change specifications without notice.

A02 series

Industrial controls • Ø22mm panel mounting pushbutton switches and indicators



BUILD YOUR PART NUMBER

A pushbutton assembly requires : screen + lamp (if illuminated) + operator + one or two switch blocks.
An indicator assembly requires : screen + lamp + operator. To order these elements, select desired model numbers from tables below. Example : IP65 illum. flush mounting maintained pushbutton, switch block with 2 N.O. contacts, red screen and 12V red LED = A0263B, A0142M1, A0213X and A02503.

| SCREEN | | | LAMP (IF REQUIRED) | | | OPERATOR | | | |
|-------------------------------------|--------|---------|--------------------|-----------|---------|--------------------------|-----------------------|---------------|---------|
| BEZEL | COLOR | PART NO | LAMP | VOLTAGE | PART NO | BEZEL | DESCRIPTION | LAMP TYPE | PART NO |
| <input type="checkbox"/> | black | A0261A | Filament | 6.3V | A0141A | <input type="checkbox"/> | Illum, momentary | Lamp/LED bulb | A0201Y |
| <input type="checkbox"/> | red | A0261B | Filament | 14V | A0141B | <input type="checkbox"/> | Illum, maintained | Lamp/LED bulb | A0201X |
| <input type="checkbox"/> | amber | A0261C | Filament | 28V | A0141C | <input type="checkbox"/> | Non-illum, momentary | Lamp/LED bulb | A0203Y |
| <input type="checkbox"/> | yellow | A0261D | Filament | 36V | A0141D | <input type="checkbox"/> | Non-illum, maintained | Lamp/LED bulb | A0203X |
| <input type="checkbox"/> | green | A0261E | Filament | 48V | A0141E | <input type="checkbox"/> | Illum, momentary | Lamp/LED bulb | A0204Y |
| <input type="checkbox"/> | blue | A0261F | Filament | 60V | A0141F | <input type="checkbox"/> | Illum, maintained | Lamp/LED bulb | A0204X |
| <input type="checkbox"/> | clear | A0261G | Neon | 110V | A0143G | <input type="checkbox"/> | Non-illum, momentary | Lamp/LED bulb | A0206Y |
| <input type="checkbox"/> | white | A0261J | Neon | 220V | A0143H | <input type="checkbox"/> | Non-illum, momentary | Lamp/LED bulb | A0206X |
| <input type="checkbox"/> | black | A0262A | LED | 6V red | A0142L1 | <input type="checkbox"/> | Non-illum, maintained | Lamp/LED bulb | A0207Y |
| <input type="checkbox"/> | red | A0262B | LED | 6V green | A0142L2 | <input type="checkbox"/> | Illum, momentary | Lamp/LED bulb | A0207X |
| <input type="checkbox"/> | amber | A0262C | LED | 6V amber | A0142L3 | <input type="checkbox"/> | Illum, maintained | Lamp/LED bulb | A0209Y |
| <input type="checkbox"/> | yellow | A0262D | LED | 12V red | A0142M1 | <input type="checkbox"/> | Non-illum, momentary | Lamp/LED bulb | A0209X |
| <input type="checkbox"/> | green | A0262E | LED | 12V green | A0142M2 | <input type="checkbox"/> | Non-illum, maintained | Lamp/LED bulb | |
| <input type="checkbox"/> | blue | A0262F | LED | 12V amber | A0142M3 | <input type="checkbox"/> | | | |
| <input type="checkbox"/> | clear | A0262G | LED | 12V blue | A0142M4 | <input type="checkbox"/> | | | |
| <input type="checkbox"/> | white | A0262J | LED | 12V white | A0142M5 | <input type="checkbox"/> | | | |
| <input checked="" type="checkbox"/> | black | A0263A | LED | 24V red | A0142N1 | <input type="checkbox"/> | | | |
| <input checked="" type="checkbox"/> | red | A0263B | LED | 24V green | A0142N2 | <input type="checkbox"/> | | | |
| <input checked="" type="checkbox"/> | amber | A0263C | LED | 24V amber | A0142N3 | <input type="checkbox"/> | | | |
| <input checked="" type="checkbox"/> | yellow | A0263D | LED | 24V blue | A0142N4 | <input type="checkbox"/> | | | |
| <input checked="" type="checkbox"/> | green | A0263E | LED | 24V white | A0142N5 | <input type="checkbox"/> | | | |
| <input checked="" type="checkbox"/> | blue | A0263F | LED | 48V red | A0142P1 | <input type="checkbox"/> | | | |
| <input checked="" type="checkbox"/> | clear | A0263G | LED | 48V green | A0142P2 | <input type="checkbox"/> | | | |
| <input checked="" type="checkbox"/> | white | A0263J | LED | 48V amber | A0142P3 | <input type="checkbox"/> | | | |

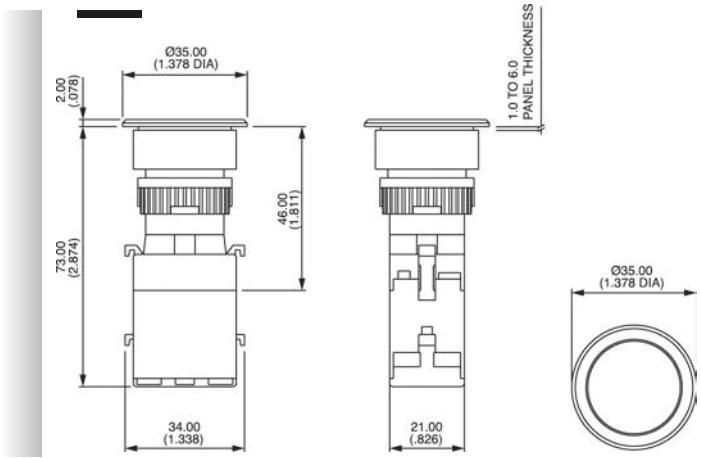
Std bezel material : nickel plated brass.
For optional black finish, add 'G' to the end of operator model number.

Bezel: rectangular, square, round. 'illum'-illuminated, 'Non-illum'-non illuminated

| SWITCH BLOCK | | | SECOND SWITCH BLOCK | | |
|---------------|---------|---------------|---------------------|--|--|
| CONTACTS | PART NO | CONTACTS | PART NO | | |
| 1 N.O. | A02501 | 1 N.O. | A02506 | | |
| 1 N.C. | A02502 | 1 N.C. | A02507 | | |
| 2 N.O. | A02503 | 2 N.O. | A02508 | | |
| 2 N.C. | A02504 | 2 N.C. | A02509 | | |
| 1 N.O./1 N.C. | A02505 | 1 N.O./1 N.C. | A02510 | | |

To achieve 3 or 4 pole switching, add second switch block from above table.

BLUE ILLUMINATED MAINTAINED PUSHBUTTON DOUBLE POLE NORMALLY OPEN



A02 series

Industrial controls • Ø22mm panel mounting
keylock switches



DISTINCTIVE FEATURES

- Single pole to four pole
- Captive screw and push on tab terminal
- 12A 250VAC



ENVIRONMENTAL SPECIFICATIONS

- Operating Temperature : -20°C to +55°C
- Sealing : Panel sealed to IP65, rear of panel IP40



ELECTRICAL SPECIFICATIONS

- Current/Voltage Rating : 25mA 5VAC min, 16A 250VAC max,
12A 12VDC max
- Initial Contact Resistance : 10mΩ max at 1A 4VDC
- Insulation Resistance : 50MΩ min
- Dielectric Strength : 750V between open contacts
5KV live to accessible
- Electrical Life : 50.000 cycles min
- Insulation : Class 2

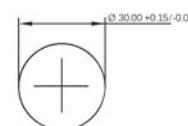
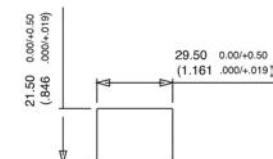
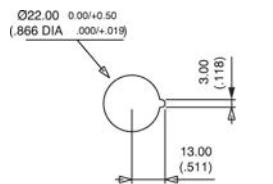


GENERAL SPECIFICATIONS

- Contact Gap : >1mm (0.039)
- Mechanical Life : 100.000 lifecycles (momentary and maintained)
- Terminals : M3 captive screw and push on tab terminal



PANEL CUT-OUT



MATERIALS

- Key Nickel : Plated steel
- Key Barrel : Chrome plated alloy
- Operator : PBT
- Nut : ABS
- Camtrack Momentary : PPE
- Camtrack Maintained : PPSU
- Switch Block 1 & 2 Pole : PBT
- Switch Block 3 & 4 Pole : PEI
- Contacts : Silver

AGENCY APPROVALS



EN 61058-1

The company reserves the right to change specifications without notice.

A02 series

Industrial controls • Ø22mm panel mounting
keylock switches

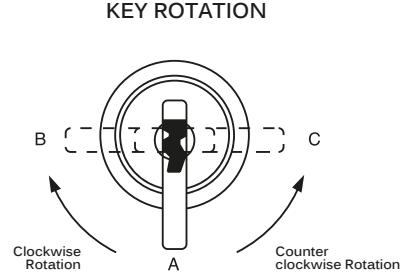


BUILD YOUR PART NUMBER

A keylock switch assembly requires : operator + one or two switch blocks. To order these elements, select desired model numbers from tables below. Example : IP65 square 2 position keyswitch, clockwise rotation, switch block with 2 N.O. contacts = A028220 and A02503.

OPERATOR

| BEZEL | DESCRIPTION | PART NO. | KEY REMOVABLE IN POSITIONS |
|--------------------------|--------------------|----------|----------------------------|
| <input type="checkbox"/> | 2 pos. maintained | A028120 | A-B |
| <input type="checkbox"/> | 2 pos. momentary | A028119 | A |
| <input type="checkbox"/> | 3 pos. maintained | A028105 | A-B-C |
| <input type="checkbox"/> | 3 pos. momentary | A028106 | A |
| <input type="checkbox"/> | 3 pos. mainL, momR | A028107 | A-B |
| <input type="checkbox"/> | 3 pos. momL, mainR | A028108 | A-C |
| <input type="checkbox"/> | 2 pos. maintained | A028220 | A-B |
| <input type="checkbox"/> | 2 pos. momentary | A028219 | A |
| <input type="checkbox"/> | 3 pos. maintained | A028205 | A-B-C |
| <input type="checkbox"/> | 3 pos. momentary | A028206 | A |
| <input type="checkbox"/> | 3 pos. mainL, momR | A028207 | A-B |
| <input type="checkbox"/> | 3 pos. momL, mainR | A028208 | A-C |
| <input type="checkbox"/> | 2 pos. maintained | A028320 | A-B |
| <input type="checkbox"/> | 2 pos. momentary | A028319 | A |
| <input type="checkbox"/> | 3 pos. maintained | A028305 | A-B-C |
| <input type="checkbox"/> | 3 pos. momentary | A028306 | A |
| <input type="checkbox"/> | 3 pos. mainL, momR | A028307 | A-B |
| <input type="checkbox"/> | 3 pos. momL, mainR | A028308 | A-C |



KEY ROTATION - 2 POSITION SWITCHES

The model numbers shown are for switches with counter clockwise lever rotation.

For clockwise 20 with 01 at the end of the rotation, replace : 19 with 02 model number.

- 2 standard keys are supplied
- 20 key barrel types available from stock
- Non removable key position: contact APEM

To specify flush mounting (30mmØ) option: add 'FM' to the end of the part number. Example: A028301 FM (round operator only).

Unsealed switches (IP40) suffix 01 to the end of the part number. For 6.35mm push on tab terminals suffix the switch block part number with SP.

Bezel: rectangular, square, round. 'pos'-position, 'mainL'-maintained left, 'momR'-momentary right, etc

SWITCH BLOCK

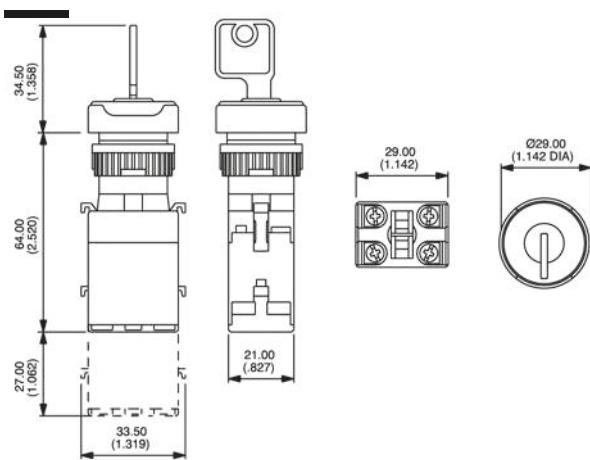
SECOND SWITCH BLOCK

| CONTACTS | PART NO |
|---------------|---------|
| 1 N.O. | A02501 |
| 1 N.C. | A02502 |
| 2 N.O. | A02503 |
| 2 N.C. | A02504 |
| 1 N.O./1 N.C. | A02505 |

| CONTACTS | PART NO |
|---------------|---------|
| 1 N.O. | A02506 |
| 1 N.C. | A02507 |
| 2 N.O. | A02508 |
| 2 N.C. | A02509 |
| 1 N.O./1 N.C. | A02510 |

To achieve 3 or 4 pole switching, add second switch block from above table.

TWO POSITION KEY SWITCH WITH DOUBLE POLE NORMALLY OPEN CONTACT BLOCK



A02 series

Industrial controls • Ø22mm panel mounting selector switches



DISTINCTIVE FEATURES

- Single pole to four pole changeover
- Captive screw and push on tab terminals
- 12A 250VAC



ENVIRONMENTAL SPECIFICATIONS

- Operating Temperature : -20°C to +55°C
- Sealing : Panel sealed to IP65, rear of panel IP40

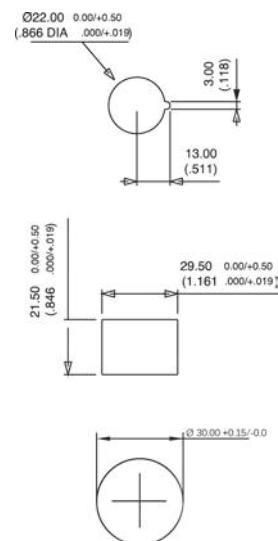


ELECTRICAL SPECIFICATIONS

- Current/Voltage Rating : 25mA 5VAC min, 16A 250VAC max, 12A 12VDC max
- Initial Contact Resistance : 10mΩ max at 1A 4VDC
- Insulation Resistance : 50MΩ min
- Dielectric Strength : 2KV between open contacts, 4KV live to accessible
- Electrical Life : 50.000 cycles min
- Insulation : Class 2



PANEL CUT-OUT



GENERAL SPECIFICATIONS

- Contact Gap : >1mm (0.039)
- Mechanical Life : 100.000 lifecycles (momentary and maintained)
- Terminals : M3 captive screw and push on tab terminals



MATERIALS

- Operator : PBT
- Nut : ABS
- Camtrack Momentary : PPE
- Camtrack Maintained : PPSU
- Switch Block 1 & 2 Pole : PBT
- Switch Block 3 & 4 Pole : PEI
- Contacts : Silver

AGENCY APPROVALS



EN 61058-1

The company reserves the right to change specifications without notice.

A02 series

Industrial controls • Ø22mm panel mounting selector switches



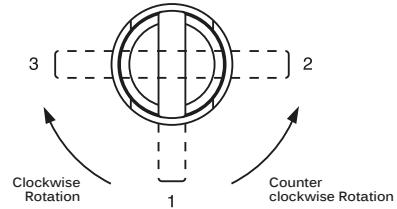
BUILD YOUR PART NUMBER

A rotary lever assembly requires : operator + one or two switch blocks. To order these elements, select desired model numbers from tables below. Example : IP65 square 2 position maintained rotary switch with long lever, clockwise rotation, switch block with 2 N.O. contacts = A029107 and A02503.

OPERATOR

| BEZEL | DESCRIPTION | SHORT LEVER | LONG LEVER |
|-------------------------------------|--------------------|-------------|------------|
| <input type="checkbox"/> | 2 pos. maintained | A029207 | A029107 |
| <input type="checkbox"/> | 2 pos. momentary | A029208 | A029108 |
| <input checked="" type="checkbox"/> | 3 pos. maintained | A029203 | A029103 |
| <input type="checkbox"/> | 3 pos. momentary | A029204 | A029104 |
| <input checked="" type="checkbox"/> | 3 pos. mainL, momR | A029205 | A029105 |
| <input type="checkbox"/> | 3 pos. momL, mainR | A029206 | A029106 |
| <input checked="" type="checkbox"/> | 2 pos. maintained | A029407 | A019307 |
| <input type="checkbox"/> | 2 pos. momentary | A029408 | A019308 |
| <input checked="" type="checkbox"/> | 3 pos. maintained | A029403 | A029303 |
| <input type="checkbox"/> | 3 pos. momentary | A029404 | A029304 |
| <input checked="" type="checkbox"/> | 3 pos. mainL, momR | A029405 | A029305 |
| <input type="checkbox"/> | 3 pos. momL, mainR | A029406 | A029306 |

LEVER POSITION



LEVER ROTATION - 2 POSITION SWITCHES

The model numbers shown are for switches with counter clockwise lever rotation.

For clockwise rotation, replace : **07 with 01** at the end of the model number.
08 with 02

Optional engraving on lever end add 'WL' to the end of the part number.

To specify flush mounting (30mmØ) option: add 'FM' to the end of the part number. Example: A029401 FM (round operators only).

Unsealed switches (IP40) suffix 01 to the end of the part number. For 6.35mm push on tab terminals suffix the switch block part number with SP.

Bezel: square, round.

SWITCH BLOCK

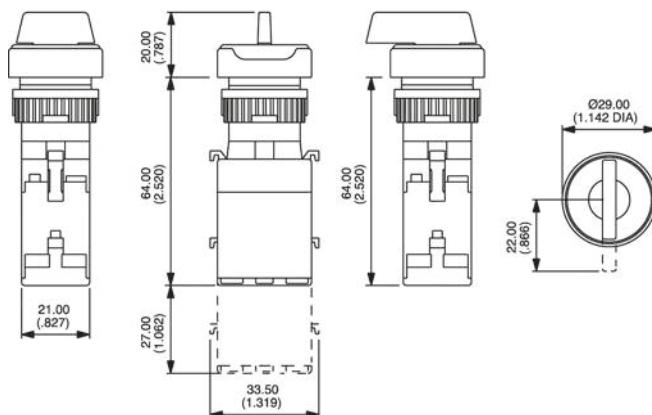
SECOND SWITCH BLOCK

| CONTACTS | PART NO |
|---------------|---------|
| 1 N.O. | A02501 |
| 1 N.C. | A02502 |
| 2 N.O. | A02503 |
| 2 N.C. | A02504 |
| 1 N.O./1 N.C. | A02505 |

| CONTACTS | PART NO |
|---------------|---------|
| 1 N.O. | A02506 |
| 1 N.C. | A02507 |
| 2 N.O. | A02508 |
| 2 N.C. | A02509 |
| 1 N.O./1 N.C. | A02510 |

To achieve 3 or 4 pole switching, add second switch block from above table.

TWO POSITION SELECTOR SWITCH WITH DOUBLE POLE NORMALLY OPEN CONTACT BLOCK



LK series

Ø19mm panel mounting keylock switches



DISTINCTIVE FEATURES

- Single and double pole options

- Up to four positions

- Multiple key pull position options



ENVIRONMENTAL SPECIFICATIONS

- Operating Temperature : -20°C to +55°C
- Solder Heat Resistance : 350°C for 5 seconds
- Sealing : Panel sealed to IP65, rear of panel IP40



ELECTRICAL SPECIFICATIONS

- Contact Rating : 4A at 125 VAC or 28VDC, 2A at 250 VAC
- Contact Resistance : $\leq 10 \text{ m}\Omega$
- Insulation Resistance : $\geq 109 \text{ M}\Omega$
- Dielectric Strength : 1000 Vrms minimum at sea level
- Electrical Life : 6000 cycles at full load



GENERAL SPECIFICATIONS

- Mechanical Life : 6000 cycles at full load.
- Operating Temperature Range : -30°C to +85°C
- Barrel Shutter Option



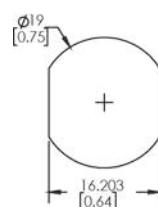
MATERIALS

- Lock Housing : Zinc alloy die casted, nickel plated
- Cylinder : 4 disc tumbler, zinc alloy die casted, nickel plated
- Keys : 2 single bitted keys, brass nickel plated
- Contacts : Gold plated copper alloy
- Body : Glass filled polyester

The company reserves the right to change specifications without notice.



PANEL CUT-OUT



AGENCY APPROVAL



UL recognized

LK series

Ø19mm panel mounting keylock switches



BUILD YOUR PART NUMBER

BASIC PART NUMBER

| | | | | | |
|-----------|------------|--|-----------------|----------------------|--------------|
| LK | | | | | |
| SERIES | FUNCTION | | FINISH | BARREL SHUTTER | KEY TYPE |
| 6 | Maintained | | N Nickel plated | (Nickel finish only) | 126 Standard |
| 5 | Momentary | | G Black | S Supplied | |
| | | | | B None | |

LOCK CONFIGURATION

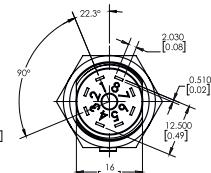
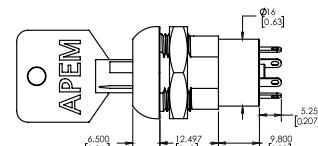
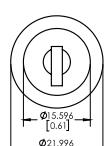
| | |
|----------|---------------------------|
| B | Double pole ON - OFF - ON |
| S | Double pole ON - ON |

For detail and other functions see
www.apem.com

OPTIONS

| | | |
|-------------------------|------------------|----------|
| - | | |
| | KEY OPTIONS | HARDWARE |
| N Nickel Key (standard) | 3 Nut (standard) | |
| M Overmoulded | 4 Clip | |

SINGLE POLE ON – OFF WITH BLACK FINISH AND OVERMOLDED KEY



A01ES-D series

Emergency stop switches •
panel cut-out Ø 16 mm



DISTINCTIVE FEATURES

- Approved to EN 60947-5-5
- 5 prominent red actuator styles
- Locked/unlocked status indicator
- AC15 1,5A 250VAC, 6A 250VAC
- Panel sealed to IP65



ENVIRONMENTAL SPECIFICATIONS

- Sealing options : front panel IP65, rear panel IP40 according to EN60947-5-5
- Operating temperature : -20°C to +55°C



ELECTRICAL SPECIFICATIONS

- Electrical function : push to shut off, twist to release
- Current/voltage rating : AC-15 1,5A 250VAC, 6A 250VAC
- Electrical life : 6050 cycles
- Contact gap : > 3 mm
- Insulation resistance : 50 MΩ min
- Dielectric test voltage : 2900V



GENERAL SPECIFICATIONS

- Panel thickness : 6 mm (.236) max.
- Mechanical life : 6050 cycles
- Operating force : 18 to 20 N
- Torque : 0.8 Nm
- Soldering : 350°C, 5 seconds (IEC 68-2-2-20Tb, method 2)
- Switch terminals : solder/ quick-connect 2.8 mm (.110) (IEC 68-2-20)

The company reserves the right to change specifications without notice.

A01ES-D series

Emergency stop switches •
panel cut-out Ø 16 mm



MATERIALS

- Operator case : polyetherimide
- Actuator : polycarbonate
- Switch block : PBT
- Panel seal : neoprene

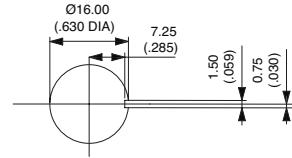
AGENCY APPROVAL

Switch block approved to
UL 1054 / VDE (EN 61058-1) and DEMKO (60947-5-5)

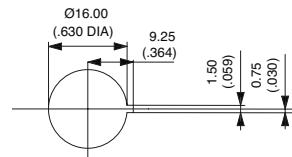


PANEL CUT-OUT

A01ES-DM - A01ES-DSP3



A01ES-D - A01ES-DF1- A01ES-DF2



ELECTRICAL FUNCTIONS



Single pole
Normally Closed



Double pole
Normally Closed

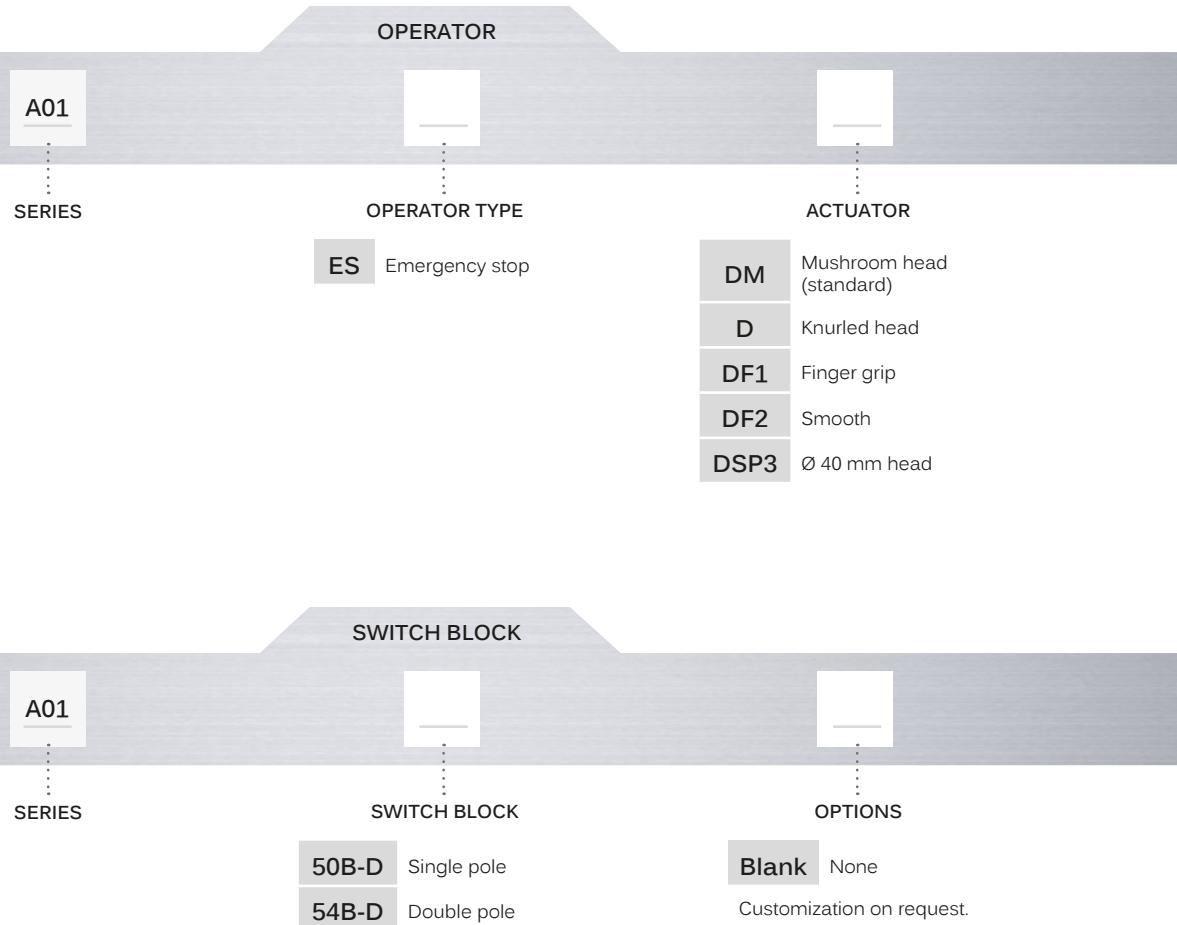
A01ES-D series

Emergency stop switches •
panel cut-out Ø 16 mm



BUILD YOUR PART NUMBER

An emergency stop switch assembly requires : 1 operator + 1 switch block. Example : Ø 16 mm red twist to reset, knurled head actuator with double pole positive break switch block = A01ES-D + A0154B-D



ABOUT THIS SERIES



Mounting accessories : standard hardware supplied : 1 nut and 1 flat seal

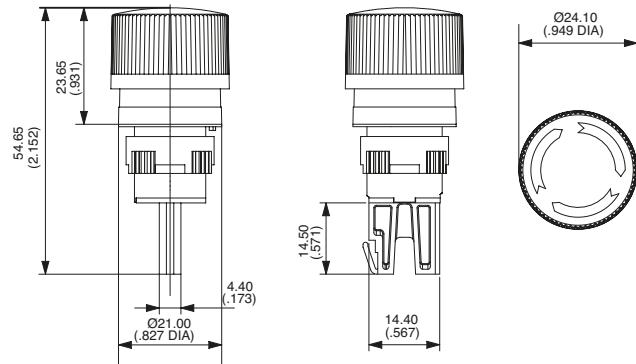
A01ES-D series

Emergency stop switches •
panel cut-out Ø 16 mm

KNURLED HEAD ACTUATOR



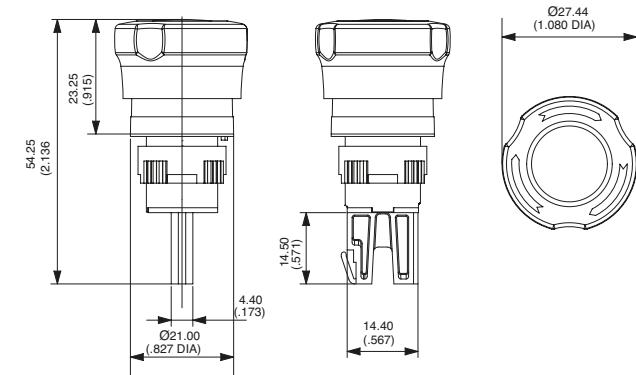
A01ES-D



FINGER GRIP ACTUATOR



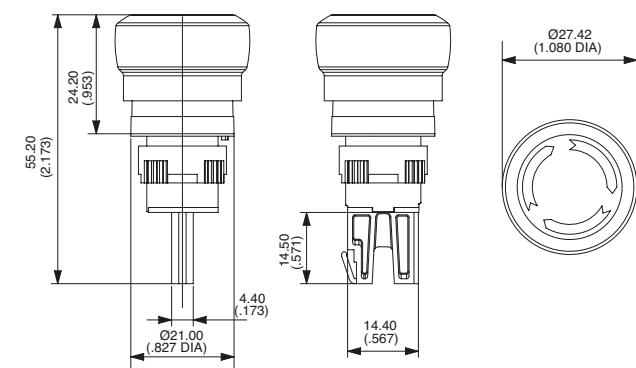
A01ES-DF1



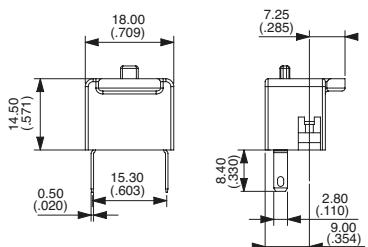
SMOOTH ACTUATOR



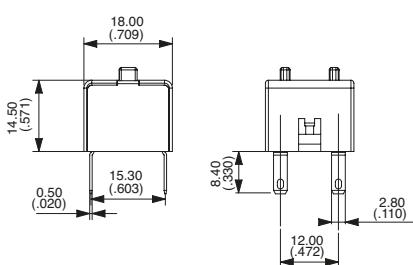
A01ES-DF2



SINGLE POLE SWITCH BLOCK: A0150B-D



DOUBLE POLE SWITCH BLOCK: A0154B-D



A02ES-I series

Emergency stop switches •
panel cut-out Ø 22 mm



DISTINCTIVE FEATURES

- Approved to EN 60947-5-5, UL 508 and CSA C22.2 No 14-10
- Pull or twist to release
- AC-12, 6A 240VAC / DC-12, 8A 24VAC
- Panel sealed to IP65
- Illuminated model available



ELECTRICAL SPECIFICATIONS

- Electrical function : push to shut off, pull or twist to release
- Current/voltage rating :
AC-12, 10A 24VAC / 6A 240VAC
DC-12, 8A 24VDC
AC-15, 10A 24VAC / 3A 240VAC
DC-13, 4A 24VDC
- Electrical life : 100.000 cycles with one contact block
- Insulation resistance : 50 MΩ min.
- Dielectric strength : contact block 2.500 Vrms
- Contacts : silver

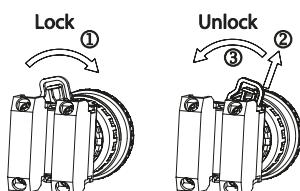


GENERAL SPECIFICATIONS

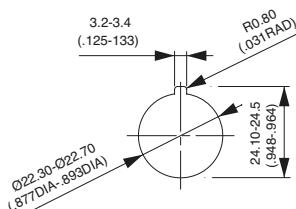
- Front panel sealing : IP65
- Panel thickness : 6 mm (.236) max.
- Low level or mechanical life : 250.000 cycles w. one contact block
- Operating temperature : -20°C to +55°C
- Switch terminals : M3.5 screws



MOUNTING LOCKING SYSTEM



PANEL CUT-OUT



AGENCY APPROVALS



UL 508
CSA C22.2 No 14-10



EN 60947-5-5

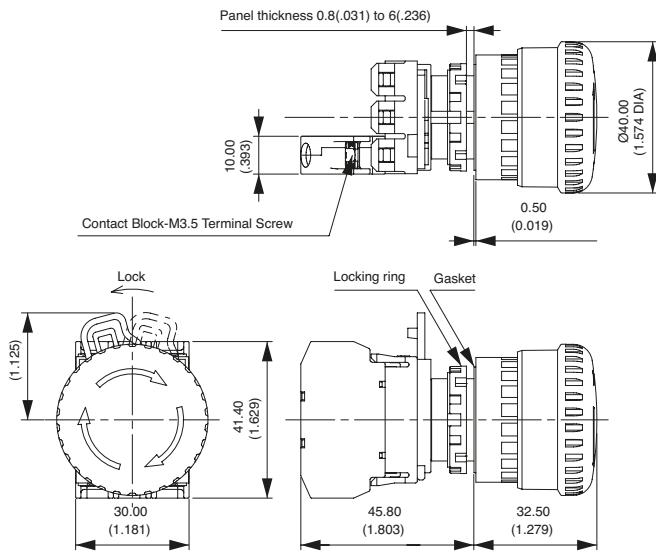
A02ES-I series

Emergency stop switches •
panel cut-out Ø 22 mm

SINGLE POLE - NORMALLY CLOSED



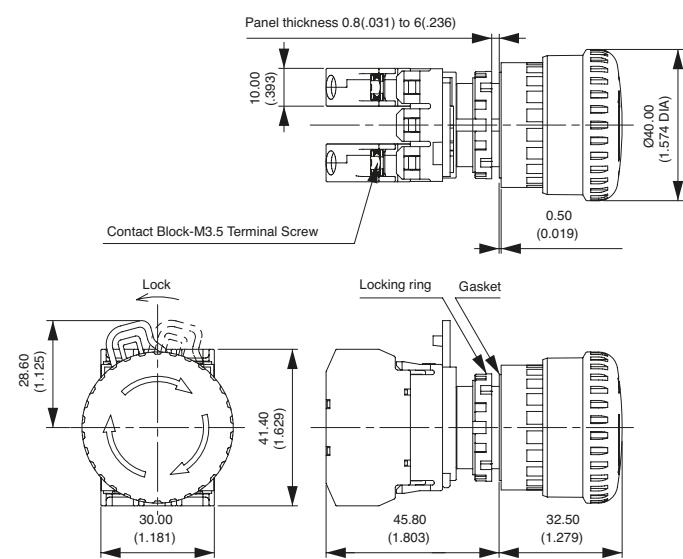
A02ESI3B101IX0



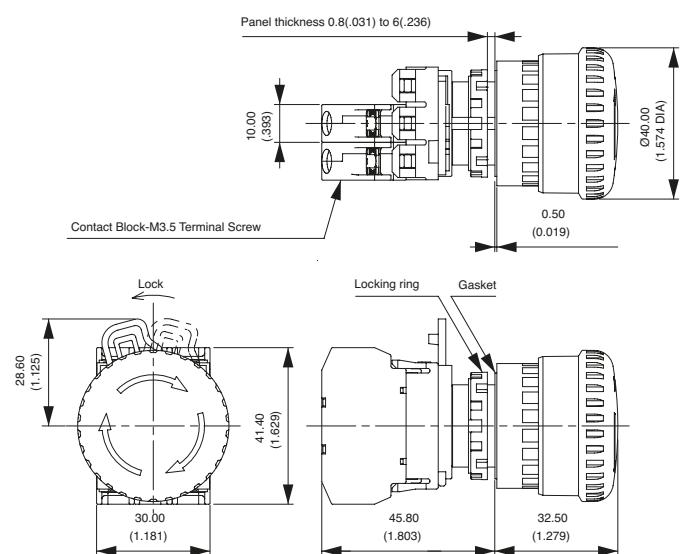
DOUBLE POLE - NORMALLY CLOSED



A02ESI3B102IX0



SINGLE POLE - NORMALLY CLOSED ILLUMINATED

With LED 24V
A02ESI4B101IR2

A02ES-H series

High-security emergency stop switches •
panel cut-out Ø 22 mm



DISTINCTIVE FEATURES

- Built-in safety
- Approved to EN 60947-5-5, UL 508 and CSA C22.2 No 14-10
- Pull or twist to release
- AC-12, 3A 240VAC / DC-12, 2A 30V
- Panel sealed to IP65

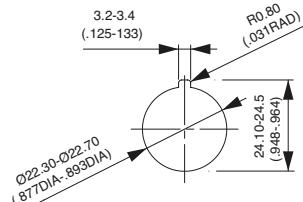


ELECTRICAL SPECIFICATIONS

- Electrical function : push to shut off, pull or twist to release
- Current/voltage rating - NC contacts :
 - AC-12, 3A 250VAC
 - AC-15, 1,5A 250VAC
 - DC-12, 2A 30V
 - DC-13, 1A 30V
- Current/voltage rating - NO contacts :
 - AC12, 0,6A 250VAC
 - AC14, 0,3A 250VAC
 - DC12, 2A 30V / 1A 30V
- Electrical life : 100.000 cycles
- Insulation resistance : 100 MΩ min.
- Dielectric strength : contact block 2.500 Vrms
- Contacts : gold plated silver



PANEL CUT-OUT



OPERATING FORCE

- Push to shut off : 32 N
- Pull to release : 21 N
- Turn to release : 0,27 Nm
- Minimum force to direct opening action : 80 N



ENVIRONMENTAL SPECIFICATIONS

- Front panel sealing : IP65
- Terminals IP20 (finger safe)
- Operating temperature : -25°C to +60°C
- Storage temperature : -45°C to +80°C



GENERAL SPECIFICATIONS

- Panel thickness : 6 mm (.236) max.
- Low level or mechanical life : 250.000 cycles
- Recommended torque : 2Nm
- Switch terminals : M3 screws

The company reserves the right to change specifications without notice. Not for sale in Japan.

AGENCY APPROVALS



UL 508
CSA 22.2 No 14-10



EN 60947-5-5

A02ES-H series

High-security emergency stop switches •
panel cut-out Ø 22 mm

DOUBLE POLE, NORMALLY CLOSED



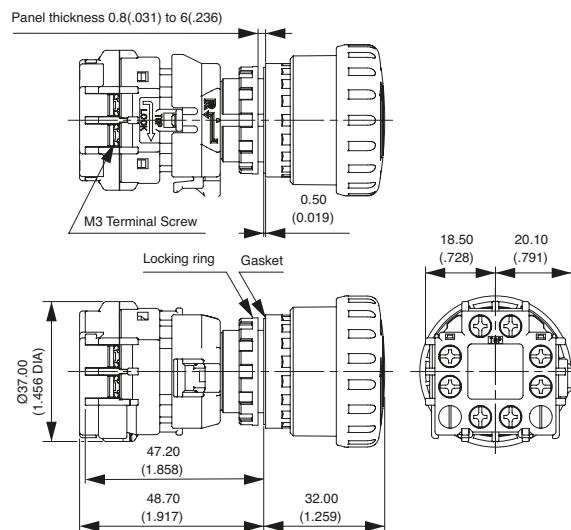
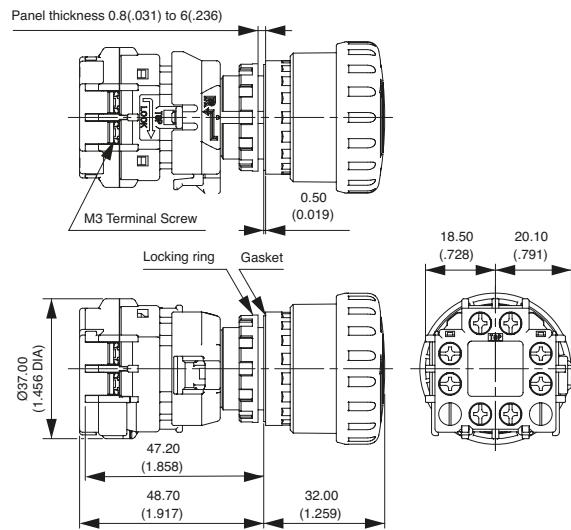
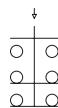
A02ESH3B102IX0



DOUBLE POLE, NORMALLY CLOSED
+ SINGLE POLE, NORMALLY OPEN



A02ESH3B112IX0



ES series

Heavy-duty emergency stop switches •
panel cut-out Ø 22 mm or Ø 28 mm



DISTINCTIVE FEATURES

- Rugged version : 100.000 cycle mechanical life
- Locked/unlocked status indicator
- Lower behind-panel depth
- Sealed to IP65, IP67 and IP69K
- Complies with EN 60947-5-1



ELECTRICAL SPECIFICATIONS

- Electrical function : push-pull ON-ON
- Current/voltage rating : 1A 24VDC DC-14
- Electrical life : 6.050 cycles
- Contact resistance : 10 mΩ max.
- Insulation resistance : 1.000 MΩ min. at 500VDC
- Dielectric strength : 1.000 Vrms 50 Hz min. between terminals
2.000 Vrms 50 Hz min. between poles and between terminals and frame

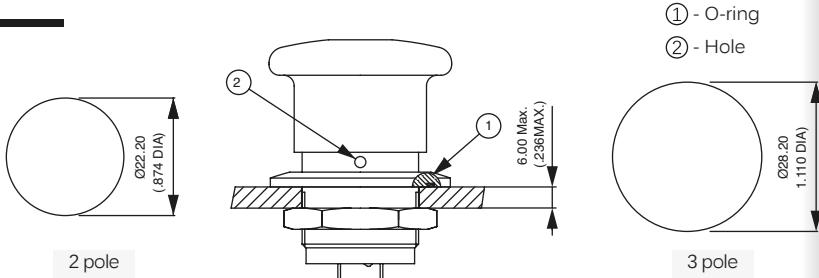


ENVIRONMENTAL SPECIFICATIONS

- Sealing : IP65, IP67 and IP69K according to IEC 60529 and DIN 40050
- Salt spray : 96 hours according to IEC 68-2-11
- Vibrations : 10-500 Hz - 10 g according to IEC 68-2-6
- Shock resistance : 50 g according to IEC 68-2-27
- Robustness (axial) : IK10
- Operating temperature : -40°C to +85°C
- According to EN 60947-5-1



PANEL CUT-OUT



NOTE : the hole in the bushing is designed for insertion of a Ø 2 mm metal rod helping to fasten the switch on the panel.

The company reserves the right to change specifications without notice.



GENERAL SPECIFICATIONS

- Panel thickness : 6 mm (.236) max.
- Low level or mechanical life : 100.000 cycles
- Travel to lock : 2,20 mm ± 0,3 mm
- Total travel : 4,20 mm ± 0,3 mm
- Torque : 5 Nm min. - 14 Nm max. applied to nut
- Operating force :
2 pole models : Push : 30N ± 7N
pull : 25N ± 5N
3 pole models : Push : 45N ± 7N
pull : 25N ± 5N



MATERIALS

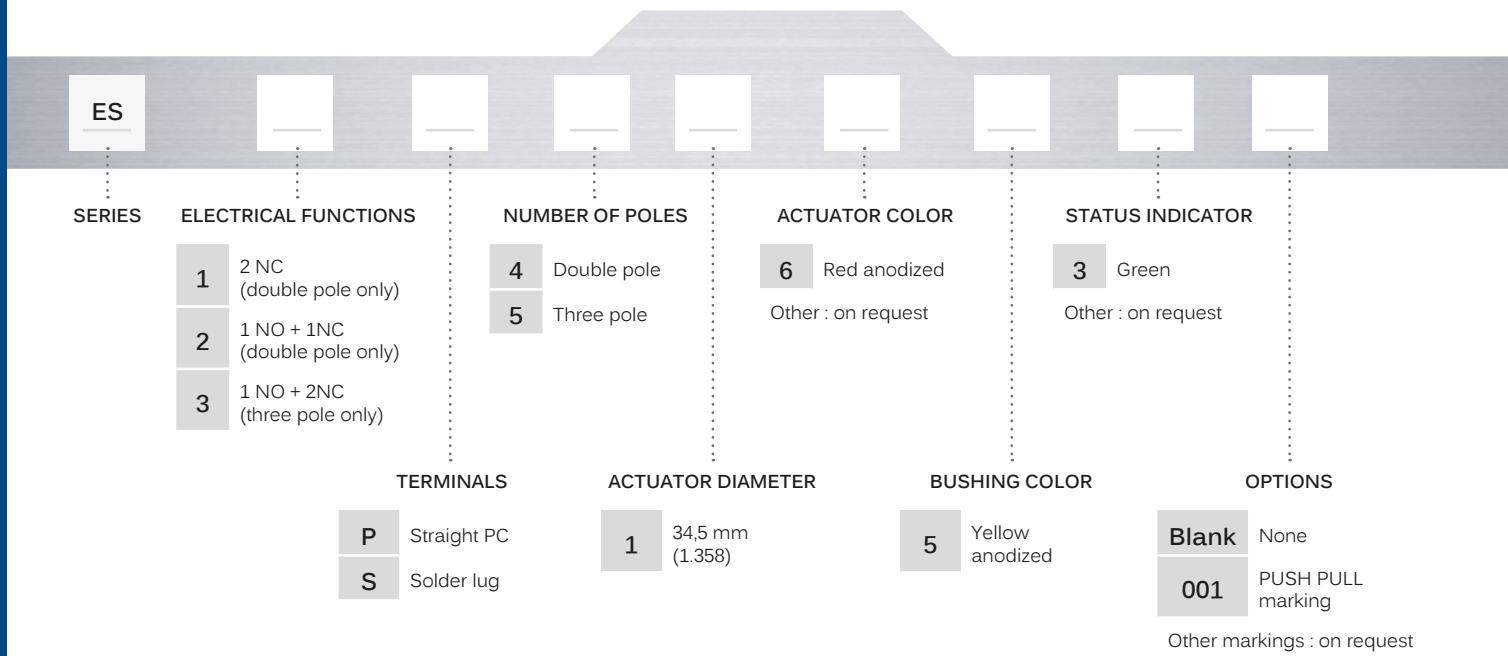
- Case : diallylphthalate (DAP)
- Actuator : aluminum, red anodized
- Bushing : aluminum, yellow anodized
- Contacts : silver, gold plated
- Terminal seal : epoxy

ES series

Heavy-duty emergency stop switches •
panel cut-out Ø 22 mm or Ø 28 mm



BUILD YOUR PART NUMBER



NOTICE : please note that not all combinations of above numbers are available.
Refer to www.apem.com for further information.

DOUBLE POLE - 2 N.C. CONTACTS



Solder lug terminals

ES1S41653

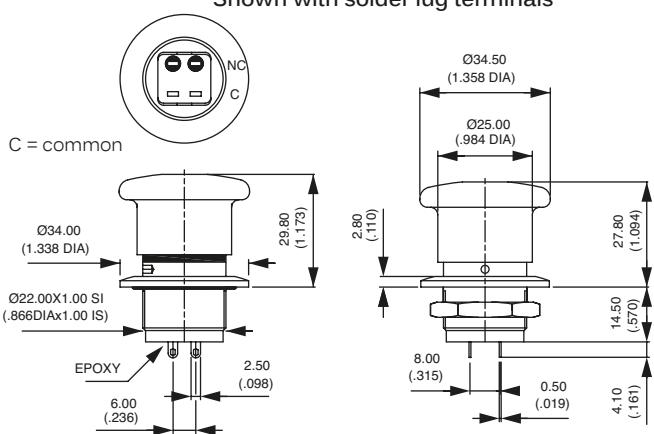


Straight PC terminals

ES1P41653



Shown with solder lug terminals



Sealing boots

For toggle or pushbutton switches



DISTINCTIVE FEATURES

- Prevent dust, sand and water from getting into switches.
- On toggle versions, also prevent ice from blocking lever action
- Compatible with front sealing options (K and X408).
- Available in a wide range of colors.
- When necessary, a sealing ring or washer is supplied with the boot.



ENVIRONMENTAL SPECIFICATIONS

- Operating temperature :
 - neoprene boots : -20°C to +50°C
 - silicone boots : -40°C to + 85°C



MATERIALS

- Boot : neoprene or silicone (see comparative advantages below)
- Nut : brass, nickel plated or black

| COMPARATIVE ADVANTAGES | TEMPERATURE RANGE | | ELASTICITY | MECHANICAL RESISTANCE |
|---------------------------|-------------------|------|------------|--------------------------|
| | LOW | HIGH | | |
| Silicone | ++ | ++ | ++ | - |
| Neoprene | - | + | - | ++ |

++ : excellent, + : good, - : poor

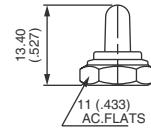
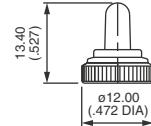
Sealing boots

For toggle or pushbutton switches

**FOR BUSHING Ø 6,35-40NS (1/4-40UNS)
5000 AND 11000 SERIES**



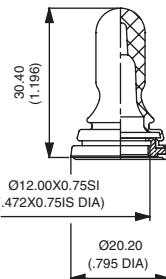
| NUT | FULL-TOGGLE SILICONE BOOTS | | | |
|-----------------------|----------------------------|------------------------|------------------------|------------------------|
| | Black | Red | Green | White |
| Knurled Nickel plated | N33161005 (U1331) | N33162005 (U1331-6) | N3316V005 (U1331-3) | N3316B005 (U1331-7) |
| Knurled Black | N33161002 (U1333) | N33162002 (U1333-6) | N3316V002 (U1333-3) | N3316B002 (U1333-7) |
| Hex Nickel plated | N33121005 (U1229) | N33122005 (U1229-6) | N3312V005 (U1229-3) | N3312B005 (U1229-7) |
| Hex Black | N33121002 (U1231) | N33122002 (U1231-6) | N3312V002 (U1231-3) | N3312B002 (U1231-7) |



**FOR BUSHING Ø12 X 0.75 SI (.472X.075 IS)
12000, 3500, 3600 AND 600 SERIES**



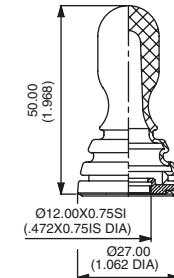
| FULL-TOGGLE BLACK NEOPRENE BOOT |
|---------------------------------|
| N36346009 (U2252) |



**FOR BUSHING Ø12 X 0.75 SI (.472X.075 IS)
600 SERIES WITH -5 LONG LEVER**



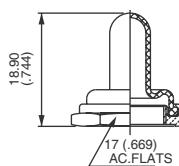
| FULL-TOGGLE BLACK NEOPRENE BOOT |
|---------------------------------|
| N36346209 (U2197) |



**FOR BUSHING Ø12 X 0.75 SI (.472X.075 IS)
4450, 4650 AND 1600 SERIES**



| HEX NUT | FULL-TOGGLE BLACK NEOPRENE BOOTS |
|---------------|----------------------------------|
| Nickel plated | N36116045 (U09) |
| Black | N36116042 (U223) |



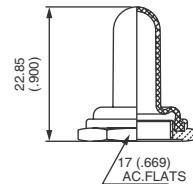
Sealing boots

For toggle or pushbutton switches

FOR BUSHING Ø 12 X 0.75 SI (.472X.075 IS) 600H, 660, 1000, 1500 AND 3600



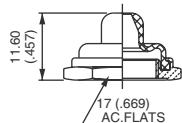
| HEX NUT | FULL-TOGGLE SILICONE BOOTS | | | |
|----------------------------------|----------------------------|------------------------|------------------------|------------------------|
| | Black | Red | Green | White |
| Nickel plated | N36111005 (U1565) | N36112005 (U1565-6) | N3611V005 (U1565-3) | N3611B005 (U1565-7) |
| Black | N36111002 (U1567) | N36112002 (U1567-6) | N3611V002 (U1567-3) | - |
| FULL-TOGGLE BLACK NEOPRENE BOOTS | | | | |
| Nickel plated | N36116005 (U851) | | | |
| Black | N36116002 (U853) | | | |



FOR BUSHING Ø 12 X 0.75 SI (.472X.075 IS) 600H, 660, 1000 AND 3600 SERIES



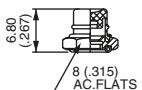
| HEX NUT | HALF-TOGGLE SILICONE BOOTS | | | |
|----------------------------------|----------------------------|------------------------|------------------------|------------------------|
| | Black | Red | Green | White |
| Nickel plated | N36111015 (U1151) | N36112015 (U1151-6) | N3611V015 (U1151-3) | N3611B015 (U1151-7) |
| Black | N36111012 (U1153) | N36112012 (U1153-6) | N3611V012 (U1153-3) | - |
| HALF-TOGGLE BLACK NEOPRENE BOOTS | | | | |
| Nickel plated | N36116015 (U598) | | | |
| Black | N36116012 (U600) | | | |



FOR BUSHING Ø 4 X 0.70 (.157 X 0.70) 9500 SERIES



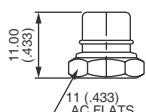
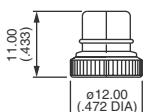
| HEX NUT | PUSHBUTTON SILICONE BOOTS | | | |
|---------------|---------------------------|------------------------|------------------------|------------------------|
| | Black | Red | Green | White |
| Nickel plated | N31221005 (U1829) | N31222005 (U1829-6) | N3122V005 (U1829-3) | N3122B005 (U1829-7) |
| Black | N31221002 (U1831) | N31222002 (U1831-6) | N3122V002 (U1831-3) | N3122B002 (U1831-7) |



FOR BUSHING Ø 6,35-40NS (1/4-40UNS) 18000, 9000 AND 13000 SERIES



| NUT | PUSHBUTTON SILICONE BOOTS | | | |
|-----------------------|---------------------------|------------------------|------------------------|------------------------|
| | Black | Red | Green | White |
| Knurled Nickel plated | N33261005 (U1401) | N33262005 (U1401-6) | N3326V005 (U1401-3) | N3326B005 (U1401-7) |
| Knurled Black | N33261002 (U1403) | N33262002 (U1403-6) | N3326V002 (U1403-3) | N3326B002 (U1403-7) |
| Hex Nickel plated | N33221005 (U1318) | N33222005 (U1318-6) | N3322V005 (U1318-3) | N3322B005 (U1318-7) |
| Hex Black | N33221002 (U1320) | N33222002 (U1320-6) | N3322V002 (U1320-3) | N3322B002 (U1320-7) |



Sealing boots

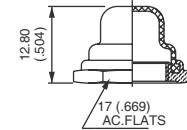
For toggle or pushbutton switches

FOR BUSHING Ø 12 X 0.75 SI (.472X.075 IS)

1200, 4700 AND 4800 SERIES



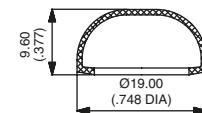
| HEX NUT | PUSHBUTTON SILICONE BOOTS | | | |
|---------------------------------|---------------------------|------------------------|------------------------|------------------------|
| | Black | Red | Green | White |
| Nickel plated | N36211005 (U1654) | N36212005 (U1654-6) | N3621V005 (U1654-3) | N3621B005 (U1654-7) |
| Black | N36211002 (U1656) | N36212002 (U1656-6) | N3621V002 (U1656-3) | - |
| PUSHBUTTON BLACK NEOPRENE BOOTS | | | | |
| Nickel plated | N36216005 (U31) | | | |
| Black | N36216002 (U225) | | | |
| Chrome plated | N36216001 (U224) | | | |



FOR DOUBLE SEALING ON IC, IH, IL, IM, IP AND IB-IS SERIES



| SILICONE BOOT | |
|---------------|---------|
| Transparent | U5125 |
| Blue | U5125-1 |
| Black | U5125-2 |
| Red | U5125-6 |

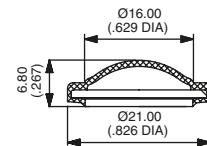


Operating temperature : -40°C to +85°C
The flat seal or O-Ring supplied with the switch should not be used with this boot.

FOR DOUBLE SEALING ON IA SERIES



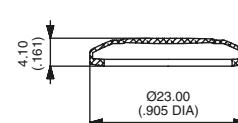
| SILICONE BOOT | |
|---------------|-------|
| Black | U6602 |
| Green | U6603 |
| Yellow | U6605 |
| Red | U6606 |



FOR AV SERIES (MODELS WITH Ø 19 MM BUSHING)



| SILICONE BOOT | |
|---------------|---------|
| Black | U2187-2 |
| Green | U2187-3 |
| Grey | U2187-4 |
| Yellow | U2187-5 |
| Red | U2187-6 |
| White | U2187-7 |
| Transparent | U2187-8 |



Switch guards

For switch series 12000 - 3500 - 600H - 6000



DISTINCTIVE FEATURES

- Prevent accidental lever operation
- Many options available
- Designed for Ø 11,9 or Ø 12 mm bushing
- Models for 2 or 3 positions switches
- Ø 1,5 mm holes for wiring a seal optional



ENVIRONMENTAL SPECIFICATIONS

- Salt spray test : 96 hours (IEC 68-2-11)
- Operating temperature : -40°C to +85°C



MATERIALS

- Support plate : black stainless steel
- Cap : thermoset or thermoplastic (20PN, 200PN, 300PN)

Switch guards

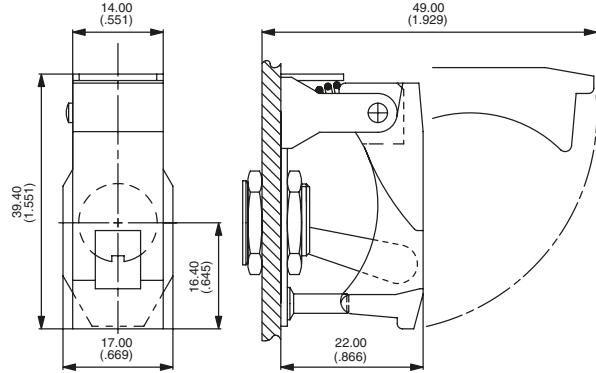
For switch series 12000 - 3500 - 600H - 6000

SERIES 20 - WITH STANDARD BUSHING FOR 2-POSITION SWITCHES

Lever returned then locked in down position (OFF)



| Model No | Color |
|----------|----------------------|
| 22 | Grey |
| 23 | White |
| 24 | Orange |
| 25 | Black |
| 26 | Red |
| 27 | Green |
| 28 | Yellow |
| 29 | Blue |
| 25/28 | Black/yellow striped |



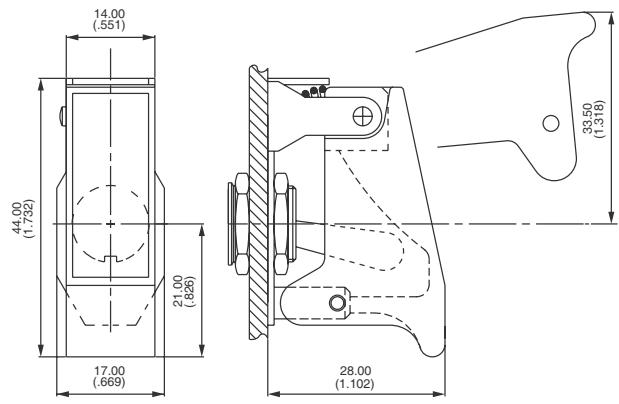
SERIES 20PN - WITH STANDARD BUSHING FOR 2-POSITION SWITCHES

Lever returned then locked in down position (OFF)



| Model No | Color |
|----------|--------|
| 22PN | Grey |
| 23PN | White |
| 24PN | Orange |
| 25PN | Black |
| 26PN | Red |
| 27PN | Green |
| 28PN | Yellow |
| 29PN | Blue |

On this model, holes for wiring a seal are standard.



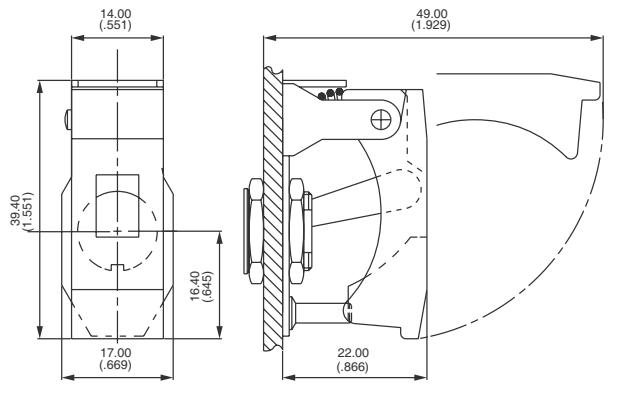
SERIES 40 - WITH STANDARD BUSHING FOR 2-POSITION SWITCHES

Lever returned then locked in upper position



Model 140 (with smaller aperture)
recommended for the 12000 series.

| Model No | Color |
|----------|----------------------|
| 42 | Grey |
| 43 | White |
| 44 | Orange |
| 45 | Black |
| 46 | Red |
| 47 | Green |
| 48 | Yellow |
| 49 | Blue |
| 45/48 | Black/yellow striped |

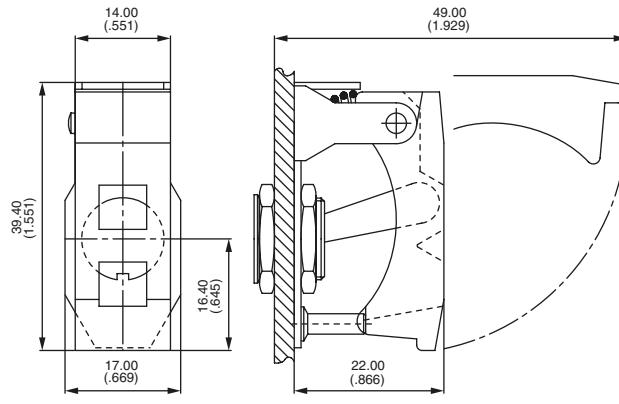


SERIES 200 - WITH STANDARD BUSHING FOR 2-POSITION SWITCHES

Lever returned then locked either in lower or in upper position



| Model No | Color |
|----------|--------|
| 202 | Grey |
| 203 | White |
| 204 | Orange |
| 205 | Black |
| 206 | Red |
| 207 | Green |
| 208 | Yellow |
| 209 | Blue |



Switch guards

For switch series 3500 - 600H - 6000 - 13000



DISTINCTIVE FEATURES

- Prevent accidental lever operation
- Holes for wiring a seal
- Many options available
- Models for 2 or 3 positions switches



ENVIRONMENTAL SPECIFICATIONS

- Salt spray test : 96 hours (IEC 68-2-11)
- Operating temperature : -40°C to +85°C



MATERIALS

- Support plate : stainless steel
- Guard : stainless steel

Switch guards

For switch series 3500 - 600H - 6000 - 13000



BUILD YOUR PART NUMBER

90

SERIES

BUSHING SHAPES

SWITCH GUARD SHAPES

For standard products

- A** Flattened, left side
- B** Flattened, right side
- C** Keyway, left
- D** Keyway, right

For other products

- E** Flattened, up
- F** Flattened, down
- G** Keyway, up
- H** Keyway, down

- | | |
|----------|--------------------------|
| 1 | Locks in center position |
| 2 | Prevents down position |
| 3 | Prevents up position |
| 4 | Locks in down position |
| 5 | Locks in up position |

OPTIONS

SWITCH GUARDS COLORS

- | | |
|------------|---------------------|
| 1 | Blue |
| 2 | Black |
| 3 | Green |
| 4 | Grey |
| 5 | Yellow |
| 6 | Red |
| 7/1 | White |
| 9 | Orange |
| 0 | Striped (see right) |

COLOR OF STRIPES

- | | |
|----------|---------------|
| A | Red/ Black |
| B | Yellow/ Black |
| C | Red/ White |
| D | White/ Black |

See website for drawing.

SERIES 90 - WITH STANDARD OR FLATTED BUSHING

Lever locked in center position

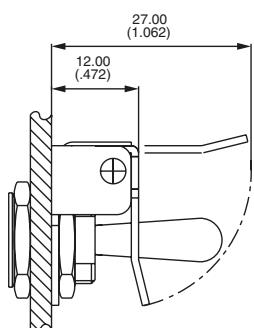
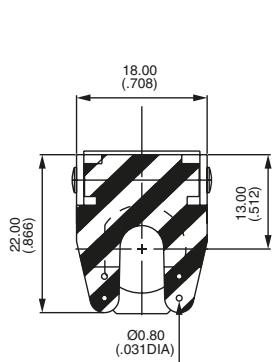


Plate features holes for wiring a seal.

MSG series

Rugged switch guards for switch series 12000 - 3500 - 600H - 6000



DISTINCTIVE FEATURES

Robust

For harsh environments

Modern, patented design



GENERAL SPECIFICATIONS

- APEM SAS patented design
- Operating temperature : -40°C to +85°C
- Storage temperature : -55°C to +85°C
- Salt spray : IEC 60068-2-11, test KA, 96 hours
- Mechanical life : 20.000 cycles



PANEL CUT-OUT

FOR BUSHING WITH KEYWAY



FOR FLATTED BUSHING



MATERIALS

- Support plate : black stainless steel
- Cap : thermoset



MOUNTING



Standard



With K sealing option



With X408 sealing option

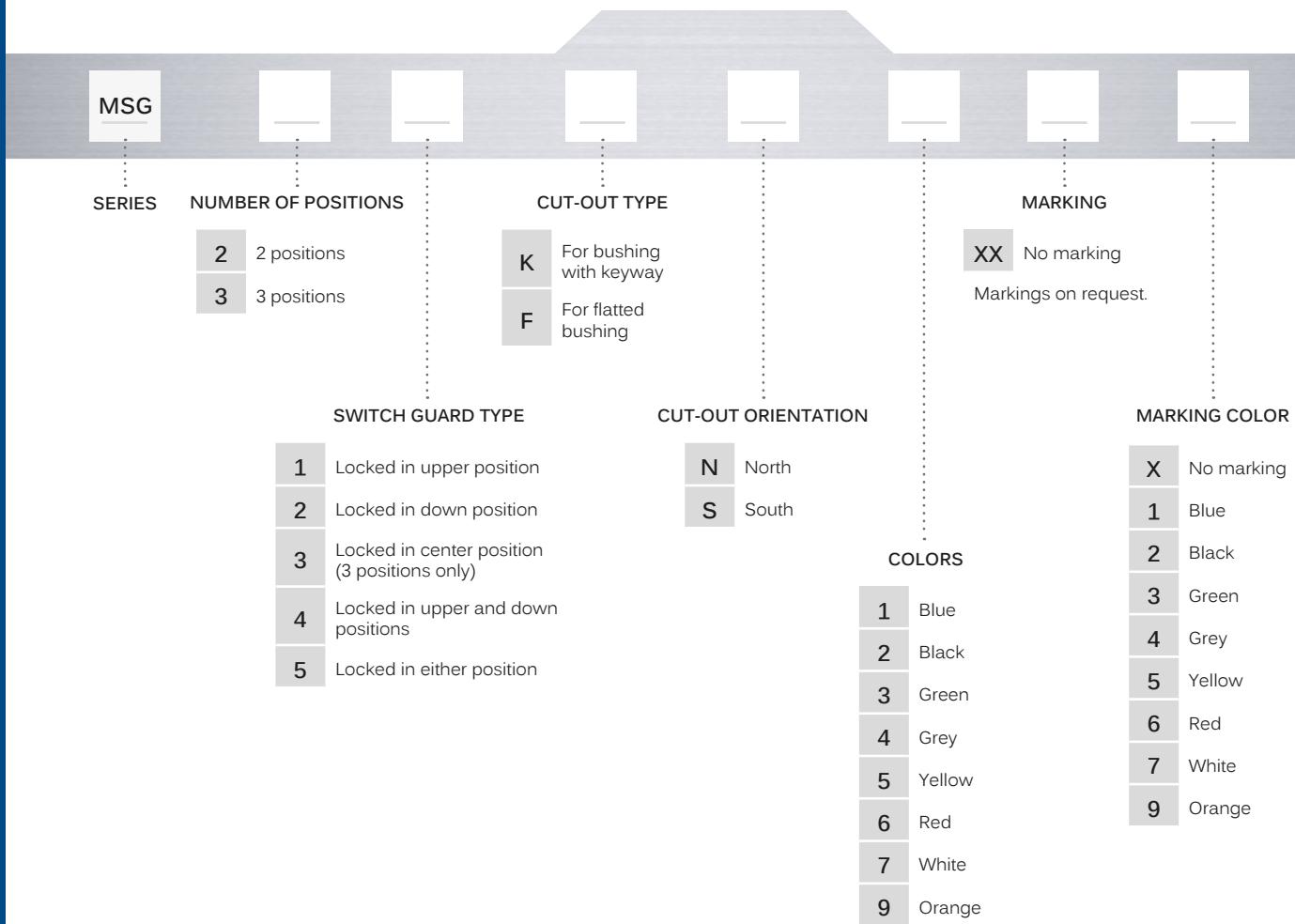
The company reserves the right to change specifications without notice.

MSG series

Rugged switch guards for switch series 12000 - 3500 - 600H - 6000



BUILD YOUR PART NUMBER

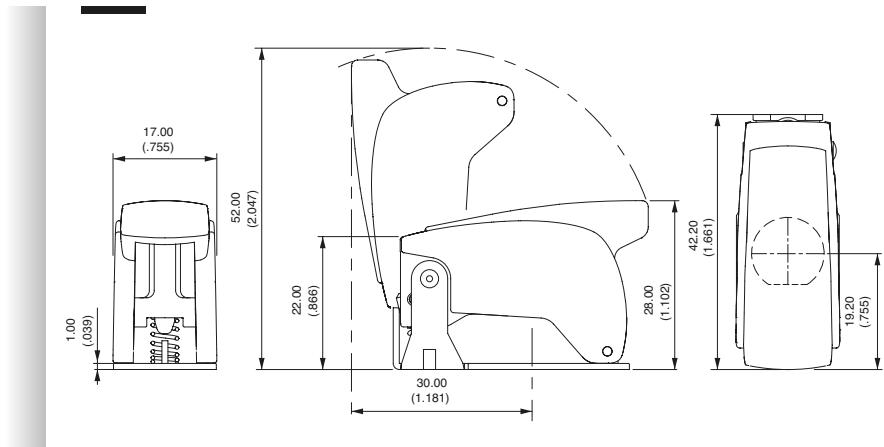


NOTICE : please note that not all combinations of above numbers are available.
Refer to www.apem.com for further information.

DIMENSIONS



Note : Ø 1,80 mm holes for wiring a seal are standard on all models.



CSG series

Switch guards for switch series 5000M - 600H



DISTINCTIVE FEATURES

- Modern, patented design
- Lightweight
- Anti-tamper wire seal hole as standard



GENERAL SPECIFICATIONS

- APEM SAS patented design
- Operating temperature : -20°C to +55°C
- Storage temperature : -40°C to +85°C



MATERIALS

- Support plate : thermoplastic
- Cap : thermoplastic



MOUNTING



Standard

With K sealing option

The company reserves the right to change specifications without notice.



PANEL CUT-OUT

FOR BUSHING WITH KEYWAY

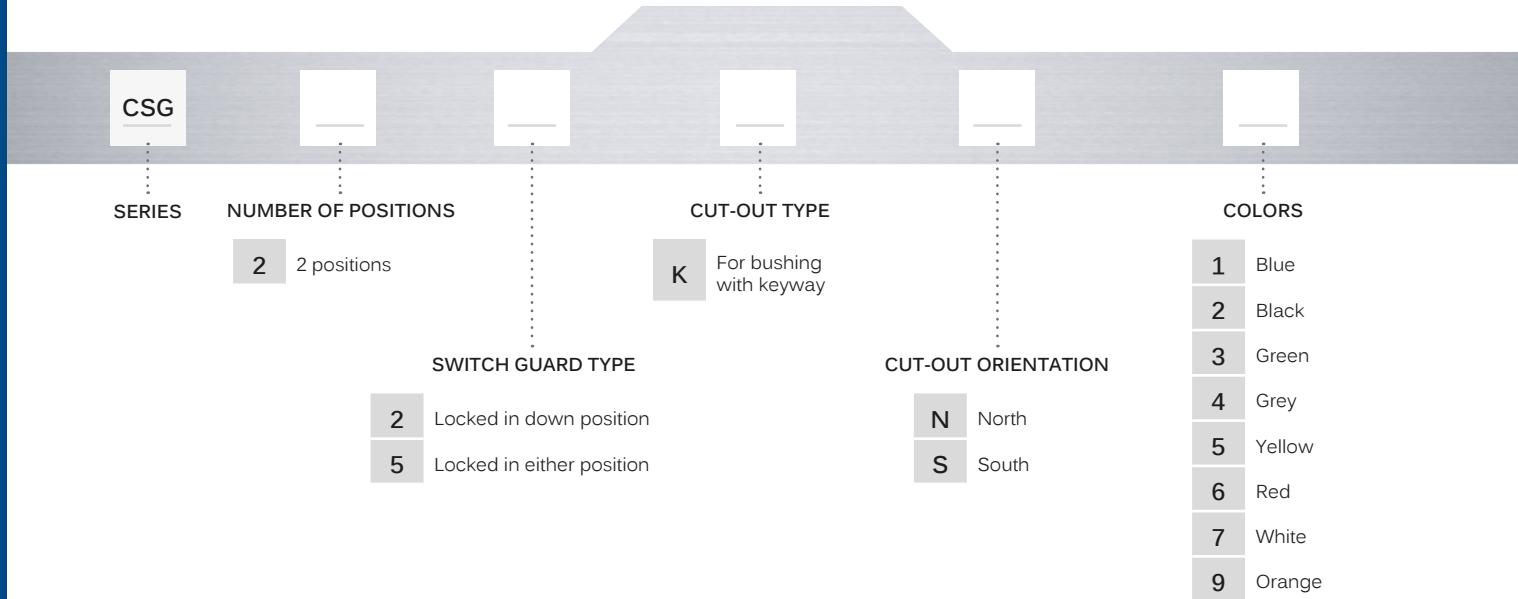


CSG series

Switch guards for switch series 5000M - 600H



BUILD YOUR PART NUMBER

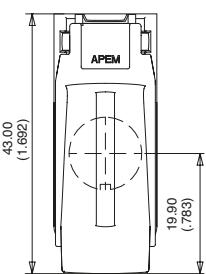
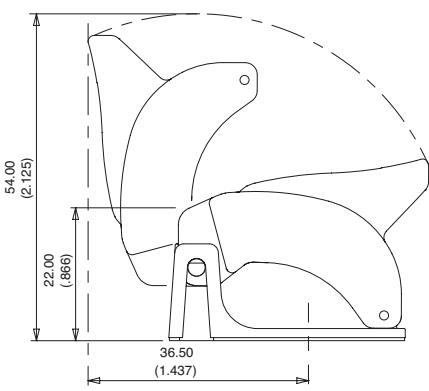
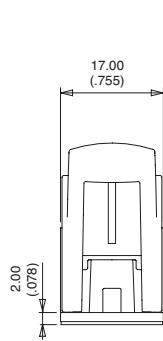


NOTICE : please note that not all combinations of above numbers are available.
Refer to www.apem.com for further information.

DIMENSIONS



Note : Ø 1,60 mm holes for wiring a seal
are standard on all models.



Hardware

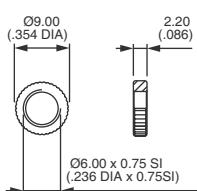
For miniature and industrial switches

Standard hardware is automatically supplied with the switches
Non-standard hardware is presented below



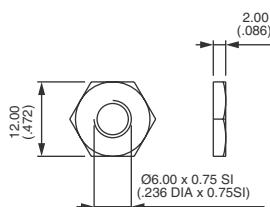
NON-STANDARD HARDWARE FOR SWITCHES Ø 6 (.236) - 5000 SERIES

KNURLED NUT



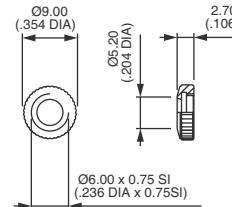
Chrome plated U826

SPECIAL NUT 12 (.472) ACROSS FLATS

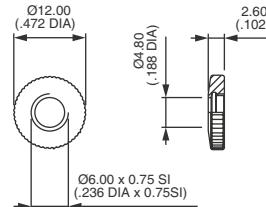


Chrome plated U1916

KNURLED CAP NUTS



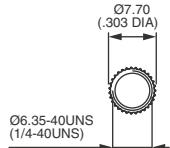
Chrome plated U461
Black U502



Chrome plated U232

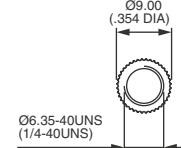
NON-STANDARD HARDWARE FOR SWITCHES Ø 6,35 (1/4) - ALL SERIES

KNURLED NUT



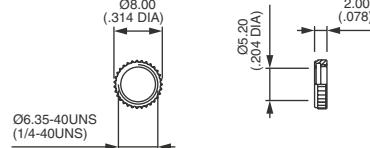
Nickel plated U369

KNURLED NUT



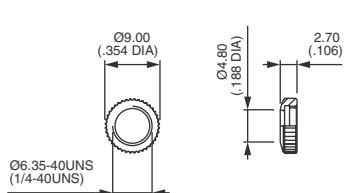
Nickel plated U229
Black U230

KNURLED NUT



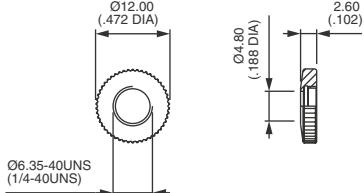
Chrome plated U501

KNURLED CAP NUT



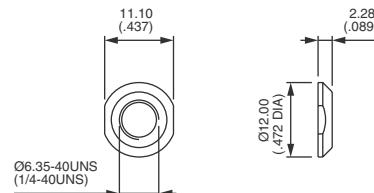
Chrome plated U216
Black U218

KNURLED CAP NUT



Chrome plated U268
Black U725

DRESS NUT



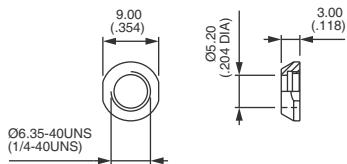
Nickel plated U443
Black U848

Hardware

For miniature and industrial switches

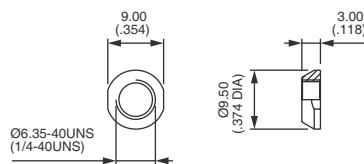
OTHER HARDWARE FOR SWITCHES Ø 6,35 (1/4) - ALL SERIES

CONIC CAP NUT



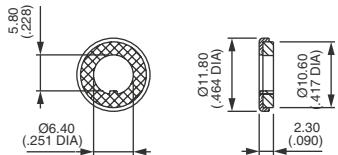
Nickel plated U500

CONIC NUT

Chrome plated U542
Nickel plated U561

SEALING WASHER

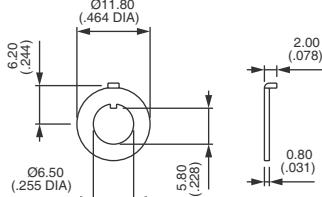
for keyway bushing



U360

SPECIAL LOCKING RING

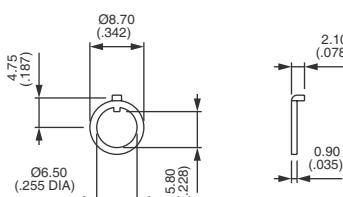
Spacing 6,2 mm (.244)



Nickel plated U368

SPECIAL LOCKING RING

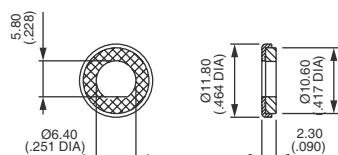
Spacing 4,75 mm (.187)



Nickel plated U409

SEALING WASHER

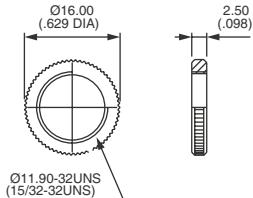
for flatted bushing



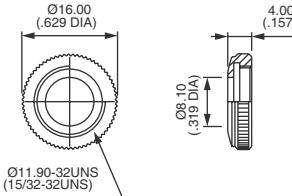
U5141

NON-STANDARD HARDWARE FOR SWITCHES Ø 11,9 (15/32) 12000, 13000X768 AND 5600M SERIES

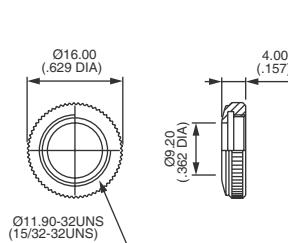
KNURLED NUT

Nickel plated U53
Black U1634

KNURLED CAP NUTS

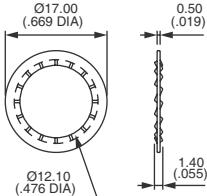


Chrome plated U124



Chrome plated U123

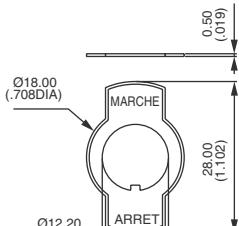
LOCKWASHER



Zinc plated steel U13

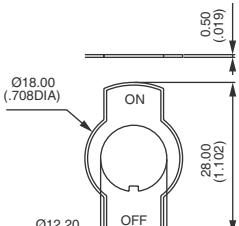
PLATES FOR SWITCHES Ø 12 (.472) AND 11,9 (15/32)

MARCHE - ARRÊT



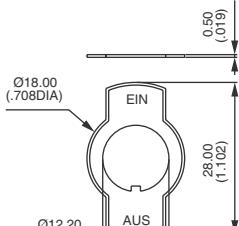
U17

ON - OFF



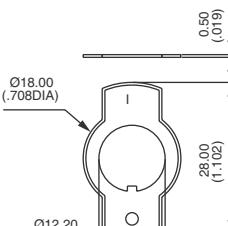
U19

EIN - AUS



U99

I - 0

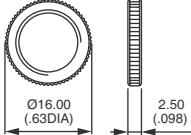
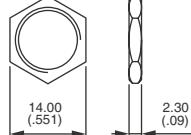
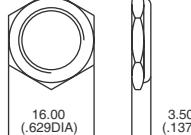
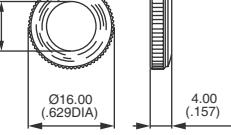


U1050

Hardware

For miniature and industrial switches

NUTS FOR BUSHING Ø 11,9 (15/32) AND Ø 12 (.472)

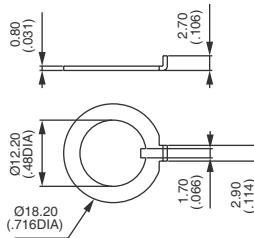
| NUTS | |  |  |  |  |
|--|--------|---|---|--|---|
| BUSHING Ø 11,9 (15/32) THREAD 0,794-32UNS SERIES 3500 - 6000 | | | | | |
| Chrome plated brass | | | U92 | | U123 |
| Nickel plated brass | U53 | | U162 | | |
| Black brass | U1634 | | U41 | | U2226 |
| BUSHING Ø 12 (.472) THREAD 0,75 SERIES IB/IS - IC - IH - IL - IM - IP - 660 - 600H - 600NH - 1000 - 1200 - 1500 - 1600 - 1700 - 3600 - 4000 | | | | | |
| Chrome plated brass | U412 | U212 | | U35 | U117 a = 8,5 (.334) U118 a = 10,3 (.405) |
| Nickel plated brass | U411 | U166 | | | U117-5 a = 8,5 (.334) |
| Black brass | U413 | U183 | | | U129 a = 8,5 (.334) U130 a = 10,3 (.405) |
| Gold plated brass | U410-4 | | | | U1862 a = 8,5 (.334) |

Hardware

For miniature and industrial switches

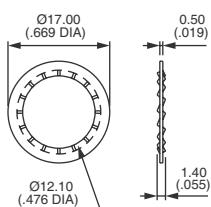
HARDWARE FOR SWITCHES Ø 12 (.472) AND 11.9 (15/32)

LOCKING RING



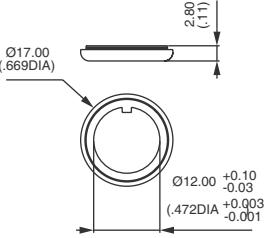
Nickel plated U121
Black U12

LOCKWASHER



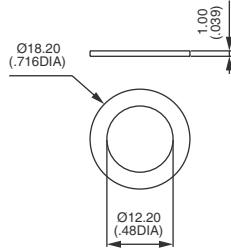
Zinc plated steel U13

SEALING WASHER



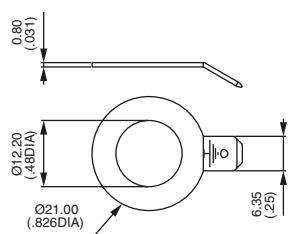
Stainless steel and neoprene U60

SEALING WASHER FOR BOOTS



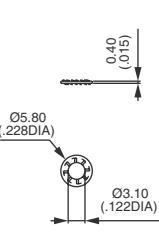
Nylon U21

GROUND CONNECTOR



Nickel plated U187

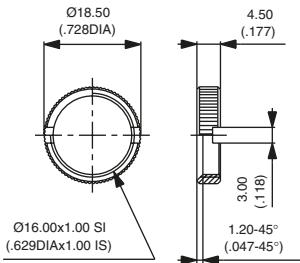
LOCKWASHER



Zinc plated steel U14

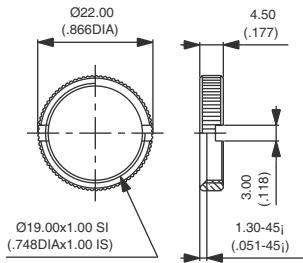
HARDWARE FOR AV SERIES (ANTI-VANDAL AND SECURITY PUSHBUTTON SWITCHES)

KNURLED NUT FOR MODELS Ø 16 (.629)

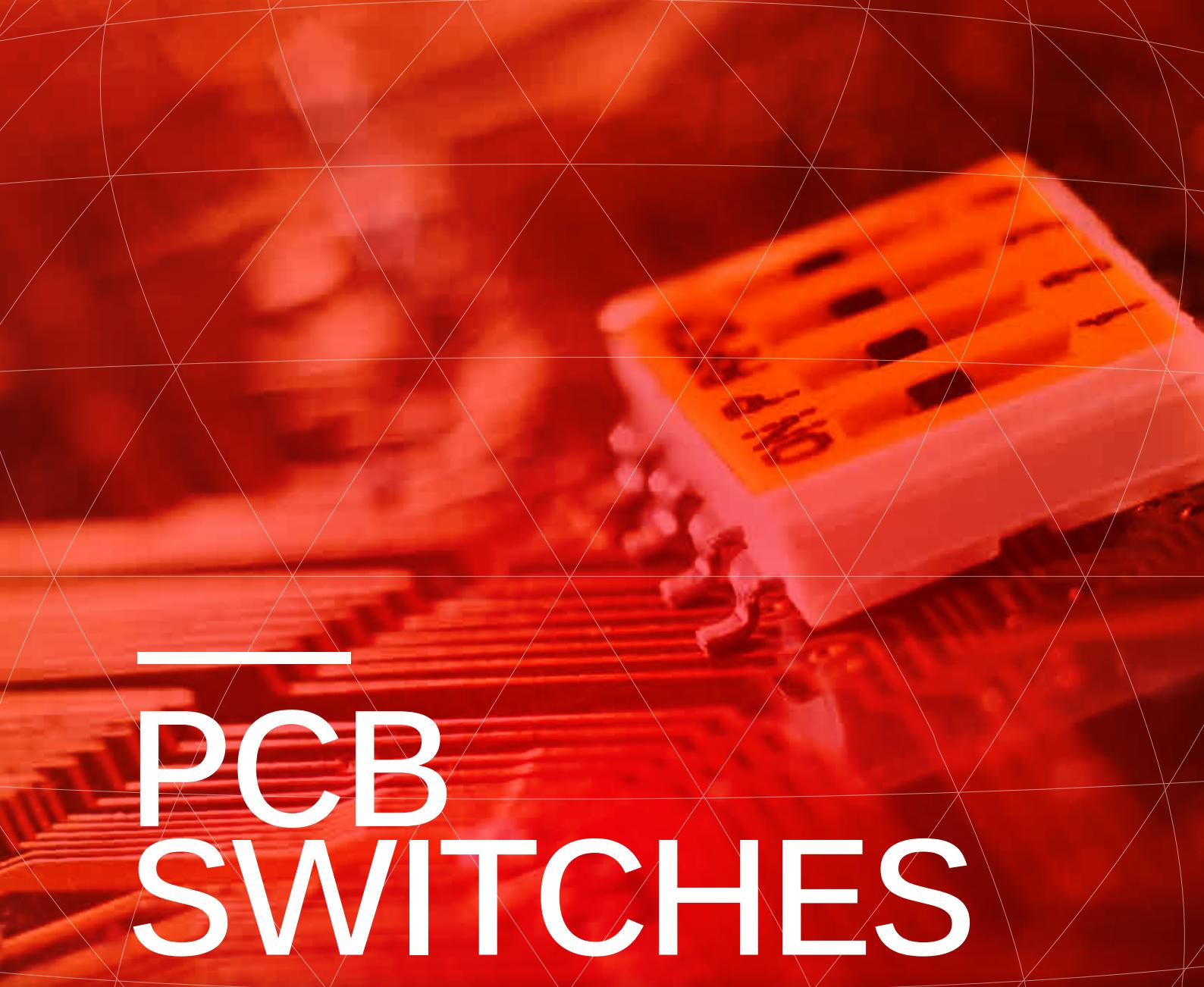


10-960-5

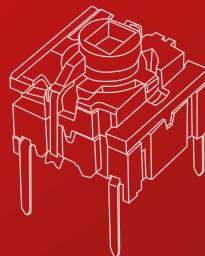
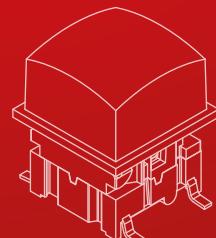
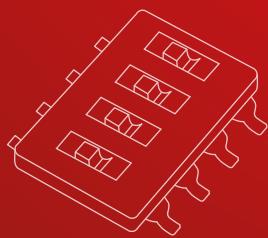
KNURLED NUT FOR MODELS Ø 19 (.748)

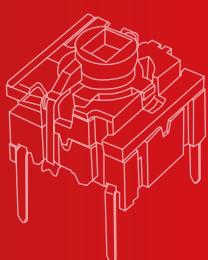
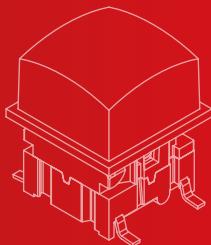
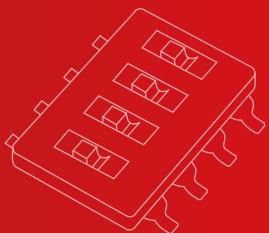


U1977-5



PCB SWITCHES





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SUBMINIATURE AND SLIDE SWITCHES

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SUBMINIATURE AND SLIDE SWITCHES

TG SERIES TOTALLY SEALED

APEM
EXCLUSIVE

WASHABLE.
A totally sealed boot protects the switch during the PCB cleaning process.

APEM
BEST SELLERDESIGNED FOR
SURFACE MOUNTRESISTANT TO
VIBRATIONS

OUR RANGE

For more information,
see APEM website

| SERIES | SMT TL | TL | SMT TP | TP | SMT TR | TR | NK | TG | G | 25000N |
|--------------------------|--------------------|-------------------|--------------------|-------------------|--------------------|-------------------|----------------|-------------------|----------|-----------------------------|
| Pages | 279 | 281 | 285 | 287 | 291 | 293 | 295 | 297 | 299 | 301 |
| Approvals | | | | | | | | | | UL |
| Poles | 1 | 1,2 | 1 | 1,2 | 1 | 1,2 | 1 | 1 | 1,2 | 1,2 |
| Maximum ratings | 0,4VA 20V AC/DC | 0,5A 48V AC/DC | 0,4VA 20V AC/DC | 0,5A 48V AC/DC | 0,4VA 20V AC/DC | 0,5A 48V AC/DC | 500mA 12VDC | 0,5A 48V AC/DC | 3A 30VDC | (2A 250VAC)* 1A 30VDC |
| Mounting options | | | | | | | | | | |
| Horizontal SMT | X | | X | | X | | | | | |
| Vertical right angle SMT | X | | X | | | | X | X | X | X |
| Vertical Through hole | | X | | X | | X | X | X | X | X |
| Horizontal Through hole | | X | | X | | X | | | | X |
| Vert. right angle TH | | X | | X | | X | | | | X |
| Panel | | | | | | | | | | X |
| Terminal options | | | | | | | | | | |
| PCB | X | X | X | X | X | X | X | X | X | X |
| Solder lugs | | | | | | | | | | X |
| Wire wrap | | | X | | | | | | | X |
| Sealing | Process | Process | Process | Process | Process | Process | No | Process | No | No |

* See applicable approvals

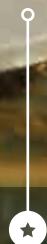
DIP AND CODED ROTARY SWITCHES

APEM
DESIGN

IKN SERIES
MINIMAL SPACE
REQUIRED

APEM
EXCLUSIVE

LOW PROFILE: OVERALL
HEIGHT FROM PCB
LESS THAN 3 MM



FRENCH
PRODUCTION
& QUALITY



WASHABLE BY
CONSTRUCTION



UP TO
8 POLES

OUR RANGE

For more information,
see APEM website



| SERIES | P36 | PT65 | NDS | NDA | NDP | IKN | IKH | IKD |
|----------------------------|--|--------------|-----------------------|-----------------------|-----------------------|---------------------------------------|-----------------------|------------|
| Pages | 305 | 307 | 309 | 311 | 313 | 315 | 317 | 319 |
| Type | Coded rotary | Coded rotary | DIP | DIP | DIP | DIP | Half pitch DIP | DIP |
| Number of positions | 10 & 16 | 10 & 16 | 1-12 (except 11) | 2-12 (except 11) | 2-12 (except 11) | 2-8 (even only) | 2-10 (even only) | 1-12 |
| Maximum ratings | 400mA 24VDC | 400mA 24VDC | 25mA 24VDC | 25mA 24VDC | 25mA 24VDC | 100mA 48VDC | 100mA 50VDC | 25mA 50VDC |
| Process sealed | Yes | Yes | With optional tape | With optional tape | With optional tape | With optional tape | With optional tape | Yes |
| Profile off PCB | Through-hole: 3.65 mm SMT: 3.85 mm | 6.5 mm | 5.85 mm | 9.9 mm | 10.2 mm | Through-hole: 4 mm SMT: 2.85 mm | 1.6 mm | 3 mm |
| Mounting options | | | | | | | | |
| SMT | X | | | | | X | X | X |
| Through hole | X | X | X | X | X | X | | X |
| Right angle - Through hole | | X | | | | | | |

TACTILE SWITCHES



MULTIMEC™ 5 HIGH PERFORMANCE

MEC
EXCLUSIVE

10 MILLION
TROUBLE-FREE
ACTUATIONS



REFLOW SOLDERABLE



LARGE CHOICE OF CAPS
AND ACCESSORIES



AVAILABLE IN NC/NO

MEC
INNOVATION



OUR RANGE

For more information,
see APEM website



| SERIES | ULTRAMEC™ 6C | MULTIMEC™ 5 | ILLUMEC™ 4F | MULTIMEC™ 3 | UNIMEC™ |
|----------------------|--------------|---|-------------------------------------|--|----------------------------|
| Pages | 323 | 365 | 369 | 375 | 385 |
| Dimensions | 8 x 8 mm | 10 x 10 mm | 10 x 10 mm | 10 x 10 mm | 12.6 x 12.6 mm |
| Height | 2.5 mm | 6.4 / 8.5 mm | 10.4 mm | 6.4 / 10.4 mm | 15.7 mm |
| Electrical function | Momentary NO | Momentary NO or NC/NO | Momentary NO | Momentary NO | Momentary or latching |
| Illumination | | X | X | X | |
| Sealing | IP67 | IP67 | IP67 | IP67 | IP54 |
| Lifecycles | 3,000,000 | up to 10,000,000 | up to 10,000,000 | up to 10,000,000 | up to 10,000,000 |
| Other specifications | Low profile | Large range of accessories; 3 standard actuation forces | Simple slip-on cap retention system | 3F has slip-on cap retention, excellent for custom caps; 3C excellent for over-mould and under overlay | 2 pole 8 contact functions |



| SERIES | 10G | 1A/1H/ 1M/1ZA | 1B/1C/ 2C/2D | 1DS/1ES/ 1FS | 1GAS/ 1GCS | 1JS | 1KS/1KBS/ 1KCS | 1NS |
|----------------------|---|---|---|-----------------------------------|---|--------------------------------------|---|---|
| Pages | 321 | 327 | 329 | 331 | 333 | 335 | 337 | 339 |
| Illumination | | X | X | X | X | X | X | X |
| Marking | | | X | X | | | | |
| Shape | | | | | | | | |
| Round | Ø11 mm | | | Ø9.6 mm | Ø11/15 mm | Ø9.6 mm | | |
| Rectangular | | 10.1 x 12.5/18.65/25 mm | | | | | | |
| Square | | | 15.1 x 15.1 mm | | | | 14.3 x 14.3 mm | |
| Other | | | | | | | | Ø9.6 / 4.9 mm |
| Height | 4.9 mm | 12.2 mm | 12.2 mm | 14.9 mm | 12.5 mm | 10.4 mm | 19.1-20.2 mm | 14.9 mm |
| Front Panel Sealing | | | | | | | | |
| Other specifications | Concave cap Floating mounting Anti-rotation for printed caps | Rocker-action caps; Long travel - 2 mm | Rocker-action solution; Long travel - 2 mm | Soft edges 20 color options | Flat surface; designed for under overlay use | Designed for under overlay use | Flat, convex or concave top surface Bezel option | Tear-drop shaped; for navigating or indicating |



| SERIES | 1PS/1QS/ 1RS | 1SS/1IS/ 1LS | 1TS/1US/ 1VS | 1WAS/1WDS/ 1WPS | 1XS | FOILMEC™ 1YS | 1ZCS | NAVIMEC™ |
|----------------------|------------------------|--|---|-------------------------------------|--------------|--|--|--|
| Pages | 341 | 343 | 345 | 347 | 349 | 351 | 353 | 355 |
| Illumination | X | X | X | X | X | X | X | X |
| Marking | | | | | | | X | X |
| Shape | | | | | | | | |
| Round | | Ø6.5 mm | Ø10.6 mm | | | | Ø14.3 mm | Ø34.25 mm |
| Rectangular | 6.5 x 12.5 mm | | | | 7.4 x 9.4 mm | | | |
| Square | | | 10.6 x 10.6 mm | | | 15.1 x 15.1 mm | | 5.2 / 7.8 / 11.6 mm |
| Other | | | 10.4 x 13.25 mm | 6.5 x 12.5 mm 8.0 x 15.2 mm | | | | |
| Height | 15.7 mm | 8.0 - 22.5 mm | 14.9 mm | 15/15.7 mm | 18.5 mm | 12.5 mm | 11.7 mm | 12.2 mm |
| Front Panel Sealing | | | X | | | | | |
| Other specifications | Concave top surface | Variable heights; rounded top surface | Rounded top surface; can be used in custom keyboards | convex or concave top surface | Soft edges | Round corners Flat surface; designed for under overlay use | Rounded top surface; many legend options | To navigate a display or control a unit; five piece solution |



| SERIES | CONTROLMEC™ | 10Q-10QM | 10R-10RF 10RM | AQUAMEC™ | VARIMEC™ | 16300- 16700 | 16310-15 | 16324-26 |
|----------------------|--|---|---|--|---|--|---|---|
| Pages | 357 | 359 | 361 | 363 | 373 | 379 | 381 | 383 |
| Illumination | X | X | X | X | | | X | X |
| Marking | X | X | X | | | | X | X |
| Shape | | | | | | | | |
| Round | Ø29.5 mm | | Ø30 mm | Ø10.6 mm | Ø5.2 / 7.8 / 11.6 mm | | | |
| Rectangular | | | | | | | | |
| Square | | 22 x 22 mm | | | 5.2 / 7.8 / 11.6 mm | 14.9 x 14.9 mm | 15.1 x 15.1 mm | 15.1 x 15.1 mm |
| Other | | | | | | | | |
| Height | 12 mm (sealed) 12.3 mm (non-sealed) | 11 mm | 11 mm | 24.2 - 27.2 mm | total height : 10.4 - 22.5 mm recess height : 2.4 - 6.4 mm | 14.6 or 16.9 mm | 16 mm | 20.5 mm |
| Front Panel Sealing | X | X | X | X | | | | |
| Other specifications | To navigate a display or control a unit; one cap solution | Flat top surface Optional metal plate with legend | Rounded or flat top surface Optional metal plate with legend | Robust front panel sealed solution | 2400 options in variable heights | Many functions incl quiet with unimec switches | 1-4 LED Many functions incl quiet with unimec switches | 1-2 LED Many functions incl quiet with unimec switches |

The most common configurations are presented in this catalog. Other commercially available configurations already existing in our different ranges of products, non-standard and custom products are available upon request.

SMT TL series

Surface mount subminiature
washable toggle switches



DISTINCTIVE FEATURES

- Tape and reel packaging
- Reflow solderable
- Available with positioning pins
- Protected against electrostatic discharges (ESD) up to 10 KV
- Washable



ENVIRONMENTAL SPECIFICATIONS

- Operating temperature : -40°C to +85°C
- Moisture resistance : 21days per IEC 512-6 test 11c
- Vibration resistance : 10-500 Hz / 10 g per IEC 512-4 test 6d
- Shock resistance : 50 g per IEC 512-4 test 6c



ELECTRICAL SPECIFICATIONS

- Max. current/voltage rating with resistive load : 0,4VA 20V max. AC or DC
- Minimum load : 10mA 50mV or 10µA 5VDC
- Initial contact resistance : 20 mΩ max
- Insulation resistance : 1.000 MΩ min. at 500VDC
- Dielectric strength : 1.000 Vrms. 50 Hz min. between terminals and frame / 500 Vrms. 50 Hz min. between terminals
- Electrical life at full load :
 - 2 position switches : 60.000 cycles
 - 3 position switches : 30.000 cycles
- Static resistance : 10 KV (Schaffner equipment)



MATERIALS

- Case : high temperature plastic material UL94-V0
- Actuator : brass, nickel plated, with high temperature UL94-V0 plastic cap
- Ground plate and positioning pins : steel, tin plated
- Contacts : brass, gold plated
- Terminals : brass, with pure tin plating over nickel barrier

The company reserves the right to change specifications without notice.

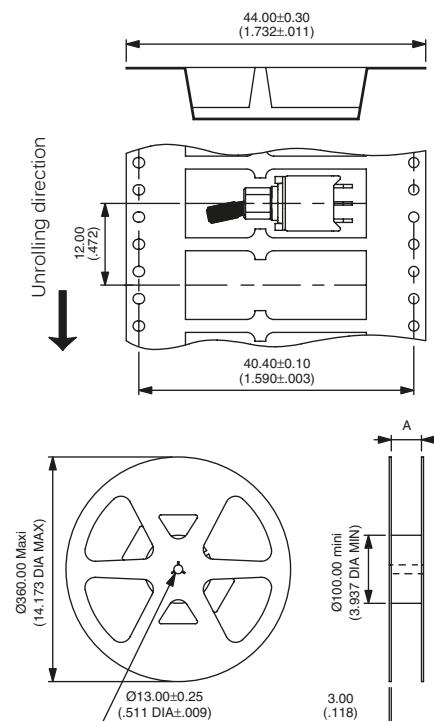


SOLDERING AND CLEANING

- Reflow soldering : infrared, vapor phase or infrared convection
- Washable per IEA-RS448-2 :
 - water + detergent - preferred
 - solvents
- Further information on reflow soldering : see end of catalog.



PACKAGING



| | | |
|--------------------|----------------------------------|-----------------------------------|
| Tape width | 24.00 (.944) | 44.00 (1.732) |
| Reel (dimension A) | 24.40+2.00/0.00 (.960+.078/.000) | 44.40+2.00/0.00 (1.748+.078/.000) |

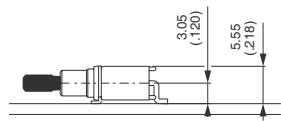
Standard packaging unit : 700 pieces
Tape meeting international standard IEC - Publication 286-3 (EIA481A)
Start leader : 400 mm min.

SMT TL series

Surface mount subminiature
washable toggle switches



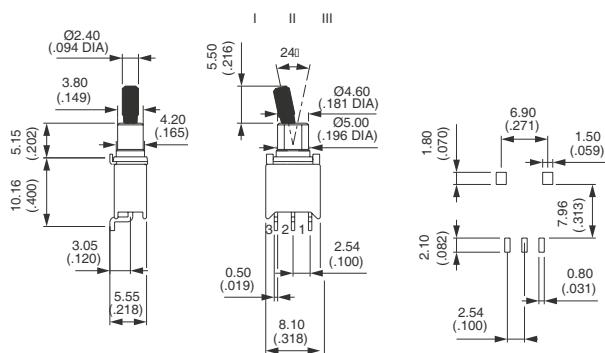
MOUNTING



WITHOUT POSITIONING PINS



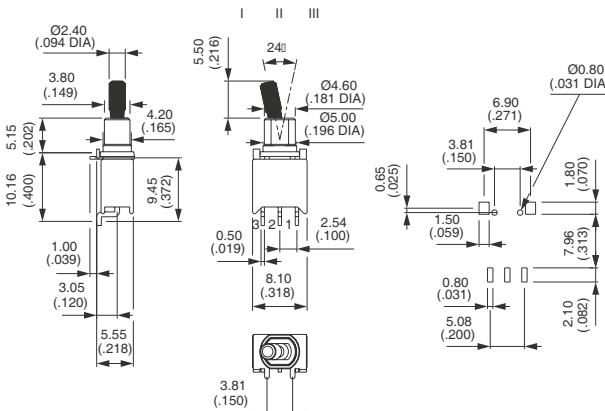
| | III | II | I |
|-------------|-----|-----|-----|
| TL36WS84000 | ON | - | ON |
| TL39WS84000 | ON | OFF | ON |
| TL37WS84000 | MOM | OFF | MOM |
| TL38WS84000 | ON | OFF | MOM |
| TL32WS84000 | ON | - | ON |



WITH POSITIONING PINS



| | III | II | I |
|-------------|-----|-----|-----|
| TL36WS84065 | ON | - | ON |
| TL39WS84065 | ON | OFF | ON |
| TL37WS84065 | MOM | OFF | MOM |
| TL38WS84065 | ON | OFF | MOM |
| TL32WS84065 | ON | - | MOM |



TL series

Subminiature washable toggle switches



DISTINCTIVE FEATURES

- Process sealed
- Single piece case
- Front and rear sealing
- Wide variety of contact materials
- Same PCB layout as TP, TR and TG subminiature switches



ENVIRONMENTAL SPECIFICATIONS

- Operating temperature : -30°C to +85°C
- Moisture : 21 days 95 % (NFC 20-603 - IEC 68-2-3)



ELECTRICAL SPECIFICATIONS

- Max. current/voltage rating with resistive load :
 - gold plated contacts : 0,4VA 20V max. AC or DC
 - silver plated contacts : 0,5A 48V max. AC or DC
- Minimum load : 10mA 50mV - 10µA 5VDC
- Contact resistance : 20 mΩ max.
- Insulation resistance : 1.000 MΩ min. at 500VDC
- Dielectric strength :
 - 1.000 Vrms 50 Hz min. between terminals and frame
 - 500 Vrms 50 Hz min. between terminals
- Electrical life at full load :

| Contacts | Number of cycles | |
|---------------|------------------|-------------|
| | 2 positions | 3 positions |
| Gold plated | 60.000 | 30.000 |
| Silver plated | 20.000 | 10.000 |



GENERAL SPECIFICATIONS

- Strength of terminals : pull-out force - 10 N max.
- Cleaning : solvents or water + detergent
- Wave soldering : 260°C - 5 sec.

The company reserves the right to change specifications without notice.



MATERIALS

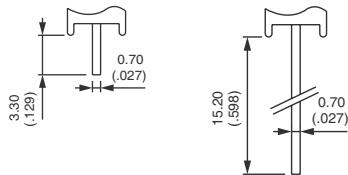
- Case : PBT
- Actuator : brass, nickel plated
- Contacts and terminals :
 - 0 : brass, gold plated
 - 1 : brass, silver plated
 - 3 : brass, gold plated (1,27 micron gold)
 - 8 : contact brass, gold plated + tin plated terminals
 - 9 : contact brass, gold plated (1,27 micron gold) + tin plated terminals
- Terminal seal : epoxy

TL series

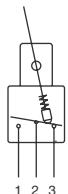
Subminiature washable toggle switches



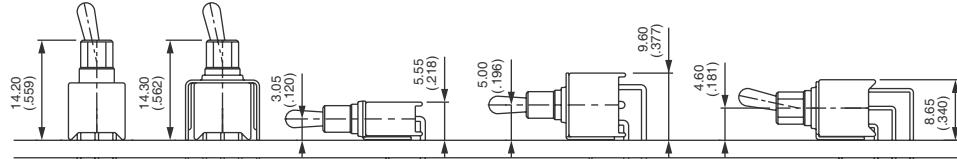
TERMINALS



ELECTRICAL FUNCTIONS



PCB MOUNTING

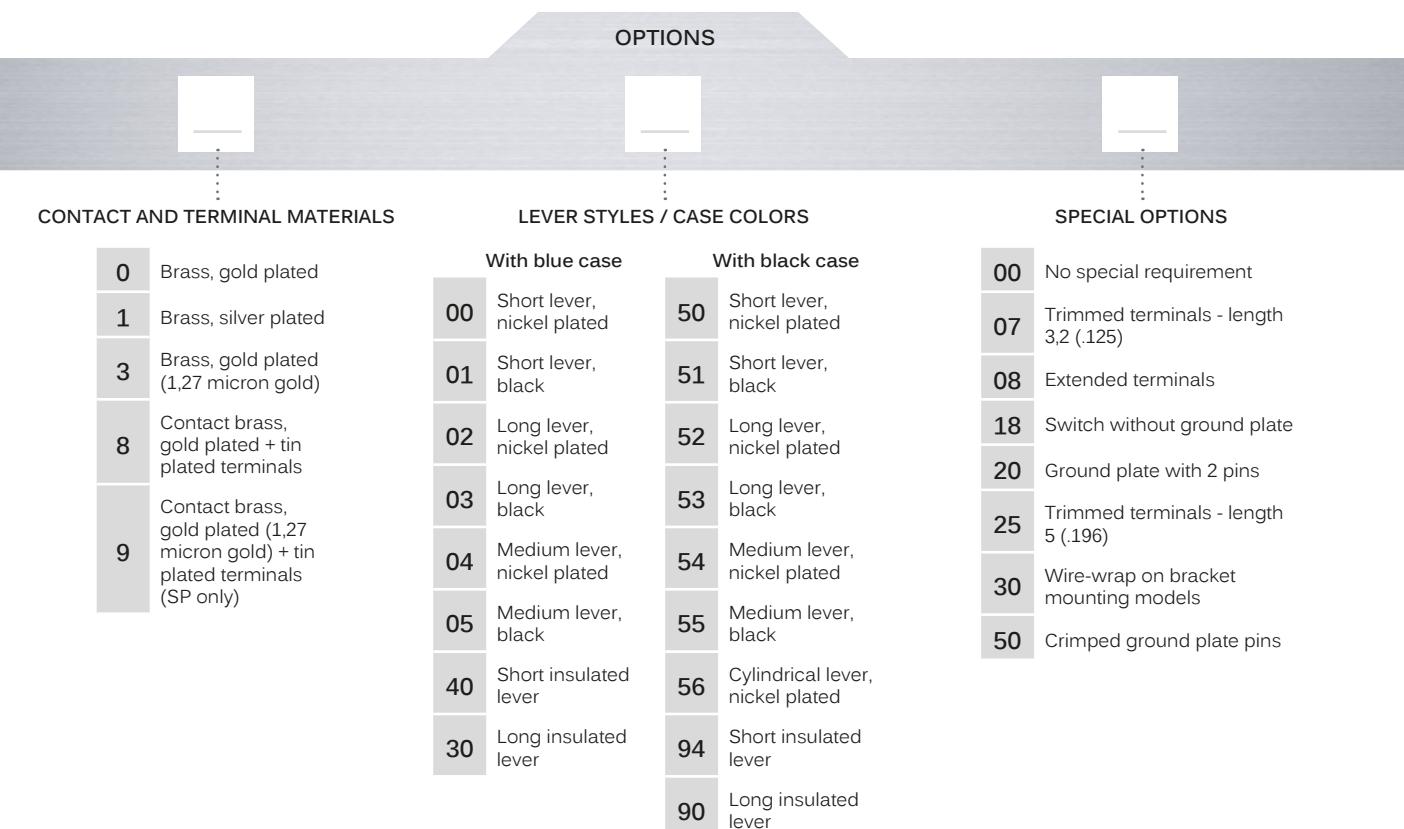
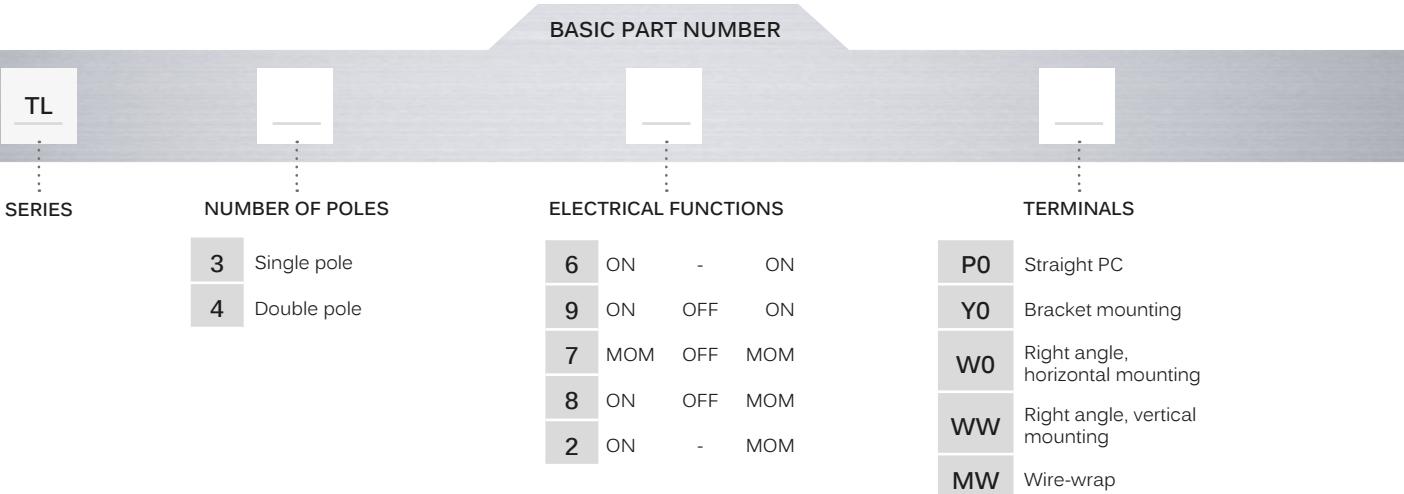


TL series

Subminiature washable toggle switches



BUILD YOUR PART NUMBER



NOTICE : please note that not all combinations of above numbers are available.
Refer to www.apem.com for further information.

TL series

Subminiature washable toggle switches

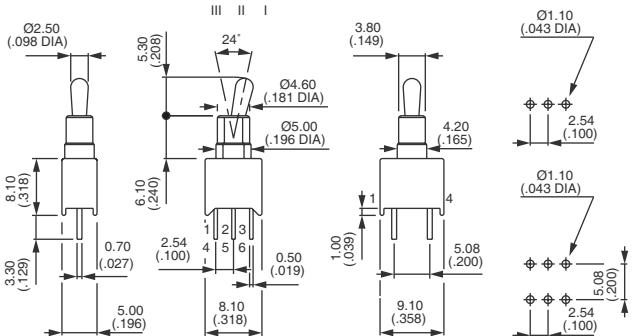
STRAIGHT PC TERMINALS : TL..P0



Single pole Double pole

| TL36P0 | TL46P0 | ON | - | ON |
|--------|--------|-----|-----|-----|
| TL39P0 | TL49P0 | ON | OFF | ON |
| TL37P0 | TL47P0 | MOM | OFF | MOM |
| TL38P0 | TL48P0 | ON | OFF | MOM |
| TL32P0 | TL42P0 | ON | - | MOM |

Shown with standard lever

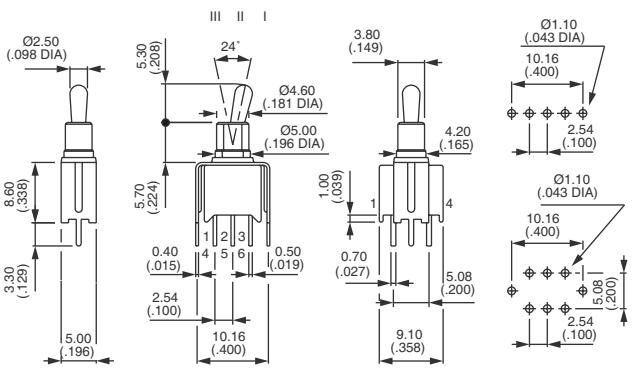


STRAIGHT PC TERMINALS BRACKET MOUNTING : TL..Y0



Single pole Double pole

| TL36Y0 | TL46Y0 | ON | - | ON |
|--------|--------|-----|-----|-----|
| TL39Y0 | TL49Y0 | ON | OFF | ON |
| TL37Y0 | TL47Y0 | MOM | OFF | MOM |
| TL38Y0 | TL48Y0 | ON | OFF | MOM |
| TL32Y0 | TL42Y0 | ON | - | MOM |

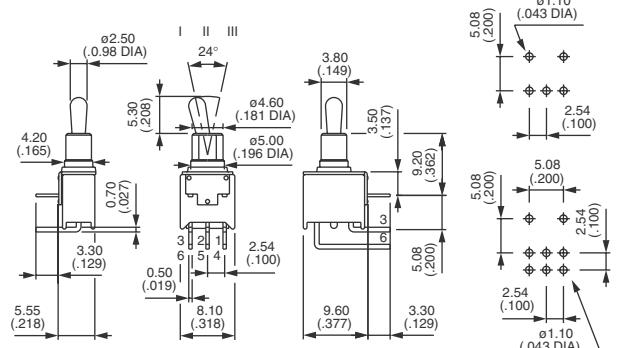


RIGHT ANGLE TERMINALS HORIZONTAL MOUNTING : TL..W0



Single pole Double pole

| TL36W0 | TL46W0 | ON | - | ON |
|--------|--------|-----|-----|-----|
| TL39W0 | TL49W0 | ON | OFF | ON |
| TL37W0 | TL47W0 | MOM | OFF | MOM |
| TL38W0 | TL48W0 | ON | OFF | MOM |
| TL32W0 | TL42W0 | ON | - | MOM |

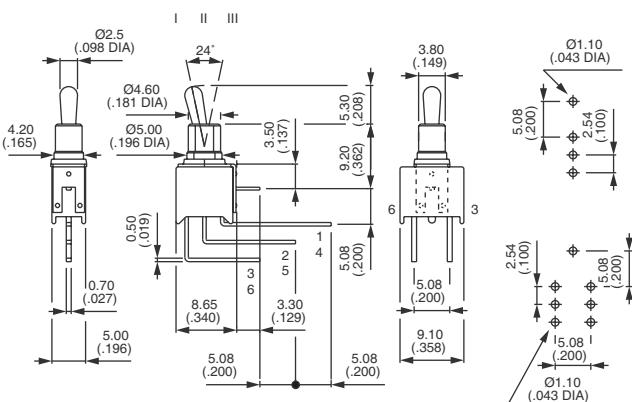


RIGHT ANGLE TERMINALS VERTICAL MOUNTING : TL..WW



Single pole Double pole

| TL36WW | TL46WW | ON | - | ON |
|---------|---------|-----|-----|-----|
| TL39WW | TL49WW | ON | OFF | ON |
| TL37WW | TL47WW | MOM | OFF | MOM |
| TL38WW* | TL48WW* | ON | OFF | MOM |
| TL32WW* | TL42WW* | ON | - | MOM |



*Functions 2 and 8 : reversed connection available. On request.

SMT TP series

Surface mount subminiature washable pushbutton switches



DISTINCTIVE FEATURES

- Tape and reel packaging
- Reflow solderable
- Available with positioning pins
- Protected against electrostatic discharges (ESD) up to 10 KV
- Washable



SOLDERING AND CLEANING

- Reflow soldering : infrared, vapor phase or infrared convection
- Washable per IEC-RS448-2 :
 - water + detergent - preferred
 - solvents
- Further information on reflow soldering : see end of catalog.

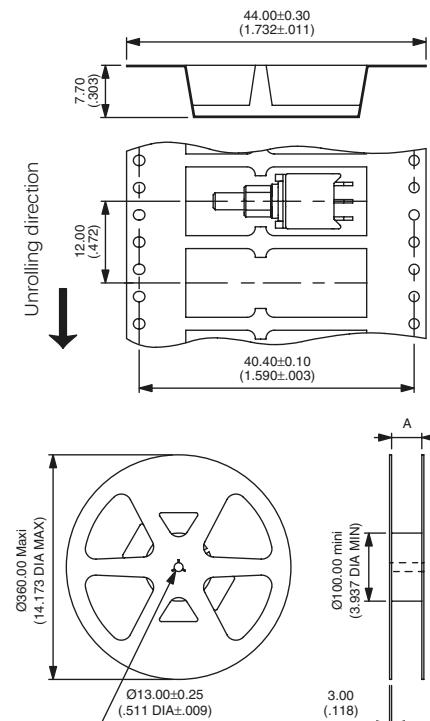


ELECTRICAL SPECIFICATIONS

- Max. current/voltage rating with resistive load : 0,4VA 20V max. AC or DC
- Minimum load : 10mA 50mV or 10µA 5VDC
- Initial contact resistance : 50 mΩ max
- Insulation resistance : 1.000 MΩ min. at 500VDC
- Dielectric strength : 1.000 Vrms. 50 Hz min. between terminals and frame / 500 Vrms. 50 Hz min. between terminals
- Electrical life at full load : 60.000 cycles
- Static resistance : 10 KV (Schaffner equipment)



PACKAGING



ENVIRONMENTAL SPECIFICATIONS

- Operating temperature : -40°C to +85°C
- Moisture resistance : 21days per IEC 512-6 test 11c
- Vibration resistance : 10-500 Hz / 10 g per IEC 512-4 test 6d
- Shock resistance : 50 g per IEC 512-4 test 6c



GENERAL SPECIFICATIONS

- Actuator travel : function 2 : 1 mm (.039) - function 3 : 0,8 mm (.031)
- Distance between case and circuit : 0,55 mm (.021)
- End stackable with 10,16 mm (.40) pitch

The company reserves the right to change specifications without notice.

| | | |
|--------------------|----------------------------------|-----------------------------------|
| Tape width | 24.00 (.944) | 44.00 (1.732) |
| Reel (dimension A) | 24.40+2.00/0.00 (.960+.078/0.00) | 44.40+2.00/0.00 (1.748+.078/0.00) |

Standard packaging unit : 700 pieces
 Tape meeting international standard IEC - Publication 286-3 (EIA481A)
 Start leader : 400 mm min.

SMT TP series

Surface mount subminiature washable pushbutton switches



MATERIALS

- Case : high temperature plastic material UL94-V0
- Actuator : high temperature plastic material UL94-V0
- Ground plate and positioning pins : steel, tin plated
- Contacts : brass, gold plated
- Terminals : brass, with pure tin plating over nickel barrier

WITHOUT POSITIONING PINS



TP32WS83500



ON



MOM

TP33WS83500



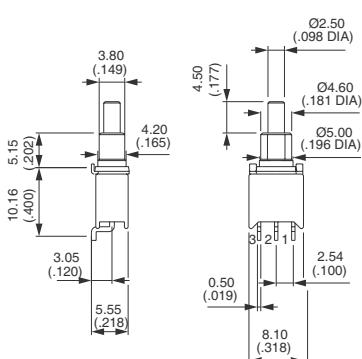
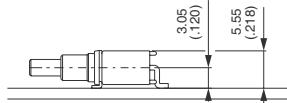
OFF



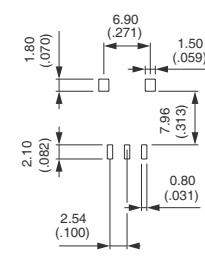
MOM



MOUNTING



Shown in function 2



WITH POSITIONING PINS



TP32WS83565



ON



MOM

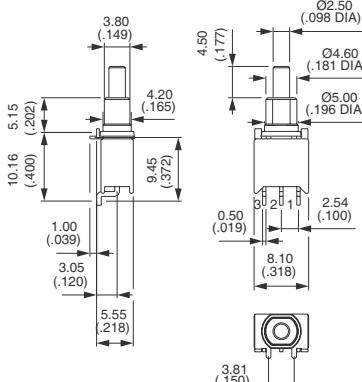
TP33WS83565



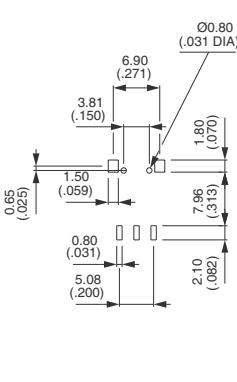
OFF



MOM



Shown in function 2



TP series

Subminiature washable momentary pushbutton switches



DISTINCTIVE FEATURES

- Process sealed
- Single piece case
- Front and rear sealing
- Wide variety of contact materials
- Same PCB layout as TL, TR and TG subminiature switches



ELECTRICAL SPECIFICATIONS

- Max. current/voltage rating with resistive load :
 - gold plated contacts : 0,4VA 20V max. AC or DC
 - silver plated contacts : 0,5A 48V max. AC or DC
- Minimum load : 10mA 50mV - 10µA 5VDC
- Contact resistance : 50 mΩ max.
- Insulation resistance : 1.000 MΩ min. at 500VDC
- Dielectric strength :
 - 1.000 Vrms 50 Hz min. between terminals and frame
 - 500 Vrms 50 Hz min. between terminals
- Electrical life at full load :
 - gold plated contacts : 60.000 cycles
 - silver plated contacts : 20.000 cycles



ENVIRONMENTAL SPECIFICATIONS

- Operating temperature : -30°C to +85°C
- Moisture : 21 days 95 % (NFC 20-603 - IEC 68-2-3)



GENERAL SPECIFICATIONS

- Total travel :
 - function 2 : 1 mm (.039)
 - function 3 : 0,8 mm (.031)
- Strength of terminals : pull-out force - 10 N max.
- Cleaning : solvents or water + detergent
- Wave soldering : 260°C - 5 sec.

The company reserves the right to change specifications without notice.

TP series

Subminiature washable momentary pushbutton switches

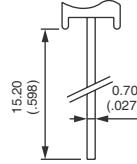
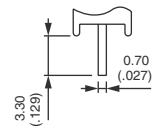


MATERIALS

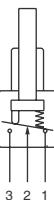
- Case : PBT
- Actuator : polyamide, glass filled
- Contacts and terminals :
 - 0 : brass, gold plated
 - 1 : brass, silver plated
 - 3 : brass, gold plated (1,27 micron gold)
 - 8 : contact brass, gold plated + tin plated terminals
 - 9 : contact brass, gold plated (1,27 micron gold) + tin plated terminals
- Terminal seal : epoxy



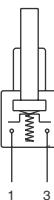
TERMINALS



ELECTRICAL FUNCTIONS



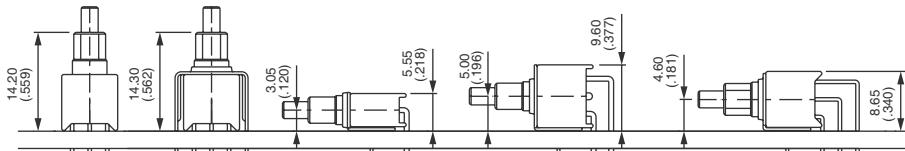
Function 2
(ON - MOM)



Function 3 (NO)
(OFF - MOM)



PCB MOUNTING

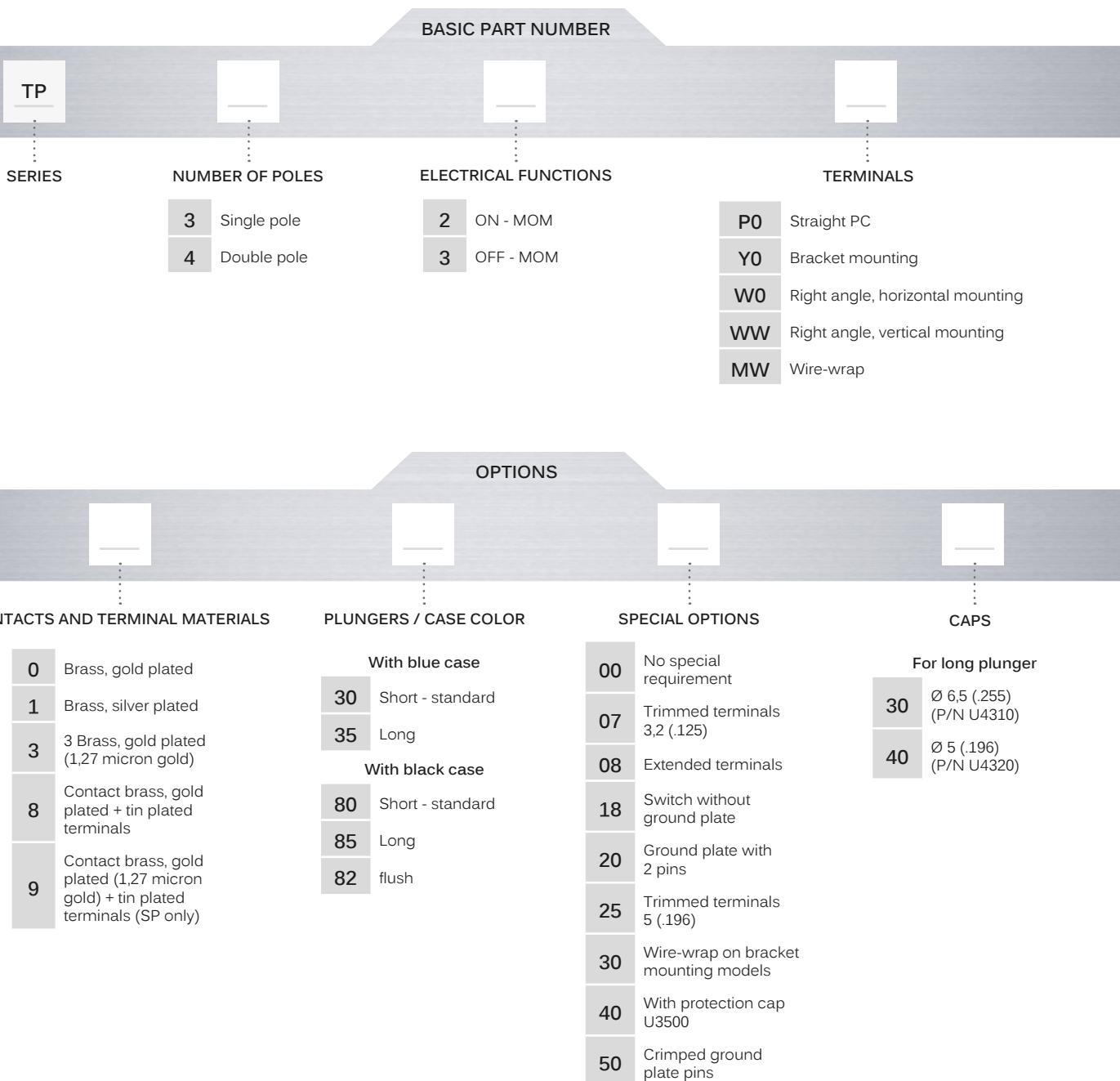


TP series

Subminiature washable momentary pushbutton switches



BUILD YOUR PART NUMBER



NOTICE : please note that not all combinations of above numbers are available. Refer to www.apem.com for further information.

TP series

Subminiature washable momentary pushbutton switches

STRAIGHT PC TERMINALS : TP..P0



Single pole

Double pole

TP32P0

TP42P0



MOM

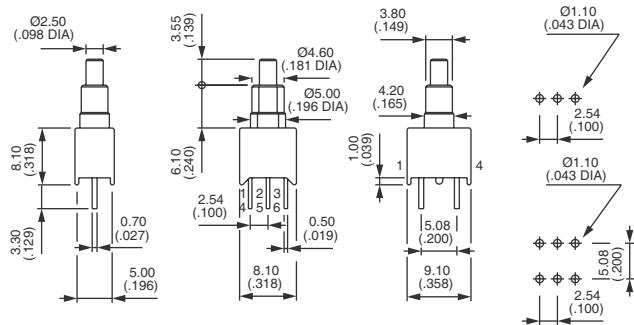
TP33P0

TP43P0



MOM

Shown in function 2, with standard plunger



Function 3 has two terminals only (3 and 1) per pole

STRAIGHT TERMINALS BRACKET MOUNTING : TP..Y0



Single pole

Double pole



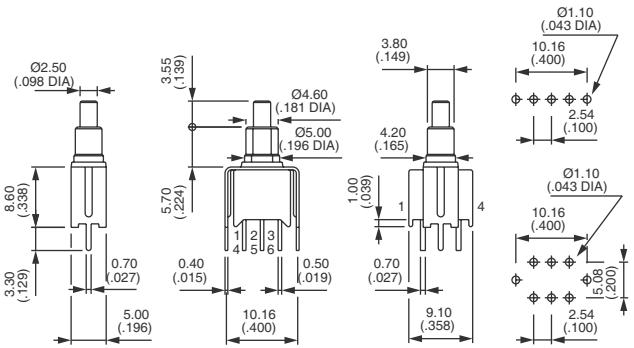
MOM

TP33Y0

TP43Y0



MOM



Function 3 has two terminals only (3 and 1) per pole

RIGHT ANGLE TERMINALS HORIZONTAL MOUNTING : TP..W0



Single pole

Double pole



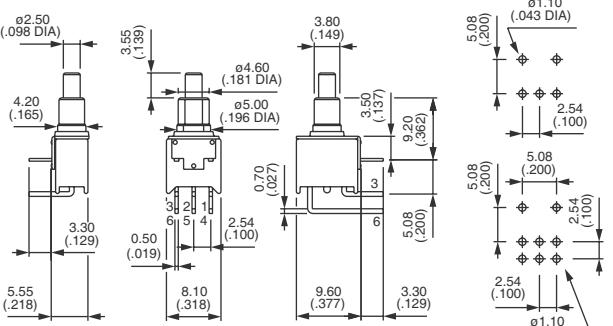
MOM

TP33W0

TP43W0



MOM



Function 3 has two terminals only (3 and 1) per pole

RIGHT ANGLE TERMINALS VERTICAL MOUNTING : TP..WW



Single pole

Double pole



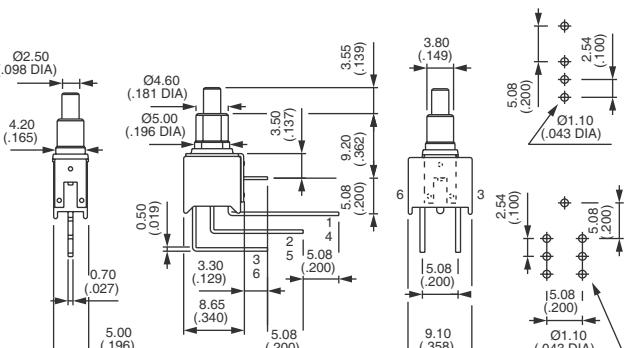
MOM

TP33WW

TP43WW



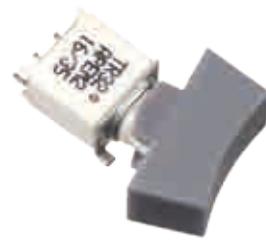
MOM



Function 3 has two terminals only (3 and 1) per pole

SMT TR series

Surface mount subminiature washable
rocker switches



DISTINCTIVE FEATURES

- Tape and reel packaging
- Reflow solderable
- Available with positioning pins
- Protected against electrostatic discharges (ESD) up to 10 KV
- Washable



SOLDERING AND CLEANING

- Reflow soldering : infrared, vapor phase or infrared convection
- Washable per IEA-RS448-2 :
 - water + detergent - preferred
 - solvents
- Further information on reflow soldering : see end of catalog.

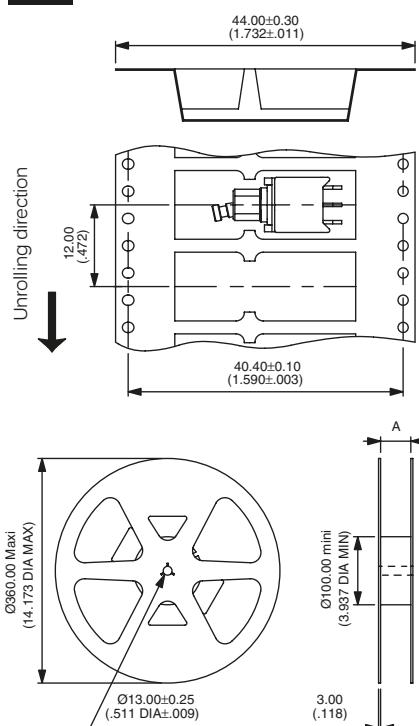


ENVIRONMENTAL SPECIFICATIONS

- Operating temperature : -40°C to +85°C
- Moisture resistance : 21 days per IEC 512-6 test 11c
- Vibration resistance : 10-500 Hz / 10 g per IEC 512-4 test 6d
- Shock resistance : 50 g per IEC 512-4 test 6c



PACKAGING



ELECTRICAL SPECIFICATIONS

- Max. current/voltage rating with resistive load : 0,4VA 20V max. AC or DC
- Minimum load : 10mA 50mV or 10µA 5VDC
- Initial contact resistance : 20 mΩ max
- Insulation resistance : 1.000 MΩ min. at 500VDC
- Dielectric strength : 1.000 Vrms. 50 Hz min. between terminals and frame/500 Vrms. 50 Hz min. between terminals
- Electrical life at full load :
 - 2 position switches : 60.000 cycles
 - 3 position switches : 30.000 cycles
- Static resistance : 10 KV (Schaffner equipment)



MATERIALS

- Case : high temperature plastic material UL94-V0
- Actuator : high temperature plastic rocker
- Ground plate and positioning pins : steel, tin plated
- Contacts : brass, gold plated
- Terminals : brass, with pure tin plating over nickel barrier

The company reserves the right to change specifications without notice.

| | | |
|--------------------|----------------------------------|-----------------------------------|
| Tape width | 24.00 (.944) | 44.00 (1.732) |
| Reel (dimension A) | 24.40+2.00/0.00 (.960+.078/0.00) | 44.40+2.00/0.00 (1.748+.078/0.00) |

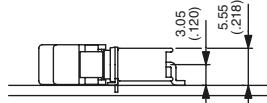
Standard packaging unit : 700 pieces
Tape meeting international standard IEC - Publication 286-3 (EIA481A)
Start leader : 400 mm min.

SMT TR series

Surface mount subminiature washable
rocker switches



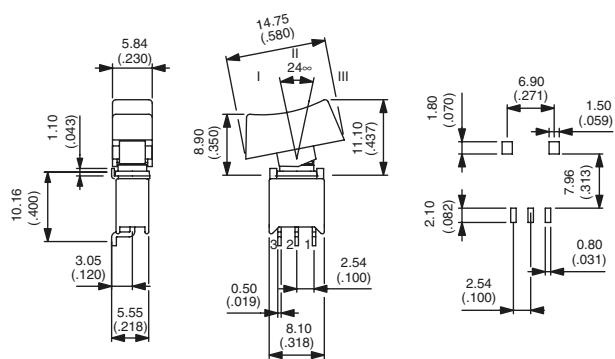
MOUNTING



WITHOUT POSITIONING PINS



| | III | II | I |
|-------------|-----|-----|-----|
| TR36WS80000 | ON | - | ON |
| TR39WS80000 | ON | OFF | ON |
| TR37WS80000 | MOM | OFF | MOM |
| TR38WS80000 | ON | OFF | MOM |
| TR32WS80000 | ON | - | MOM |

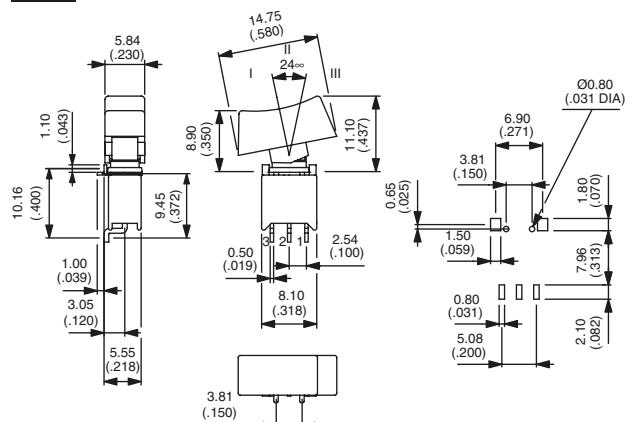


Rocker U4700 to order separately. See website.

WITH POSITIONING PINS



| | III | II | I |
|-------------|-----|-----|-----|
| TR36WS80065 | ON | - | ON |
| TR39WS80065 | ON | OFF | ON |
| TR37WS80065 | MOM | OFF | MOM |
| TR38WS80065 | ON | OFF | MOM |
| TR32WS80065 | ON | - | MOM |



Rocker U4700 to order separately. See website.

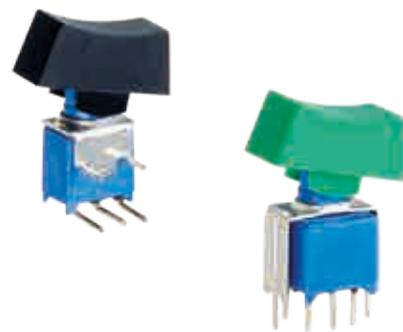
TR series

Subminiature washable rocker switches



DISTINCTIVE FEATURES

- Process sealed
- Single piece case
- Front and rear sealing
- Wide variety of contact materials
- Same PCB layout as TL, TP and TG subminiature switches



GENERAL SPECIFICATIONS

- Strength of terminals :
pull-out force - 10 N max
- Cleaning : solvents or water + detergent
- Wave soldering : 260°C - 5 sec.



ENVIRONMENTAL SPECIFICATIONS

- Operating temperature : -30°C to +85°C
- Moisture : 21 days 95 % (NFC 20-603 - IEC 68-2-3)



MATERIALS

- Case : PBT
- Actuator : polyamide
- Contacts and terminals :
 - 0 : brass, gold plated
 - 1 : brass, silver plated
 - 3 : brass, gold plated (1,27 micron gold)
 - 8 : contact brass, gold plated
+ tin plated terminals
 - 9 : contact brass, gold plated
(1,27 micron gold) + tin plated terminals
- Terminal seal : epoxy



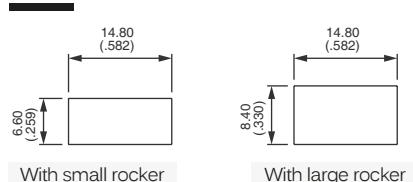
ELECTRICAL SPECIFICATIONS

- Max. current/voltage rating with resistive load :
 - gold plated contacts : 0,4VA 20V max. AC or DC
 - silver plated contacts : 0,5A 48V max. AC or DC
- Minimum load : 10mA 50mV - 10µA 5VDC
- Contact resistance : 20 mΩ max.
- Insulation resistance : 1.000 MΩ min. at 500VDC
- Dielectric strength :
 - 1.000 Vrms 50 Hz min. between terminals and frame
 - 500 Vrms 50 Hz min. between terminals
- Electrical life at full load :

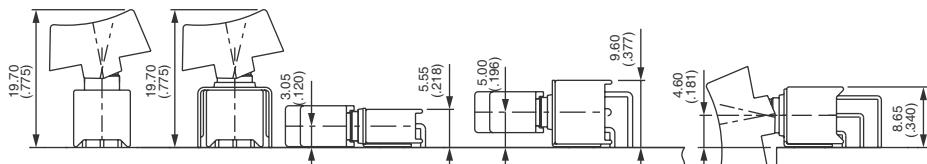
| Contacts | Number of cycles | |
|---------------|------------------|-------------|
| | 2 positions | 3 positions |
| Gold plated | 60.000 | 30.000 |
| Silver plated | 20.000 | 10.000 |



PANEL CUT-OUT



PCB MOUNTING



The company reserves the right to change specifications without notice.

TR series

Subminiature washable rocker switches



BUILD YOUR PART NUMBER

BASIC PART NUMBER

| TR | | | |
|--------|-----------------|----------------------|-------------------------------------|
| SERIES | NUMBER OF POLES | ELECTRICAL FUNCTIONS | TERMINALS |
| 3 | Single pole | 6 ON - ON | P0 Straight PC |
| 4 | Double pole | 9 ON OFF ON | Y0 Bracket mounting |
| | | 7 MOM OFF MOM | W0 Right angle, horizontal mounting |
| | | 8 ON OFF MOM | WW Right angle, vertical mounting |
| | | 2 ON - MOM | MW Wire-wrap |

OPTIONS

CONTACTS AND TERMINAL MATERIALS

| | |
|---|--|
| 0 | Brass, gold plated |
| 1 | Brass, silver plated |
| 3 | Brass, gold plated (1,27 micron gold) |
| 8 | Contact brass, gold plated + tin plated terminals |
| 9 | Contact brass, gold plated (1,27 micron gold) + tin plated terminals (SP only) |

CASE COLOR

00 Blue

SPECIAL OPTIONS

| | |
|----|---------------------------------------|
| 00 | No special requirement |
| 07 | Trimmed terminals - length 3,2 (.125) |
| 08 | Extended terminals |
| 18 | Switch without ground plate |
| 20 | Ground plate with 2 pins |
| 25 | Trimmed terminals - length 5 (.196) |
| 30 | Wire-wrap on bracket mounting models |
| 50 | Crimped ground plate pins |

ROCKERS

| | |
|----|-------|
| 10 | Small |
| 20 | Large |

Colors, see website.

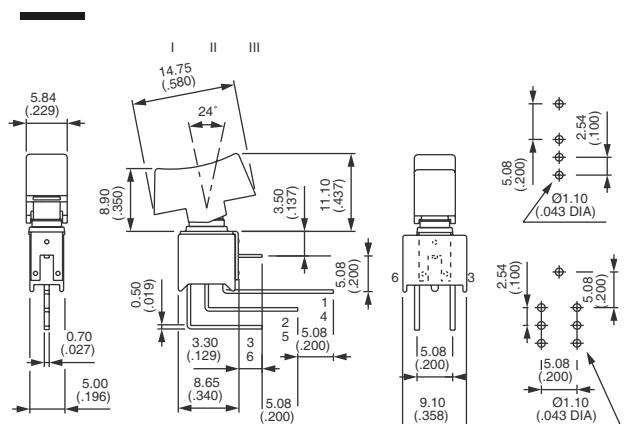
NOTICE : please note that not all combinations of above numbers are available.
Refer to www.apem.com for further information.

RIGHT ANGLE TERMINALS VERTICAL MOUNTING : TR..WW



| Single pole | Double pole | III | II | I |
|-------------|-------------|-----|-----|-----|
| TR36WW | TR46WW | ON | - | ON |
| TR39WW | TR49WW | ON | OFF | ON |
| TR37WW | TR47WW | MOM | OFF | MOM |
| TR38WW* | TR48WW* | ON | OFF | MOM |
| TR32WW* | TR42WW* | ON | - | MOM |

*Functions 2 and 8 : reversed connection available . Consult factory.



NK series

Subminiature slide switches



DISTINCTIVE FEATURES

- The smallest changeover
- Flush and raised actuators
- Straight PC and right angle terminals



ENVIRONMENTAL SPECIFICATIONS

- Operating temperature : -40°C to +85°C
- Moisture test : 21 days at 95 % RH (IEC 68-2-3)



ELECTRICAL SPECIFICATIONS

- Max. current/voltage rating with resistive load : 0,5A 12V
- Minimum load : 1mA 10mV
- Initial contact resistance : 20 mΩ max.
- Insulation resistance : 10.000 MΩ min. at 500VDC
- Dielectric strength : 250 Vrms 50 Hz min. between terminals
2.000 Vrms 50 Hz min. between adjacent poles of switches placed side by side
- Electrical life with nominal load : 2.000 cycles
- Capacitance : < 1,5 pF

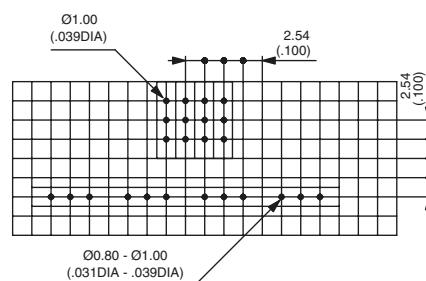


MATERIALS

- Case : PA6/6, glass filled, UL94-V0
- Actuator : PA6/6, glass filled, UL94-V0
- Contacts : gold over nickel



EXAMPLES OF LAYOUT



GENERAL SPECIFICATIONS

- Soldering temperature : 250°C for 5 sec. max.
- Wave solderable : flux sealed
- End stackable, 2,54 (.100) terminal to terminal pitch - 4 switches max., hole dia. 1 mm (.039)
- Travel : 1,6 mm (.062)

The company reserves the right to change specifications without notice.

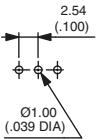
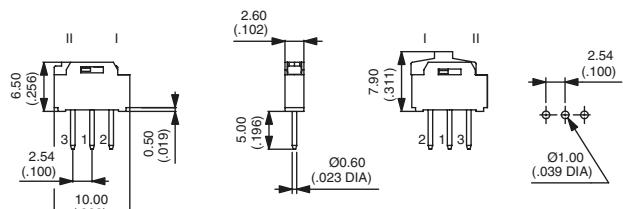
NK series

Subminiature slide switches

STRAIGHT PC TERMINALS



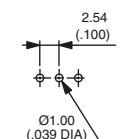
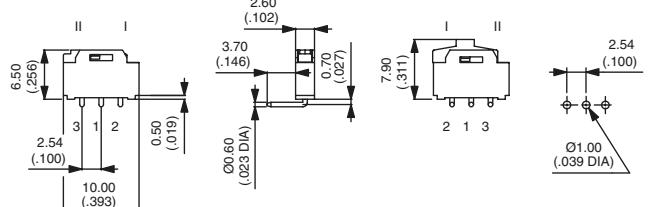
| | I 1-3 | II 1-2 | |
|-----------------|----------|-----------|----|
| Flush actuator | ON | - | ON |
| Raised actuator | ON | - | ON |



RIGHT ANGLE TERMINALS



| | I 1-3 | II 1-2 | |
|----------------|----------|-----------|----|
| Flush actuator | ON | - | ON |
| Flush actuator | ON | - | ON |



TG series

Subminiature slide switches



DISTINCTIVE FEATURES

- Single piece case
- Epoxy sealed terminals
- Washable version available
- Wide variety of contact materials
- Same PCB layout as TL, TP and TR subminiature series



ELECTRICAL SPECIFICATIONS

- Current/voltage rating with resistive load :
 - Gold plated contacts : 0,4VA 20V max. AC or DC
 - Silver plated contacts : 0,5A 48V max. AC or DC
- Contact resistance : 20 mΩ max.
- Insulation resistance : 1.000 MΩ min. at 500VDC
- Dielectric strength : 1.000 Vrms 50 Hz min. between terminals and frame 500 Vrms 50 Hz min. between terminals
- Electrical life at full load : 2 position switches : 60.000 cycles
3 position switches : 30.000 cycles



MATERIALS

- Case : flame retardant thermoplastic
- Actuator : thermoplastic
- Ground plate and bracket : brass, tin plated
- Contacts and terminals : see next page
- Rubber seal : silicone, transparent
- Terminal seal : epoxy

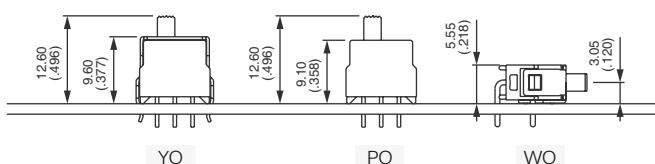


GENERAL SPECIFICATIONS

- Travel : 2,60 mm (.102)
- Wave soldering : 260°C - 5 sec. max.
- Operating temperature : -30°C to +85°C
- Cleaning : solvents or water + detergent



PCB MOUNTING



The company reserves the right to change specifications without notice.

TG series

Subminiature slide switches



BUILD YOUR PART NUMBER

BASIC PART NUMBER

| | | | |
|---------------|-----------------|-------------------------------------|-----------|
| TG | | | |
| SERIES | NUMBER OF POLES | ELECTRICAL FUNCTIONS | TERMINALS |
| 3 Single pole | 6 ON - ON | P0 Straight PC | |
| | 9 ON OFF ON | Y0 Straight PC, bracket mounting | |
| | | W0 Right angle, horizontal mounting | |
| | | MW Wire-wrap | |

OPTIONS

CONTACT AND TERMINAL MATERIALS

| | |
|---|---|
| 0 | Brass, gold plated (std) |
| 1 | Brass, silver plated |
| 3 | Brass, gold plated (1.27 µ gold) |
| 8 | Contact brass, gold plated + tin plated terminals |
| 9 | Contact brass, gold plated (1.27 µ gold) + tin plated term. |

ACTUATORS

| | |
|----|-----------------|
| 00 | High (standard) |
| 10 | Flush |

MODEL

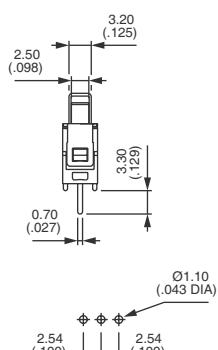
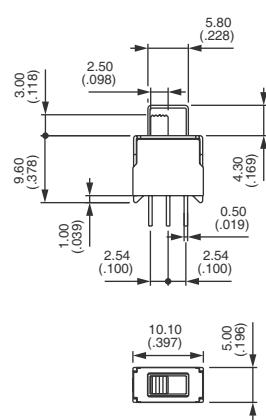
| | |
|----|----------|
| 00 | Standard |
| 50 | Washable |

STRAIGHT PC TERMINALS WASHABLE MODEL



TG36P0•0050

ON - ON
ON OFF ON



G series

Slide switches • telecom grade



DISTINCTIVE FEATURES

- Panel and PC mount models
- 6 actuator lengths
- Wide variety of contact materials



ELECTRICAL SPECIFICATIONS

- Max. current/voltage rating with resistive load :
 - silver contacts (codes 1 or 2) : 3A 30VDC
 - gold plated brass contacts (code 0) : 0,4VA 20VAC or DC max.
- Initial contact resistance : 10 mΩ
- Insulation resistance : 1.000 MΩ min.
- Dielectric strength : 1.000 Vrms 50 Hz min.
- Electrical life with resistive load :
 - silver contacts (codes 1 or 2) : 2 positions : 40.000 cycles;
 - 3 positions : 20.000 cycles
 - gold plated brass contacts (code 0) : 60.000 cycles (0,4VA max.)



MATERIALS

- Case : PES
- Actuator : polyamide, glass filled
- Cover : stainless steel
- Contacts
 - 0 : brass, gold plated
 - 1 : silver
 - 2 : silver, gold plated
 - 5 : special contact, lower rating, minimum quantity : consult factory
- Terminal seal : epoxy



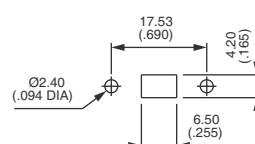
GENERAL SPECIFICATIONS

- Travel : 2,20 mm (.086), except actuator N on SP model : 2,60 mm (.102)
- Operating temperature : -30°C to +85°C
- Recommended soldering : 300°C 5 sec. max.

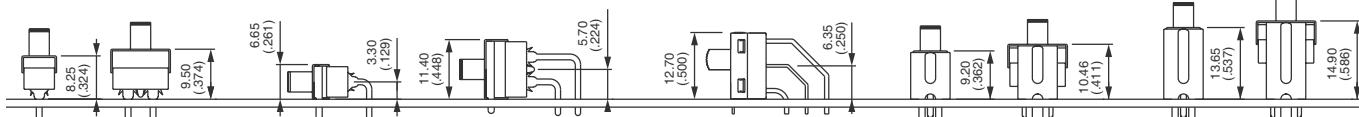


PANEL CUT-OUT

SOLDER LUG MODEL



PCB MOUNTING



The company reserves the right to change specifications without notice.

G series

Slide switches • telecom grade



BUILD YOUR PART NUMBER

BASIC PART NUMBER

| G | | | | |
|--------|----------------------------|-----------------|----------------------|-----------------------------------|
| SERIES | ACTUATORS | NUMBER OF POLES | ELECTRICAL FUNCTIONS | TERMINALS |
| C | 3,50 mm (.137) | 3 Single pole | 6 ON - ON | S0 Solder lugs |
| H | 5,10 mm (.200) Standard | 4 Double pole | 9 ON OFF ON | P0 Straight PC |
| L | 6,40 mm (.251) | | | W0 Right angle, horizontal |
| B | 7,65 mm (.301) | | | WW Right angle, vertical |
| E | 9,10 mm (.358) | | | Y0 Straight PC with short bracket |
| N | 9,50 mm (.374) | | | Y4 Straight PC with tall bracket |

Types L, B and E for single pole models only.

OPTIONS

CONTACT AND TERMINAL MATERIALS

| | |
|---|-------------------------------|
| 0 | Brass, gold plated |
| 1 | Silver |
| 2 | Silver, gold plated |
| 5 | Special contact, lower rating |

SPECIAL OPTIONS 1

| | |
|----|----------------------------------|
| 00 | Standard model |
| 10 | Switch without ground plate |
| 11 | 10,35 mm (.407) PC terminals |
| 12 | Same as 11, without ground plate |

SPECIAL OPTIONS 2

| | |
|----|-----------------------------|
| 00 | No epoxy seal |
| 01 | Epoxy sealed terminals |
| 10 | Extended terminals |
| 11 | Same as 10, with epoxy seal |

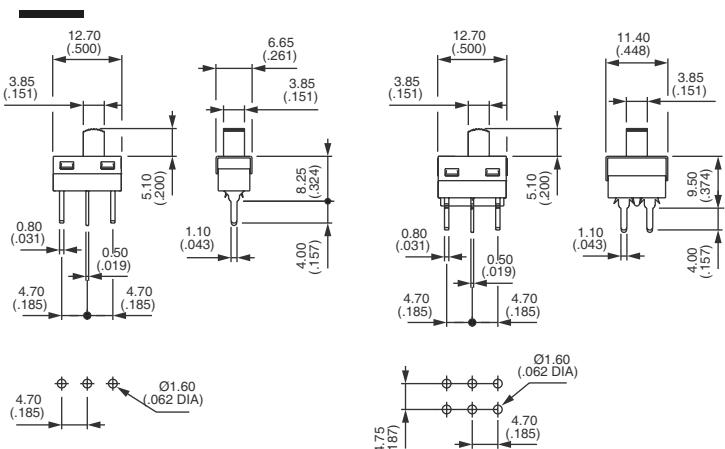
NOTICE : please note that not all combinations of above numbers are available.
Refer to www.apem.com for further information.

STRAIGHT PC TERMINALS



Single pole Double pole

| | | | | |
|--------|--------|----|-----|----|
| GH36P0 | GH46P0 | ON | - | ON |
| GH39P0 | GH49P0 | ON | OFF | ON |



25000N series

Professional slide switches



DISTINCTIVE FEATURES

Professional grade slide switches for PC boards

Approved according to UL 1054

Wave solderable

Available with flush, high and side actuator

Various actuator lengths



ELECTRICAL SPECIFICATIONS

- Max. current/voltage rating with resistive load :
 - silver contacts (A) : 1A 30VDC
 - gold plated brass contacts (LD) : 100mA 30VDC
- Minimum load :
 - silver contacts (A) : 100mA 10V
 - gold plated brass contacts (LD) : 10µA 5VDC - 10mA 50mV
- Initial contact resistance :
 - silver contacts (A) : 10mΩ max.
 - gold plated brass contacts (LD) : 50mΩ max.
- Insulation resistance : 1.000 MΩ min. at 500VDC
- Dielectric strength :
 - 1.000 Vrms 50 Hz min. between terminals
 - 2.000 Vrms 50 Hz min. between poles
 - 2.000 Vrms 50 Hz min. between terminals and frame
- Electrical life : 10.000 cycles at full load
- Low level or mechanical life : 20.000 cycles



GENERAL SPECIFICATIONS

- Operating temperature : -40°C to +85°C
- Overall length : 14 mm (.551)
- Actuator height (outside case) :
 - high : 2,80 mm (.110)
 - extra high : 6 mm (.236)
 - side : 2,3 mm (.090)
 - long side : 6 mm (.236)
- Travel : 4 mm (.157)

AGENCY APPROVAL



2A 250VAC
4A 125VAC

Availability : consult factory for details of approved models.

Marking : to order switches marked UL, complete the "Options and Approvals" box of ordering format.

25000N series

Professional slide switches



MATERIALS

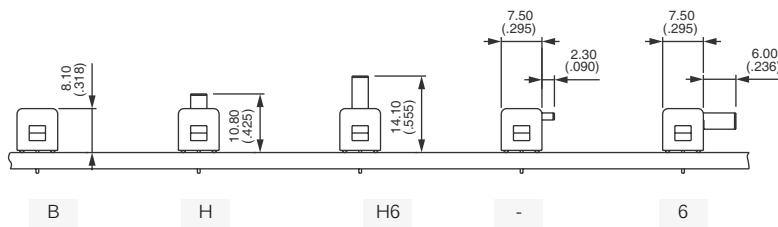
- Case : PBT
- Actuator : polyamide, glass filled
- Cover : polyamide, glass filled
- Contacts
A : silver
LD : brass, gold plated
- Terminal seal : epoxy



ELECTRICAL FUNCTIONS



PCB MOUNTING



25000N series

Professional slide switches



BUILD YOUR PART NUMBER

BASIC PART NUMBER

| 25 | | | | N |
|--------|--|-----------------|----------------------|------------------|
| SERIES | ACTUATOR AND TERMINALS | NUMBER OF POLES | ELECTRICAL FUNCTIONS | VERSION |
| 1 | Flush or high actuator, terminal spacing 2,54 (.100) | 3 Single pole | 6 ON - ON | N For all models |
| 4 | Flush or high actuator, terminal spacing 5,08 (.200) | 4 Double pole | 9 ON OFF ON | |
| 3 | Side actuator, terminal spacing 2,54 (.100) | | | |
| 5 | Side actuator, terminal spacing 5,08 (.200) | | | |

OPTIONS

| CONTACT MATERIALS | ACTUATOR | OPTIONS AND APPROVALS |
|----------------------|---------------|--|
| A Silver | B Flush | X601 Special contact : lower rating |
| LD Gold plated brass | H High | X693 Flame retardant plastic material |
| | H6 Extra high | |
| | Blank Side | X693UL Switches approved and marked UL (Silver contact only) |
| | -6 Long side | |

NOTICE : please note that not all combinations of above numbers are available.
Refer to www.apem.com for further information.

25000N series

Professional slide switches

HIGH ACTUATOR : 25000NH



Terminal spacing
2,54 (.100)

Single pole

25136N H

25139N H

Double pole

25146N H

25149N H

Terminal spacing
5,08 (.200)

Single pole

25436N H

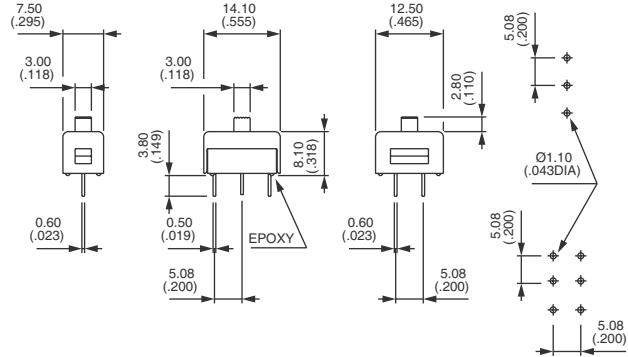
25439N H

Double pole

25446N H

25449N H

Shown with 5,08 mm terminal spacing



EXTRA HIGH ACTUATOR : 25000NH6



Terminal spacing
2,54 (.100)

Single pole

25136N H6

25139N H6

Double pole

25146N H6

25149N H6

Terminal spacing
5,08 (.200)

Single pole

25436N H6

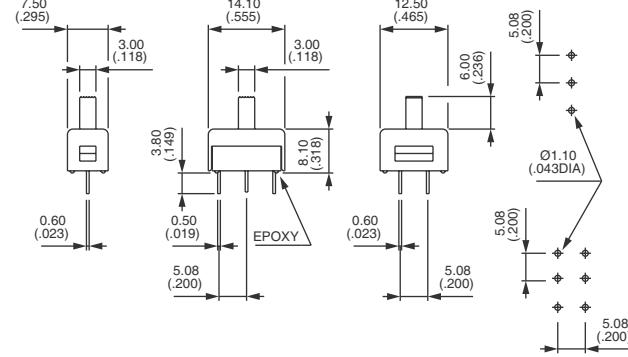
25439N H6

Double pole

25446N H6

25449N H6

Shown with 5,08 mm terminal spacing



SIDE ACTUATOR : 25000N



Terminal spacing
2,54 (.100)

Single pole

25336N

25339N

Double pole

25346N

25349N

Terminal spacing
5,08 (.200)

Single pole

25536N

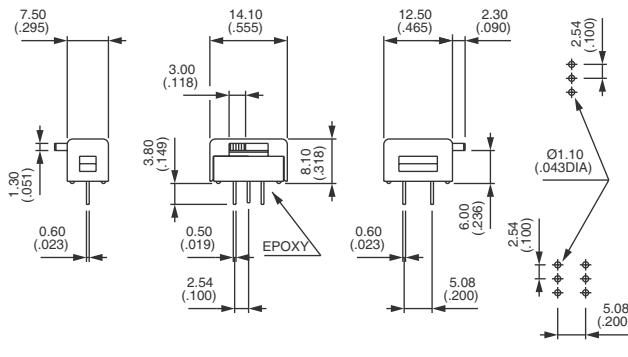
25539N

Double pole

25546N

25549N

Shown with 2,54 mm terminal spacing



LONG SIDE ACTUATOR : 25000N-6



Terminal spacing
2,54 (.100)

Single pole

25336N -6

25339N -6

Double pole

25346N -6

25349N -6

Terminal spacing
5,08 (.200)

Single pole

25536N -6

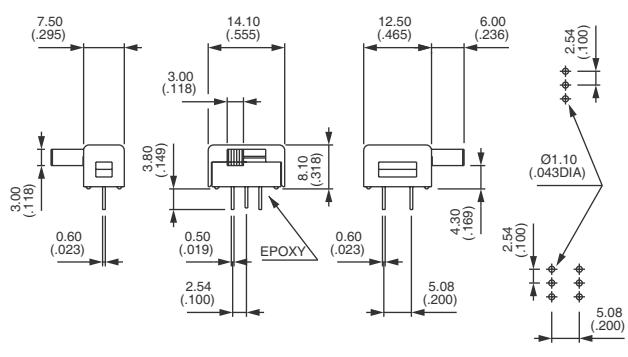
25539N -6

Double pole

25546N -6

25549N -6

Shown with 2,54 mm terminal spacing



P36 series

Low profile rotary code switches



DISTINCTIVE FEATURES

- 3 actuator types
- Sub-miniature size
- Solder and flux sealed, washable



ENVIRONMENTAL SPECIFICATIONS

- Operating temperature: -50°C to +125°C



ELECTRICAL SPECIFICATIONS

- Operating voltage : 42 VDC max.
- Contact load, static : 400mA max.
- Contact load, dynamic : 100mA max.
- Initial contact resistance : 80 mΩ max.
- Insulation resistance : 100 MΩ min.



MATERIALS

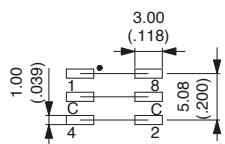
- Base : UL94-V0, high temperature thermoplastic
- Cover : stainless steel
- Actuator : PA 4.6 nylon
- Contacts : gold over nickel plated phosphor bronze
- Terminals : tin plated

The company reserves the right to change specifications without notice.

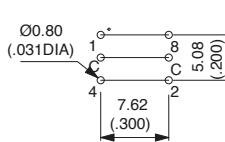


PCB MOUNTING

SURFACE MOUNT



THROUGH-HOLE



P36 series

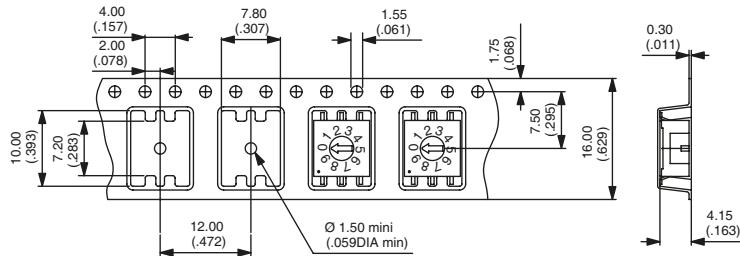
Low profile rotary code switches



PACKAGING

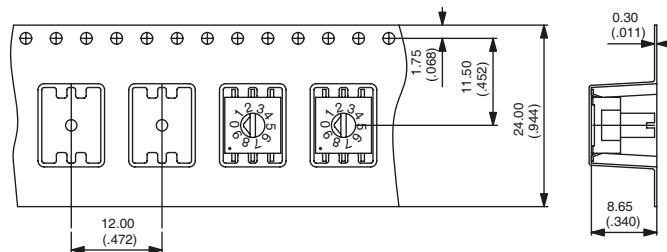
P36S1..

1300 pieces per reel
dim.A = 22,4 mm
dim B = 16,4 mm



P36S3..
P36S8..

600 pieces per reel
dim.A = 30,4 mm
dim B = 24,4 mm



Reels : To order a SMT product with tape & reel packaging, add "TR" at the end of its part number.
Tubes : 50 pieces (through-hole or SMT) per tube.



BUILD YOUR PART NUMBER

P36

...
SERIES

(none)

Through-hole

S

Surface mount

...
ACTUATORS

1

Screwdriver

3

Spindle

8

Slotted spindle

...
CODES

01

BCD

02

BCD complement

03

Hexadecimal

06

Hexadecimal complement

...
TERMINALS

(none)

Straight or SMT

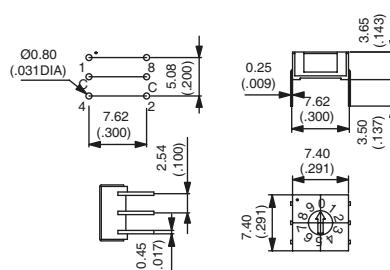
V

Crimped

L254

Right angle,
spacing 2,54 (.100)

THROUGH-HOLE MOUNTING



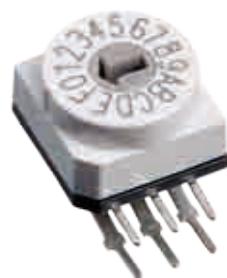
PT65 series

Rotary code switches



DISTINCTIVE FEATURES

- 4 actuator types
- Sub-miniature size
- Solder and flux sealed, washable



ENVIRONMENTAL SPECIFICATIONS

- Operating temperature: -20°C to +70°C



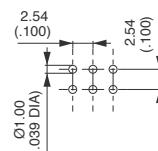
ELECTRICAL SPECIFICATIONS

- Operating voltage : 42V
- Contact load, static : 200mA
- Contact load, dynamic : 150mA max.
- Initial contact resistance : 80 mΩ max.
- Insulation resistance : 100 MΩ min.

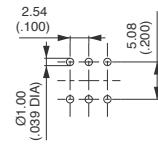


PCB MOUNTING

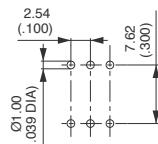
PCB RIGHT ANGLE 2.54



PCB RIGHT ANGLE 5.08



PCB STRAIGHT



MATERIALS

- Base : UL94-V0, high temperature thermoplastic
- Cover : UL94-V0, high temperature thermoplastic
- Actuator : PA 4.6 nylon
- Contacts : gold over nickel plated phosphor bronze
- Terminals : tin plated



PACKAGING

- Switches for screwdriver slot or accessory actuation (PT651 and PT657) : tubes of 50 pieces
- Switches with spindle (PT653) or segment wheel (PT655) : trays of 50 pieces
- Accessories : bags of 50 pieces

The company reserves the right to change specifications without notice.

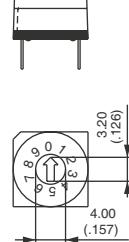
PT65 series

Rotary code switches

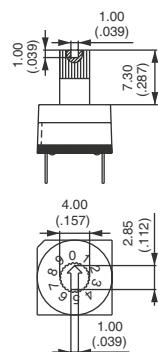


BUILD YOUR PART NUMBER

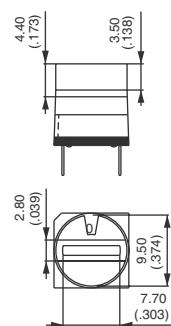
| | | | |
|-----------------|---------------------------|--|-----------|
| PT65 | | | |
| SERIES | ACTUATORS | CODES | TERMINALS |
| 1 Screwdriver | 01 BCD | (none) Straight | |
| 3 Spindle | 02 BCD complement | L254 Right angle, spacing 2,54 (.100) | |
| 5 Segment wheel | 03 Hexadecimal | L508 Right angle, spacing 5,08 (.200) | |
| 7 Accessories | 06 Hexadecimal complement | | |



1 > Screwdriver

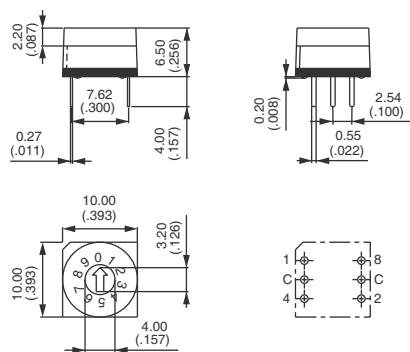


3 > Spindle



5 > Segment wheel

SCREWDRIVER SLOT - STRAIGHT TERMINALS



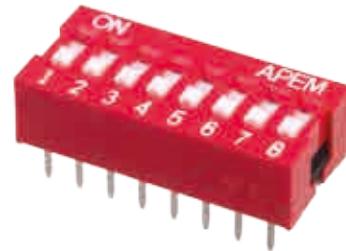
NDS series

Through-hole standard profile
dual in line switches



DISTINCTIVE FEATURES

- 1 to 12 Way
- Self-cleaning wiping contacts
- Gold plated terminals
- Washable with tape seal



ENVIRONMENTAL SPECIFICATIONS

- Operating Temperature: -40°C to +85°C
- Storage Temperature: -40°C to +85°C
- Washable (with tape seal)



ELECTRICAL SPECIFICATIONS

- Max. Current/Voltage Rating:
 - Switching: 25mA 24VDC
 - Contact rating: 100mA 50VDC
- Initial Contact Resistance: 50mΩ max
- Insulation Resistance: 100MΩ min. at 500VDC
- Dielectric Strength: 500VAC min.
- Electrical Life: 2.000 cycles



MECHANICAL SPECIFICATIONS

- Operating force: 1.000gf (9.8N) max



MATERIALS

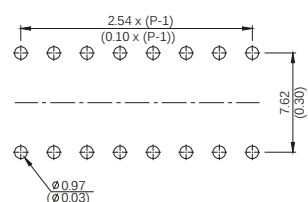
- Case & Actuator: PBT
- Base: PA66
- Contact: Gold plated
- Terminal: Gold plated brass
- Protection tape: Polyimide

The company reserves the right to change specifications without notice.



PCB LAYOUT

THROUGH-HOLE



NDS series

Through-hole standard profile
dual in line switches



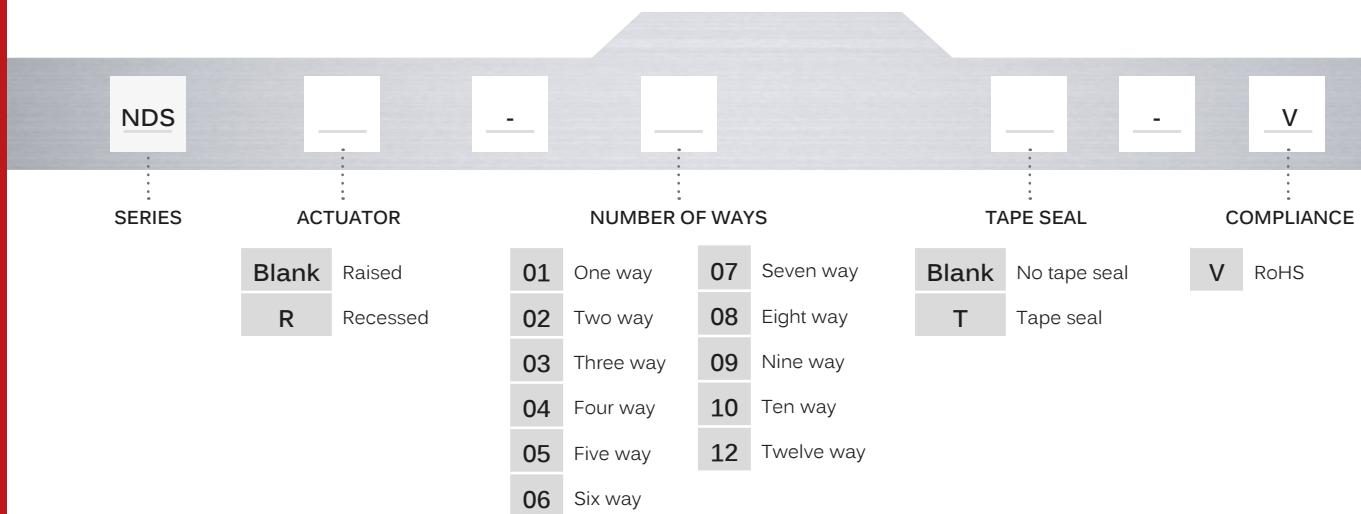
PACKAGING

IC TUBE THROUGH-HOLE

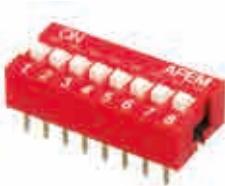
| Number of ways | No tape seal | With tape seal |
|----------------|--------------|----------------|
| 1 | 120 pcs | 110 pcs |
| 2 | 72 pcs | 70 pcs |
| 3 | 51 pcs | 50 pcs |
| 4 | 40 pcs | 39 pcs |
| 5 | 32 pcs | |
| 6 | 27 pcs | |
| 7 | 24 pcs | |
| 8 | 21 pcs | |
| 9 | 19 pcs | |
| 10 | 17 pcs | |
| 12 | 14 pcs | |



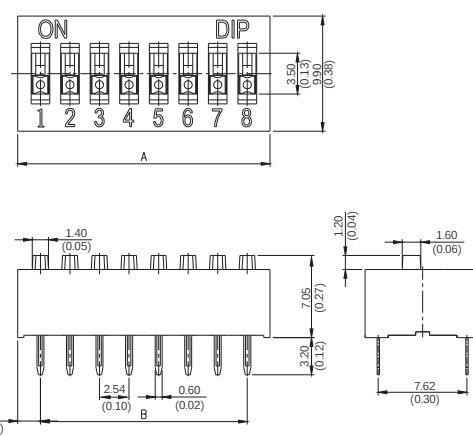
BUILD YOUR PART NUMBER



8 WAY - STANDARD PROFILE WITH RAISED ACTUATORS



| Number of ways | Dimension A | Dimension B |
|----------------|-------------|-------------|
| 1 | 3.90(0.15) | NA |
| 2 | 6.44(0.25) | 2.54(0.1) |
| 3 | 8.98(0.35) | 5.08(0.2) |
| 4 | 11.52(0.45) | 7.62(0.3) |
| 5 | 14.06(0.55) | 10.16(0.4) |
| 6 | 16.60(0.65) | 12.70(0.5) |
| 7 | 19.14(0.75) | 15.24(0.6) |
| 8 | 21.68(0.85) | 17.78(0.7) |
| 9 | 24.22(0.95) | 20.32(0.8) |
| 10 | 26.76(1.05) | 22.86(0.9) |
| 12 | 31.84(1.25) | 27.94(1.1) |



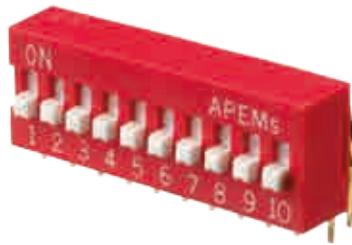
NDA series

Right angle through-hole standard profile dual in line switches



DISTINCTIVE FEATURES

- 2 to 12 Way
- Self-cleaning wiping contacts
- Gold plated terminals
- Washable with tape seal



ENVIRONMENTAL SPECIFICATIONS

- Operating Temperature: -20°C to +70°C
- Storage Temperature: -40°C to +85°C
- Washable (with tape seal)



ELECTRICAL SPECIFICATIONS

- Max. Current/Voltage Rating:
 - Switching: 25mA 24VDC
 - Contact rating: 100mA 50VDC
- Initial Contact Resistance: 50mΩ max
- Insulation Resistance: 100MΩ min. at 500VDC
- Dielectric Strength: 500VAC min.
- Electrical Life: 2.000 cycles



MECHANICAL SPECIFICATIONS

- Operating force: 1.000gf (9.8N) max



MATERIALS

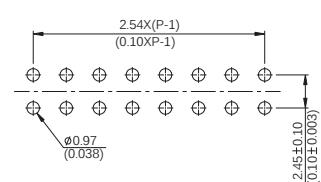
- Case & Actuator: PBT
- PA66
- Moving Contact: Gold plated
- Terminal: Gold plated
- Protection tape: Polyimide

The company reserves the right to change specifications without notice.



PCB LAYOUT

THROUGH-HOLE



NDA series

Right angle through-hole standard profile dual in line switches



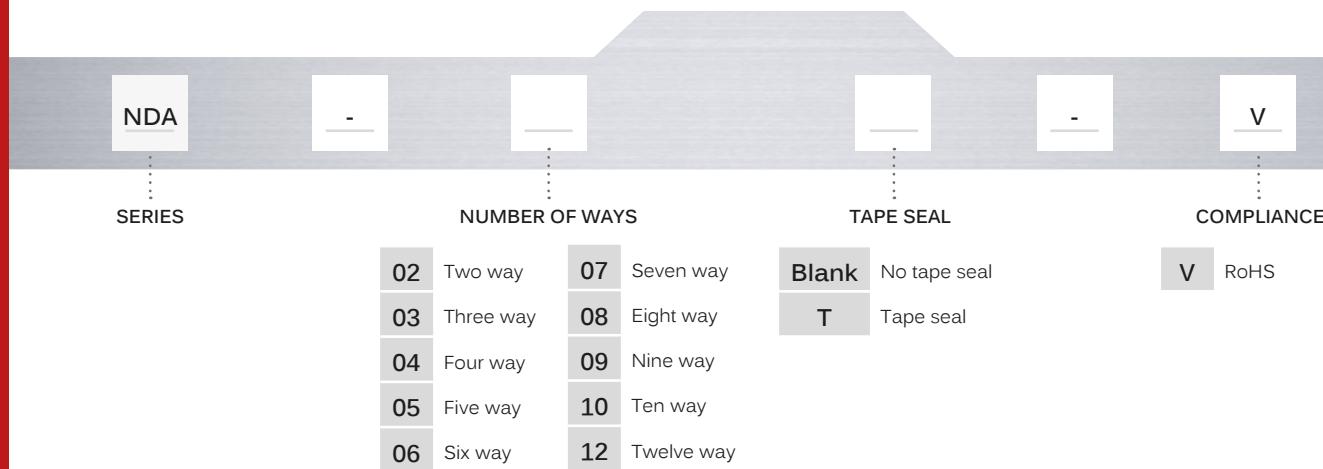
PACKAGING

IC TUBE THROUGH-HOLE

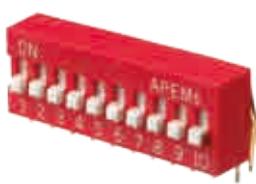
| Number of ways | No tape seal | With tape seal |
|----------------|--------------|----------------|
| 2 | 73 pcs | 70 pcs |
| 3 | 52 pcs | 50 pcs |
| 4 | 40 pcs | 39 pcs |
| 5 | 33 pcs | 32 pcs |
| 6 | 28pcs | |
| 7 | 24 pcs | |
| 8 | 21 pcs | |
| 9 | 19 pcs | |
| 10 | 17 pcs | |
| 12 | 14 pcs | |



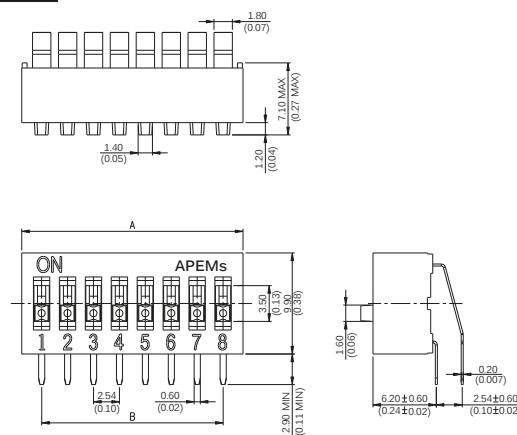
BUILD YOUR PART NUMBER



STANDARD PROFILE RIGHT ANGLE THROUGH-HOLE



| Number of ways | Dimension A | Dimension B |
|----------------|-------------|-------------|
| 2 | 6.44(0.25) | 2.54(0.1) |
| 3 | 8.98(0.35) | 5.08(0.2) |
| 4 | 11.52(0.45) | 7.62(0.3) |
| 5 | 14.06(0.55) | 10.16(0.4) |
| 6 | 16.60(0.65) | 12.70(0.5) |
| 7 | 19.14(0.75) | 15.24(0.6) |
| 8 | 21.68(0.85) | 17.78(0.7) |
| 9 | 24.22(0.95) | 20.32(0.8) |
| 10 | 26.76(1.05) | 22.86(0.9) |
| 12 | 31.84(1.25) | 27.94(1.1) |



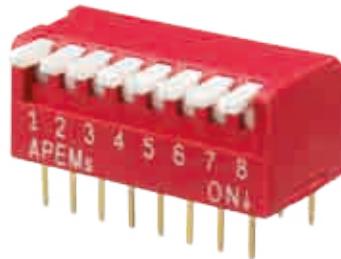
NDP series

Piano through-hole standard profile
dual in line switches



DISTINCTIVE FEATURES

- 2 to 12 Way
- Self-cleaning wiping contacts
- Gold plated terminals
- Washable with tape seal



ENVIRONMENTAL SPECIFICATIONS

- Operating Temperature: -20°C to +70°C
- Storage Temperature: -40°C to +85°C
- Washable (with tape seal)



ELECTRICAL SPECIFICATIONS

- Max. Current/Voltage Rating:
 - Switching: 25mA 24VDC
 - Contact rating: 100mA 50VDC
- Initial Contact Resistance: 50mΩ max
- Insulation Resistance: 100MΩ min. at 500VDC
- Dielectric Strength: 500VAC min.
- Electrical Life: 2.000 cycles



MECHANICAL SPECIFICATIONS

- Operating force: 400gf (3.92N) max



MATERIALS

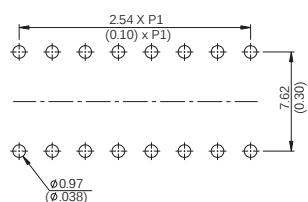
- Case & Actuator: PBT
- Base: PA66
- Contact: Gold plated
- Terminal: Gold plated brass
- Protection tape: Polyimide

The company reserves the right to change specifications without notice.



PCB LAYOUT

THROUGH-HOLE



NDP series

Piano through-hole standard profile
dual in line switches



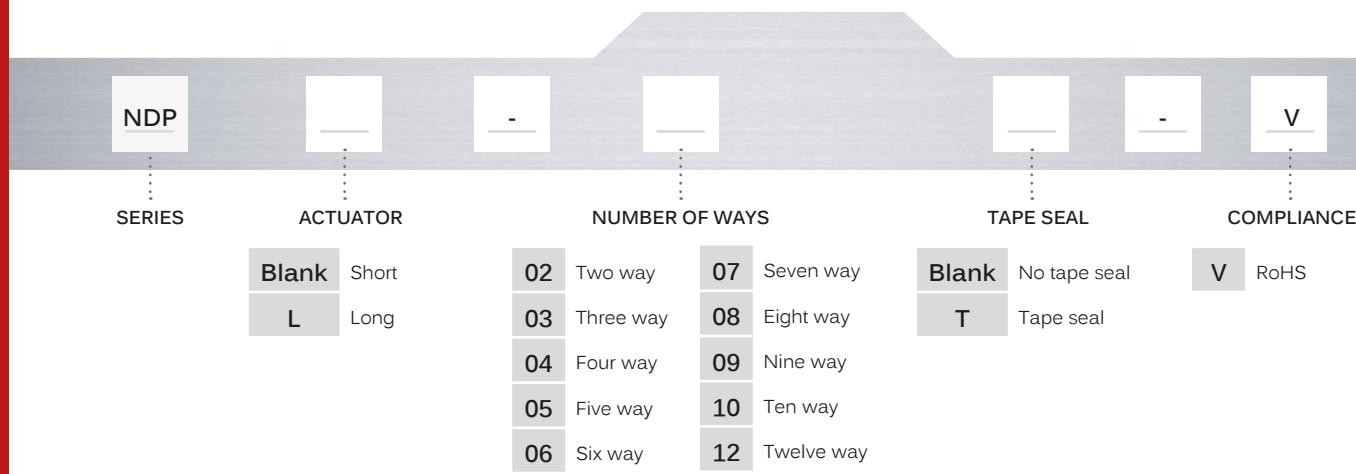
PACKAGING

IC TUBE THROUGH-HOLE

| Number of ways | No tape seal | With tape seal |
|----------------|--------------|----------------|
| 2 | 70 pcs | 65 pcs |
| 3 | 50 pcs | 49 pcs |
| 4 | 39 pcs | |
| 5 | 32 pcs | |
| 6 | 27pcs | |
| 7 | 24 pcs | |
| 8 | 21 pcs | |
| 9 | 19 pcs | |
| 10 | 17 pcs | |
| 12 | 14 pcs | |



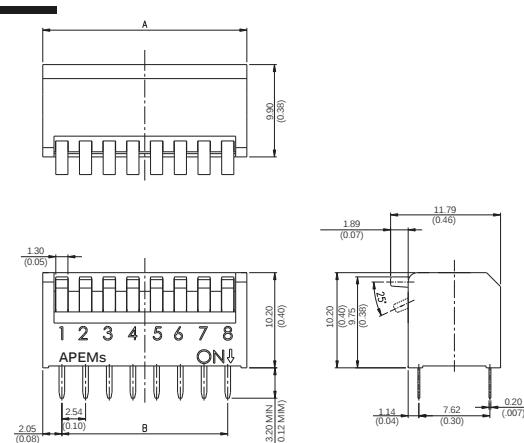
BUILD YOUR PART NUMBER



8 WAY STANDARD PROFILE THROUGH-HOLE PIANO STYLE



| Number of ways | Dimension A | Dimension B |
|----------------|-------------|-------------|
| 2 | 6.44(0.25) | 2.54(0.1) |
| 3 | 8.98(0.35) | 5.08(0.2) |
| 4 | 11.52(0.45) | 7.62(0.3) |
| 5 | 14.06(0.55) | 10.16(0.4) |
| 6 | 16.60(0.65) | 12.70(0.5) |
| 7 | 19.14(0.75) | 15.24(0.6) |
| 8 | 21.68(0.85) | 17.78(0.7) |
| 9 | 24.22(0.95) | 20.32(0.8) |
| 10 | 26.76(1.05) | 22.86(0.9) |
| 12 | 31.84(1.25) | 27.94(1.1) |



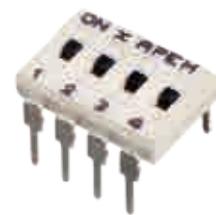
IKN series

Surface mount and through-hole DIP switches



DISTINCTIVE FEATURES

- Low profile
- Wide operating temperature range
- Self-cleaning wiping contacts
- Tin plated terminals



ENVIRONMENTAL SPECIFICATIONS

- Operating temperature : -40°C to +100°C
- Storage temperature : -40°C to +125°C



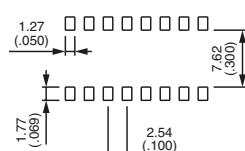
ELECTRICAL SPECIFICATIONS

- Max. current/voltage rating :
 - switching : 100mA 24VDC
 - non-switching : 100mA 48VDC
- Contact resistance :
 - initial : 30 mΩ max.
 - after 2.000 cycles : 100 mΩ max.
- Insulation resistance : 1.000 MΩ min. at 500VDC
- Dielectric strength : 500 VAC min.
- Electrical life : 2.000 cycles
- Travel : 0,67 mm (.026)

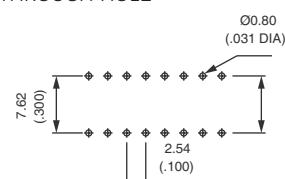


PCB LAYOUT

SURFACE MOUNT



THROUGH-HOLE



MATERIALS

- Case and actuator : UL 94-V0 thermoplastic
- Stationary contact : bronze, gold plated over nickel barrier
- Moving contact : beryllium copper, gold plated
- Terminals : tin plated over nickel barrier
- Protection tape : polyimide

The company reserves the right to change specifications without notice.

IKN series

Surface mount and through-hole DIP switches

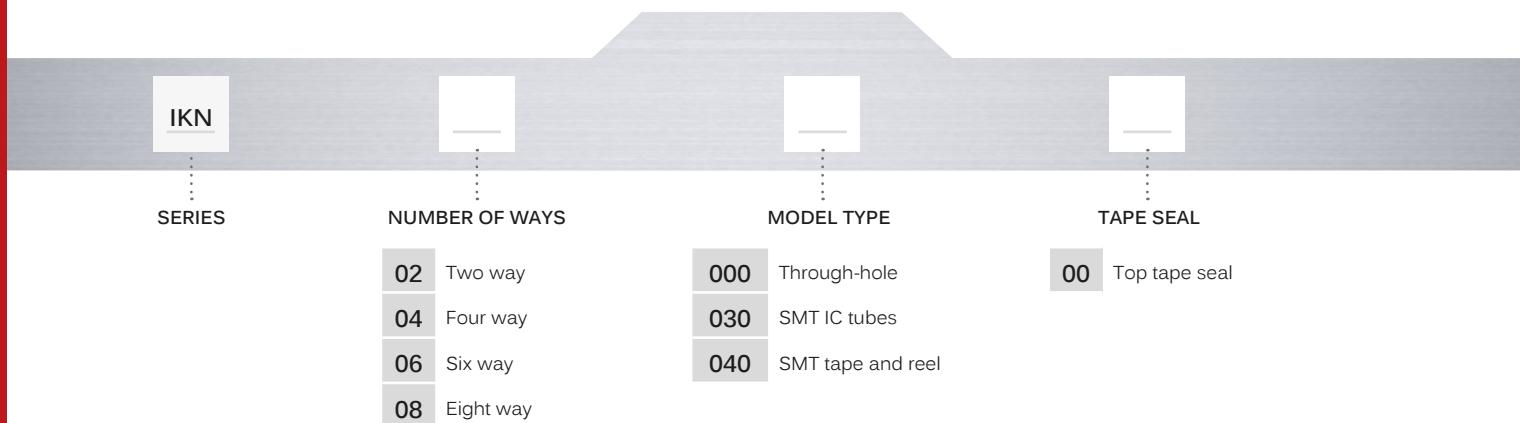


PACKAGING

| Number of ways | Tape and reel | IC tubes |
|----------------|---------------|----------|
| 2 | 1000 pcs | 88 pcs |
| 4 | | 48 pcs |
| 6 | | 33 pcs |
| 8 | | 25 pcs |



BUILD YOUR PART NUMBER

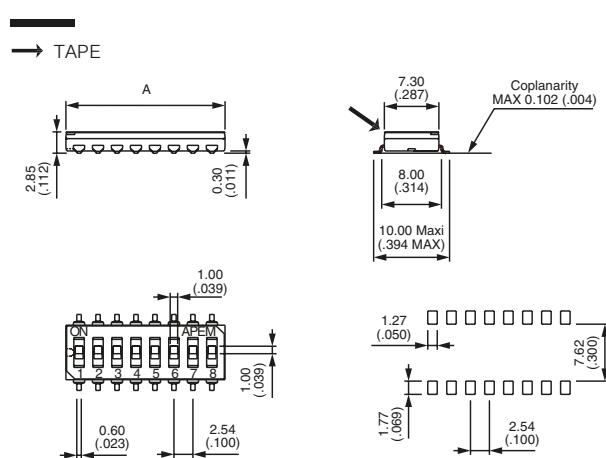


DIMENSIONS



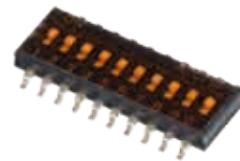
| Number of Poles | Dimension "A" |
|-----------------|---------------|
| 2 | 6 (.236) |
| 4 | 11,10 (.437) |
| 6 | 16,20 (.637) |
| 8 | 21,30 (.838) |

Supplied with all poles in "ON" position.
Other models (3, 5 and 7 positions) : on request



IKH series

Surface mount half pitch DIP switches



DISTINCTIVE FEATURES

- 1,27 mm (.050) terminal to terminal pitch
- Overall height from PCB : 1,6 mm (.063) only
- Very small PCB space requirement
- Self-cleaning wiping contacts



ENVIRONMENTAL SPECIFICATIONS

- Operating temperature : -20°C to +70°C
- Storage temperature : -40°C to +85°C



ELECTRICAL SPECIFICATIONS

- Max. current/voltage rating :
 - switching : 25mA 24VDC
 - non switching : 100mA 50VDC
- Initial contact resistance : 100 mΩ max.
- Insulation resistance : 100 MΩ min. at 500VDC
- Dielectric strength : 300 Vca min.
- Electrical life : 1.000 cycles
- Travel : 0,60 mm (.024)



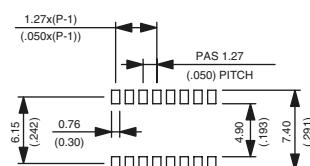
MATERIALS

- Case and cover : high temperature thermoplastic UL 94-V0, black
- Actuator : high temperature thermoplastic UL 94-V0, white
- Contacts : phosphor bronze, gold plated, over nickel barrier
- Terminals : tin plated
- Tape seal : polyimide

The company reserves the right to change specifications without notice.



PCB LAYOUT



IKH series

Surface mount half pitch DIP switches

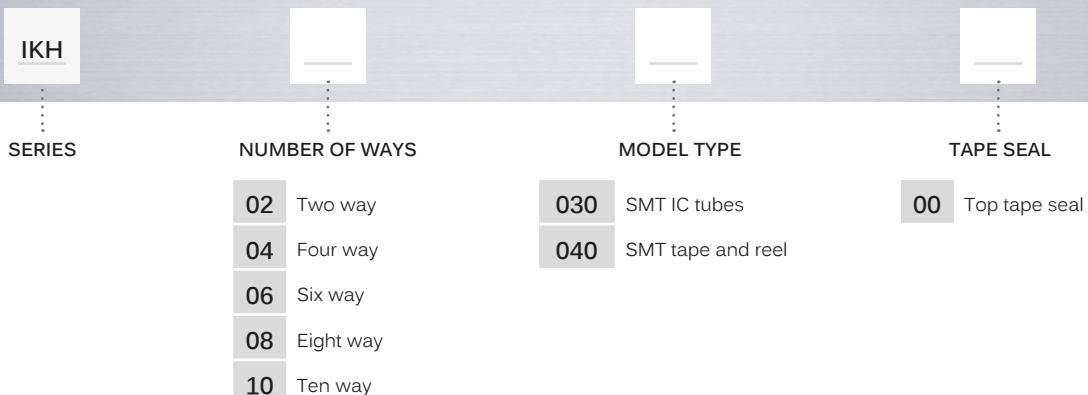


PACKAGING

| Number of ways | Tape and reel | IC tubes |
|----------------|---------------|----------|
| 2 | 1000 pcs | 125 pcs |
| 4 | | 75 pcs |
| 6 | | 54 pcs |
| 8 | | 40 pcs |
| 10 | | 33 pcs |



BUILD YOUR PART NUMBER

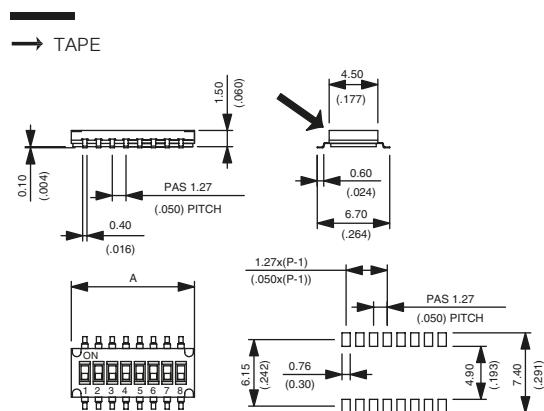


DIMENSIONS



| Number of ways | Dimension "A" |
|----------------|---------------|
| 2 | 3,77 (.148) |
| 4 | 6,31 (.248) |
| 6 | 8,85 (.348) |
| 8 | 11,39 (.448) |
| 10 | 13,93 (.548) |

Supplied with all poles in "ON" position.
Switches without tape seal : on request - Long terminal : on request.



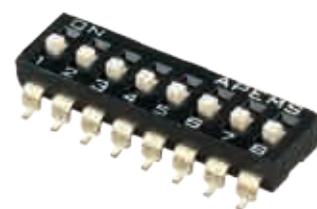
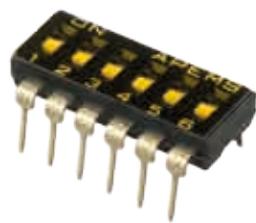
IKD series

Surface mount and through-hole
low profile dual in line switches



DISTINCTIVE FEATURES

- Raised and recessed actuators
- Even and odd pole numbers
- Self-cleaning wiping contacts
- Gold plated terminals



ENVIRONMENTAL SPECIFICATIONS

- Operating Temperature Range: -20°C to +85°C
- Storage Temperature Range: -40°C to +85°C
- Process compatible – withstand IR and vapor phase reflow soldering
- Washable (tape seal standard) except 1-pole model



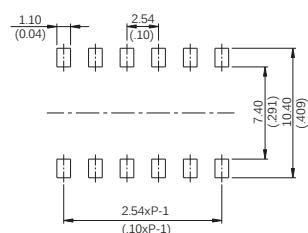
ELECTRICAL SPECIFICATIONS

- Max. Current/Voltage Rating:
 - Switching: 25mA 24VDC
 - Non-switching: 100mA 50VDC
- Initial Contact Resistance: 50mΩ max
- Insulation Resistance: 100MΩ min. at 500VDC
- Dielectric Strength: 500VAC min.
- Electrical Life: 2.000 cycles

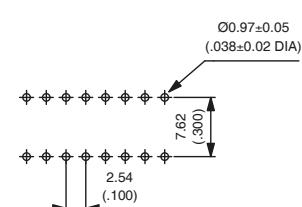


PCB LAYOUT

SURFACE MOUNT



THROUGH-HOLE



GENERAL SPECIFICATIONS

- Max Reverse Voltage: 5V
- Life Expectancy: 100.000 hours



MATERIALS

- Case & Actuator: UL94-V0
- Moving Contact: Phosphor bronze, gold plated, over nickel barrier
- Terminal: Gold plated
- Protection Tape: Polyimide

The company reserves the right to change specifications without notice.

IKD series

Surface mount and through-hole
low profile dual in line switches



PACKAGING

| Number of ways | TAPE AND REEL | | IC TUBE THROUGH-HOLE |
|----------------|-----------------|--------------------|----------------------|
| | Raised actuator | Recessed actuator | |
| 1 | 800 pcs | 800 pcs 900 pcs | 130 pcs |
| 2 | 700 pcs | | 76 pcs |
| 3 | 700 pcs | | 55 pcs |
| 4 | 700 pcs | | 42 pcs |
| 5 | 800 pcs | | 35 pcs |
| 6 | 700 pcs | | 28 pcs |
| 7 | 800 pcs | | 25 pcs |
| 8 | 700 pcs | | 22 pcs |
| 9 | 700 pcs | | 20 pcs |
| 10 | 700 pcs | | 18 pcs |
| 11 | 700 pcs | | 17 pcs |
| 12 | 700 pcs | | 15 pcs |

For surface mount J bend
please contact APEM



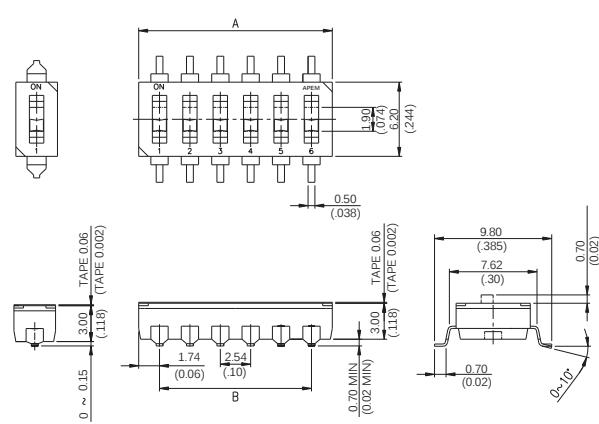
BUILD YOUR PART NUMBER

| IKD | | | | |
|---------------|-----------------------|-------------------|---|--------------------------|
| ... SERIES | ... NUMBER OF WAYS | ... MODEL TYPE | ... TAPE SEAL | |
| 01 | One way | 07 Seven way | 001 Through-hole raised actuators | 00 Top tape seal* |
| 02 | Two way | 08 Eight way | 000 Through-hole recessed actuators | 01 No tape seal |
| 03 | Three way | 09 Nine way | 031 SMT gull wing raised actuators IC tubes | *Recessed actuators only |
| 04 | Four way | 10 Ten way | 030 SMT gull wing recessed actuators IC tubes | |
| 05 | Five way | 11 Eleven way | 041 SMT gull wing raised actuators T/R | |
| 06 | Six way | 12 Twelve way | 040 SMT gull wing recessed actuators T/R | |
| | | | 051 SMT J bend raised actuators IC tubes | |
| | | | 050 SMT J bend recessed actuators IC tubes | |
| | | | 061 SMT J bend raised actuators T/R | |
| | | | 060 SMT J bend recessed actuators T/R | |

SMT GULL WING WITH RAISED ACTUATORS



| Number of ways | Dimension A | Dimension B |
|----------------|-------------|-------------|
| 1 | 3.48(.137) | N/A |
| 2 | 6.02(.237) | 2.54(.10) |
| 3 | 8.56(.337) | 5.08(.20) |
| 4 | 11.10(.437) | 7.62(.30) |
| 5 | 13.64(.537) | 10.16(.40) |
| 6 | 16.18(.637) | 12.70(.50) |
| 7 | 18.72(.737) | 15.24(.60) |
| 8 | 21.26(.837) | 17.78(.70) |
| 9 | 23.80(.937) | 20.32(.80) |
| 10 | 26.34(1.03) | 22.86(.90) |
| 12 | 31.42(1.23) | 27.94(1.10) |



10G

Round floating cap • low total height



DISTINCTIVE FEATURES

Round cap Ø11.0mm

h=4.9mm

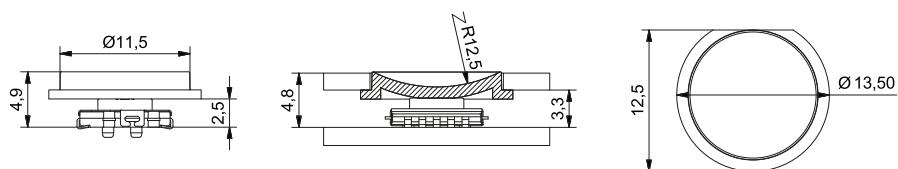
Concave cap

Floating mounting - easy alignment of PCB and front panel

Anti-rotation for printed caps

SWITCH SPECIFICATIONS : see Ultramec™ series

6C+10G - J-BEND

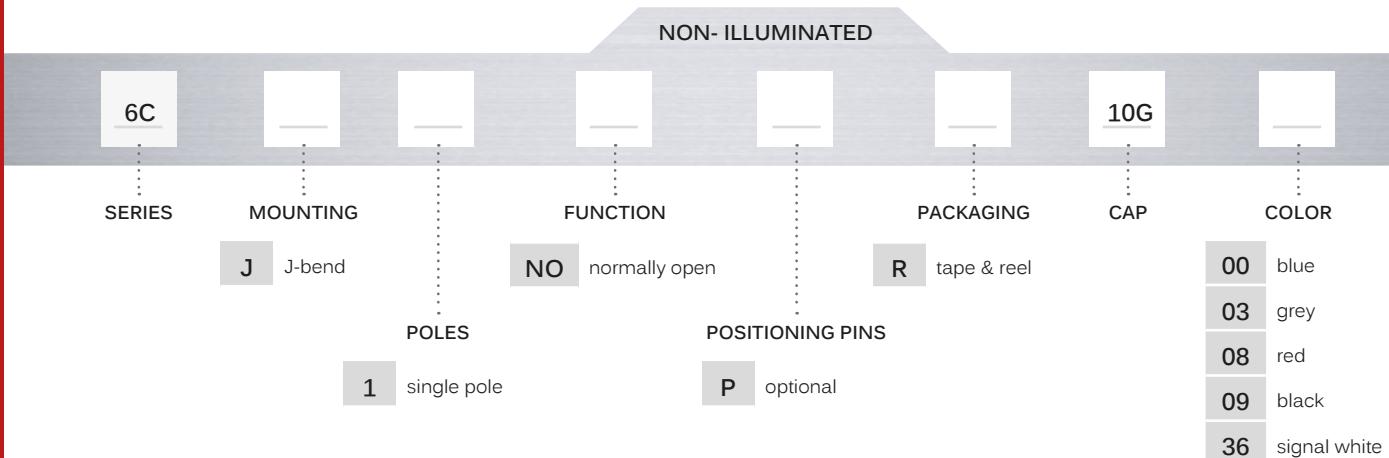


10G

Round floating cap • low total height



BUILD YOUR PART NUMBER



NOTICE : Refer to www.apem.com for further information.



MOUNTING

- Panel cut-out : min. Ø11.4 mm
- Switch spacing AxB : min. 14.0 + 14.0 mm



MATERIALS

- Cap : ABS UL94HB

Ultramec™ 6C

High performance tactile switches •
low profile • IP67



DISTINCTIVE FEATURES

Low profile h=2.5 mm

8 x 8 mm

Normally open momentary switch

Sealed to IP67

3,000,000 cycles lifetime



ENVIRONMENTAL SPECIFICATIONS

- Sealing : IP67 according to IEC 60529
- Working and storage temperature : -40°C/+85°C
- Soldering : JEDEC J-STD-020C



ELECTRICAL SPECIFICATIONS

- Recommended load : 0.5-50mA 24VDC
- Contact resistance : <50mΩ
- Insulation resistance : >10MΩ
- Contact bounce : <2mS
- Dielectric strength: 250V



MECHANICAL SPECIFICATIONS

- Standard actuation force :
before soldering 4.2N ±1.0N
after soldering : 3.7N ±0.7N
- Max. actuation force : 100N for 10 sec
- Travel : 0.3 mm ±0.15 mm
- Lifetime : 3,000,000 cycles

The company reserves the right to change specifications without notice.



MATERIALS

- Housing : PPS UL94V0
- Actuator : silicone
- Contact dome : stainless steel
- Fixed contacts :
Silver : CuZn + 1µNi + 4µAg
- Terminals : CuZn + 1µNi

All tolerance if not otherwise specified ±0.2mm.

Ultramec™ 6C

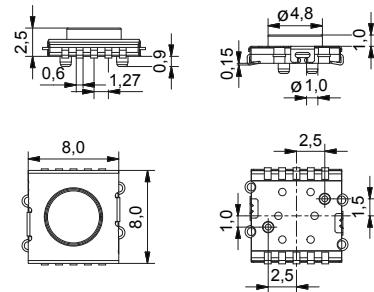
High performance tactile switches •
low profile • IP67

6C

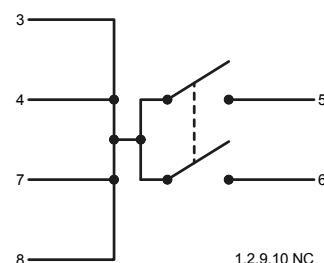
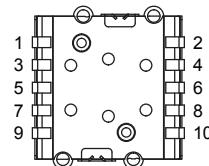
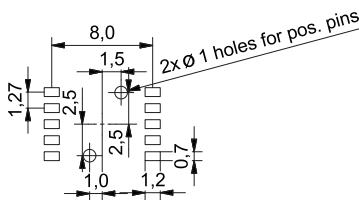


- J-bend
- NO

All tolerances unless otherwise noted : ± 0.2 mm



PCB LAYOUT & CIRCUIT DIAGRAM

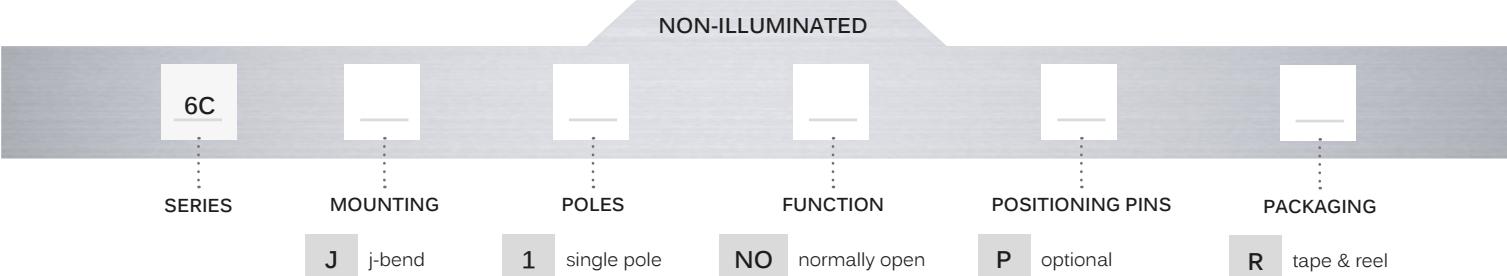


Ultramec™ 6C

High performance tactile switches •
low profile • IP67



BUILD YOUR PART NUMBER



ABOUT THIS SERIES



Notice : please note that not all combinations of above numbers are available.
Refer to www.apem.com for further information.



Accessories : See pages 321-322 for cap and bezel options

Ultramec™ 6C

High performance tactile switches •
low profile • IP67

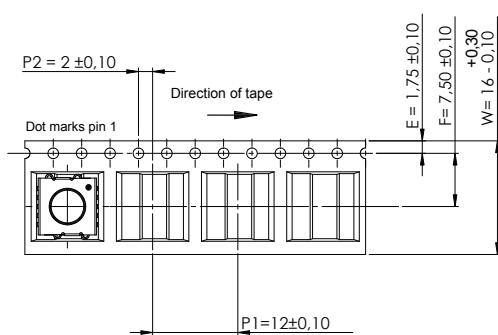


TAPE & REEL

Tape and reel is available for the parts listed and has the following specifications

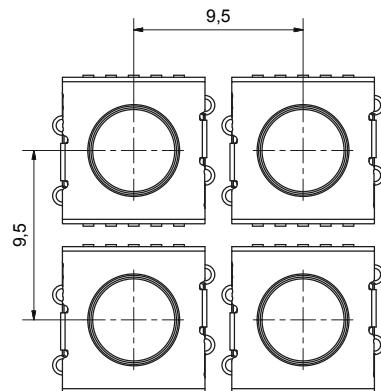
- Reel diameter: Ø330 mm
- Tape width: 16 mm
- Pitch: see list
- Tape and reel material : antistatic or better
- Quantity per reel : see list

| PART NO. | ORDERING CODE | PITCH | QUANTITY PER REEL |
|----------|---------------|-------|-------------------|
| 6CJ1NOP | 6CJ1NOPR | 12 | 1000 |
| 6CJ1NO | 6CJ1NOR | 12 | 1000 |



MOUNTING

SPACE REQUIREMENT - MATRIX MOUNTING



surface mount (J-bend)

1A/1H/1M/1ZA

Rectangular caps • rocker-action • long travel



DISTINCTIVE FEATURES

Rectangular rocker-action caps

Three sizes: 10.1 x 12.5 / 18.65 / 25.0 mm

h=12.2 mm

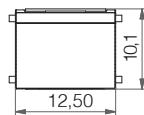
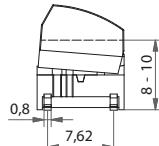
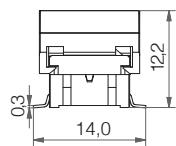
Long travel - 2 mm

The cap series can be combined into a custom keyboard

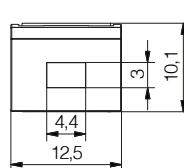
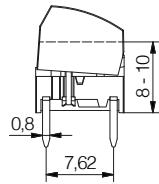
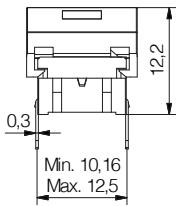


SWITCH SPECIFICATIONS : see Multimec® 5 series.

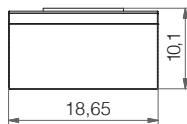
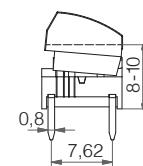
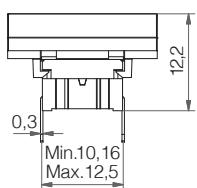
5G+1A - SMD



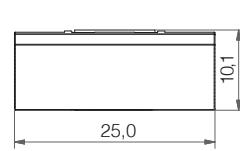
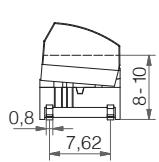
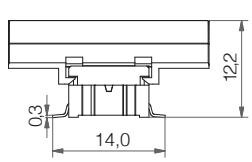
5G+1H - TH W/LED



5G+1ZA - TH



5G+1M - SMD



The company reserves the right to change specifications without notice. All tolerance if not otherwise specified $\pm 0.2\text{mm}$.

1A/1H/1M/1ZA

Rectangular caps • rocker-action • long travel



BUILD YOUR PART NUMBER

ILLUMINATED

| 5G | MOUNTING | ACTUATION FORCE | LED | CAP | COLOR | LENS |
|-------------------|----------|-------------------------|-----|------------------|-----------------|---------------|
| TH9 through-hole | 20 2.0N | 01 blue | 1A | 1H | 1H | 1 transparent |
| SH9 surface mount | 35 3.5N | 22 green | 1H | 03 grey | 2 green | |
| | 65 6.5N | 29 high intensity green | | 09 black | 4 yellow | |
| | | 42 yellow | | 1A | 6 frosted white | |
| | | 61 white | | 16 frosted white | 8 red | |
| | | 82 red | | | | |
| | | 2242 green/yellow | | | | |
| | | 8222 red/green | | | | |
| | | 8242 red/yellow | | | | |

NON-ILLUMINATED

| 5G | MOUNTING | ACTUATION FORCE | CAP | COLOR | 1A/1M | 1ZA | 1ZA |
|-------------------|----------|-----------------|-----------|---------------|---------------------|-----|-----|
| TH9 through-hole | 20 2.0N | 1A | 00 blue | 03 grey | 50 metal dark blue | | |
| SH9 surface mount | 35 3.5N | 1M | 02 green | 06 white | 53 metal light grey | | |
| | 65 6.5N | 1ZA | 03 grey | 09 black | 57 metal dark grey | | |
| | | | 04 yellow | 30 ultra blue | 58 metal bordeaux | | |
| | | | 06 white | 40 dusty blue | | | |
| | | | 08 red | 42 aqua blue | | | |
| | | | 09 black | | | | |

NOTICE : please note that not all combinations of above numbers are available.
Refer to www.apem.com for further information.



MOUNTING

- Panel cut-out :
 - 1A/1H : 13.0 x 10.5 mm
 - 1M : 25.7 x 10.5 mm
 - 1ZA : 19.4 x 10.5 mm
- Switch spacing AxB :
 - 1A/1H : 12.7 x 10.16 mm
 - 1M : 25.4 x 10.16 mm
 - 1ZA : 18.84 x 10.16 mm



MATERIALS

- Cap :
 - solid color : ABS UL94HB
 - illuminated : polycarbonate UL94HB
- Lens : polycarbonate UL94HB

1B/1C+2C/2D

Square solutions • rocker-action • long travel



DISTINCTIVE FEATURES

Square solution 15.1 x 15.1 mm

h=12.2 mm

Long travel - 2 mm

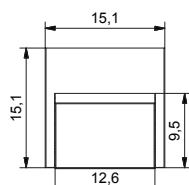
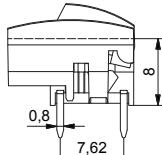
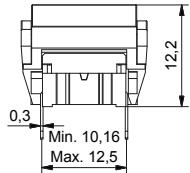
Full or lens illumination option with the cap

Illumination option in bezel with an LED on the PCB

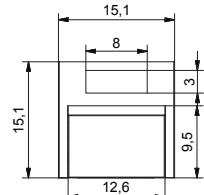
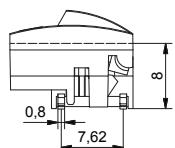
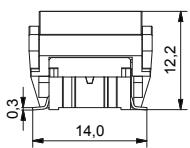


SWITCH SPECIFICATIONS : see Multimec® 5 series.

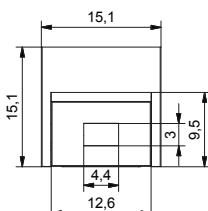
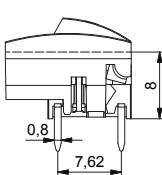
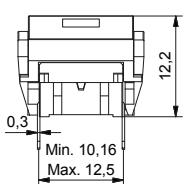
5G+1B+2C - TH



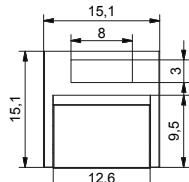
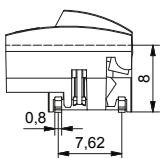
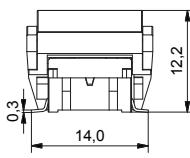
5G+1B+2D - SMD



5G+1C+2C - TH W/LED



5G+1B+2D - SMD - W/LED



The company reserves the right to change specifications without notice. All tolerance if not otherwise specified $\pm 0.2\text{mm}$.

1B/1C+2C/2D

Square solutions • rocker-action • long travel



BUILD YOUR PART NUMBER

| ILLUMINATED CAP | | | | | | | | | |
|---------------------|-------------------|-------------------------|-------|------------------|--------------------|-------------|-----------------|--|--|
| 5G | | | | | | | | | |
| SERIES | ACTUATION FORCE | LED | | COLOR | LENS 1C | BEZEL COLOR | LENS 2D | | |
| | 20 2.0N | 01 blue | | 1C | 1 transparent | 00 blue | 1 transparent | | |
| | 35 3.5N | 22 green | | 03 grey | 2 green | 03 grey | 2 green | | |
| | 65 6.5N | 29 high intensity green | | 08 red | 4 yellow | 06 white | 4 yellow | | |
| | | 42 yellow | | 09 black | 6 frosted white | 08 red | 6 frosted white | | |
| | | 61 white | | 1B | 8 red | 09 black | 8 red | | |
| | | 82 red | CAP | 16 frosted white | | | | | |
| MOUNTING | 2242 green/yellow | 1B | BEZEL | | | | | | |
| TH9 through-hole | 8222 red/green | 1C | 2C | non-illuminated | | | | | |
| SH9 surface mount | 8242 red/yellow | | 2D | illuminated | | | | | |
| NON-ILLUMINATED CAP | | | | | | | | | |
| 5G | | | 1B | | | | | | |
| SERIES | MOUNTING | ACTUATION FORCE | CAP | CAP COLOR | BEZEL | BEZEL COLOR | LENS 2D | | |
| | TH9 through-hole | 20 2.0N | | 00 blue | 2C non-illuminated | 00 blue | 1 transparent | | |
| | SH9 surface mount | 35 3.5N | | 02 green | 2D illuminated | 03 grey | 2 green | | |
| | | 65 6.5N | | 03 grey | | 06 white | 4 yellow | | |
| | | | | 04 yellow | | 08 red | 6 frosted white | | |
| | | | | 06 white | | 09 black | 8 red | | |
| | | | | 08 red | | | | | |
| | | | | 09 black | | | | | |

NOTICE : please note that not all combinations of above numbers are available. Refer to www.apem.com for further information.



MOUNTING

- Panel cut-out : min. 15.5 x 15.5 mm
- Switch spacing AxB : min. 15.24 x 15.24 mm



MATERIALS

- Cap :
 - solid color : ABS UL94HB
 - illuminated : polycarbonate UL94HB
- Lens : polycarbonate UL94HB

1DS/1ES/1FS

Round caps • many color options •
many illumination options



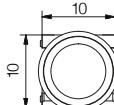
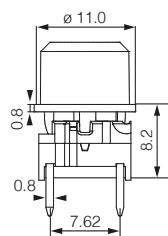
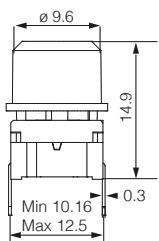
DISTINCTIVE FEATURES

- Round Ø9.6 mm
- h=14.9 mm
- Soft edges
- Full, lens or legend illumination option
- 20 color options

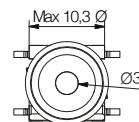
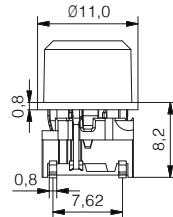
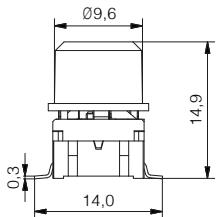


SWITCH SPECIFICATIONS : see Multimec® 5 series.

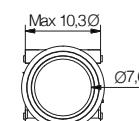
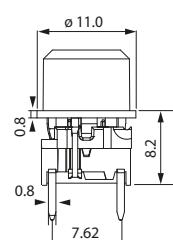
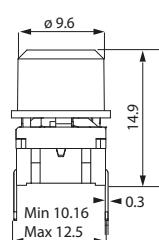
5G+1DS - TH



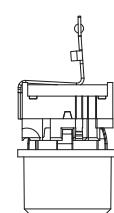
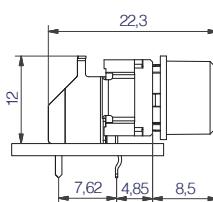
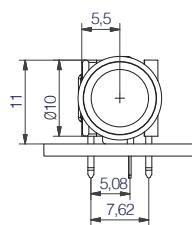
5G+1ES - SMD W/LED



5G+1FS - TH W/LED



5G+1DS WITH RAS



The company reserves the right to change specifications without notice. All tolerance if not otherwise specified $\pm 0.2\text{mm}$.

1DS/1ES/1FS

Round caps • many color options •
many illumination options



BUILD YOUR PART NUMBER

| ILLUMINATED | | | | | | |
|-------------------|----------|-------------------------|-----|------------------|-----------------|--------------|
| 5G | MOUNTING | ACTUATION FORCE | LED | CAP | COLOR 1ES/1FS | LENS 1ES/1FS |
| TH9 through-hole | 20 2.0N | 01 blue | 1ES | 00 blue | 1 transparent | |
| SH9 surface mount | 35 3.5N | 22 green | 1FS | 02 green | 2 green | |
| | 65 6.5N | 29 high intensity green | 1DS | 03 grey | 4 yellow | |
| | | 42 yellow | | 04 yellow | 6 frosted white | |
| | | 61 white | | 06 white | | |
| | | 82 red | | 08 red | 8 red | |
| | | 2242 green/yellow | | 09 black | | |
| | | 8222 red/green | | 11 transparent | | |
| | | 8242 red/yellow | | 16 frosted white | | |
| | | | | 1DS | | |

| NON-ILLUMINATED | | | | | | |
|-------------------|----------|-----------------|-----|-----------|---------------|---------------------|
| 5G | MOUNTING | ACTUATION FORCE | 1DS | CAP | COLOR | |
| TH9 through-hole | 20 2.0N | | | 00 blue | 30 ultra blue | 50 metal dark blue |
| SH9 surface mount | 35 3.5N | | | 02 green | 40 dusty blue | 53 metal light grey |
| | 65 6.5N | | | 03 grey | 42 aqua blue | 57 metal dark grey |
| | | | | 04 yellow | 32 mint green | 58 metal bordeaux |
| | | | | 06 white | 33 tele grey | |
| | | | | 08 red | 34 melon | |
| | | | | 09 black | 38 noble red | |

NOTICE : Please note that not all combinations of above numbers are available.
Other versions : Please refer to www.apem.com for information on the 3F & 4F series versions - 1D/1E/1F



MOUNTING

- Panel cut-out : min. Ø10.0 mm
- Switch spacing AxB : min. 12.7 x 12.7 mm



MATERIALS

- Cap :
 - solid color : ABS UL94HB
 - illuminated : polycarbonate UL94HB
- Lens : polycarbonate UL94HB

1GAS/1GCS

Ø11 mm & 15 mm round caps •
for under overlay



DISTINCTIVE FEATURES

Round Ø11 mm and Ø15 mm

h=12.5 mm

Flat surface

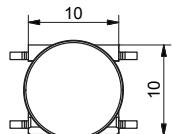
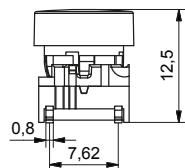
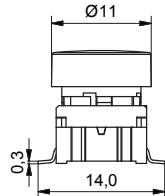
Rounded edges for better use under overlay

Illumination available

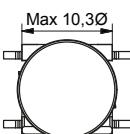
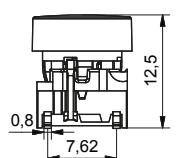
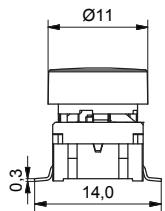


SWITCH SPECIFICATIONS : see Multimec® 5 series.

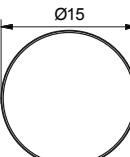
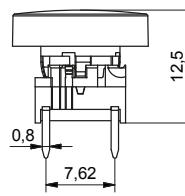
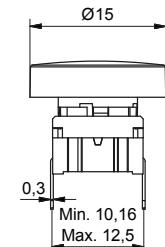
5G+1GAS - SMD



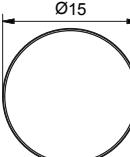
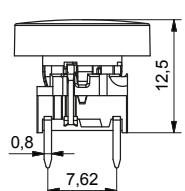
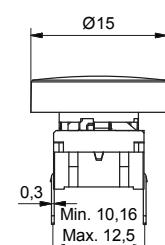
5G+1GAS - SMD W/LED



5G+1GCS - TH



5G+1GCS - TH W/LED



1GAS/1GCS

Ø11 mm & 15 mm round caps •
for under overlay



BUILD YOUR PART NUMBER

ILLUMINATED

5G

SERIES

MOUNTING

ACTUATION FORCE

ILLUMINATED

LED

CAP

COLOR

TH9 through-hole

20 2.0N

01 blue

1GAS

11 transparent

SH9 surface mount

35 3.5N

22 green

1GCS

16 frosted white

65 6.5N

29 high intensity green

42 yellow

61 white

82 red

2242 green/yellow

8222 red/green

8242 red/yellow

NON-ILLUMINATED

5G

SERIES

MOUNTING

ACTUATION FORCE

CAP

COLOR

TH9 through-hole

20 2.0N

1GAS

00 blue

SH9 surface mount

35 3.5N

1GCS

02 green

65 6.5N

03 grey

04 yellow

06 white

08 red

09 black

NOTICE : Other versions : Please refer to www.apem.com for information on the 3F & 4F series versions - 1GA/1GC



MOUNTING

- Panel cut-out :
 - 1GAS - min. Ø11.4 mm
 - 1GCS - min. Ø15.4 mm
- Switch spacing AxB :
 - 1GAS - min. 12.7x11.14 mm
 - 1GCS - min. 15.14x15.24 mm



MATERIALS

- Cap :
 - solid color : ABS UL94HB
 - illuminated : polycarbonate UL94HB

1JS

Ø9.6 mm round caps •
for under overlay



DISTINCTIVE FEATURES

Round Ø9.6 mm

h=10.4 mm

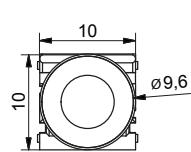
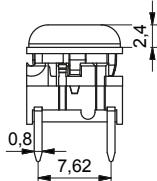
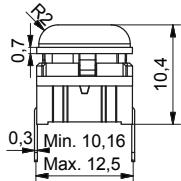
Round edges make it excellent for under overlay

Low total height

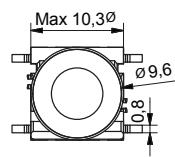
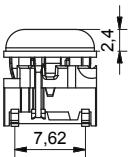
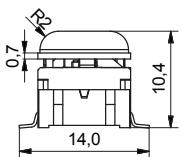
Illumination available

SWITCH SPECIFICATIONS : see Multimec® 5 series.

5G+1JS - TH



5G+1JS - SMD - W/LED



1JS

Ø9.6 mm round caps •
for under overlay



BUILD YOUR PART NUMBER

ILLUMINATED

| 5G | | | | 1JS | |
|--------|---------------|-----------------|-------------------------|------------------|-------|
| SERIES | MOUNTING | ACTUATION FORCE | LED | CAP | COLOR |
| TH9 | through-hole | 20 2.0N | 01 blue | 11 transparent | |
| SH9 | surface mount | 35 3.5N | 22 green | 16 frosted white | |
| | | 65 6.5N | 29 high intensity green | | |
| | | | 42 yellow | | |
| | | | 61 white | | |
| | | | 82 red | | |
| | | | 2242 green/yellow | | |
| | | | 8222 red/green | | |
| | | | 8242 red/yellow | | |

NON-ILLUMINATED

| 5G | | | | 1JS | |
|--------|---------------|-----------------|-----------|-------|--|
| SERIES | MOUNTING | ACTUATION FORCE | CAP | COLOR | |
| TH9 | through-hole | 20 2.0N | 00 blue | | |
| SH9 | surface mount | 35 3.5N | 02 green | | |
| | | 65 6.5N | 03 grey | | |
| | | | 04 yellow | | |
| | | | 06 white | | |
| | | | 08 red | | |
| | | | 09 black | | |

NOTICE : Refer to www.apem.com for further information.



MOUNTING

- Panel cut-out : min. Ø10.4 mm
- Switch spacing AxB : min. 12.7 x 12.7 mm



MATERIALS

- Cap :
 - solid color : ABS UL94HB
 - illuminated : polycarbonate UL94HB

1KS/1KBS/ 1KCS+2K

Square caps • different top surfaces •
insertable legend option



DISTINCTIVE FEATURES

Square caps 14.3 x 14.3 mm

h=19.1-20.2 mm

Flat, convex or concave top surface

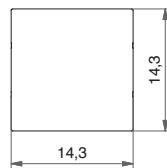
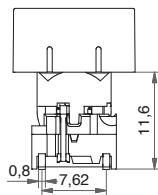
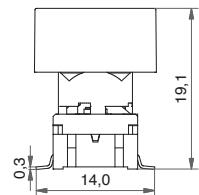
A layer with legend can be inserted between cap and diffusor

Bezel option

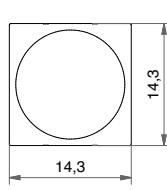
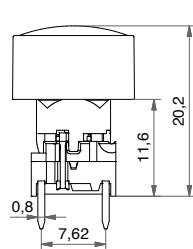
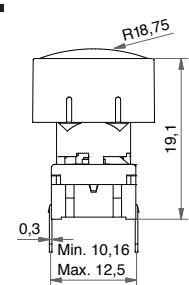


SWITCH SPECIFICATIONS : see Multimec® 5 series.

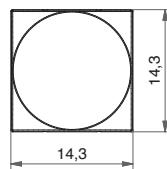
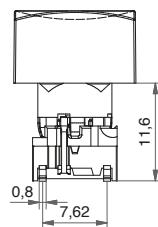
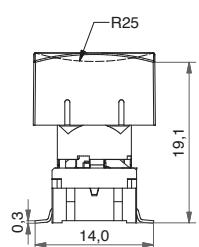
5G+1KS - SMD - W/LED



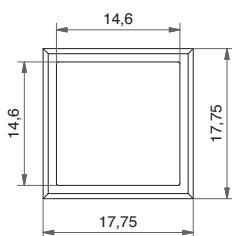
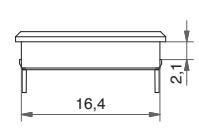
5G+1KBS - TH - W/LED



5G+1KCS - SMD - W/LED



2K



1KS/1KBS/1KCS + 2K

Square caps • different top surfaces •
insertable legend option



BUILD YOUR PART NUMBER

ILLUMINATED

5G

SERIES

ACTUATION FORCE

LED

CAP

BEZEL

COLOR

| | | | | | | |
|----|------|------|----------------------|------|---|----------|
| 20 | 2.0N | 01 | blue | 1KS | 2K | 03 grey |
| 35 | 3.5N | 22 | green | 1KBS | | 06 white |
| 65 | 6.5N | 29 | high intensity green | 1KCS | | 08 red |
| | | 42 | yellow | | | 09 black |
| | | 61 | white | | | |
| | | 82 | red | | | |
| | | 2242 | green/yellow | 1116 | frosted white lens with transparent lid | |
| | | 8222 | red/green | | | |
| | | 8242 | red/yellow | | | |

MOUNTING

TH9 through-hole

SH9 surface mount

NON-ILLUMINATED

5G

SERIES

MOUNTING

ACTUATION FORCE

1KS

CAP

COLOR

BEZEL

COLOR

| | | | | | | |
|-----|---------------|----|------|--------------------------|----------|---------|
| TH9 | through-hole | 20 | 2.0N | incl. frosted white lens | 2K | 03 grey |
| SH9 | surface mount | 35 | 3.5N | 0016 blue | 06 white | 08 red |
| | | 65 | 6.5N | 0216 green | 09 black | |
| | | | | 0316 grey | | |
| | | | | 0416 yellow | | |
| | | | | 0616 white | | |
| | | | | 0816 red | | |
| | | | | 0916 black | | |

NOTICE : Other versions : Please refer to www.apem.com for information on the 3F & 4F series versions - 1K/1KB/1KC



MOUNTING

- Panel cut-out : min. 14.7 x 14.7 mm
- Switch spacing AxB : min. 15.24 x 15.24 mm



MATERIALS

- Cap :
 - solid color : ABS UL94HB
 - illuminated : polycarbonate UL94HB
- Lens : polycarbonate UL94HB

1NS

Teardrop-shaped cap • for navigation or indicating • illumination option



DISTINCTIVE FEATURES

Teardrop-shaped cap : Ø9.6 / □4.9 mm

h=14.9 mm

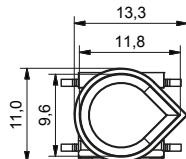
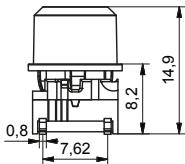
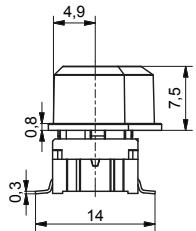
Excellent for creative layouts for navigation or indicating

Illumination available

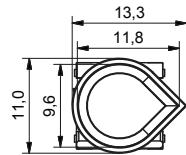
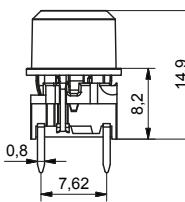
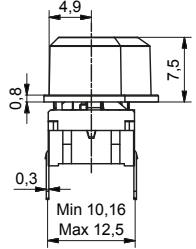


SWITCH SPECIFICATIONS : see Multimec® 5 series.

5G+1NS - SMD



5G+1NS - TH - W/LED



1NS

Teardrop-shaped cap • for navigation or indicating • illumination option



BUILD YOUR PART NUMBER

ILLUMINATED

5G

SERIES

MOUNTING

ACTUATION FORCE

1NS

COLOR

TH9 through-hole

20 2.0N

01

blue

16 frosted white

SH9 surface mount

35 3.5N

22

green

65 6.5N

29

high intensity green

42

yellow

61

white

82

red

2242

green/yellow

8222

red/green

8242

red/yellow

NON-ILLUMINATED

5G

SERIES

MOUNTING

ACTUATION FORCE

1NS

COLOR

TH9 through-hole

20 2.0N

03 grey

SH9 surface mount

35 3.5N

09 black

65 6.5N

NOTICE : Other versions : Please refer to www.apem.com for information on the 3F & 4F series version - 1N



MOUNTING

- Panel cut-out : min. Ø10.2/□5.1 mm
- Switch spacing AxB : min. 12.7 x 12.7 mm



MATERIALS

- Cap :
 - solid color : ABS UL94HB
 - illuminated : polycarbonate UL94HB

1PS/1QS/1RS

Rectangular caps • concave surface • different illumination options



DISTINCTIVE FEATURES

Rectangular caps 6.5 x 12.5 mm

h=15.7 mm

Concave top surface

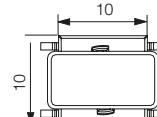
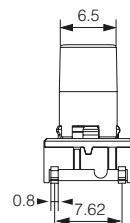
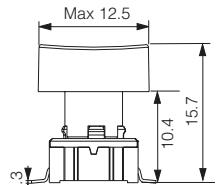
Full or lens illumination option

5E/5G + 1PS; 5G + 1QS/1RS

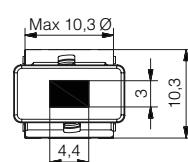
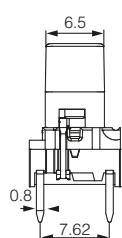
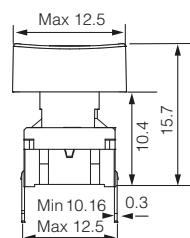


SWITCH SPECIFICATIONS : see Multimec® 5 series.

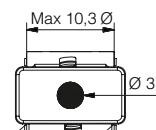
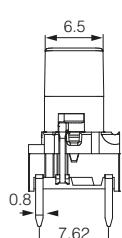
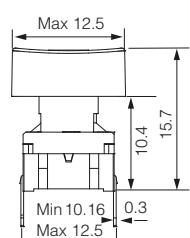
5E+1PS - SMD



5G+1QS - TH W/LED



5G+1RS - TH W/LED



1PS/1QS/1RS

Rectangular caps • concave surface • different illumination options



BUILD YOUR PART NUMBER

ILLUMINATED

| 5G | MOUNTING | ACTUATION FORCE | LED | CAP | COLOR | LENS |
|-------------------|----------|-------------------------|-----|------------------|-----------------|------|
| TH9 through-hole | 20 2.0N | 01 blue | 1PS | 1QS/1RS | 1 transparent | |
| SH9 surface mount | 35 3.5N | 22 green | 1QS | 00 blue | 6 frosted white | |
| | 65 6.5N | 29 high intensity green | 1RS | 03 grey | | |
| | | 42 yellow | | 09 black | | |
| | | 61 white | | 1PS | | |
| | | 82 red | | 11 transparent | | |
| | | 2242 green/yellow | | 16 frosted white | | |
| | | 8222 red/green | | | | |
| | | 8242 red/yellow | | | | |

NON-ILLUMINATED

| 5E | MOUNTING | ACTUATION FORCE | CAP | COLOR |
|-------------------|----------|-----------------|-----------|-------|
| TH9 through-hole | 20 2.0N | | 00 blue | |
| SH9 surface mount | 35 3.5N | | 02 green | |
| | 65 6.5N | | 03 grey | |
| | | | 04 yellow | |
| | | | 06 white | |
| | | | 08 red | |
| | | | 09 black | |

NOTICE : Please note that not all combinations of above numbers are available.

Other versions : Please refer to www.apem.com for information on the 3F & 4F series versions - 1P/1Q/1R



MOUNTING

- Panel cut-out : min. 7.0 x 13.0 mm, R max 1.0
- Switch spacing AxB : min. 15.24 x 10.16 mm



MATERIALS

- Cap :
 - solid color : ABS UL94HB
 - illuminated : polycarbonate UL94HB
- Lens : polycarbonate UL94HB

1SS/1IS/1LS

Small round caps •
variable heights • illumination option



DISTINCTIVE FEATURES

Round caps Ø6.5 mm

9 different total height options : 8.0 - 22.5 mm

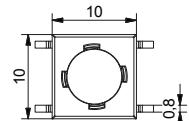
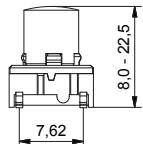
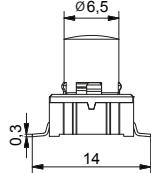
Full or lens illumination option

7 solid, 2 transparent and 5 lens colors

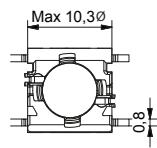
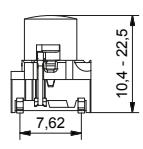
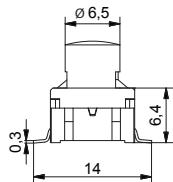


SWITCH SPECIFICATIONS : see Multimec® 5 series.

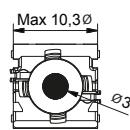
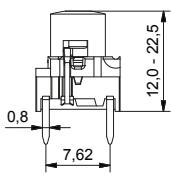
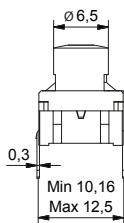
5E+1SS - SMD



5G+1IS - SMD - W/LED



5G+1LS - TH - W/LED



1SS/1IS/1LS

Small round caps •
variable heights • illumination option



BUILD YOUR PART NUMBER

ILLUMINATED

| | | | | | | | | |
|--------------------------|-------------------------|--------------------------|-----|--|------------|------------------|---|---------------|
| 5G | | | | | | | | |
| SERIES | | | | | CAP | | | |
| | | ACTUATION FORCE | | | 1IS | 1LS | 1 | transparent |
| | | 20 2.0N | | | 1LS | 00 blue | 2 | green |
| | | 35 3.5N | | | | 02 green | 4 | yellow |
| | | 65 6.5N | | | | 03 grey | 6 | frosted white |
| MOUNTING | | | LED | | | 04 yellow | 8 | red |
| TH9 through-hole | 01 blue | 82 red | | | | 06 white | | |
| SH9 surface mount | 22 green | 2242 green/yellow | | | | 08 red | | |
| | 29 high intensity green | 8222 red/green | | | | 09 black | | |
| | 42 yellow | 8242 red/yellow | | | | 11S | | |
| | 61 white | | | | | 11 transparent | | |
| | | | | | | 16 frosted white | | |

NON-ILLUMINATED

| | | | | | | | | |
|--------------------------|--|-----------------|------------|--|-----------|----------|------|------|
| 5E | | | 1SS | | | | | |
| SERIES | | | CAP | | | | | |
| | | ACTUATION FORCE | | | 00 blue | 06 white | 08.0 | 08.0 |
| | | 20 2.0N | | | 02 green | 08 red | 09.5 | 09.5 |
| | | 35 3.5N | | | 03 grey | 09 black | 10.4 | 10.4 |
| MOUNTING | | 65 6.5N | | | 04 yellow | | 11.0 | 11.0 |
| TH9 through-hole | | | | | | | 12.0 | 12.0 |
| SH9 surface mount | | | | | | | 15.0 | 15.0 |
| | | | | | | | 16.0 | 16.0 |
| | | | | | | | 19.0 | 19.0 |
| | | | | | | | 22.5 | 22.5 |

NOTICE : Please note that not all combinations of above numbers are available. Refer to www.apem.com for further information. Other versions : Please refer to www.apem.com for information on the 3F & 4F series version - 1S



MOUNTING

- Panel cut-out : min. Ø7.0 mm
- Switch spacing AxB : min. 12.7 x 12.7 mm



MATERIALS

- Cap :
 - solid color 1SS: polyamide UL94V2
 - solid color 1LS: ABS UL94HB
 - illuminated : polycarbonate UL94HB
- Lens : polycarbonate UL94HB

1TS/1US/1VS

Square, round and half-ellipse shaped caps •
for navigation unit • front panel sealing option



DISTINCTIVE FEATURES

1TS: 10.6 x 10.6; 1US: Ø10.6; 1VS: 10.4 x 13.25 mm

h=14.9 mm

Rounded top surface

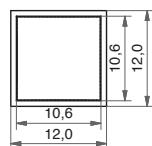
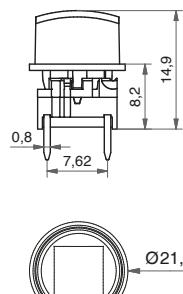
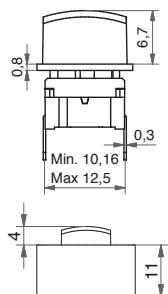
Front panel seal options to IP67 - 1TS&1US or IP65 - 1VS

Can be combined for a navigation unit



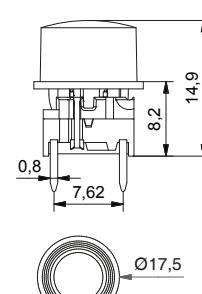
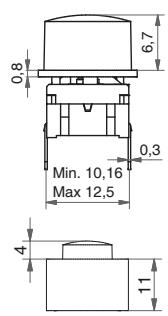
SWITCH SPECIFICATIONS : see Multimec® 5 series.

5G+1TS - TH



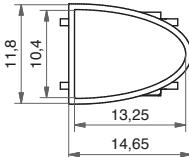
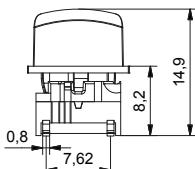
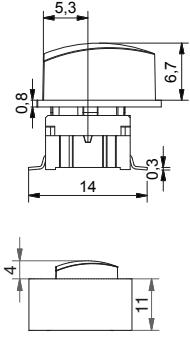
with sealing 1TW

5G+1US - TH - W/LED



with sealing 1UW

5G+1VS - SMD



with sealing 1VW

The company reserves the right to change specifications without notice. All tolerance if not otherwise specified $\pm 0.2\text{mm}$.

1TS/1US/1VS

Square, round and half-ellipse shaped caps •
for navigation unit • front panel sealing option



BUILD YOUR PART NUMBER

ILLUMINATED

| | | | | | |
|-------------------|----------|-------------------------|-----|-----|---------------|
| 5G | | | | | |
| SERIES | MOUNTING | ACTUATION FORCE | LED | CAP | COLOR |
| TH9 through-hole | 20 2.0N | 01 blue | 1TS | 16 | frosted white |
| SH9 surface mount | 35 3.5N | 22 green | 1US | | |
| | 65 6.5N | 29 high intensity green | 1VS | | |
| | | 42 yellow | | | |
| | | 61 white | | | |
| | | 82 red | | | |
| | | 2242 green/yellow | | | |
| | | 8222 red/green | | | |
| | | 8242 red/yellow | | | |

NON-ILLUMINATED

| | | | | |
|-------------------|----------|-----------------|-----|-------|
| 5E | | | | |
| SERIES | MOUNTING | ACTUATION FORCE | CAP | COLOR |
| TH9 through-hole | 20 2.0N | 1TS | 00 | blue |
| SH9 surface mount | 35 3.5N | 1US | 03 | grey |
| | 65 6.5N | 1VS | 08 | red |
| | | | 09 | black |

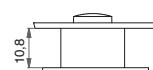
NOTICE : Other versions : Please refer to www.apem.com for information on the 3F & 4F series versions - 1T/1U/1V



MOUNTING

- Panel cut-out :
 - 1TS : min. 11.0 x 11.0 mm
 - 1US : min. Ø11.0 mm
 - 1VS : min. 11.0 x 13.65 mm
- Switch spacing AxB : min. 12.7 x 12.7 mm

DISTANCE BETWEEN PCB
AND FRONT PANEL
IN CASE OF SEALING



MATERIALS

- Cap :
 - solid color : ABS UL94HB
 - illuminated : polycarbonate UL94HB
- Lens : polycarbonate UL94HB

1WAS/1WDS/ 1WPS

Ellipse-shaped caps • different top surfaces •
two sizes



DISTINCTIVE FEATURES

1WAS/1WPS : 6.5 x 12.5 mm

1WDS - 8.0 x 15.2 mm

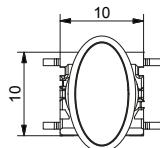
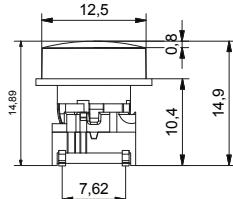
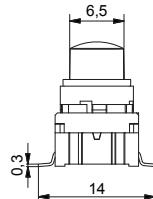
1WAS/1WDS : h=15 mm; convex top surface

1WPS : h=15.7 mm; concave top surface

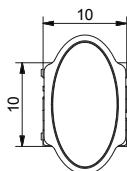
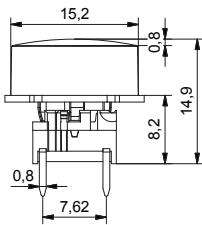
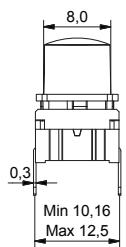


SWITCH SPECIFICATIONS : see Multimec® 5 series.

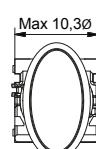
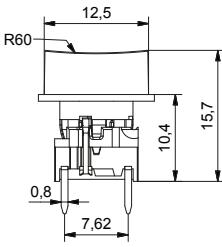
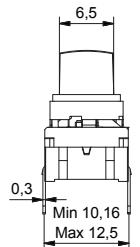
5G+1WAS - SMD



5G+1WDS - TH



5G+1WPS - TH W/LED



1WAS/1WDS/1WPS

Ellipse-shaped caps • different top surfaces • two sizes



BUILD YOUR PART NUMBER

ILLUMINATED

| 5G | | | | | | |
|--------|---------------|-----------------|-------------------------|------|-------|---------------|
| SERIES | MOUNTING | ACTUATION FORCE | LED | CAP | COLOR | |
| TH9 | through-hole | 20 2.0N | 01 blue | 1WAS | 16 | frosted white |
| SH9 | surface mount | 35 3.5N | 22 green | 1WDS | | |
| | | 65 6.5N | 29 high intensity green | 1WPS | | |
| | | | 42 yellow | | | |
| | | | 61 white | | | |
| | | | 82 red | | | |
| | | | 2242 green/yellow | | | |
| | | | 8222 red/green | | | |
| | | | 8242 red/yellow | | | |

NON-ILLUMINATED

| 5G | | | | | | |
|--------|---------------|-----------------|------|----------|----|------------------|
| SERIES | MOUNTING | ACTUATION FORCE | CAP | COLOR | | |
| TH9 | through-hole | 20 2.0N | 1WAS | 00 blue | 30 | ultra blue |
| SH9 | surface mount | 35 3.5N | 1WDS | 03 grey | 40 | dusty blue |
| | | 65 6.5N | 1WPS | 08 red | 42 | aqua blue |
| | | | | 09 black | 53 | metal light grey |
| | | | | | 57 | metal dark grey |

NOTICE : Other versions : Please refer to www.apem.com for information on the 3F & 4F series versions - 1WA/1WD/1WP



MOUNTING

- Panel cut-out :

1WAS/1WPS : min. 12.9 x 6.9 mm

1WDS : min. 15.6 x 8.4 mm
- Switch spacing AxB :

1WAS/1WPS : min. 12.7 x 10.3 mm

1WDS : min. 15.34 x 10.3 mm



MATERIALS

- Cap :

- solid color : ABS UL94HB

- illuminated : polycarbonate UL94HB

1XS

Rectangular caps • soft edges



DISTINCTIVE FEATURES

Rectangular 7.4 x 9.4 mm

h=18.5 mm

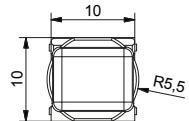
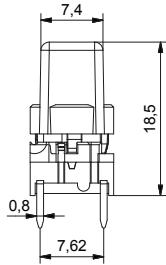
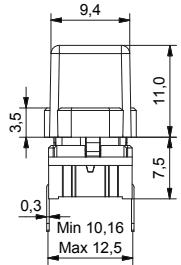
Soft edges

Illumination option

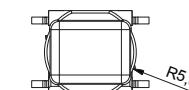
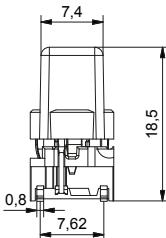
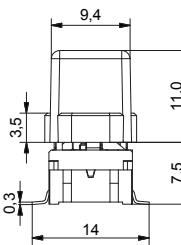


SWITCH SPECIFICATIONS : see Multimec® 5 series.

5G+1XS - TH



5G+1XS - SMD W/LED



1XS

Rectangular caps • soft edges



BUILD YOUR PART NUMBER

ILLUMINATED

| 5G | | | | 1XS | |
|--------|---------------|-----------------|-------------------------|------------------|-------|
| SERIES | MOUNTING | ACTUATION FORCE | LED | CAP | COLOR |
| TH9 | through-hole | 20 2.0N | 01 blue | 11 transparent | |
| SH9 | surface mount | 35 3.5N | 22 green | 16 frosted white | |
| | | 65 6.5N | 29 high intensity green | | |
| | | | 42 yellow | | |
| | | | 61 white | | |
| | | | 82 red | | |
| | | | 2242 green/yellow | | |
| | | | 8222 red/green | | |
| | | | 8242 red/yellow | | |

NON-ILLUMINATED

| 5E | | | | 1XS | |
|--------|---------------|-----------------|-----------|-------|--|
| SERIES | MOUNTING | ACTUATION FORCE | CAP | COLOR | |
| TH9 | through-hole | 20 2.0N | 00 blue | | |
| SH9 | surface mount | 35 3.5N | 02 green | | |
| | | 65 6.5N | 03 grey | | |
| | | | 04 yellow | | |
| | | | 06 white | | |
| | | | 08 red | | |
| | | | 09 black | | |

NOTICE : Other versions : Please refer to www.apem.com for information on the 3F & 4F series version - 1X



MOUNTING

- Panel cut-out : min. 9.8 x 7.9 mm
- Switch spacing AxB : min. 12.7 x 12.7 mm



MATERIALS

- Cap :
 - solid color : ABS UL94HB
 - illuminated : polycarbonate UL94HB

Foilmec™ 1YS

Square cap • for under overlay •
illumination option



DISTINCTIVE FEATURES

Square cap 15.0 x 15.0 mm

h=12.5 mm

Round corners

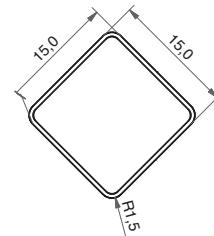
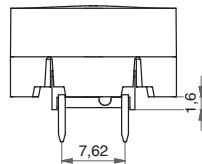
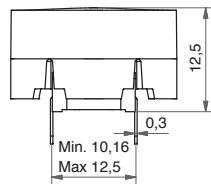
Flat surface

Illumination with LEDs on PCB

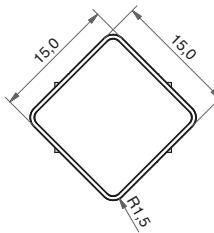
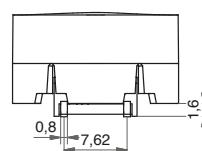
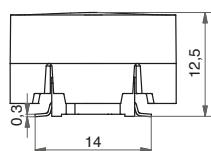


SWITCH SPECIFICATIONS : see Multimec® 5 series.

5E+1YS - TH



5E+1YS - SMD



Foilme™ 1YS

Square cap • for under overlay •
illumination option



BUILD YOUR PART NUMBER

ILLUMINATED

5E

SERIES

MOUNTING

ACTUATION FORCE

1YS

CAP

COLOR

TH9 through-hole

SH9 surface mount

20 2.0N

35 3.5N

65 6.5N

0616

white cap with
frosted white lens

NOTICE : Other versions : Please refer to www.apem.com for information on the 3E series version - 1Y



MOUNTING

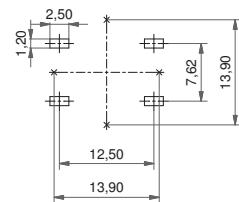
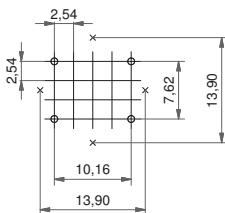
- Panel cut-out : min. 16.0 x 16.0 mm
- Switch spacing AxB : min. 17.0 x 17.0 mm



MATERIALS

- Cap : ABS UL94HB
- Lens : polycarbonate UL94HB

PCB LAYOUT WITH LED PLACEMENT



1ZCS

Round caps • rounded top •
many legend options



DISTINCTIVE FEATURES

Round Ø14.3 mm

h=11.7 mm

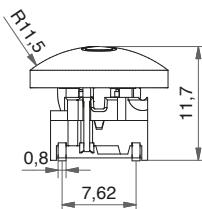
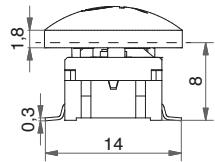
Rounded top surface

Legends in pad print, reverse print or hard paint laser marked

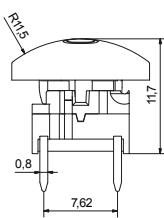
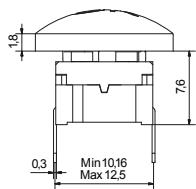


SWITCH SPECIFICATIONS : see Multimec® 5 series.

5G+1ZCS - SMD - W/LED



5G+1ZCS - TH



1ZCS

Round caps • rounded top •
many legend options



BUILD YOUR PART NUMBER

| ILLUMINATED | | | | | | | |
|-------------|-----------------|------|------|----------------------|-------|---------------|-----------|
| 5G | | | | 1ZCS | | | |
| SERIES | ACTUATION FORCE | | LED | CAP | COLOR | LEGEND TYPE* | LEGEND* |
| | 20 | 2.0N | 01 | blue | 16 | frosted white | 1ZB |
| | 35 | 3.5N | 22 | green | | | 136 ▲ |
| | 65 | 6.5N | 29 | high intensity green | | | 1ZCS |
| | | | 42 | yellow | | | 038 RESET |
| | | | 61 | white | | | 051 ESC |
| | | | 82 | red | | | 105 ENTER |
| MOUNTING | | | 2242 | green/yellow | | | 118 OK |
| TH9 | through-hole | | 8222 | red/green | | | 119 SET |
| SH9 | surface mount | | 8242 | red/yellow | | | 120 MENU |
| | | | | | | | 121 FUNC |
| | | | | | | | 122 HOME |
| | | | | | | | 123 ⌂ |

| NON-ILLUMINATED | | | | | | | |
|-----------------|--|-----------------|-----|---------------|---------------------|------------------|-----------|
| 5G | | | | 1ZCS | | | |
| SERIES | MOUNTING | ACTUATION FORCE | CAP | COLOR | LEGEND* (PAD PRINT) | | |
| | TH9 through-hole | 20 2.0N | | 03 grey | 50 | metal dark blue | 1ZB |
| | SH9 surface mount | 35 3.5N | | 06 white | 53 | metal light grey | 136 ▲ |
| | | 65 6.5N | | 08 red | 57 | metal dark grey | 1ZCS |
| | | | | 09 black | 58 | metal bordeaux | 038 RESET |
| | | | | 30 ultra blue | | | 051 ESC |
| | | | | 40 dusty blue | | | 105 ENTER |
| | | | | 42 aqua blue | | | 118 OK |
| *optional | | | | | | | 119 SET |
| NOTICE : | Please note that not all combinations of above numbers are available. Refer to www.apem.com for standard legends and other further information. Other versions : Please refer to www.apem.com for information on the 3F & 4F series versions - 1ZC | | | | | | |
| | | | | | | | 120 MENU |
| | | | | | | | 121 FUNC |
| | | | | | | | 122 HOME |
| | | | | | | | 123 ⌂ |



MOUNTING

- Panel cut-out : min. Ø14.7 mm
- Switch spacing AxB : min. 14.44 x 14.44 mm



MATERIALS

- Cap :
 - solid color : ABS UL94HB
 - illuminated : polycarbonate UL94HB

navimec™

Round five-piece solutions •
for navigation unit • many legend options



DISTINCTIVE FEATURES

Round Ø34.25 mm

h=12.2 mm

5 piece navigational solution

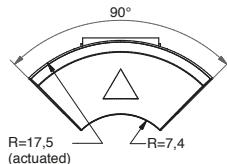
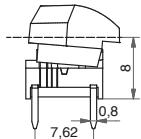
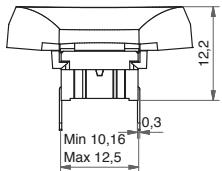
Illumination option

Pad print or hard paint laser marked legends

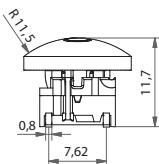
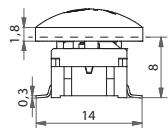


SWITCH SPECIFICATIONS : see Multimec® 5 series.

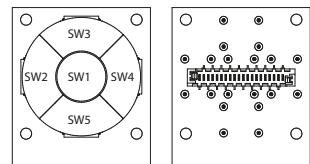
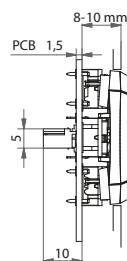
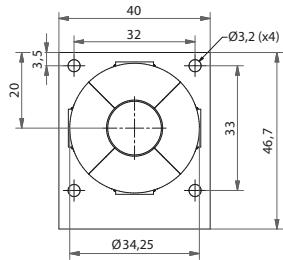
5G+1ZB - TH



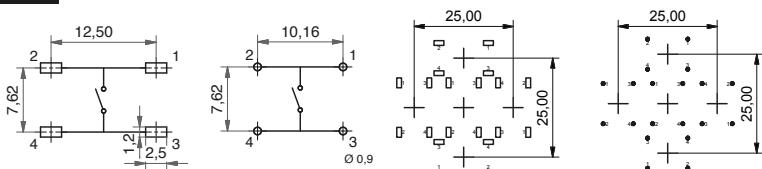
5G+1ZCS - SMD - W/LED



NAVIMEC MODULE



PCB LAYOUT & CIRCUIT DIAGRAMS



We recommend using through-hole terminals for precise placing.



CONNECTOR INFORMATION

Connectors on the module are Molex picoflex series 90816-0320 for switches and 90816-0316 for additional LEDs.

We recommend using:

Cable socket: 90327-0320 for switches and 90327-0316 for additional LEDs.

navimec™

Round five-piece solutions •
for navigation unit • many legend options



BUILD YOUR PART NUMBER

| SINGLE PARTS | | | | | | | |
|-----------------|---|---|--|---|--|--|--------------------------------|
| 5G | MOUNTING | LED* | COLOR | LEGEND TYPE* | LEGEND* | | |
| SWITCH | TH9 through-hole SH9 surface mount | 01 blue 22 green 29 high intensity green 42 yellow 61 white 82 red 2242 green/yellow 8222 red/green 8242 red/yellow | illuminated frosted white non illuminated 03 grey 06 white 09 black 30 ultra blue 40 dusty blue 42 aqua blue 50 metal dark blue 53 metal light grey 57 metal dark grey 58 metal bordeaux | Blank LMH R | pad printed hard paint laser marked revers printed | 1ZB 1ZCS 038 RESET 051 ESC 105 ENTER 118 OK 119 SET 120 MENU 121 FUNC 122 HOME 123 ⌂ | ▲ |
| ACTUATION FORCE | 20 2.0N 35 3.5N 65 6.5N | 1ZB edge cap (4x) 1ZCS center cap | | | | | |
| MODULE | | | | | | | |
| 95 | N | CAP | ACTUATION FORCE | LED* | LEGEND TYPE* | LEGEND* | |
| MODULE | N navimec | | 20 2.0N 35 3.5N 65 6.5N | 01 blue 22 green 29 high intensity green 42 yellow 61 white 82 red | Blank LMH | pad printed hard paint laser marked | 1ZB 1ZCS 118 OK 123 ⌂ |
| TYPE | A non-illuminated B illuminated | | | COLOR | | | |
| | | | | 16 frosted white 09 black | | | |

*optional

NOTICE : please note that not all combinations of above numbers are available. Refer to www.apem.com for further information. Other versions : Please refer to www.apem.com for information on the 3 & 4 series version - navimec 1ZC+1ZB



MOUNTING

- Panel cut-out : min. Ø35.0 - 35.5 mm depending on application



MATERIALS

- Cap :
 - solid color : ABS UL94HB
 - illuminated : polycarbonate UL94HB

Controlmec™

Round front panel sealed solutions •
for navigation unit • illumination option



DISTINCTIVE FEATURES

Round Ø29.5 mm

h=12.3 mm (1ZW-sealed) ; h=12.0mm (1Z non-sealed)

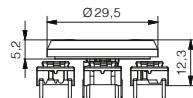
Front panel sealing to IP67

One piece navigational cap

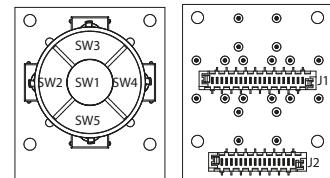
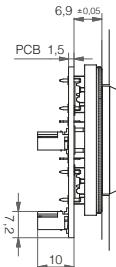
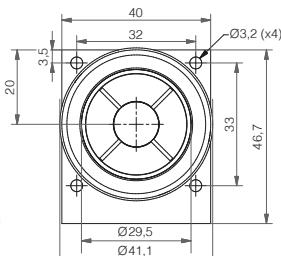
Single components or a complete module

SWITCH SPECIFICATIONS : see Multimec® 5 series.

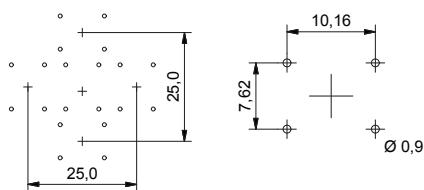
4X5E+5G TH +1ZW



CONTROLMEC 1ZW MODULE



PCB LAYOUT



CONNECTOR INFORMATION

Connectors on the module are Molex picoflex series 90816-0320 for switches and 90816-0316 for additional LEDs.

We recommend using:

Cable socket: 90327-0320 for switches and 90327-0316 for additional LEDs.

Controlmec™

Round front panel sealed solutions •
for navigation unit • illumination option



BUILD YOUR PART NUMBER

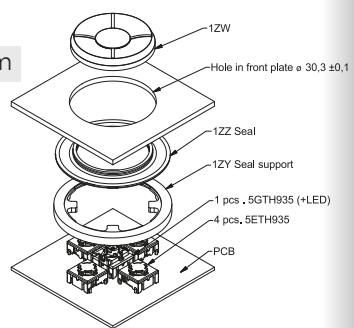
| SINGLE PARTS | | | | | | | | | |
|--------------|---------------|--|-------------------------|-------------------------|------------------|--------------|-------------------------|---------|--|
| 5G + 4x5E | | | | | | | | | |
| SWITCH | MOUNTING | | LED* | CAP | COLOR | | LEGEND TYPE* | | |
| TH9 | through-hole | | 01 blue | 1Z non-sealed | illuminated | Blank | pad printed | | |
| SH9 | surface mount | | 22 green | 1ZW for sealing | frosted white | LMH | hard paint laser marked | | |
| | | | 29 high intensity green | in case of 1ZW add | | | | | |
| | | | 42 yellow | 1ZZ09 sealing | | | | | |
| | | | 61 white | 1ZY spacer | | | | | |
| | | | 82 red | | | | | | |
| | | | 2242 green/yellow | | | | | | |
| | | | 8222 red/green | | | | | | |
| | | | 8242 red/yellow | | | | | | |
| | | | | | | | | | |
| | | | | | | | LEGEND* | | |
| | | | | | | | 136 ▲ | | |
| | | | | | | | center | | |
| | | | | | | | 118 OK | | |
| | | | | | | | 123 ⚡ | | |
| MODULE | | | | | | | | | |
| 95 | C | | | | | | | | |
| MODULE | CAP | | ACTUATION FORCE | LED* | | LEGEND TYPE* | | LEGEND* | |
| C | controlmec | | 35 3.5N | 01 blue | | Blank | pad printed | edge | |
| | | | 65 6.5N | 22 green | | LMH | hard paint laser marked | center | |
| | | | | 29 high intensity green | | | | | |
| | | | | 42 yellow | | | | | |
| | | | | 61 white | | | | | |
| | | | | 82 red | | | | | |
| | | | | | 16 frosted white | | | | |
| | | | | | 09 black | | | | |
| *optional | | | | | | | | | |

NOTICE : please note that not all combinations of above numbers are available.
Refer to www.apem.com for further information.



MOUNTING

- Panel cut-out : min. Ø 30.3 mm



MATERIALS

- Cap :
 - solid color : ABS UL94HB
 - illuminated : polycarbonate UL94HB

10Q/10QM

Large square cap • optional metal plate •
many legend options



DISTINCTIVE FEATURES

Square 22 x 22 mm; h=11 mm

Flat top surface

Pad print, reverse print, hard paint laser marked or metal
plate engraved legend option

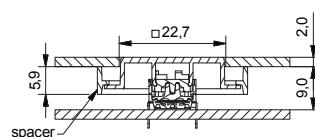
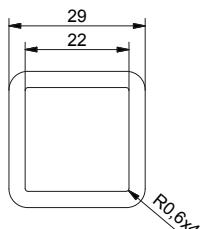
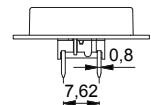
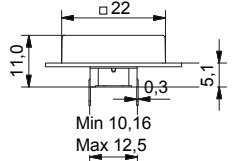
Optional IP67 sealing -10QW and spacer - 10QY

LEDs on PCB for excellent illumination

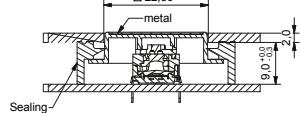
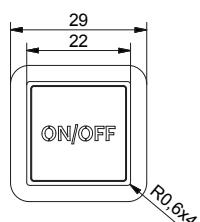
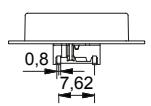
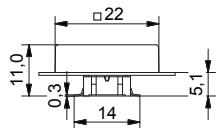


SWITCH SPECIFICATIONS : see Multimec® 5 series.

5G+10Q - TH



5G+10QM - SMD - W/LED



10Q/10QM

Large square cap • optional metal plate •
many legend options



BUILD YOUR PART NUMBER

ILLUMINATED

| 5G | MOUNTING | ACTUATION FORCE | LED | CAP | COLOR | SPACER* | SEALING* |
|-----|---------------|-----------------|-------------------------|------|------------------|---------|----------|
| TH9 | through-hole | 20 2.0N | 01 blue | 10Q | 16 frosted white | 10QY | 10QW |
| SH9 | surface mount | 35 3.5N | 22 green | 10QM | | | |
| | | 65 6.5N | 29 high intensity green | | | | |
| | | | 42 yellow | | | | |
| | | | 61 white | | | | |
| | | | 82 red | | | | |
| | | | 2242 green/yellow | | | | |
| | | | 8222 red/green | | | | |
| | | | 8242 red/yellow | | | | |

NON-ILLUMINATED

| 5G | MOUNTING | ACTUATION FORCE | CAP | COLOR | SPACER* | SEALING* |
|-----|---------------|-----------------|-----|-----------|---------|----------|
| TH9 | through-hole | 20 2.0N | 10Q | 00 blue | 10QY | 10QW |
| SH9 | surface mount | 35 3.5N | | 02 green | | |
| | | 65 6.5N | | 03 grey | | |
| | | | | 04 yellow | | |
| | | | | 06 white | | |
| | | | | 08 red | | |
| | | | | 09 black | | |

*optional

NOTICE : please note that not all combinations of above numbers are available.
Refer to www.apem.com for further information.



MOUNTING

- Panel cut-out : min. 22.5 x 22.5 mm
- Switch spacing AxB : min. 32.5 x 32.5 mm



MATERIALS

- Cap :
 - solid color : ABS UL94HB
 - illuminated : polycarbonate UL94HB
 - metal plate: stainless steel

10R/10RF/10RM

Large round caps • optional metal plate • different top surface



DISTINCTIVE FEATURES

Round Ø30 mm, h=11 mm

Rounded or flat top surface

Pad print, reverse print, hard paint laser marked or metal plate engrave legend option

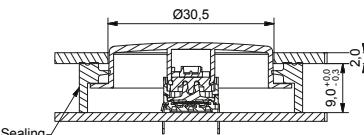
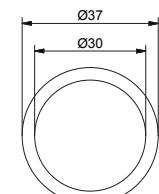
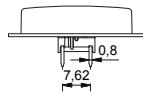
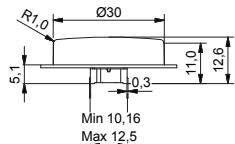
Optional IP67 sealing - 10RW and spacer - 10RY

LEDs on PCB for excellent illumination

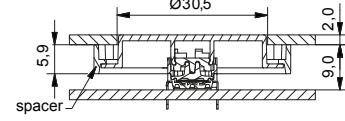
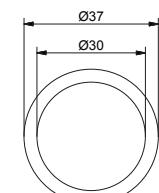
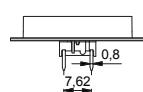
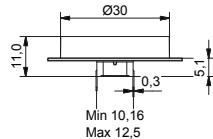


SWITCH SPECIFICATIONS : see Multimec® 5 series.

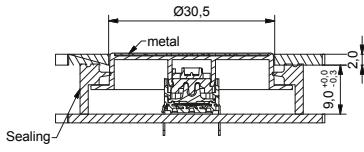
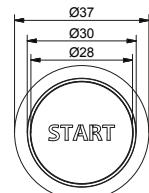
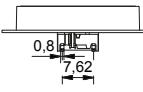
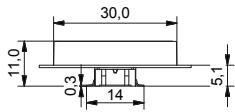
5G+10R - TH



5G+10RF - TH



5G+10RF - SMD W/LED



The company reserves the right to change specifications without notice. All tolerance if not otherwise specified ±0.2mm.

10R/10RF/10RM

Large round caps • optional metal plate • different top surface



BUILD YOUR PART NUMBER

ILLUMINATED

| 5G | MOUNTING | ACTUATION FORCE | LED | CAP | COLOR | SPACER | SEALING |
|-----|---------------|-----------------|-------------------------|------|------------------|--------|---------|
| TH9 | through-hole | 20 2.0N | 01 blue | 10R | 16 frosted white | 10RY | 10RW |
| SH9 | surface mount | 35 3.5N | 22 green | 10RF | | | |
| | | 65 6.5N | 29 high intensity green | 10RM | | | |
| | | | 42 yellow | | | | |
| | | | 61 white | | | | |
| | | | 82 red | | | | |
| | | | 2242 green/yellow | | | | |
| | | | 8222 red/green | | | | |
| | | | 8242 red/yellow | | | | |

NON-ILLUMINATED

| 5G | MOUNTING | ACTUATION FORCE | CAP | COLOR | SPACER | SEALING |
|-----|---------------|-----------------|------|-----------|--------|---------|
| TH9 | through-hole | 20 2.0N | 10R | 00 blue | 10RY | 10RW |
| SH9 | surface mount | 35 3.5N | 10RF | 02 green | | |
| | | 65 6.5N | | 03 grey | | |
| | | | | 04 yellow | | |
| | | | | 06 white | | |
| | | | | 08 red | | |
| | | | | 09 black | | |

NOTICE : please note that not all combinations of above numbers are available.
Refer to www.apem.com for further information.



MOUNTING

- Panel cut-out : min. Ø30.6 mm
- Switch spacing AxB : min. 40.5 x 40.5 mm



MATERIALS

- Cap :
 - solid color : ABS UL94HB
 - illuminated : polycarbonate UL94HB
 - metal plate: stainless steel

Aquamec™

Round front panel sealed solutions •
variable heights • IP67



DISTINCTIVE FEATURES

Round Ø10.6 mm

h= 24.2 - 27.2 mm

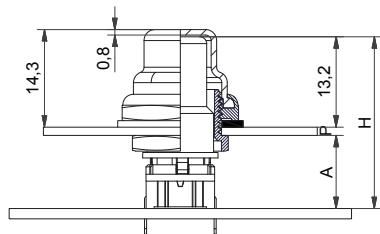
Front panel sealed to IP67

Illumination option



SWITCH SPECIFICATIONS : see Multimec® 5 series.

5G+AQUAMEC™



$$H = A + P + 13.2$$

This leaves nominal 0.3 mm clearance between the top of the cap and the inner side of the sealing boot to accomplish assembly tolerances. A can be chosen between 10-13 mm, we recommend 10 mm to reduce building height and optimise cap guidance.

| A | P | CAP | H | BUSHING |
|------|-----|-------------|------|---------|
| 10.0 | 1.0 | AQCSxx-24.2 | 24.2 | AQN-0.5 |
| 10.0 | 2.0 | AQCSxx-25.2 | 25.2 | AQN-0.5 |
| 10.0 | 3.0 | AQCSxx-26.2 | 26.2 | AQN-2.5 |
| 10.0 | 4.0 | AQCSxx-27.2 | 27.2 | AQN-2.5 |

Cap is available in black (09) or transparent (11).

The dimension H is the overall height of the switch+cap.

Bushing AQN-0.5 accepts panel thickness (P) 0.5-2.5 mm.

Bushing AQN-2.5 accepts panel thickness (P) 2.5-4.0 mm.

Aquamec™

Round front panel sealed solutions •
variable heights • IP67



BUILD YOUR PART NUMBER

| ILLUMINATED | | | | | | | |
|-------------|---------------|-----------------|-------------------------|---------|-------------|--------------------|---------------------------|
| 5G | | | | | AQCS11 | | AQB0111 |
| SERIES | MOUNTING | ACTUATION FORCE | LED | | CAP | | SEALING BOOT |
| TH9 | through-hole | 20 2.0N | 01 blue | | transparent | | |
| SH9 | surface mount | 35 3.5N | 22 green | | | | transparent incl. sealing |
| | | 65 6.5N | 29 high intensity green | BUSHING | | OVERALL HEIGHT (H) | |
| | | | 42 yellow | AQN-0.5 | | 24.2 | |
| | | | 61 white | AQN-2.5 | | 25.2 | |
| | | | 82 red | | | 26.2 | |
| | | | 2242 green/yellow | | | 27.2 | |
| | | | 8222 red/green | | | | |
| | | | 8242 red/yellow | | | | |

| NON-ILLUMINATED | | | | | | | |
|-----------------|---------------|-----------------|---------|-------|--------------------|--|---------------------|
| 5G | | | | | AQCS09 | | AQB0109 |
| SERIES | MOUNTING | ACTUATION FORCE | BUSHING | CAP | OVERALL HEIGHT (H) | | SEALING BOOT |
| TH9 | through-hole | 20 2.0N | AQN-0.5 | black | 24.2 | | |
| SH9 | surface mount | 35 3.5N | AQN-2.5 | | 25.2 | | black incl. sealing |
| | | 65 6.5N | | | 26.2 | | |
| | | | | | 27.2 | | |

NOTICE : Please note that not all combinations of above numbers are available Refer to www.apem.com for further information.
Other versions : Please refer to www.apem.com for information on the 3F & 4F series versions - Aquamec™



MOUNTING

- Panel cut-out : min. Ø12.0 mm
- Switch spacing AxB : min. 20 x 20 mm



MATERIALS

- Cap :
 - solid color : polyamide UL94V2
 - illuminated : polycarbonate UL94HB

Multimec® 5

High performance tactile switches •
MIL-PRF-28855H • excellent illumination



DISTINCTIVE FEATURES

- Large range of accessories
- Momentary switches with NO or NC/NO function
- Sealed to IP67
- Single or bi-color illumination option
- Illumination with integrated chip-LEDs



ENVIRONMENTAL SPECIFICATIONS

- Sealing : IP67 according to IEC 60529
- Working and storage temperature :
 - non-illuminated : -40°C/+160°C
 - illuminated : -30°C/+85°C
- Soldering :
 - through-hole : IEC 68-2-20 8
 - surface mount : JEDEC J-STD-020C



ELECTRICAL SPECIFICATIONS

- Recommended load :
 - Gold contacts : 0.5µ-50mA 24VDC
 - Silver contacts : 0.5-50mA 24VDC
- Contact resistance : <30mΩ - typically 10mΩ
- Insulation resistance : >10MΩ
- Contact bounce : <2mS - typically 0.5mS



MECHANICAL SPECIFICATIONS

- Standard actuation force :
 - momentary NO : 2.0N, 3.5N, 6.5N
 - quiet version : 2.0N
 - NC/NO function : 3.5N
- Max. actuation force :
 - momentary : 115N for 60 sec (according to MIL-PRF-22885H)
 - NC/NO : 100N for 10 sec
- Travel : 1mm
- Lifetime : >10,000,000 cycles

The company reserves the right to change specifications without notice.



MATERIALS

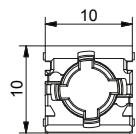
- Housing : PPS UL94V0
- Actuator : PPS UL94V0
- Sealing : Silicone rubber
- Contacts spring : Stainless steel
Silver : +3µAg
Gold : +1µAu
- Fixed contacts :
Silver : SnCu + 2µNI + 3µAg
Gold : SnCu + 2µNI + 1µAu
- Terminals : SnCu + 2µNI + 3µSn100

All tolerance if not otherwise specified ±0.2mm.

Multimec® 5

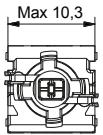
High performance tactile switches •
MIL-PRF-28855H • excellent illumination

5G NON-ILLUMINATED



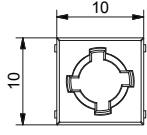
- SMD, TH or right angle TH
- NO or NC/NO

5G ILLUMINATED



- SMD or TH
- NO
- single or bi-color LEDs

5E NON-ILLUMINATED



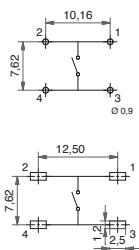
- SMD, TH or right angle TH
- NO or NC/NO

All tolerances unless otherwise noted : ± 0.2 mm

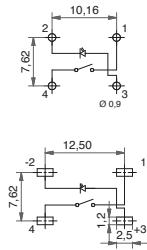


PCB LAYOUT & CIRCUIT DIAGRAM

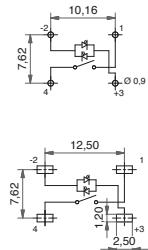
Non-illuminated



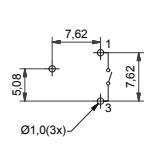
Single LED



Bicolor - 2 LEDs

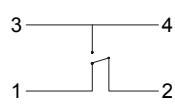


RAS



NC/NO function

*not for sale in Japan



Multimec® 5

High performance tactile switches •
MIL-PRF-28855H • excellent illumination



BUILD YOUR PART NUMBER

| ILLUMINATED | | | | |
|-------------|---------------|-----------------|-------------------------|-----------------|
| SERIES | MOUNTING | ACTUATION FORCE | LED | OPTIONAL |
| 5G | | | | |
| TH9 | through-hole | 20 2.0N | 01 blue | Q quiet contact |
| SH9 | surface mount | 35 3.5N | 22 green | R tape & reel |
| | | 65 6.5N | 29 high intensity green | G gold contacts |
| | | | 42 yellow | |
| | | | 61 white | |
| | | | 82 red | |
| | | | 2242 green/yellow | |
| | | | 8222 red/green | |
| | | | 8242 red/yellow | |

| NON-ILLUMINATED | | | | |
|-----------------|-------------------|-----------------|---|--|
| SERIES | MOUNTING | ACTUATION FORCE | OPTIONAL | |
| 5E | | | Q quiet contact | |
| 5G | TH9 through-hole | 20 2.0N | RAS right angle (with TH only) | |
| | SH9 surface mount | 35 3.5N | NCNO normally closed/ normally open function (with 3.5N only) | |
| | | 65 6.5N | R tape & reel | |
| | | | G gold contacts | |



ABOUT THIS SERIES



Notice : please note that not all combinations of above numbers are available.

Refer to www.apem.com for further information.



Accessories : See pages 327-364 for cap and bezel options

Multimec® 5

High performance tactile switches •
MIL-PRF-28855H • excellent illumination



TAPE & REEL

Tape and reel is available for the parts listed and has the following specifications

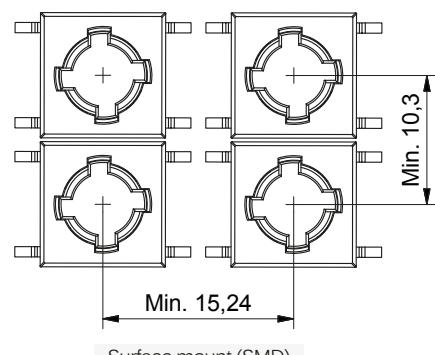
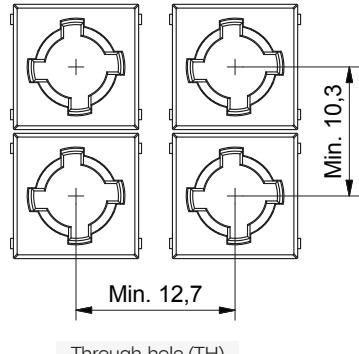
- Reel diameter: Ø330 mm
- Tape width: 24 mm
- Pitch: See list
- Tape and reel material: antistatic or better
- Quantity per reel: see list

| PART NO. | ORDERING CODE | PITCH | QUANTITY PER REEL |
|-------------------|--------------------|-------|-------------------|
| 5ESH9XX | 5ESH9XXR | 16 | 500 |
| 5GSH9XX | 5GSH9XXR | 16 | 500 |
| 5XSH9XX1SSXX-08.0 | 5XSH9XXR1SSXX-08.0 | 20 | 250 |
| 5XSH9XX1SSXX-09.5 | 5XSH9XXR1SSXX-09.5 | 20 | 250 |
| 5XSH9XX1SSXX-10.4 | 5XSH9XXR1SSXX-10.4 | 20 | 250 |
| 5XSH9XX1SSXX-11.0 | 5XSH9XXR1SSXX-11.0 | 20 | 250 |
| 5XSH9XX1SSXX-12.0 | 5XSH9XXR1SSXX-12.0 | 20 | 250 |
| 5GSH9XX01 | 5GSH9XX01R | 20 | 250 |
| 5GSH9XX22 | 5GSH9XX22R | 20 | 250 |
| 5GSH9XX42 | 5GSH9XX42R | 20 | 250 |
| 5GSH9XX61 | 5GSH9XX61R | 20 | 250 |
| 5GSH9XX82 | 5GSH9XX82R | 20 | 250 |
| 5GSH9XX2242 | 5GSH9XX2242R | 20 | 250 |
| 5GSH9XX8222 | 5GSH9XX8222R | 20 | 250 |
| 5GSH9XX8242 | 5GSH9XX8242R | 20 | 250 |



MOUNTING

SPACE REQUIREMENT - MATRIX MOUNTING



LED COMPONENT SPECIFICATIONS

| Color | | Blue | Green | Yellow | White | Red | High Intensity Green |
|-------------|--|------|-------|--------|-------|-----|----------------------|
| Color Codes | | 01 | 22 | 42 | 61 | 82 | 29 |

ABSOLUTE MAXIMUM RATINGS (Ta=25°C)

| | | | | | | | |
|-----------------------|----|---------|---------|---------|---------|---------|---------|
| Power | mW | 110 | 75 | 60 | 48 | 65 | 102.5 |
| Current forward | mA | 25 | 30 | 25 | 15 | 25 | 25 |
| Forward peak current | mA | 100 | 80 | 60 | 100 | 100 | 150 |
| Voltage reverse | V | 5 | 5 | 5 | NA | 12 | 5 |
| Operating temperature | °C | -40/+85 | -55/+85 | -40/+85 | -40/+85 | -30/+85 | -40/+85 |
| Storage temperature | °C | -40/+85 | -55/+85 | -40/+90 | -40/+85 | -40/+85 | -40/+85 |
| Soldering temperature | °C | 5 | 5 | 5 | NA | 12 | 5 |

ELECTRICAL-OPTICAL CHARACTERISTICS (Ta=25°C)

| | | | | | | | |
|-------------------------|----------|------|-----|--------|------|------|------|
| Voltage forward | Typ. V | 3.3 | 2 | 1.75** | 2.85 | 2 | 3.3 |
| | Max. V | 3.7 | 2.4 | 2.35 | 3.1 | 2.5 | 4.1 |
| Current reverse (VR=5V) | Max. µA | 50 | 100 | 10 | NA | 100 | 50 |
| Wave length | nm | 468 | 571 | 591 | NA | 633 | 525 |
| Spread | △nm | 25 | NA | 15 | NA | 16 | 30 |
| Spread angle | degree | 120 | 130 | 120 | 150 | 160 | 60 |
| Luminous Intensity | Min. mcd | 28.5 | 18 | 28.5 | 71 | 28 | 500 |
| | Typ. mcd | 72* | 35 | 72* | 224* | 180* | 1000 |
| Optical intensity | Lm/w | NA | NA | NA | 36 | 7 | NA |

*F=20mA, **Pulse width 1ms Duty cycle 1:5, ***F=50mA, ****Luminous Flux mlm

Illumec™ 4F

Illuminated switches • slip-on cap retention system • integrated chip-LEDs



DISTINCTIVE FEATURES

- 10 x 10 mm ; h=10.4 mm
- Illumination with integrated chip-LEDs
- Single or bi-color illumination
- Momentary NO
- Simple slip-on cap retention system



ENVIRONMENTAL SPECIFICATIONS

- Switch sealing : IP67 according to IEC 60529
- Working and storage temperature : -30°C/+85°C
- Soldering :
 - through-hole : IEC 68-2-20 8
 - surface mount : JEDEC J-STD-020C



ELECTRICAL SPECIFICATIONS

- Recommended load :
 - Gold contacts : 0.5µ-50mA 24VDC
 - Silver contacts : 0.5-50mA 24VDC
- Contact resistance : <30mΩ - typically 10mΩ
- Insulation resistance : >10MΩ
- Contact bounce : <2mS - typically 0.5mS



MATERIALS

- Housing : PPS UL94V0
- Actuator : PPS UL94V0
- Sealing : Silicone rubber
- Contacts spring : Stainless steel
Silver : +3µAg
Gold : +1µAu
- Fixed contacts :
Silver : SnCu + 2µNI + 3µAg
Gold : SnCu + 2µNI + 1µAu
- Terminals : SnCu + 2µNI + 3µSn100



MECHANICAL SPECIFICATIONS

- Standard actuation force : 3.5N
- Max. actuation force : 100N for 10 sec
- Travel : 1 mm
- Lifetime : >10,000,000 cycles

The company reserves the right to change specifications without notice.

All tolerance if not otherwise specified ±0.2mm.

Illumec™ 4F

Illuminated switches • slip-on cap retention system • integrated chip-LEDs

4FSH9XX

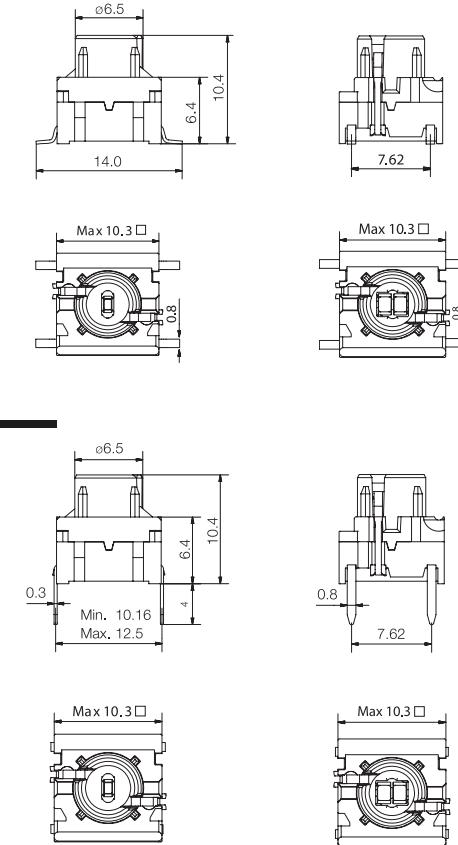


- SMD
- NO
- Single or bi-color LEDs

4FTH9XX



- TH
- NO
- Single or bi-color LEDs

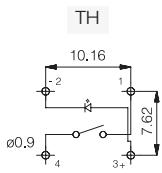


All tolerances unless otherwise noted : ± 0.2 mm

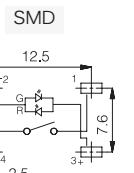
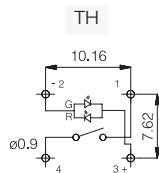


PCB LAYOUT & CIRCUIT DIAGRAM

SINGLE LED



BI-COLOR - 2 LEDs

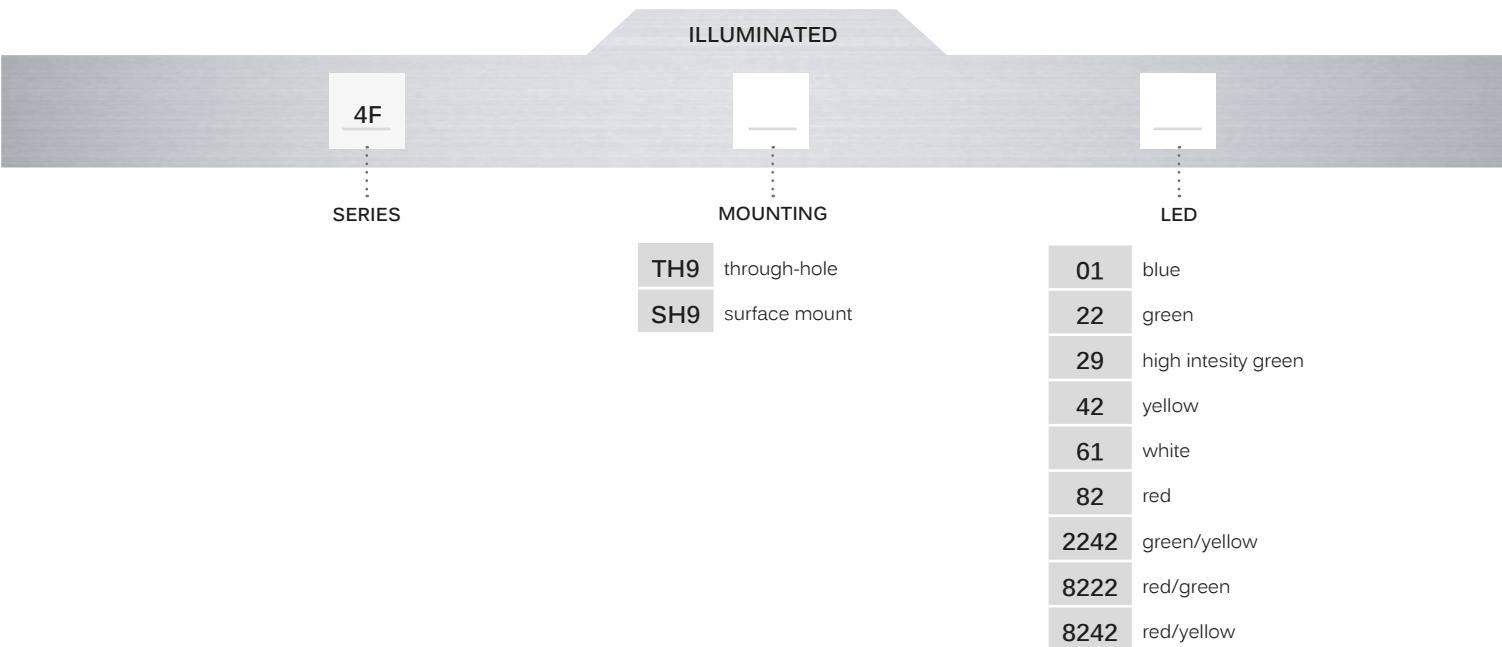


Illumec™ 4F

Illuminated switches • slip-on cap retention system • integrated chip-LEDs



BUILD YOUR PART NUMBER



ABOUT THIS SERIES

- Notice :** Refer to www.apem.com for further information.
- Accessories :** See the website for 4F cap and bezel options

Illumec™ 4F

Illuminated switches • slip-on cap retention system • integrated chip-LEDs



TAPE & REEL

Tape and reel is available for the parts listed and has the following specifications

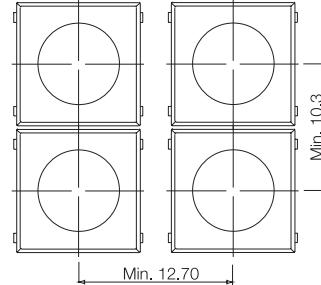
- Reel diameter: Ø330 mm
- Tape width: 24 mm
- Pitch: see list
- Tape and reel material : antistatic or better
- Quantity per reel : see list

| PART NO. | ORDERING CODE | PITCH | QUANTITY PER REEL |
|-----------|---------------|-------|-------------------|
| 4FSH901 | 4FSH901R | 20 | 250 |
| 4FSH922 | 4FSH922R | 20 | 250 |
| 4FSH942 | 4FSH942R | 20 | 250 |
| 4FSH961 | 4FSH961R | 20 | 250 |
| 4FSH982 | 4FSH982R | 20 | 250 |
| 4FSH92242 | 4FSH92242R | 20 | 250 |
| 4FSH98222 | 4FSH98222R | 20 | 250 |
| 4FSH98242 | 4FSH98242R | 20 | 250 |

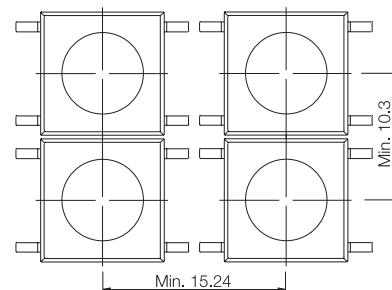


MOUNTING

SPACE REQUIREMENT - MATRIX MOUNTING



through-hole (TH)



surface mount (SMD)

LED COMPONENT SPECIFICATIONS

| Color | | Blue | Green | Yellow | White | Red | High Intensity Green |
|---|----------|---------|---------------------|---------|---------|---------|----------------------|
| Color Codes | | 01 | 22 | 42 | 61 | 82 | 29 |
| ABSOLUTE MAXIMUM RATINGS (Ta=25°C) | | | | | | | |
| Power | mW | 110 | 75 | 60 | 48 | 65 | 102.5 |
| Current forward | mA | 25 | 30 | 25 | 15 | 25 | 25 |
| Forward peak current | mA | 100 | 80 | 60 | 100 | 100 | 150 |
| Voltage reverse | V | 5 | 5 | 5 | NA | 12 | 5 |
| Operating temperature | °C | -40/+85 | -55/+85 | -40/+85 | -40/+85 | -30/+85 | -40/+85 |
| Storage temperature | °C | -40/+85 | -55/+85 | -40/+90 | -40/+85 | -40/+85 | -40/+85 |
| Soldering temperature | °C | 5 | 245 for max. 10 sec | | | | |
| ELECTRICAL-OPTICAL CHARACTERISTICS (Ta=25°C) | | | | | | | |
| Voltage forward | Typ. V | 3.3 | 2 | 1.75** | 2.85 | 2 | 3.3 |
| | Max. V | 3.7 | 2.4 | 2.35 | 3.1 | 2.5 | 4.1 |
| Current reverse (VR=5V) | Max. µA | 50 | 100 | 10 | NA | 100 | 50 |
| Wave length | nm | 468 | 571 | 591 | NA | 633 | 525 |
| Spread | △nm | 25 | NA | 15 | NA | 16 | 30 |
| Spread angle | degree | 120 | 130 | 120 | 150 | 160 | 60 |
| Luminous Intensity | Min. mcd | 28.5 | 18 | 28.5 | 71 | 28 | 500 |
| | Typ. mcd | 72* | 35 | 72* | 224* | 180* | 1000 |
| Optical intensity | Lm/w | NA | NA | NA | 36 | 7 | NA |

*F=20mA, **Pulse width 1ms Duty cycle 1:5, ***F=50mA, ****Luminous Flux mlm

Varimec™

Round or square caps •
variable total and above recess heights



DISTINCTIVE FEATURES

Round or square cap: 5.2 mm, 7.8 mm, 11.6 mm

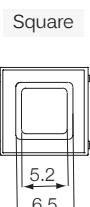
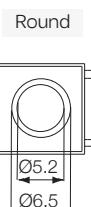
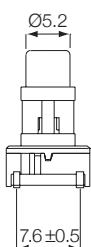
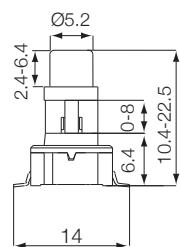
10 total height options 10.4 - 22.5 mm

8 above recess height options 2.4 - 6.4 mm

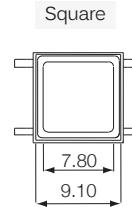
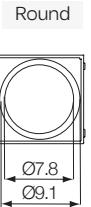
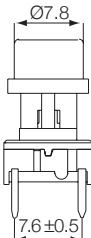
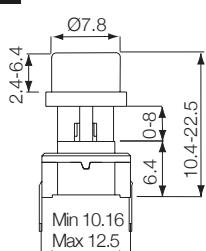


SWITCH SPECIFICATIONS : see Multimec® 3 series.

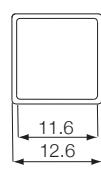
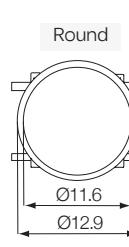
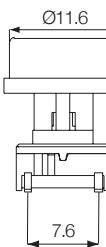
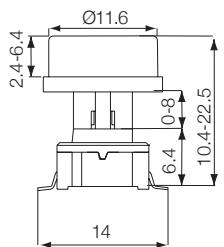
3E+5.2



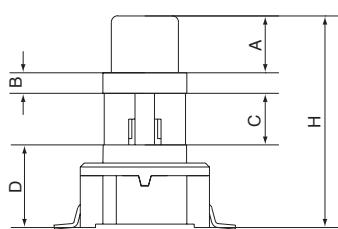
3E+7.8



3E+11.6



THE CONCEPT



- H= Overall heights from 10.4-22.5
- A= Variable height from 2.4 to 6.4
H has to exceed A with min. 8.0
- B= Fixed recess 1.6
- D= Fixed switch 6.4
- C= Variable from 0-8.1
C=H-A-B-D
- All measurements in mm

The company reserves the right to change specifications without notice. All tolerance if not otherwise specified $\pm 0.2\text{mm}$.

Varimec™

Round or square caps •
variable total and above recess heights



BUILD YOUR PART NUMBER

ROUND

| 3E | MOUNTING | COLOR | OVERALL HEIGHT H | | HEIGHT ABOVE RECESS A | | |
|----|-------------------|-----------|------------------|--------|-----------------------|--|------------|
| | TH9 through-hole | 60 blue | A 10.4 | F 14.0 | A 2.4 | | |
| | SH9 surface mount | 63 grey | B 11.0 | G 15.0 | B 3.0 | | |
| | | 64 yellow | C 12.0 | H 16.0 | C 3.5 | | |
| | | 68 red | D 12.5 | J 19.0 | D 4.0 | | TAPE |
| | | 69 black | E 13.0 | K 22.5 | E 4.5 | | R optional |
| | | | | | F 5.0 | | |
| | | | | | G 5.6 | | |
| | | | | | H 6.4 | | |

SQUARE

| 3E | MOUNTING | COLOR | OVERALL HEIGHT H | | HEIGHT ABOVE RECESS A | | |
|----|-------------------|-----------|------------------|--------|-----------------------|--|------------|
| | TH9 through-hole | 60 blue | A 10.4 | F 14.0 | A 2.4 | | |
| | SH9 surface mount | 63 grey | B 11.0 | G 15.0 | B 3.0 | | |
| | | 64 yellow | C 12.0 | H 16.0 | C 3.5 | | |
| | | 68 red | D 12.5 | J 19.0 | D 4.0 | | TAPE |
| | | 69 black | E 13.0 | K 22.5 | E 4.5 | | R optional |
| | | | | | F 5.0 | | |
| | | | | | G 5.6 | | |
| | | | | | H 6.4 | | |

NOTICE : please note that not all combinations of above numbers are available. Refer to www.apem.com for further information.



MOUNTING

- Panel cut-out :
 - 5.2 mm : min. Ø5.6 / 5.6x5.6 mm
 - 7.8 mm : min. Ø8.2 / 8.2x8.2 mm
 - 11.6 mm : min Ø12.0 / 12.0x12.0mm
- Switch spacing Ax B :
 - 5.2 & 7.8 mm : min. 12.7x12.7 mm
 - Ø11.6 mm : min 13.6x13.6 mm
 - 11.6 mm : min. 12.7x12.7 mm



MATERIALS

- Cap :
 - solid color : polyamide UL94V2

Multimec® 3

High performance tactile switches •
robust



DISTINCTIVE FEATURES

10 x 10 mm; h=6.4 mm (10,4 mm -3F)

Illuminated RAS with 3F series

3F series has a slip-on cap retention system - great for custom caps

3C series excellent for over-mold and under overlay



ENVIRONMENTAL SPECIFICATIONS

- Sealing : IP67 according to IEC 60529
- Working and storage temperature :
 - non-illuminated : -40°C/+160°C
 - illuminated : -30°C/+85°C
- Soldering :
 - through hole : IEC 68-2-20 8
 - surface mount : JEDEC J-STD-020C



ELECTRICAL SPECIFICATIONS

- Recommended load :
 - Gold contacts : 0.5µ-50mA 24VDC
 - Silver contacts : 0.5-50mA 24VDC
- Contact resistance : <30mΩ - typically 10mΩ
- Insulation resistance : >10MΩ
- Contact bounce : <2mS - typically 0.5mS



MATERIALS

- Housing : PPS UL94V0
- Actuator : PPS UL94V0
- Sealing : Silicone rubber
- Contacts spring : Stainless steel
Silver : +3µAg
Gold : +1µAu
- Fixed contacts :
Silver : SnCu + 2µNI + 3µAg
Gold : SnCu + 2µNI + 1µAu
- Terminals : SnCu + 2µNI + 3µSn100



MECHANICAL SPECIFICATIONS

- Standard actuation force 3.5N
- Max. actuation force : 100N for 10 sec
- Travel : 1mm
- Lifetime : >10,000,000 cycles

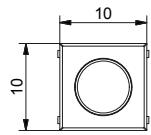
The company reserves the right to change specifications without notice.

All tolerance if not otherwise specified ±0.2mm.

Multimec® 3

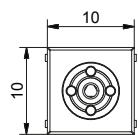
High performance tactile switches • robust

3C



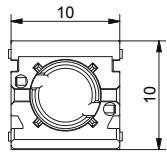
- SMD, TH or right angle TH

3E



- SMD, TH or right angle TH

3F

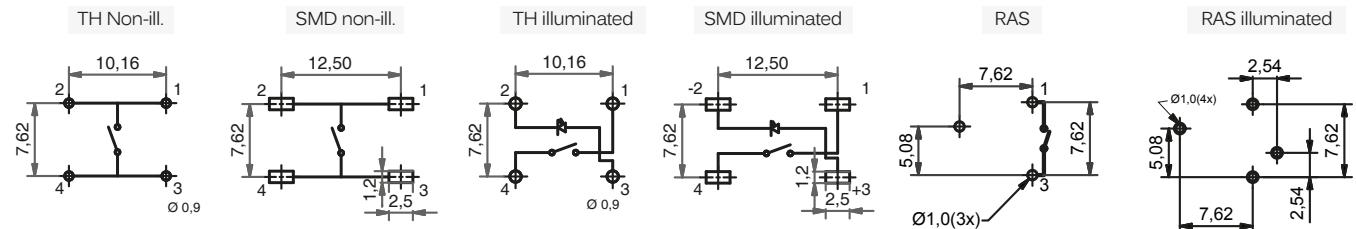


- SMD, TH or right angle TH
- single or bi-color LEDs

All tolerances unless otherwise noted : ± 0.2 mm



PCB LAYOUT & CIRCUIT DIAGRAM



Multimec® 3

High performance tactile switches • robust



BUILD YOUR PART NUMBER

| ILLUMINATED | | | |
|------------------|---------------------------------------|--|---|
| 3F | MOUNTING | LED | OPTIONAL |
| TH9 through-hole | SH9 surface mount | 01 blue 22 green 42 yellow 61 white 82 red 2242 green/yellow 8222 red/green 8242 red/yellow | Q quiet contact R tape & reel G gold contacts RAS right angle (with TH only) |
| NON-ILLUMINATED | | | |
| 3C | MOUNTING | OPTIONAL | |
| 3E | TH9 through-hole SH9 surface mount | Q quiet contact RAS right angle (with TH only) R tape & reel G gold contacts | |
| 3F | | | |



ABOUT THIS SERIES

- ⓘ **Notice :** please note that not all combinations of above numbers are available.
Refer to www.apem.com for further information.
- ⓘ **Accessories :** See pages 373-374 and the website for cap and bezel options

Multimec® 3

High performance tactile switches • robust



TAPE & REEL

Tape and reel is available for the parts listed and has the following specifications

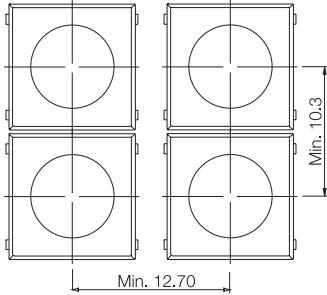
- Reel diameter: Ø330mm
- Tape width: 24mm
- Pitch: See list
- Tape and reel material : antistatic or better
- Quantity per reel : see list

| PART NO. | ORDERING CODE | PITCH | QUANTITY PER REEL |
|--|---------------|-------|-------------------|
| 3CSH9 | 3CSH9R | 16 | 500 |
| 3ESH9 | 3ESH9R | 16 | 500 |
| 3ESH9-08.0 | 3ESH9-08.0 | 20 | 250 |
| 3ESH9-09.5 | 3ESH9-09.5 | 20 | 250 |
| 3ESH9-10.4 | 3ESH9-10.4 | 20 | 250 |
| 3ESH9-11.0 | 3ESH9-11.0 | 20 | 250 |
| 3ESH9-12.0 | 3ESH9-12.0 | 20 | 250 |
| All Varimec below 12.5; R after the part no. | | 20 | 250 |
| 3FSH9 | 3FSH9R | 20 | 250 |

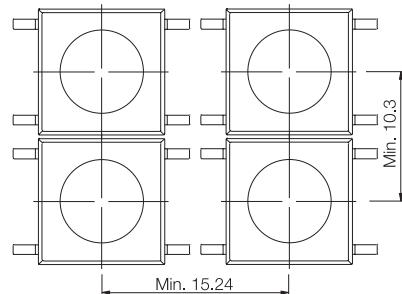


MOUNTING

SPACE REQUIREMENT - MATRIX MOUNTING



through-hole (TH)



surface mount (SMD)

| 3F LED COMPONENT SPECIFICATIONS | | | | | | | | | | | | |
|--|---|-------------------|------|------|----------|---------|-------------------|----------|---------|---------|----------|-------------------|
| Color | | B | G | Y | W | R | G/Y | R/G | R/Y | G | Y | R |
| Color Codes | | | | | | | | | | | | |
| | | 00 | 20 | 40 | 65 | 80 | 2040 | 8020 | 8040 | 24 | 46 | 87 |
| ABSOLUTE MAXIMUM RATINGS (Ta=25°C) | | | | | | | | | | | | |
| Power | mW | 105 | 70 | 60 | 120 | 60 | 120 | 100 | 120 | 60 | 60 | 120 |
| Current forward | mA | 30 | 20 | 20 | 25 | 20 | 25 | 30 | 25 | 25 | 25 | 50 |
| Forward peak current | mA | 150 | 60** | 60** | 100 | 60** | 150 | 120 | 150 | 60 | 60 | 200 |
| Voltage reverse | V | 5 | 3 | 3 | 5 | 3 | 5 | 5 | 5 | 5 | 5 | 5 |
| Operating temperature | °C | -40/+85 | | | -40/+85 | -25/+85 | -40/+85 | -55/+100 | -40/+85 | -40/+85 | -40/+85 | -40/+85 |
| Storage temperature | °C | -40/+85 | | | -40/+100 | -40/+85 | | | -40/+85 | -40/+85 | -40/+100 | -40/+100 |
| Soldering temperature | °C | 260 for max 5 sec | | | | | 260 for max 2 sec | | | | | 300 for max 3 sec |
| ELECTRICAL-OPTICAL CHARACTERISTICS (Ta=25°C) | | | | | | | | | | | | |
| Voltage forward | Typ. V | 3.8 | 2.1 | 2.1 | 3.8 | 2.0 | 2.1 | 2.0 | 2.1 | 2.0* | 2.0 | 2.0*** |
| | Max. V | 4.5 | 3.0 | 3.0 | 4.3 | 3.0 | 2.8 | 2.6 | 2.8 | 2.4* | 2.4 | 2.4*** |
| Current reverse (VR=5V) | µA | 10 | 10 | 10 | 50 | 10 | 2 | 2 | 2 | 10 | 10 | 10 |
| Wave length | nm | 466 | 563 | 585 | NA | 650 | | 630/565 | 625/590 | 570 | 589 | 624/632 |
| Spread | Δnm | 60 | 40 | 40 | NA | 40 | 35 | 35 | 35 | 10 | NA | 20 |
| Spread angle | degree | 60 | 45 | 45 | 25 | 45 | 60 | 200 | 60 | 100 | 40 | 40 |
| Luminous Intensity | Min. mcd | 18 | 9.0 | 5.6 | 630 | 5.6 | 8 | 2.2 | 8 | 70**** | 630 | 400**** |
| | Typ. mcd | 50 | 25 | 16 | 1000 | 16 | 25 | 4.8 | 25 | 20**** | 1250 | 800**** |
| Orientation | The longer pin is the anode, the shorter is the cathode. For bi-color LEDs the anode for the first color (ex. 8020) is the longer pin. | | | | | | | | | | | |

*F=20mA, **Pulse width 1ms Duty cycle 1:5, ***F=50mA, ****Luminous Flux mlm

16300/16700

Rectangular or square caps • distinct tactile feel •
many legend options



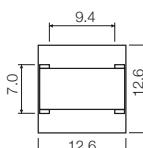
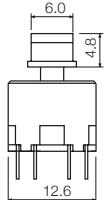
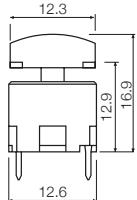
DISTINCTIVE FEATURES

- Rectangular cap : 6 x 12.3 mm; h=16.9 mm
- Square cap : 14.9 x 14.9 mm; h=14.6 mm
- Many standard legends options
- Many functions incl quiet with Unimec™ switches

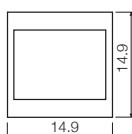
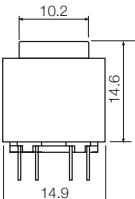
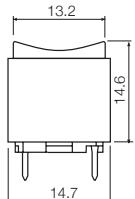


SWITCH SPECIFICATIONS : see Unimec™ series.

UNIMEC+16300



UNIMEC+16700



16300/16700

Rectangular or square caps • distinct tactile feel •
many legend options



BUILD YOUR PART NUMBER

ILLUMINATED

15

SERIES

FUNCTION

CAP

COLOR

| | |
|------------|------------------------|
| 400 | momentary quiet silver |
| 401 | momentary silver |
| 402 | momentary gold |
| 420 | momentary quiet gold |
| 451 | latching silver |
| 452 | latching gold |

16300

16700

| | |
|-----------|--------|
| 00 | blue |
| 02 | green |
| 03 | grey |
| 04 | yellow |
| 06 | white |
| 08 | red |
| 09 | black |



MOUNTING

- Panel cut-out :
 - 16300 : min. 12.7 x 6.4 mm
 - 16700 : min. 15.3 x 15.3 mm
- Switch spacing AxB :
 - 16300 : min. 13 x 13 mm
 - 16700 : min. 15.5 x 15.5 mm



MATERIALS

- Cap : ABS UL94HB

16310-15

Square solutions • distinct tactile feel •
height 16 mm • illumination option



DISTINCTIVE FEATURES

Square solution 15.1 x 15.1 mm

h=16.0 mm

1-4 LED illumination option

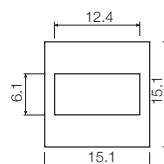
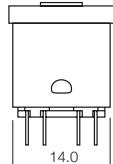
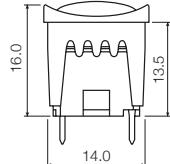
Many standard legend options for 16300 cap

Many functions incl quiet with Unimec™ switches

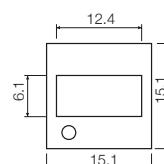
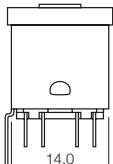
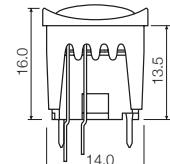


SWITCH SPECIFICATIONS : see Unimec™ series.

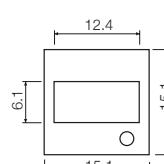
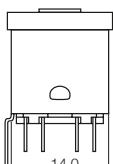
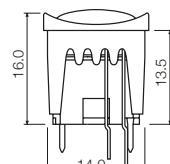
UNIMEC+16300 + 16310



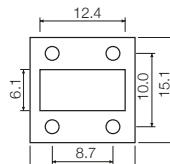
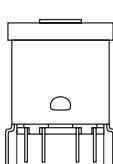
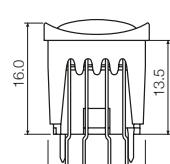
UNIMEC+16300 + 16311



UNIMEC+16300 + 16312



UNIMEC+16300 + 16315



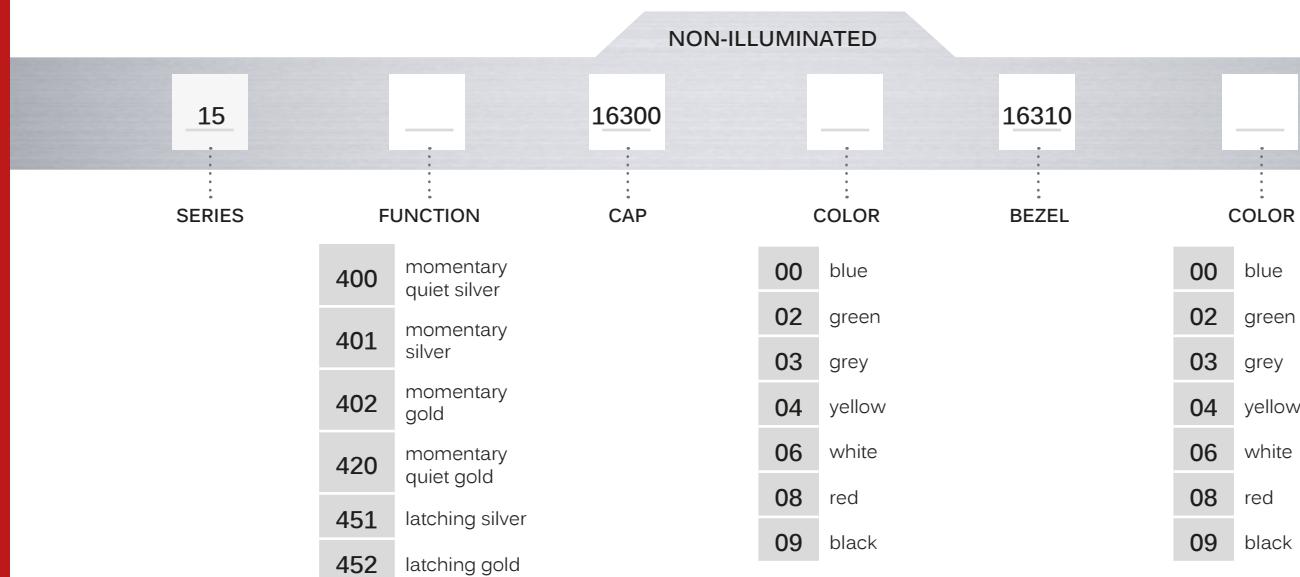
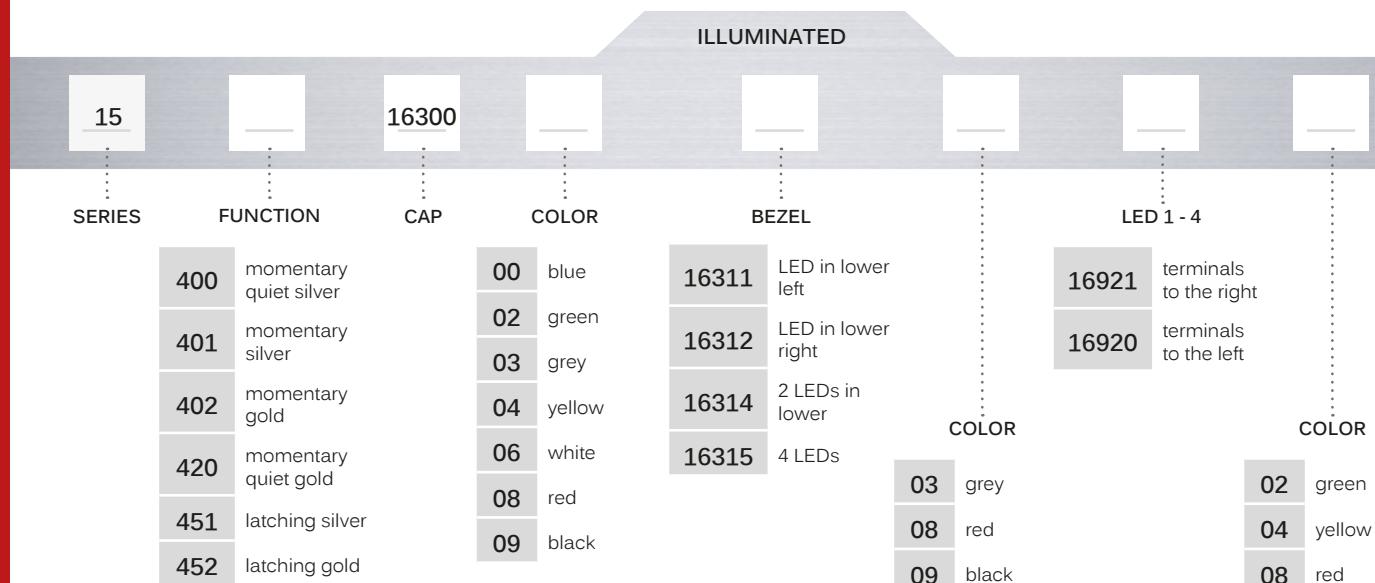
The company reserves the right to change specifications without notice. All tolerance if not otherwise specified $\pm 0.2\text{mm}$.

16310-15

Square solutions • distinct tactile feel •
height 16 mm • illumination option



BUILD YOUR PART NUMBER

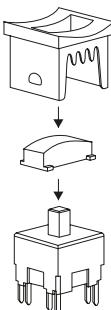


NOTICE : please note that not all combinations of above numbers are available.
Refer to www.apem.com for further information.



MOUNTING

- Panel cut-out : min. 14.1 x 14.1 mm
 - Switch spacing AxB : min. 15.24 x 15.24 mm



MATERIALS

- Cap & bezel : ABS UL94HB

16324-26

Square solutions • distinct tactile feel •
height 20.5 mm • illumination option



DISTINCTIVE FEATURES

Square solution 15.1 x 15.1 mm

h=20.5 mm

1-2 lens illumination option

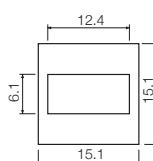
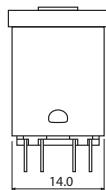
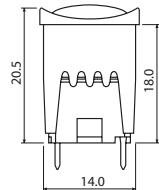
Many standard legend options for 16300 cap

Many functions incl quiet with Unimec™ switches

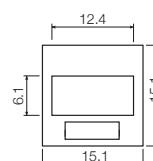
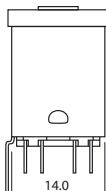
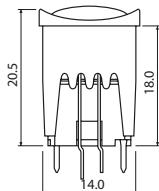


SWITCH SPECIFICATIONS : see Unimec™ series.

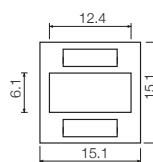
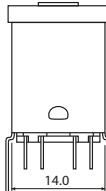
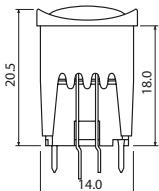
UNIMEC+16300 + 16324



UNIMEC+16300 + 16325



UNIMEC+16300 + 16326



16324-26

Square solutions • distinct tactile feel •
height 20.5 mm • illumination option



BUILD YOUR PART NUMBER

ILLUMINATED

| 15 | | 16300 | | | | 16927 | | 16922 | |
|--------|---------------------------|-------|--------|-------|------------|-------------|-------------|-------|--------|
| SERIES | FUNCTION | CAP | COLOR | BEZEL | | LENS 1 OR 2 | LENS 1 OR 2 | | |
| 400 | momentary quiet silver | 00 | blue | 16325 | one lens | | | | |
| 401 | momentary silver | 02 | green | 16326 | two lenses | | | | |
| 402 | momentary gold | 03 | grey | | | | | | |
| 420 | momentary quiet gold | 04 | yellow | | | | | | |
| 451 | latching silver | 06 | white | | | | | | |
| 452 | latching gold | 08 | red | | | | | | |
| | | 09 | black | | | | | | |
| | | | | 03 | grey | 02 | green | 02 | green |
| | | | | 08 | red | 04 | yellow | 04 | yellow |
| | | | | 09 | black | 08 | red | 08 | red |

NON-ILLUMINATED

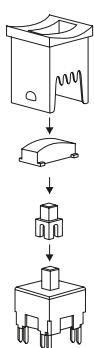
| 15 | | 16300 | | | | 16324 | |
|--------|---------------------------|-------|--------|-------|--|-------|-------|
| SERIES | FUNCTION | CAP | COLOR | BEZEL | | COLOR | |
| 400 | momentary quiet silver | 00 | blue | | | 03 | grey |
| 401 | momentary silver | 02 | green | | | 09 | black |
| 402 | momentary gold | 03 | grey | | | | |
| 420 | momentary quiet gold | 04 | yellow | | | | |
| 451 | latching silver | 06 | white | | | | |
| 452 | latching gold | 08 | red | | | | |
| | | 09 | black | | | | |

NOTICE : please note that not all combinations of above numbers are available.
Refer to www.apem.com for further information.



MOUNTING

- Panel cut-out : min. 14.1 x 14.1 mm
- Switch spacing AxB : min. 15.24 x 15.24 mm



MATERIALS

- Cap & bezel : ABS UL94HB
- Lens : polycarbonate UL94V2

Unimec™

8 contact functions •
2 pole • distinct tactile feel



DISTINCTIVE FEATURES

- 12.6 x 12.6 mm; h=15.7 mm
- 2 pole
- Momentary, latching or quiet
- 8 contact functions
- Up to 10,000,000 cycle lifetime



ENVIRONMENTAL SPECIFICATIONS

- Sealing : IP54 according to IEC 60529
- Working temperature : -40°C/+160°C
- Storage temperature : -65°C/+160°C
- Soldering : IEC 68-2-3



ELECTRICAL SPECIFICATIONS

- Recommended load :
 - Gold contacts : min. 0.5µmA - max. 250mA - 120V - 9W AC - 6W DC
 - Silver contacts : min. 0.5mA - max. 250mA - 120V - 9W AC - 6W DC
- Contact resistance : max. 100mΩ (initially)
- Insulation resistance : >10MΩ
- Contact bounce : max. 10ms
- Dielectric strength between adjacent contacts : 1000 V for 2 min
- Insulation resistance between adjacent contacts : 5 X 1013Ω
- Capacitance between adjacent contacts : 0.5 pF



MECHANICAL SPECIFICATIONS

- Standard actuation force : 2.5N
- Max. actuation force : 100N for 10 sec
- Travel : 1.8 mm
- Lifetime :
 - momentary : >10,000,000 cycles
 - latching : 5,000,000 cycles

The company reserves the right to change specifications without notice.



MATERIALS

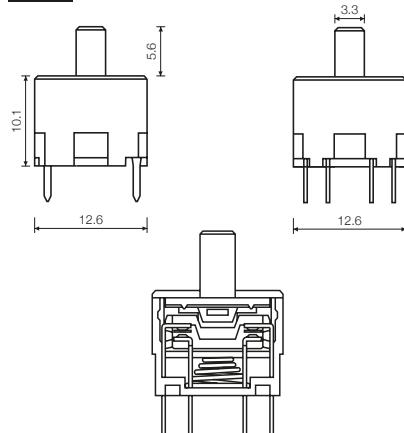
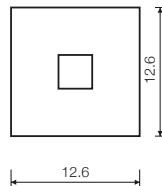
- Housing : LCP UL94V0
- Actuator : LCP UL94V0
- Switch spring : Stainless steel
- Key spring : Stainless steel
- Latch pin : Stainless steel
- Fixed contacts :
 - Silver : SnCu + 2µNI + 3µAg
 - Gold : SnCu + 2µNI + 3µAu
- Moving contacts :
 - Silver : Stainless steel + 3µAg
 - Gold : Stainless steel + 3µAg + 1µAu
- Terminals : SnCu + 2µNI + 3µSn100

All tolerance if not otherwise specified ±0.2mm.

Unimec™

8 contact functions •
2 pole • distinct tactile feel

UNIMEC



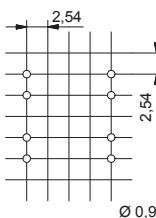
- TH
- momentary, latching or quiet
- 8 contact functions

All tolerances unless otherwise noted : ± 0.2 mm

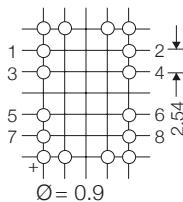


PCB LAYOUT

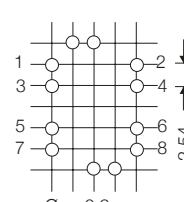
PCB MOUNTING HOLE DIMENSIONS



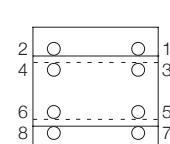
With 3mm LED
16923 and 16924



With round LED
16920 and 16921



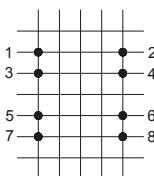
With square LED
16922



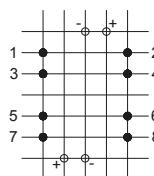
- up
-- down

FUNCTIONAL DIAGRAM

CIRCUIT DIAGRAM



With round LED
16920 and 16921

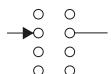


With rect. LED
16922

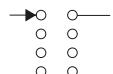


WIRING

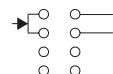
Select the contact function you require - and design your PC board accordingly



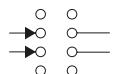
1 make contact



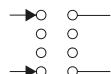
1 break contact



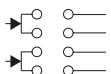
1 change over contact



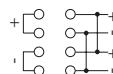
2 make contact



2 break contact



2 change over contact

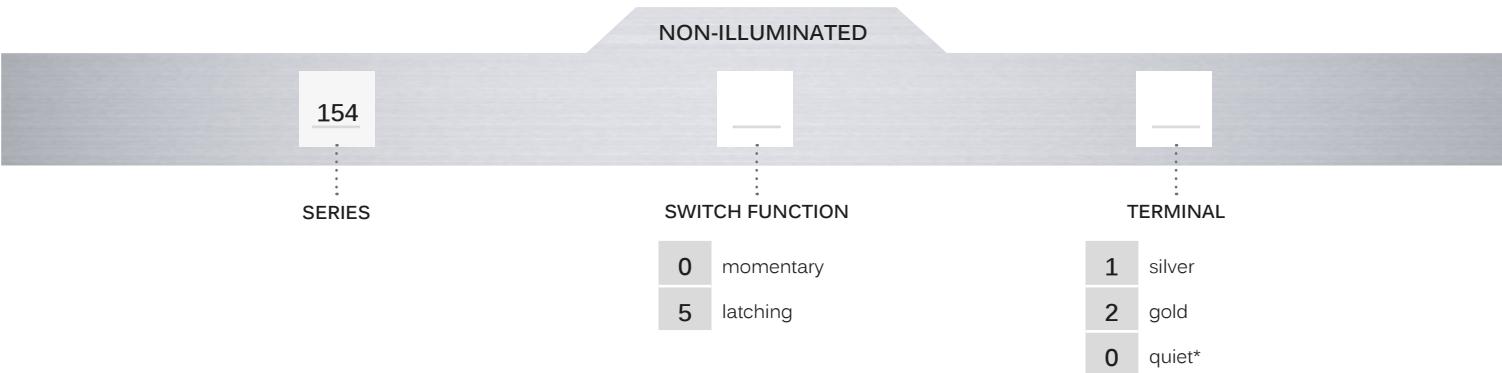


reverse polarity

8 contact functions •
2 pole • distinct tactile feel



BUILD YOUR PART NUMBER



*quiet function has silver terminals, in case of gold terminals the part number is 15420



ABOUT THIS SERIES

Notice : please note that not all combinations of above numbers are available.
Refer to www.apem.com for further information.

Laser marking on the switch for identification : 15400 A; 15420 H; 15401 E; 15402 F; 15451 I; 15452 J

Accessories : See pages 379 - 384 or cap and bezel options

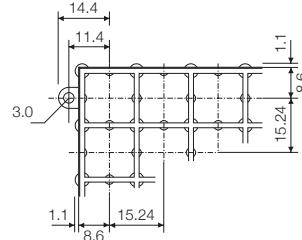
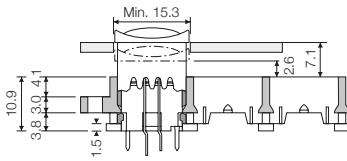
Unimec™

8 contact functions •
2 pole • distinct tactile feel



VARIO SUPPORT MOUNTING

For all types of Unimec™ switches with bezels - 16310 - 16315 and 16324 - 16326.
More options available as custom.



16.410 (1x1)

16.411 (1x2)

16.412 (1x3)

16.413 (1x4)

16.414 (1x5)

16.415 (1x6)

16.416 (1x7)

16.417 (1x8)

16.418 (1x9)

16.419 (1x10)

16.420 (2x2)

16.421 (2x3)

16.422 (2x4)

16.423 (2x5)

16.424 (2x6)

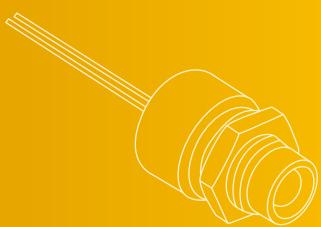
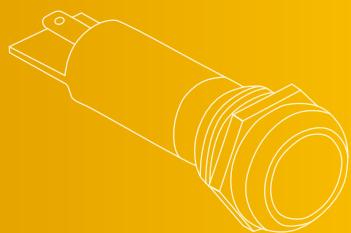
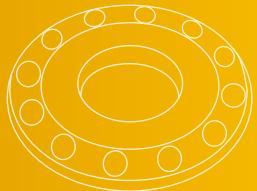
| LED COMPONENT SPECIFICATIONS | | | | | | | | | | | | | | | | |
|--|--|---------------------|-----|-----|---------------------|-----|-----|---------------------|------|------|------|------|---------|---------------------|---------|--|
| Part Nos. | | 16920/16921 | | | 16922 | | | 16923 | | | | | | 16924 | | |
| Color (G=green, Y=yellow, R=red) | | G | Y | R | G | Y | R | B | G | Y | W | R | G | Y | R | |
| Color Codes | | 02 | 04 | 08 | 02 | 04 | 08 | 00 | 20 | 40 | 65 | 80 | 23 | 45 | 88 | |
| ABSOLUTE MAXIMUM RATINGS (Ta=25°C) | | | | | | | | | | | | | | | | |
| Power | mW | 100 | 100 | 100 | 135 | 135 | 135 | 105 | 70 | 60 | 120 | 60 | 150 | 130 | 300 | |
| Current forward | mA | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 20 | 20 | 25 | 20 | 40 | 40 | 90 | |
| Forward peak current | mA | 50 | 50 | 50 | 90 | 90 | 90 | 200 | 60** | 60** | 100 | 60** | 500 | 500 | 1000 | |
| Voltage reverse | V | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 3 | 3 | 5 | 3 | 12 | 12 | 5 | |
| Operating temperature | °C | -25 / +100 | | | -55 / +100 | | | -25 / +85 | | | | | | -55 / +100 | | |
| Storage temperature | °C | -25 / +100 | | | -55 / +100 | | | -30 / +100 | | | | | | -55 / +100 | | |
| Soldering temperature | °C | +245 for max. 3 sec | | | +300 for max. 3 sec | | | +260 for max. 5 sec | | | | | | +300 for max. 3 sec | | |
| ELECTRICAL-OPTICAL CHARACTERISTICS (Ta=25°C) | | | | | | | | | | | | | | | | |
| Voltage forward | Typ. V | 2.0 | 2.0 | 2.0 | 2.1 | 2.2 | 2.3 | 2.1 | 2.1 | 2.1 | 3.8 | 2.0 | 2.1* | 2.3*** | 2.4*** | |
| | Max. V | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 2.8 | 3.0 | 3.0 | 4.3 | 3.0 | 2.5* | 2.5*** | 3.8*** | |
| Current reverse | µA | 100 | 100 | 100 | 100 | 100 | 100 | 2 | 10 | 10 | 50 | 10 | 10 | 10 | 10 | |
| Wave length | nm | 560 | 590 | 660 | 565 | 585 | 635 | 460 | 563 | 585 | NA | 650 | 570 | 587 | 635 | |
| Spread | Ønm | 10 | 10 | 10 | 10 | 10 | 10 | 40 | 40 | 40 | NA | 40 | 25 | 45 | 45 | |
| Spread angle | degree | 20 | 20 | 20 | 45 | 45 | 45 | 20 | 45 | 45 | 25 | 45 | 25 | 45 | 45 | |
| Luminous Intensity | Min. mcd | 1 | 1 | 0.8 | 1.5 | 2.5 | 2.5 | 20 | 9.0 | 5.6 | 630 | 5.6 | 71**** | 71**** | 100**** | |
| | Typ. mcd | 2 | 3 | 1.6 | 2.5 | 3.0 | 5.0 | 25 | 25 | 16 | 1000 | 16 | 112**** | 112**** | 160**** | |
| Orientation | The longer pin is the anode, the shorter is the cathode. | | | | | | | | | | | | | | | |

*F=20mA, **Pulse width 1ms Duty cycle 1:5, ***F=50mA, ****Luminous Flux mlm



LED INDICATORS





SELECTION GUIDE

LED INDICATORS 392

PANEL MOUNT LED INDICATORS

| | |
|-------------|-----|
| Q6 | 395 |
| Q8 | 397 |
| Q12..... | 399 |
| Q14..... | 403 |
| Q16..... | 405 |
| Q19..... | 407 |
| Q22..... | 409 |
| QH | 411 |
| QRM6..... | 413 |
| QRM8..... | 415 |
| QRM-NV..... | 417 |
| QS..... | 419 |

BASED LED'S

| | |
|----------|-----|
| MG | 421 |
| MF..... | 423 |
| E10..... | 425 |
| BA9..... | 427 |

LED INDICATORS

OUR RANGE



| SERIES | Q6 | Q8 | Q12 | Q14 | Q16 | Q19 | Q22 | QH |
|-----------------------|------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|----------------|
| Pages | 395 | 397 | 399 | 403 | 405 | 407 | 409 | 411 |
| Panel cut-out | 6 mm | 8 mm | 12 mm | 14 mm | 16 mm | 19 mm | 22 mm | 16/19/22/22+ |
| Voltage range | 2VDC 28VAC/DC | 2VDC 220VAC/DC | 2VDC 220VAC/DC | 2VDC 220VAC/DC | 2VDC 220VAC/DC | 2VDC 220VAC/DC | 2VDC 220VAC/DC | 12VDC 24VDC |
| Sealing | IP67 | IP67 | IP67 | IP67 | IP67 | IP67 | IP67 | IP67 |
| Bezel style | | | | | | | | |
| Prominent | X | X | X | X | X | X (+extra) | X | |
| Recessed | X | X | X | | X | X | X | |
| Flush | X | X | X | X | X | X | X | X |
| Rear mount | | | | | | | | |
| Terminal options | | | | | | | | |
| Solder lugs / fastons | X | X | X | X | X | X | X | |
| Pins | X | X | X | X | X | X | X | |
| Wires | X | X | X | X | X | X | X | X |
| Bezel finish | | | | | | | | |
| Bright chrome | X | X | X | X | X | X | X | |
| Satin chrome | X | X | X | X | X | X | X | |
| Black chrome | X | X | X | X | X | X | X | |
| Plastic | | | | | X | | X | X |
| No bezel | | | | | | | | |
| Type of illumination | | | | | | | | |
| Fixed light | X | X | X | X | X | X | X | X |
| Flashing | X | X | X | X | X | X | X | X |
| Bi-color | X | X | X | X | X | X | X | X |
| Tri-color | | X | X | X | X | X | X | |
| Night vision | | | | | | | | |
| LED colors | | | | | | | | |
| Standard colors | 6 | 6 | 6 | 6 | 6 | 6 | 5 | 5 + RGB |
| Superbright colors | 6 | 6 | 6 | 5 | 5 | 5 | 3 | |
| Hyperbright colors | 4 | 4 | 4 | 4 | 4 | 4 | | |


 APEM
BEST SELLER

Q SERIES

UNLIMITED DESIGN POSSIBILITIES



For more information,
see APEM website

- SUPER BRIGHT LEDs for good visibility even in bright daylight

- LONG LIFE EXPECTANCY

- A LARGE CHOICE OF MODELS: DIAMETERS, BEZEL SHAPES, FINISHES, COLORS, TERMINALS, POWER SUPPLY...

- CUSTOM ENGRAVING

 APEM
EXCLUSIVE


| SERIES | QRM6 | QRM8 | QRM-NV | QS | MG | MF | E10 | Ba9 |
|-----------------------------|------------------|------------------|------------------|-------------------|-------------------|-------------------|---------------|---------------|
| Pages | 413 | 415 | 417 | 419 | 421 | 423 | 425 | 427 |
| Panel cut-out | 6 mm | 8 mm | 8 mm | 6/8/10/12 mm | 6/8/10/12 mm | 8 mm | 6/8/10/12 mm | 8 mm |
| Voltage range | 2VDC 28VAC/DC | 2VDC 28VAC/DC | 2VDC 28VAC/DC | 2VDC 220VAC/DC | 12VDC 28VAC/DC | 12VDC 28VAC/DC | 6VDC - 230VAC | 6VDC - 230VAC |
| Sealing | IP67 | IP67 | IP67 | | | | | |
| Bezel style | | | | | | | | |
| Prominent | | | | | | | | |
| Recessed | | | | | | | | |
| Flush | | | | X | | | | |
| Rear mount | X | X | X | | | | | |
| Terminal options | | | | | | | | |
| Solder lugs / fastons | | | | X | | | | |
| Pins | X | X | X | | | | | |
| Wires | X | X | X | | X | | | |
| Bezel finish | | | | | | | | |
| Bright chrome | | | | | | | | |
| Satin chrome | | | | | | | | |
| Black chrome | X | X | X | | | | | |
| Plastic | | | | X | | | | |
| No bezel | | | | | X | X | X | X |
| Type of illumination | | | | | | | | |
| Fixed light | X | X | X | X | X | X | X | X |
| Flashing | | | | X | | | | |
| Bi-color | X | X | X | X | | | | |
| Tri-color | | X | X | 10 mm only | | | | |
| Night vision | | | X | | | | | |
| LED colors | | | | | | | | |
| Standard colors | 5 | 5 | NVIS colors | 6 | 5 | 5 | 5 | 5 |
| Superbright colors | 6 | 6 | | | | | | |
| Hyperbright colors | 3 | 3 | | 4 | | | | |

The most common configurations are presented in this catalog. Other commercially available configurations already existing in our different ranges of products, non-standard and custom products are available upon request.

Q6 series

Ø6mm panel mount LED indicators



DISTINCTIVE FEATURES

- 3mm colored diffused epoxy lens or 3mm water clear super bright LEDs
- Prominent, recessed and flush bezel styles
- (2.0 x 0.5) solder lug terminals, pins or (200mm long) wire terminations, other lengths available on request



ENVIRONMENTAL SPECIFICATIONS

- IP67 sealing option (EN60529)
- Temperature Range: -40 to +85°C (operating & storage)



ELECTRICAL SPECIFICATIONS

| Voltage | Operating Voltage (Min to Max) | Operating Current (Typical All Types) |
|------------------|-----------------------------------|--|
| 02 (No Resistor) | 1.8 to 3.8VDC | 20mA max |
| 6VDC | 5.4 to 6.6VDC | 20mA |
| 12VDC | 10.8 to 13.2VDC | 20mA |
| 24VDC | 21.6 to 26.4VDC | 20mA |
| 28VDC | 25.2 to 30.8VDC | 20mA |

| LED COMPONENT SPECIFICATIONS | | | |
|-----------------------------------|------------------------|---------|-----------------|
| Standard LED Intensity | Prominent and Recessed | Flush | Forward Voltage |
| HE Red | 40mcd | 10mcd | 2.0V |
| Green | 50mcd | 12mcd | 2.2V |
| Yellow | 30mcd | 6mcd | 2.1V |
| Blue | 1,200mcd | 100mcd | 3.8V |
| White | 1,200mcd | 160mcd | 3.8V |
| Orange | 60mcd | 10mcd | 2.0V |
| Bi-color (Typical) (Red/Green) | 20/15mcd | 10/8mcd | 2.0V/2.2V |

Bi-color - The color is changed by reversing the polarity of the supply voltage.

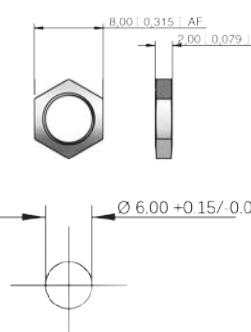
The company reserves the right to change specifications without notice.

LED characteristics are dependent upon environmental conditions. Therefore published data should be considered nominal.



MOUNTING

PANEL CUT-OUT



GENERAL SPECIFICATIONS

- Max Reverse Voltage: 5V
- Viewing Angle: 30–100° (dependant on model)
- Life Expectancy: 100,000 hours
- Torque: 4cNm (dependent on option)



MATERIALS

- Plated brass bezel finished in bright chrome, black chrome or satin grey and moulded polycarbonate rear body

Q6 series

Ø6mm panel mount LED indicators



BUILD YOUR PART NUMBER

Q

SERIES

MOUNTING HOLE

BEZEL STYLE

TERMINALS

BEZEL FINISH

6 Ø6mm

| | |
|---|-----------|
| P | Prominent |
| R | Recessed |
| F | Flush |

| | |
|---|------------------------------------|
| 1 | Solder Lug/ Fastons (2.0 x 0.5) |
| 2 | Pins |
| 3 | Wires |

| | |
|---|------------------|
| 4 | Rear epoxy Pins |
| 5 | Rear epoxy Wires |
| 6 | Short body Pins |
| 7 | Short body Wires |

| | |
|---|---------------|
| C | Bright Chrome |
| B | Black Chrome |
| G | Satin Grey |

TYPE OF ILLUMINATION

LED COLOR

VOLTAGE

SEALING

| | |
|----|---------------------------------|
| XX | Fixed Light |
| KK | Flashing Light (12V – 28VDC) |
| YY | Bi-color |

| | |
|----|------------------------|
| R | Red |
| G | Green |
| Y | Yellow |
| B | Blue |
| W | White |
| O | Orange |
| HR | Hyper Bright Red |
| HG | Hyper Bright Green |
| HY | Hyper Bright Yellow |
| HO | Hyper Bright Orange |

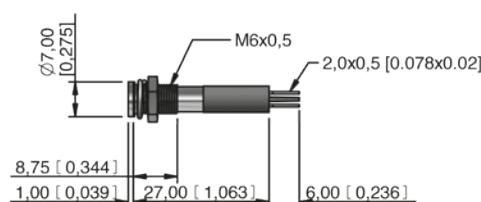
| | |
|----|------------------------|
| SR | Super Bright Red |
| SG | Super Bright Green |
| SY | Super Bright Yellow |
| SB | Super Bright Blue |
| SW | Super Bright White |
| SO | Super Bright Orange |
| RG | Red/Green |
| RY | Red/Yellow |
| GY | Green/Yellow |

| | |
|-----|-------------|
| 02 | no resistor |
| 06 | 6VDC |
| 12 | 12VDC |
| 12A | 12VAC/DC |
| 24 | 24VDC |
| 24A | 24VAC/DC |
| 28 | 28VDC |
| 28A | 28VAC/DC |

| | |
|---------|----------|
| (Blank) | Unsealed |
| E | IP67 |

NOTICE : please note that not all combinations of above numbers are available.
Refer to www.apem.com for further information.

FLUSH BEZEL – SOLDER LUG/FASTON TERMINALS WITH STANDARD BODY



Q8 series

Ø8mm panel mount LED indicators



DISTINCTIVE FEATURES

- 5mm colored diffused epoxy lens or 5mm water clear super bright LEDs

- Prominent, recessed and flush bezel styles

- (2.8 x 0.8) solder lug/faston terminals, pins or (200mm long) wire terminations (2.0 x 0.5) solder lug/faston terminals on tri-color versions



ENVIRONMENTAL SPECIFICATIONS

- IP67 sealing option (EN60529)
- Temperature Range: -40 to +85°C (operating & storage)



ELECTRICAL SPECIFICATIONS

| Voltage | Operating Voltage (Min to Max) | Operating Current (Typical All Types) |
|------------------|-----------------------------------|--|
| 02 (No Resistor) | 1.8 to 3.3VDC | 20mA max |
| 6VDC | 5.4 to 6.6VDC | 20mA |
| 12VDC | 10.8 to 13.2VDC | 20mA |
| 24VDC | 21.6 to 26.4VDC | 20mA |
| 28VDC | 25.2 to 30.8VDC | 20mA |
| 110VAC | 99 to 121VAC | 6mA |
| 220VAC | 207 to 235VAC | 3mA |

| LED COMPONENT SPECIFICATIONS | | | |
|---|------------------------|------------|-----------------|
| Standard LED Intensity | Prominent and Recessed | Flush | Forward Voltage |
| HE Red | 80mcd | 8mcd | 2.0V |
| Green | 60mcd | 6mcd | 2.2V |
| Yellow | 50mcd | 6mcd | 2.1V |
| Blue | 1600mcd | 50mcd | 3.3V |
| White | 1600mcd | 500mcd | 3.3V |
| Orange | 60mcd | 110mcd | 2.2V |
| Bi-color (Typical) (Red/Green) | 14/30mcd | 15/10mcd | 2.0V/2.2V |
| Tri-color (Typical) (Red/Green/Yellow) | 60/15/13mcd | 15/10/6mcd | 2.0V/2.2V/2.1V |

Bi-color - The color is changed by reversing the polarity of the supply voltage.
Tri-color - The indicator has red and green LEDs, when both connected yellow is produced.

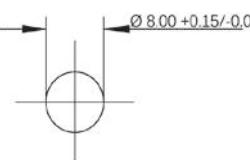
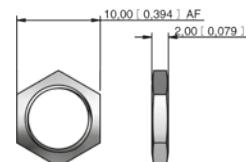
The company reserves the right to change specifications without notice.

LED characteristics are dependent upon environmental conditions. Therefore published data should be considered nominal.



MOUNTING

PANEL CUT-OUT



GENERAL SPECIFICATIONS

- Max Reverse Voltage: 5V
- Viewing Angle: 30–100° (dependant on model)
- Life Expectancy: 100,000 hours
- Torque: 20 to 25cNm (dependant on option)



MATERIALS

- Plated brass bezel finished in bright chrome, black chrome or satin grey and moulded polycarbonate rear body

Q8 series

Ø8mm panel mount LED indicators



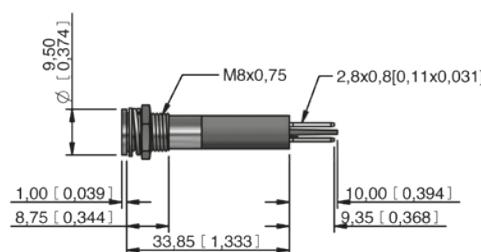
BUILD YOUR PART NUMBER

| Q | MOUNTING HOLE | BEZEL STYLE | TERMINALS | BEZEL FINISH |
|--------|---------------|-----------------------------------|---|-----------------|
| SERIES | MOUNTING HOLE | BEZEL STYLE | TERMINALS | BEZEL FINISH |
| 8 Ø8mm | P Prominent | 1 Solder Lug/ Fastons (2.8 x 0.8) | 5 Rear epoxy Wires | C Bright Chrome |
| | R Recessed | 2 Pins | 6 Short body Pins | B Black Chrome |
| | F Flush | 3 Wires | 7 Short body Wires | G Satin Grey |
| | | 4 Rear epoxy Pins | 8 Short body Lug/ Fastons (2.8 x 0.8) | |
| | | | 9 Extended short body solder Lug/ Fastons (2.8 x 0.5) | |

| TYPE OF ILLUMINATION | LED COLOR | VOLTAGE | SEALING |
|---------------------------------|---------------------|------------------------|------------------------|
| XX Fixed Light | R Red | HG Hyper Bright Green | SW Super Bright White |
| KK Flashing Light (12V – 28VDC) | G Green | HY Hyper Bright Yellow | SO Super Bright Orange |
| YY Bi-color | Y Yellow | HO Hyper Bright Orange | RG Red/Green |
| ZZ Tri-color | B Blue | SR Super Bright Red | RY Red/Yellow |
| | W White | SG Super Bright Green | GY Green/Yellow |
| | O Orange | SY Super Bright Yellow | RYG Red/Yellow/Green |
| | HR Hyper Bright Red | SB Super Bright Blue | |
| | | | (Blank) Unsealed |
| | | | E IP67 |

NOTICE : please note that not all combinations of above numbers are available.
Refer to www.apem.com for further information.

FLUSH BEZEL - SOLDER LUG/FASTON TERMINALS WITH STANDARD BODY



Q12 series

Ø12mm panel mount LED indicators



DISTINCTIVE FEATURES

8mm colored diffused epoxy lens or 8mm water clear super bright LEDs

2VDC - 220VAC

(2.8 x 0.8) solder lug/faston terminals, pins or (200mm long) wire terminations



ENVIRONMENTAL SPECIFICATIONS

- IP67 sealing option (EN60529)
- Temperature Range: -40 to +85°C (operating & storage)



ELECTRICAL SPECIFICATIONS

| Voltage | Operating Voltage (Min to Max) | Operating Current (Typical All Types) |
|------------------|-----------------------------------|--|
| 02 (No Resistor) | 1.8 to 3.3VDC | 20mA max |
| 6VDC | 5.4 to 6.6VDC | 20mA |
| 12VDC | 10.8 to 13.2VDC | 20mA |
| 24VDC | 21.6 to 26.4VDC | 20mA |
| 28VDC | 25.2 to 30.8VDC | 20mA |
| 110VAC | 99 to 121VAC | 6mA |
| 220VAC | 207 to 235VAC | 3mA |

LED COMPONENT SPECIFICATIONS

| Standard LED Intensity | Prominent and Recessed | Forward Voltage |
|---|------------------------|-----------------|
| HE Red | 350mcd | 2.0V |
| Green | 60mcd | 2.2V |
| Yellow | 50mcd | 2.1V |
| Blue | 800mcd | 3.3V |
| White | 1,200mcd | 3.3V |
| Orange | 100mcd | 2.2V |
| Bi-color (Typical) (Red/Green) | 20/10mcd | 2.0V/2.2V |
| Tri-color (Typical) (Red/Green/Yellow) | 80/15/13mcd | 2.0V/2.2V/2.1V |

Bi-color - The color is changed by reversing the polarity of the supply voltage.
Tri-color - The indicator has red and green LEDs, when both connected yellow is produced.

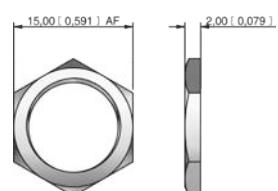
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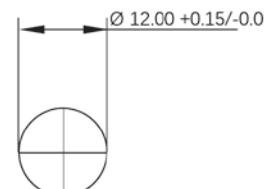


MOUNTING

PANEL CUT-OUT



M12 x 0.75 THREAD



GENERAL SPECIFICATIONS

- Max Reverse Voltage: 5V
- Viewing Angle: 30–100° (dependant on model)
- Life Expectancy: 100,000 hours
- Torque: 75cNm (dependent on option)



MATERIALS

- Plated brass bezel finished in bright chrome, black chrome or satin grey and moulded polycarbonate rear body

Q12 series

Ø12mm panel mount LED indicators



BUILD YOUR PART NUMBER

PROMINENT AND RECESSED BEZEL

| SERIES | MOUNTING HOLE | BEZEL STYLE | TERMINALS | BEZEL FINISH |
|----------|---------------|-----------------------------------|--------------------|-----------------|
| 12 Ø12mm | P Prominent | 1 Solder Lug/ Fastons (2.8 x 0.8) | 5 Rear epoxy Wires | C Bright Chrome |
| | R Recessed | 2 Pins | 6 Short body Pins | B Black Chrome |
| | | 3 Wires | 7 Short body Wires | G Satin Grey |
| | | 4 Rear epoxy Pins | | |

TYPE OF ILLUMINATION

| | |
|----|------------------------------|
| XX | Fixed Light |
| KK | Flashing Light (12V – 28VDC) |
| YY | Bi-color |
| ZZ | Tri-color |

| | |
|----|------------------|
| R | Red |
| G | Green |
| Y | Yellow |
| B | Blue |
| W | White |
| O | Orange |
| HR | Hyper Bright Red |

LED COLOR

| | |
|----|---------------------|
| HG | Hyper Bright Green |
| HY | Hyper Bright Yellow |
| HO | Hyper Bright Orange |
| SR | Super Bright Red |
| SG | Super Bright Green |
| SY | Super Bright Yellow |
| SB | Super Bright Blue |

| | |
|-----|---------------------|
| SW | Super Bright White |
| SO | Super Bright Orange |
| RG | Red/Green |
| RY | Red/Yellow |
| GY | Green/Yellow |
| RYG | Red/Yellow/Green |

VOLTAGE

| | |
|-----|--------------|
| 02 | no resistor* |
| 06 | 6VDC |
| 12 | 12VDC |
| 12A | 12VAC/DC |
| 24 | 24VDC |
| 24A | 24VAC/DC |
| 28 | 28VDC |
| 28A | 28VAC/DC |
| 110 | 110VAC |
| 220 | 220VAC |

SEALING

| | |
|---------|----------|
| (Blank) | Unsealed |
| E | IP67 |

NOTICE : please note that not all combinations of above numbers are available.
Refer to www.apem.com for further information.

Q12 series

Ø12mm panel mount LED indicators

| FLUSH BEZEL | | | | |
|-------------|---------------|-------------|--|---|
| SERIES | MOUNTING HOLE | BEZEL STYLE | TERMINALS | BEZEL FINISH |
| Q | 12 Ø12mm | F Flush | 1 Solder Lug/ Fastons (2.8 x 0.8) 4 Rear epoxy Pins 5 Rear epoxy Wires | C Bright Chrome B Black Chrome G Satin Grey |

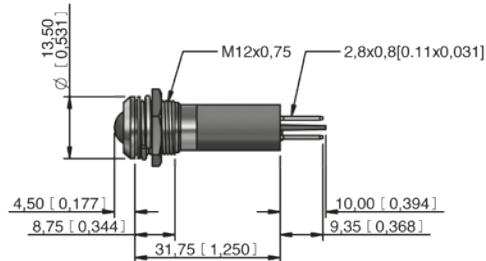
| TYPE OF ILLUMINATION | LED COLOR | VOLTAGE | SEALING |
|----------------------|-----------|-----------------|------------------|
| XX Fixed Light | R Red | 02 no resistor* | (Blank) Unsealed |
| | G Green | 06 6VDC | E IP67 |
| | Y Yellow | 12 12VDC | |
| | B Blue | 12A 12VAC/DC | |
| | W White | 24 24VDC | |
| | O Orange | 24A 24VAC/DC | |
| | | 28 28VDC | |
| | | 28A 28VAC/DC | |
| | | 110 110VAC | |
| | | 220 220VAC | |

NOTICE : please note that not all combinations of above numbers are available.
Refer to www.apem.com for further information.

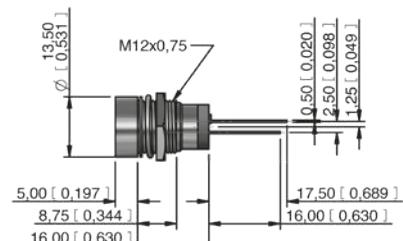
Q12 series

Ø12mm panel mount LED indicators

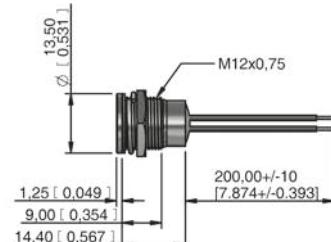
PROMINENT BEZEL - SOLDER LUG/FASTON TERMINALS WITH STANDARD BODY



RECESSED BEZEL - PCB PIN TERMINALS WITH STANDARD BODY



FLUSH BEZEL - REAR EPOXY WIRES WITH SHORT BODY



Q14 series

Ø14mm panel mount LED indicators



DISTINCTIVE FEATURES

10mm colored diffused epoxy lens or 10mm water clear super bright LEDs

Prominent and flush bezel styles

(2.8 x 0.8) solder lug/faston terminals, pins or (200mm long) wire terminations

Custom engraving available



ENVIRONMENTAL SPECIFICATIONS

- IP67 sealing option (EN60529)
- Temperature Range: -40 to +85°C (operating & storage)



ELECTRICAL SPECIFICATIONS

| Voltage | Operating Voltage (Min to Max) | Operating Current (Typical All Types) |
|------------------|-----------------------------------|--|
| 02 (No Resistor) | 1.8 to 3.3VDC | 20mA max |
| 6VDC | 5.4 to 6.6VDC | 20mA |
| 12VDC | 10.8 to 13.2VDC | 20mA |
| 24VDC | 21.6 to 26.4VDC | 20mA |
| 28VDC | 25.2 to 30.8VDC | 20mA |
| 110VAC | 99 to 121VAC | 6mA |
| 220VAC | 207 to 235VAC | 3mA |

| LED COMPONENT SPECIFICATIONS | | | |
|---|------------------------|-------------|-----------------|
| Standard LED Intensity | Prominent and Recessed | Flush | Forward Voltage |
| HE Red | 80mcd | 10mcd | 2.0V |
| Green | 60mcd | 5mcd | 2.2V |
| Yellow | 50mcd | 4mcd | 2.1V |
| Blue | 540mcd | 100mcd | 3.3V |
| White | 1000mcd | 150mcd | 3.3V |
| Orange | 80mcd | 200mcd | 2.2V |
| Bi-color (Typical) (Red/Green) | 15/15mcd | 14/10mcd | 2.0V/2.2V |
| Tri-color (Typical) (Red/Green/Yellow) | 60/50/50mcd | 15/10/30mcd | 2.0V/2.2V/2.1V |

Bi-color - The color is changed by reversing the polarity of the supply voltage.
Tri-color - The indicator has red and green LEDs, when both connected yellow is produced.

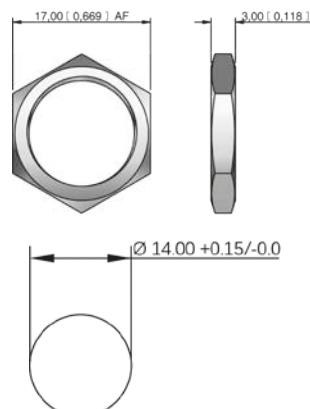
The company reserves the right to change specifications without notice.

LED characteristics are dependent upon environmental conditions. Therefore published data should be considered nominal.



MOUNTING

PANEL CUT-OUT



GENERAL SPECIFICATIONS

- Max Reverse Voltage: 5V
- Viewing Angle: 30–100° (dependant on model)
- Life Expectancy: 100,000 hours
- Torque: 75cNm (dependent on option)



MATERIALS

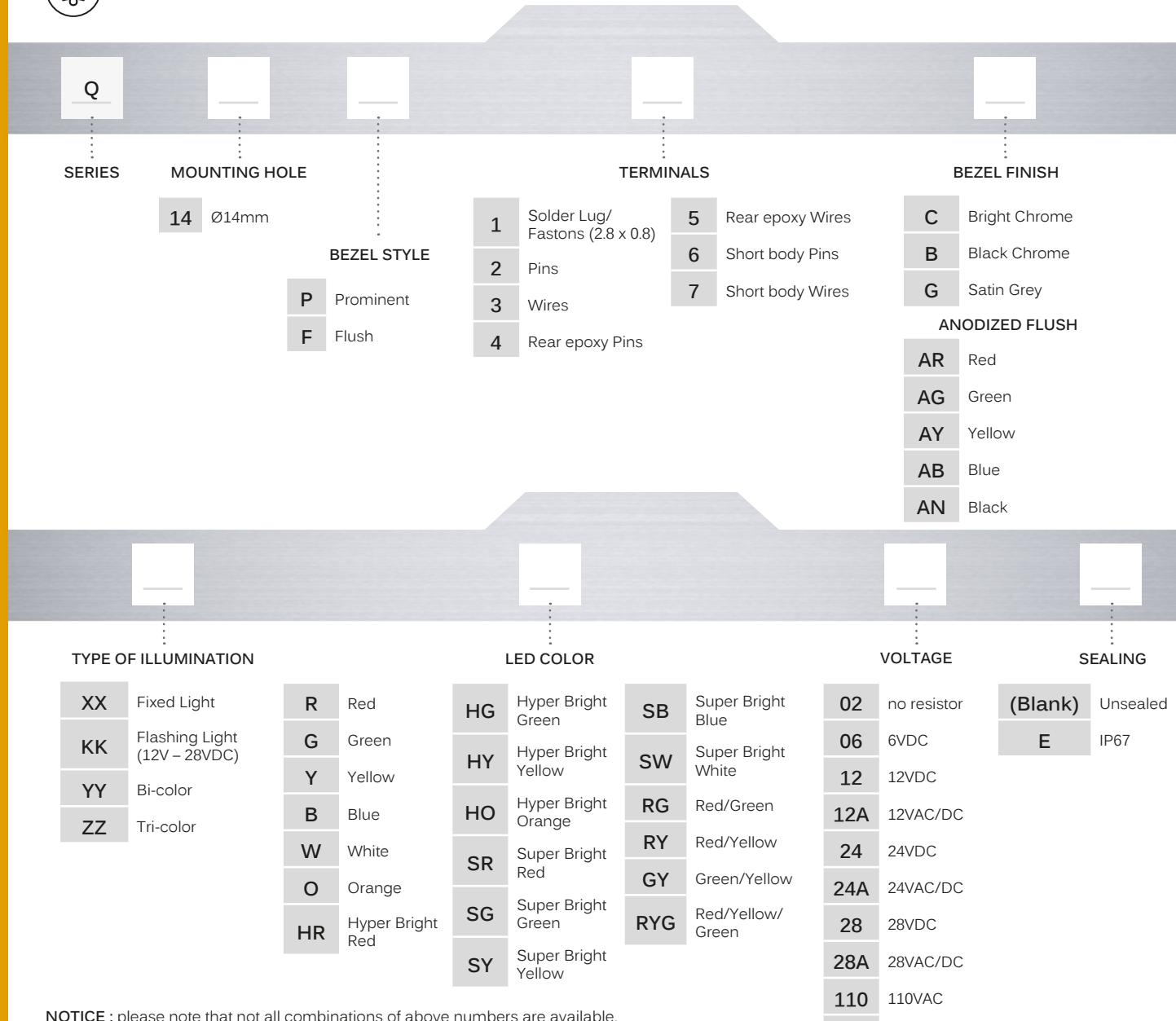
- Plated brass bezel finished in bright chrome, black chrome or satin grey and moulded polycarbonate rear body

Q14 series

Ø14mm panel mount LED indicators

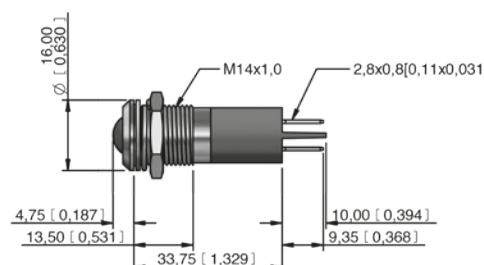


BUILD YOUR PART NUMBER



NOTICE : please note that not all combinations of above numbers are available.
Refer to www.apem.com for further information.

PROMINENT BEZEL - SOLDER LUG/FASTON TERMINALS WITH STANDARD BODY



Q16 series

Ø16mm panel mount LED indicators



DISTINCTIVE FEATURES

Secret until lit polycarbonate decals or custom engraving
10mm colored diffused epoxy lens or 10mm water clear super bright LEDs
(2.8 x 0.8) solder lug/faston terminals, pins or (200mm long) wire terminations



ENVIRONMENTAL SPECIFICATIONS

- IP67 sealing option (EN60529)
- Temperature Range: -40 to +85°C (operating & storage)



ELECTRICAL SPECIFICATIONS

| Voltage | Operating Voltage (Min to Max) | Operating Current (Typical All Types) |
|------------------|-----------------------------------|--|
| 02 (No Resistor) | 1.8 to 3.3VDC | 20mA max* |
| 6VDC | 5.4 to 6.6VDC | 20mA |
| 12VDC | 10.8 to 13.2VDC | 20mA |
| 24VDC | 21.6 to 26.4VDC | 20mA |
| 28VDC | 25.2 to 30.8VDC | 20mA |
| 110VAC | 99 to 121VAC | 6mA |
| 220VAC | 207 to 235VAC | 3mA |

| LED COMPONENT SPECIFICATIONS | | | |
|---|------------------------|-------------|-----------------|
| Standard LED Intensity | Prominent and Recessed | Flush | Forward Voltage |
| HE Red | 80mcd | 10mcd | 2.0V |
| Green | 60mcd | 5mcd | 2.2V |
| Yellow | 50mcd | 4mcd | 2.1V |
| Blue | 540mcd | 100mcd | 3.3V |
| White | 1000mcd | 150mcd | 3.3V |
| Orange | 80mcd | 200mcd | 2.2V |
| Bi-color (Typical) (Red/Green) | 15/15mcd | 14/10mcd | 2.0V/2.2V |
| Tri-color (Typical) (Red/Green/Yellow) | 60/50/50mcd | 15/10/30mcd | 2.0V/2.2V/2.1V |

Bi-color - The color is changed by reversing the polarity of the supply voltage.
Tri-color - The indicator has red and green LEDs, when both connected yellow is produced.

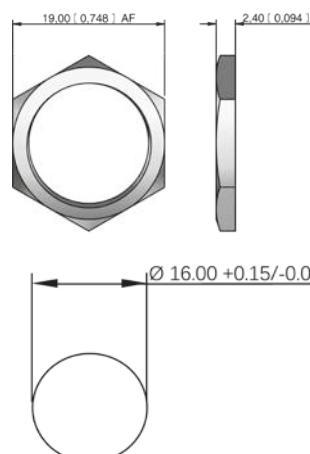
The company reserves the right to change specifications without notice.

LED characteristics are dependent upon environmental conditions. Therefore published data should be considered nominal.



MOUNTING

PANEL CUT-OUT



GENERAL SPECIFICATIONS

- Max Reverse Voltage: 5V
- Viewing Angle: 30–100° (dependant on model)
- Life Expectancy: 100,000 hours
- Torque: 75cNm (dependent on option)



MATERIALS

- Plated brass bezel finished in bright chrome, black chrome or satin grey and moulded polycarbonate rear body

Q16 series

Ø16mm panel mount LED indicators



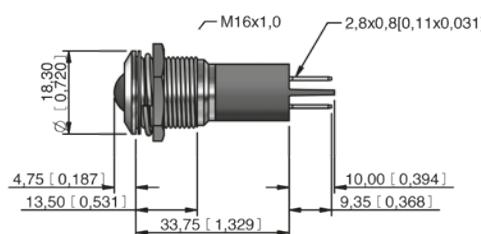
BUILD YOUR PART NUMBER

| SERIES | MOUNTING HOLE | BEZEL STYLE | TERMINALS | BEZEL FINISH |
|--------|---------------|--------------|-----------------------------------|-----------------|
| 16 | Ø16mm | Metal | 1 Solder Lug/ Fastons (2.8 x 0.8) | Metal |
| | | P Prominent | 2 Pins | C Bright Chrome |
| | | R Recessed | 3 Wires | B Black Chrome |
| | | F Flush | 4 Rear epoxy Pins | G Satin Grey |
| | | Plastic | | Plastic |
| | | PP Prominent | | BP Black |
| | | FP Flush | | |

| TYPE OF ILLUMINATION | LED COLOR | VOLTAGE | SEALING |
|---------------------------------|---------------------|------------------------|-----------------------|
| XX Fixed Light | R Red | HG Hyper Bright Green | SB Super Bright Blue |
| KK Flashing Light (12V – 28VDC) | G Green | HY Hyper Bright Yellow | SW Super Bright White |
| YY Bi-color | Y Yellow | HO Hyper Bright Orange | RG Red/Green |
| ZZ Tri-color | B Blue | SR Super Bright Red | RY Red/Yellow |
| | W White | SG Super Bright Green | GY Green/Yellow |
| | O Orange | SY Super Bright Yellow | RYG Red/Yellow/Green |
| | HR Hyper Bright Red | | |

NOTICE : please note that not all combinations of above numbers are available.
Refer to www.apem.com for further information.

PROMINENT BEZEL - SOLDER LUG/FASTON TERMINALS WITH STANDARD BODY



Q19 series

Ø19mm panel mount LED indicators



DISTINCTIVE FEATURES

10mm colored diffused epoxy lens or 10mm water clear super bright LEDs

Prominent and flush bezel styles

(2.8 x 0.8) solder lug/faston terminals, pins or (200mm long) wire terminations

Custom engraving available



ENVIRONMENTAL SPECIFICATIONS

- IP67 sealing option (EN60529)
- Temperature Range: -40 to +85°C (operating & storage)



ELECTRICAL SPECIFICATIONS

| Voltage | Operating Voltage (Min to Max) | Operating Current (Typical All Types) |
|------------------|-----------------------------------|--|
| 02 (No Resistor) | 1.8 to 3.3VDC | 20mA max |
| 6VDC | 5.4 to 6.6VDC | 20mA |
| 12VDC | 10.8 to 13.2VDC | 20mA |
| 24VDC | 21.6 to 26.4VDC | 20mA |
| 28VDC | 25.2 to 30.8VDC | 20mA |
| 110VAC | 99 to 121VAC | 6mA |
| 220VAC | 207 to 235VAC | 3mA |

| LED COMPONENT SPECIFICATIONS | | | |
|---|------------------------|-------------|-----------------|
| Standard LED Intensity | Prominent and Recessed | Flush | Forward Voltage |
| HE Red | 80mcd | 10mcd | 2.0V |
| Green | 60mcd | 5mcd | 2.2V |
| Yellow | 50mcd | 4mcd | 2.1V |
| Blue | 540mcd | 100mcd | 3.3V |
| White | 1000mcd | 150mcd | 3.3V |
| Orange | 80mcd | 200mcd | 2.2V |
| Bi-color (Typical) (Red/Green) | 15/15mcd | 14/10mcd | 2.0V/2.2V |
| Tri-color (Typical) (Red/Green/Yellow) | 60/50/50mcd | 15/10/30mcd | 2.0V/2.2V/2.1V |

Bi-color - The color is changed by reversing the polarity of the supply voltage.
Tri-color - The indicator has red and green LEDs, when both connected yellow is produced.

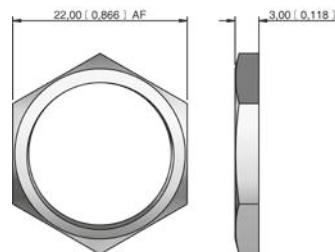
The company reserves the right to change specifications without notice.

LED characteristics are dependent upon environmental conditions. Therefore published data should be considered nominal.

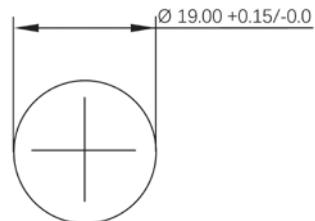


MOUNTING

PANEL CUT-OUT



M19 x 1.0 THREAD



GENERAL SPECIFICATIONS

- Max Reverse Voltage: 5V
- Viewing Angle: 30–100° (dependant on model)
- Life Expectancy: 100,000 hours
- Torque: 75cNm (dependent on option)



MATERIALS

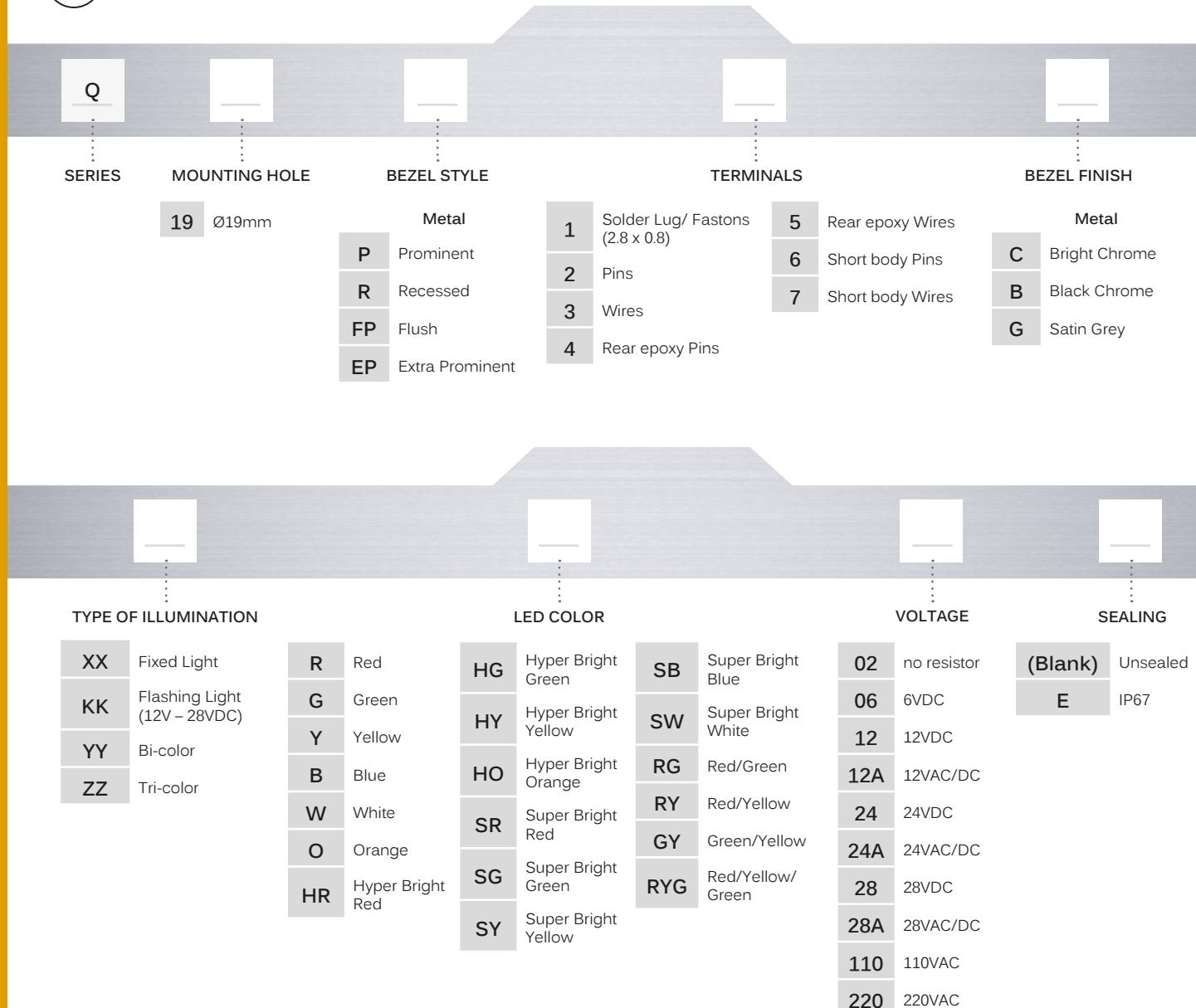
- Plated brass bezel finished in bright chrome, black chrome or satin grey and moulded polycarbonate rear body

Q19 series

Ø19mm panel mount LED indicators

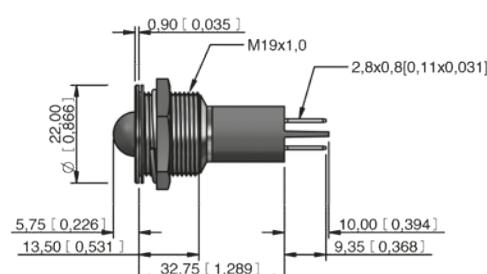


BUILD YOUR PART NUMBER



NOTICE : please note that not all combinations of above numbers are available.
Refer to www.apem.com for further information.

PROMINENT BEZEL - SOLDER LUG/FASTON TERMINALS WITH STANDARD BODY



Q22 series

Ø22mm panel mount LED indicators



DISTINCTIVE FEATURES

18mm colored diffused epoxy lens or 18mm super bright LEDs

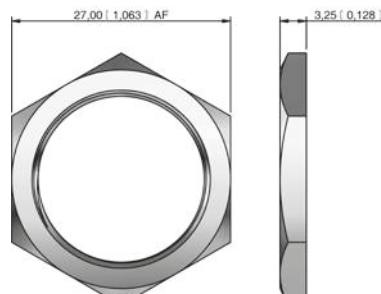
Custom engraving available

(2.8 x 0.8) solder lug/faston terminals, pins or (200mm long) wire terminations

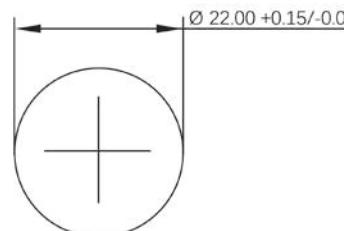


MOUNTING

PANEL CUT-OUT



M22 x 1,0 THREAD



GENERAL SPECIFICATIONS

- Max Reverse Voltage: 5V
- Viewing Angle: 30–100° (dependant on model)
- Life Expectancy: 100,000 hours
- Torque: 75cNm (dependent on option)



MATERIALS

- Plated brass bezel finished in bright chrome, black chrome or satin grey and moulded polycarbonate rear body

The company reserves the right to change specifications without notice.

LED characteristics are dependent upon environmental conditions. Therefore published data should be considered nominal.

Q22 series

Ø22mm panel mount LED indicators

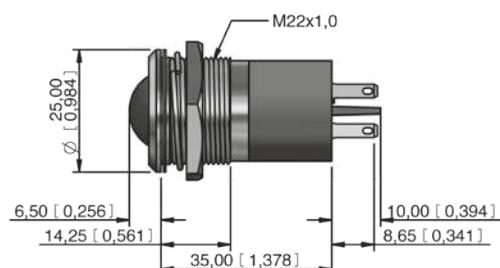


BUILD YOUR PART NUMBER

| SERIES | MOUNTING HOLE | BEZEL STYLE | TERMINALS | BEZEL FINISH |
|--------------------------------|-----------------------|----------------------------------|-----------------------------------|-------------------|
| 22 Ø22mm | | | | |
| | | Metal | 1 Solder Lug/ Fastons (2.8 x 0.8) | Metal |
| | | P Prominent | 4 Rear epoxy Pins | C Bright Chrome |
| | | R Recessed | 5 Rear epoxy Wires | B Black Chrome |
| | | F Flush | 6 Short body Pins | G Satin Grey |
| | | Y Chamfer (Stainless Steel only) | 7 Short body Wires | S Stainless Steel |
| | | Plastic | | Plastic |
| | | PP Prominent | | BP Black |
| | | FP Flush | | |
| TYPE OF ILLUMINATION | LED COLOR | | VOLTAGE | SEALING |
| XX Fixed Light | R Red | SY Super Bright Yellow | 02 no resistor | (Blank) Unsealed |
| KK Flashing Light (only 12VDC) | G Green | RG Red/Green | 06 6VDC | E IP67 |
| YY Bi-color | Y Yellow | RY Red/Yellow | 12 12VDC | |
| ZZ Tri-color | B Blue | GY Green/Yellow | 12A 12VAC/DC | |
| | W White | RYG Red/Yellow/ Green | 24 24VDC | |
| | SR Super Bright Red | | 24A 24VAC/DC | |
| | SG Super Bright Green | | 28 28VDC | |
| | | | 28A 28VAC/DC | |
| | | | 110 110VAC | |
| | | | 220 220VAC | |
| | | | | DL Daisy Chain |
| | | | | LT Lamp Test |

NOTICE : please note that not all combinations of above numbers are available.
Refer to www.apem.com for further information.

PROMINENT BEZEL - SOLDER LUG/FASTON TERMINALS WITH STANDARD BODY



QH series

Halo LED illumination



DISTINCTIVE FEATURES

- Single, dual and RGB colors available

- Designed to integrate with Ø16, Ø19 and Ø22mm panel cutout switches and other APEM indicators

- Ø22mm oversized version for integration with APEM's range of Emergency Stop switches

- Panel sealed up to IP67

- 200mm 26AWG UL1061 wire terminations



ENVIRONMENTAL SPECIFICATIONS

- Panel Seal : IP67 to EN60529 : 1992
- EMC Immunity : EN61000-4-3, 100V/m, extended to radiated fields in frequency range of 80MHz-2.7GHz, 1kHz 80% sine wave modulation
- EMC Emissions : EN61000-6-4 : 2011, Class B 30Mhz-11Ghz
- Electrostatic Discharge : EN61000-4-2 up to +/- 15KV
- Operating Temperature Range : -30 to +70°C



ELECTRICAL SPECIFICATIONS

| Voltage | Operating Voltage (Min to Max) | Operating Current (Typical All Types) |
|-----------------|-----------------------------------|--|
| 12VDC to 24 VDC | 12.0 to 26.4 | 4.2mA to 20mA |

| LED COMPONENT SPECIFICATIONS | | |
|------------------------------|-----------|-----------------|
| Standard LED | Intensity | Forward Voltage |
| HE Red | 120 mcd | 2.0 (typical) |
| Green | 350 mcd | 3.1 (typical) |
| Yellow | 90 mcd | 2.0 (typical) |
| Blue | 90 mcd | 3.1 (typical) |
| White | 350 mcd | 3.1 (typical) |

Luminous intensity will be reduced with lower operating current.



MATERIALS

- Body : PC
- Lens : PC

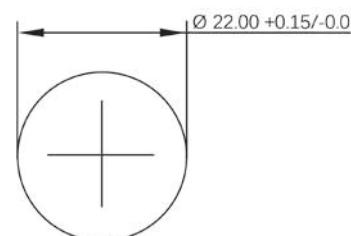
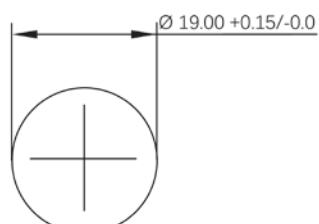
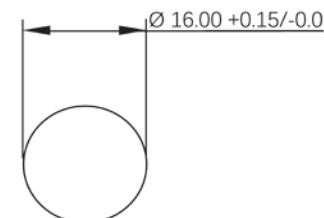
The company reserves the right to change specifications without notice.

LED characteristics are dependent upon environmental conditions. Therefore published data should be considered nominal.



MOUNTING

PANEL CUT-OUT



GENERAL SPECIFICATIONS

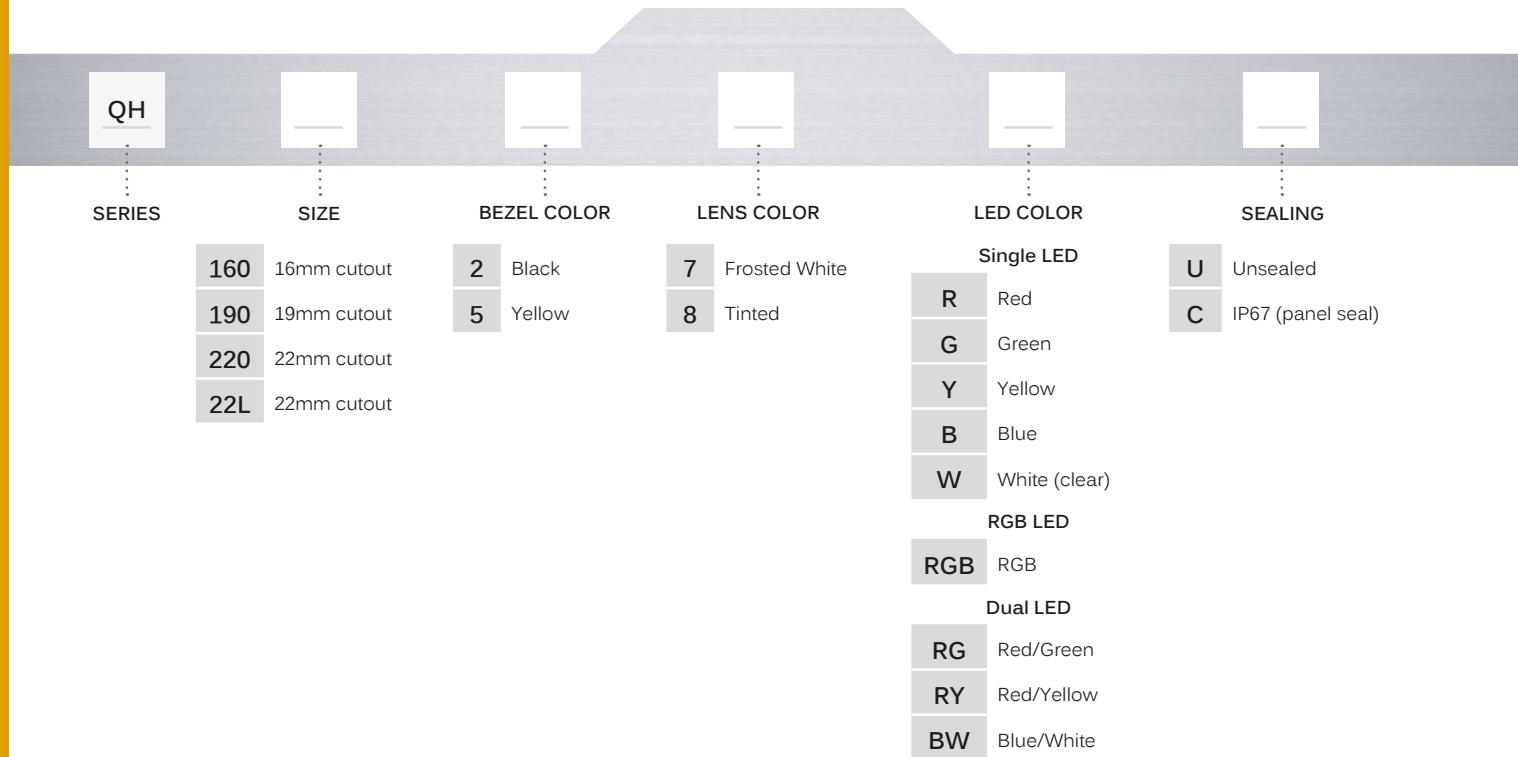
- Max Reverse Voltage : 5VDC
- Life Expectancy : 50,000 Hours
- Single color PCB : 12 LED's
- Dual Color PCB : 12 LED's, 6 of each (alternately placed)
- RGB

QH series

Halo LED illumination



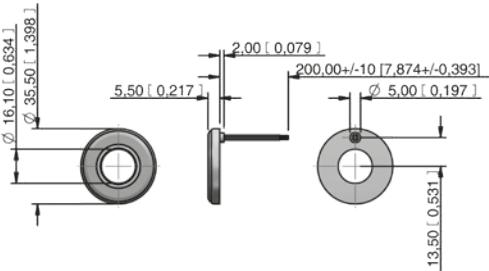
BUILD YOUR PART NUMBER



QH22L57YC

Shown fitted to an Emergency Stop switch

**QH 16MM - YELLOW BEZEL
FROSTED WHITE LENS - YELLOW LED**



QRM6 series

Ø6mm rear panel mount LED indicators



DISTINCTIVE FEATURES

- 3mm flush diffused LED, standard, hyper bright or clear water
- Bi-color LED options
- 200mm wire or pin terminations



ENVIRONMENTAL SPECIFICATIONS

- IP67 sealing option (EN60529)
- Operating Temperature Range: -40 to +85°C
- Storage Temperature Range: -55 to +100°C



ELECTRICAL SPECIFICATIONS

| Voltage | Operating Voltage (Min to Max) | Operating Current (Typical All Types) |
|------------------|-----------------------------------|--|
| 02 (No Resistor) | 2.1 to 3.3VDC | 20mA max |
| 6VDC | 5.4 to 6.6VDC | 20mA |
| 12VDC | 10.8 to 13.2VDC | 20mA |
| 24VDC | 21.6 to 26.4VDC | 20mA |
| 28VDC | 25.2 to 30.8VDC | 20mA |

| LED COMPONENT SPECIFICATIONS | | |
|-----------------------------------|------------------------------|-----------------|
| Standard LED Intensity | MCD Output (all voltages) | Forward Voltage |
| HE Red | 10mcd | 2.0V |
| Green | 8mcd | 2.2V |
| Yellow | 6mcd | 2.1V |
| Blue | 200mcd | 3.8V |
| White | 500mcd | 3.3V |
| Bi-color (Typical) (Red/Green) | 10/8mcd | 2.0V/2.2V |

The color is changed by reversing the polarity of the supply voltage.

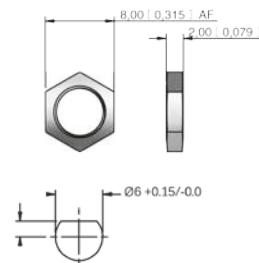
The company reserves the right to change specifications without notice.

LED characteristics are dependent upon environmental conditions. Therefore published data should be considered nominal.



MOUNTING

PANEL CUT-OUT



GENERAL SPECIFICATIONS

- Max Reverse Voltage: 5V
- Viewing Angle: 60°
- Life Expectancy: 100,000 hours
- Max Panel Thickness: 3.5mm
- Torque: 60cNm



MATERIALS

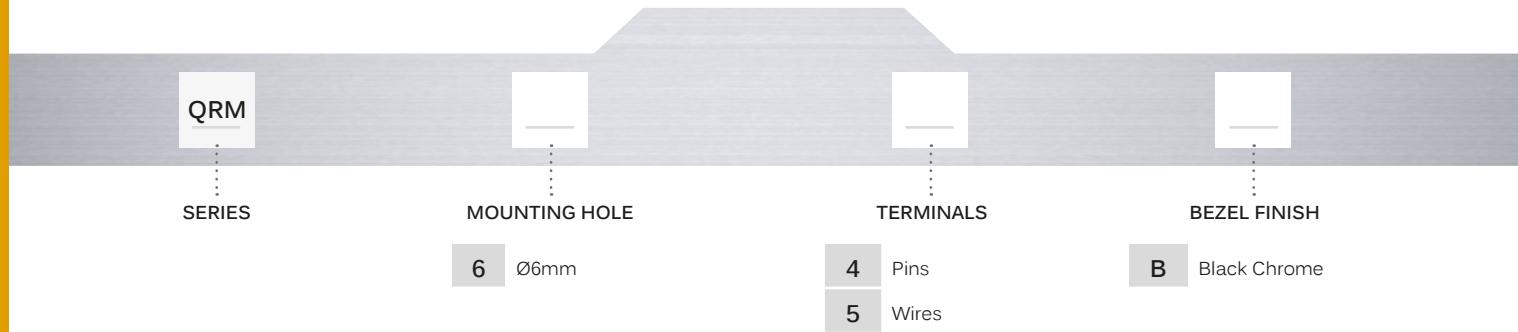
- Body: Black chrome plated brass
- Lock Washer: Spring steel
- Nut: Black chrome plated brass
- Terminal Seal: Epoxy
- Panel Seal: Nitrile O-ring
- Wires: 24AWG to UL1061 or UL1213 on request

QRM6 series

Ø6mm rear panel mount LED indicators



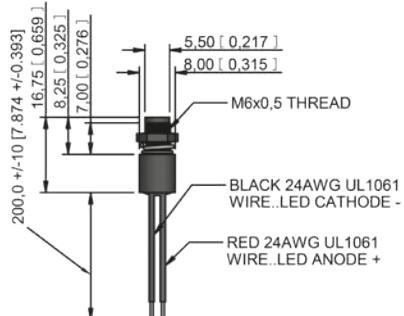
BUILD YOUR PART NUMBER



| TYPE OF ILLUMINATION | | LED COLOR | | VOLTAGE | SEALING |
|----------------------|-------------|-----------|---------------------|---------|-----------------|
| XX | Fixed Light | R | Red | SW | no resistor |
| YY | Bi-color | G | Green | 02 | IP67 (Standard) |
| | | Y | Yellow | 06 | 6VDC |
| | | B | Blue | 12 | 12VDC |
| | | W | White | 24 | 24VDC |
| | | HR | Hyper Bright Red | 28 | 28VDC |
| | | HG | Hyper Bright Green | | |
| | | HY | Hyper Bright Yellow | | |
| | | SR | Super Bright Red | | |
| | | SG | Super Bright Green | | |
| | | SY | Super Bright Yellow | | |
| | | SB | Super Bright Blue | | |
| | | RG | | | |
| | | RY | | | |
| | | GY | | | |

NOTICE : please note that not all combinations of above numbers are available.
Refer to www.apem.com for further information.

REAR MOUNT - WIRE TERMINALS WITH STANDARD BODY



QRM8 series

Ø8mm rear panel mount LED indicators



DISTINCTIVE FEATURES

- 5mm flush diffused LED, standard, hyper bright or clear water
- Bi-color and tri-color LED options
- 200mm wire or pin terminations



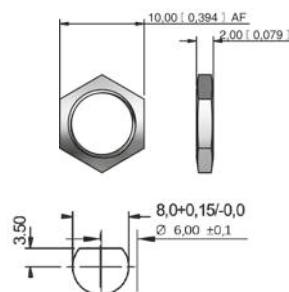
ENVIRONMENTAL SPECIFICATIONS

- IP67 sealing option (EN60529)
- Operating Temperature Range: -40 to +85°C
- Storage Temperature Range: -55 to +100°C



MOUNTING

PANEL CUT-OUT



ELECTRICAL SPECIFICATIONS

| Voltage | Operating Voltage (Min to Max) | Operating Current (Typical All Types) |
|------------------|-----------------------------------|--|
| 02 (No Resistor) | 2.1 to 3.3VDC | 20mA max |
| 6VDC | 5.4 to 6.6VDC | 20mA |
| 12VDC | 10.8 to 13.2VDC | 20mA |
| 24VDC | 21.6 to 26.4VDC | 20mA |
| 28VDC | 25.2 to 30.8VDC | 20mA |



GENERAL SPECIFICATIONS

- Max Reverse Voltage: 5V
- Viewing Angle: 60°
- Life Expectancy: 100,000 hours
- Max Panel Thickness: 3.5mm
- Torque: 60cNm

| LED COMPONENT SPECIFICATIONS | | |
|---|------------------------------|-----------------|
| Standard LED Intensity | MCD Output (all voltages) | Forward Voltage |
| HE Red | 8mcd | 2.0V |
| Green | 6mcd | 2.2V |
| Yellow | 6mcd | 2.1V |
| Blue | 50mcd | 3.8V |
| White | 500mcd | 3.3V |
| Bi-color (Typical) (Red/Green) | 15/10mcd | 2.0V/2.2V |
| Tri-color (Typical) (Red/Green/Yellow) | 15/10/6mcd | 2.0V/2.2V/2.1V |

Bi-color - The color is changed by reversing the polarity of the supply voltage.
Tri-color - The indicator has red and green LEDs, when both connected yellow is produced.

The company reserves the right to change specifications without notice.

LED characteristics are dependent upon environmental conditions. Therefore published data should be considered nominal.



MATERIALS

- Body: Black chrome plated brass
- Lock Washer: Spring steel
- Nut: Black chrome plated brass
- Terminal Seal: Epoxy
- Panel seal: Nitrile O-ring
- Wires: 24AWG to UL1061 or UL1213 on request

QRM8 series

Ø8mm rear panel mount LED indicators



BUILD YOUR PART NUMBER

QRM

SERIES

MOUNTING HOLE

TERMINALS

BEZEL FINISH

8 Ø8mm

4 Pins

B Black Chrome

5 Wires

TYPE OF ILLUMINATION

XX Fixed Light

YY Bi-color

ZZ Tri-color

R Red

G Green

Y Yellow

B Blue

W White

HR Hyper Bright Red

HG Hyper Bright Green

LED COLOR

HY Hyper Bright Yellow

SR Super Bright Red

SG Super Bright Green

SY Super Bright Yellow

SB Super Bright Blue

SW Super Bright White

SO Super Bright Orange

RG Red/Green

RY Red/Yellow

GY Green/Yellow

RYG Red/Yellow/Green

VOLTAGE

02 no resistor

06 6VDC

12 12VDC

12A 12VAC/DC

24 24VDC

24A 24VAC/DC

28 28VDC

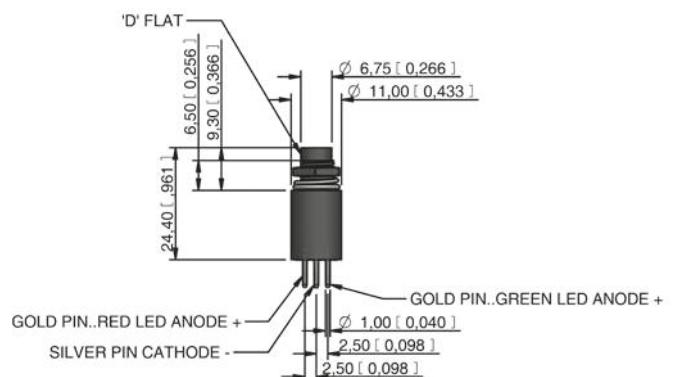
28A 28VAC/DC

SEALING

E IP67 (Standard)

NOTICE : please note that not all combinations of above numbers are available.
Refer to www.apem.com for further information.

REAR MOUNT - RIGID PCB TERMINALS WITH LONG BODY



QRM-NV series

Ø8mm rear panel mount NVIS LED indicators



DISTINCTIVE FEATURES

NVIS Green A, NVIS Green B, NVIS Yellow, NVIS Red, NVIS White

NVIS compliant to MIL Std 3009

200mm wire or rigid pin (1.00mm) terminations



ENVIRONMENTAL SPECIFICATIONS

- IP67 sealing option (EN60529)
- Operating Temperature Range: -40 to +85°C
- Storage Temperature Range: -55 to +100°C



ELECTRICAL SPECIFICATIONS

| Voltage | Operating Voltage (Min to Max) | Operating Current (Typical All Types) |
|------------------|-----------------------------------|--|
| 02 (No Resistor) | 2.1 to 3.3VDC | 20mA max |
| 6VDC | 5.4 to 6.6VDC | 20mA |
| 12VDC | 10.8 to 13.2VDC | 20mA |
| 24VDC | 21.6 to 26.4VDC | 20mA |
| 28VDC | 25.2 to 30.8VDC | 20mA |

LED COMPONENT SPECIFICATIONS

| LED Color | NVIS Radiance | NVIS Chromoticity | Dominant Wavelength | MCD Output | Forward Voltage |
|---------------------|---|-------------------|---------------------|------------|-----------------|
| NW1S Green A | NRA \leq 1.7eE-10 @ 0.1fL | r \leq .037 | 530nm | 150mcd | 3.3V |
| NW1S Green A | NRA \leq 1.7eE-10 @ 0.1fL | r \leq .057 | 555nm | 150mcd | 3.3V |
| NW1S Yellow Class A | 5.0E-8 \leq NRA \leq 1.5E-7 @ 15fL | r \leq .083 | - | 150mcd | 3.3V |
| NW1S Yellow Class B | 4.7E-8 \leq NRB \leq 1.47E-7 @ 15fL | r \leq .83 | 585nm | 150mcd | 3.3V |
| NW1S Red | 4.7E-8 \leq NRB \leq 1.4E-7 @ 15 fL | r \leq .060 | 605nm | 110mcd | 2.1V |
| NW1S White | NRA \leq 1.0E-9 @ 0.1fL | r \leq .40 | (x).33 (y).33 | 150mcd | 3.3V |

Luminous intensity will be reduced with lower operating current.

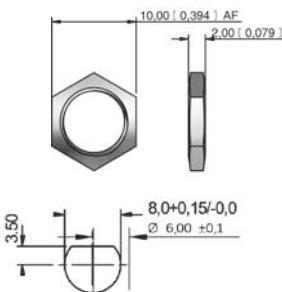
The company reserves the right to change specifications without notice.

LED characteristics are dependent upon environmental conditions. Therefore published data should be considered nominal.



MOUNTING

PANEL CUT-OUT



GENERAL SPECIFICATIONS

- Max Reverse Voltage: 5V
- Viewing Angle: 60°
- Life Expectancy: 100,000 hours
- Max Panel Thickness: 3.5mm
- Torque: 60cNm



MATERIALS

- Body: Black chrome plated brass
- Lock Washer: Spring steel
- Nut: Black chrome plated brass
- Terminal Seal: Epoxy
- Panel Seal: Nitrile O-ring
- Wires: 24AWG to UL1213

QRM-NV series

Ø8mm rear panel mount NVIS LED indicators

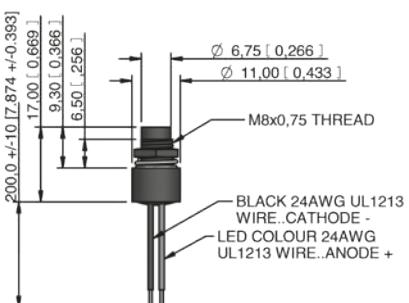


BUILD YOUR PART NUMBER

| | | | |
|----------------------|--|---|-------------------|
| QRM-NV | | | |
| SERIES | MOUNTING HOLE | TERMINALS | BEZEL FINISH |
| 8 Ø8mm | 4 Ridgid Pins 5 Wires | B Black Chrome | |
| TYPE OF ILLUMINATION | LED COLOR | VOLTAGE | SEALING |
| XX Fixed Light | NV-GRA NVIS Green A NV-GRB NVIS Green B NV-YWA NVIS Yellow A NV-YWB NVIS Yellow B NV-RD NVIS Red NV-WH NVIS White | 02 no resistor 06 6VDC 12 12VDC 12A 12VAC/DC 24 24VDC 24A 24VAC/DC 28 28VDC 28A 28VAC/DC | E IP67 (Standard) |

NOTICE : please note that not all combinations of above numbers are available.
Refer to www.apem.com for further information.

REAR MOUNT - WIRE TERMINALS WITH STANDARD BODY



QS series

Snap-in panel mount LED indicators



DISTINCTIVE FEATURES

- 6mm, 8mm, 10mm and 12mm Ø cut-out sizes
- Front panel snap-in mounting requires no additional hardware
- Standard intensity diffused LED or high brightness LED for daylight viewing



ENVIRONMENTAL SPECIFICATIONS

- Operating Temperature Range: -40 to +85°C



ELECTRICAL SPECIFICATIONS

| Voltage | Operating Voltage (Min to Max) | Operating Current (Typical All Types) |
|----------------------------------|-----------------------------------|--|
| 05 (No Resistor) | 2.1 to 3.3VDC | 20mA max |
| 6VDC | 5.4 to 6.6VDC | 20mA |
| 12VDC | 10.8 to 13.2VDC | 20mA |
| 24VDC | 21.6 to 26.4VDC | 20mA |
| 28VDC | 25.2 to 30.8VDC | 20mA |
| 110VAC (not available on QS6) | 99 to 110VAC | 6mA |
| 220VAC (not available on QS6) | 207 to 253VAC | 3mA |

| LED COMPONENT SPECIFICATIONS | | | |
|---|---------------------------------|-----------------------|-----------------|
| Standard LED Intensity | 6mm Intensity (all voltages) | 8,10 & 12mm Intensity | Forward Voltage |
| HE Red | 40mcd | 100mcd | 2.0V |
| Green | 40mcd | 60mcd | 2.2V |
| Yellow | 30mcd | 50mcd | 2.1V |
| Blue | 1,200mcd | 1600mcd | 3.8V |
| White(clear) | 1,200mcd | 1600mcd | 3.8V |
| Bi-color (Typical) (Red/Green) | 60mcd | 45mcd | 2.0V |
| Tri-color (Typical) (Red/Green/Yellow) | - | 60/15/13mcd | 2.5V |

Bi-color - The color is changed by reversing the polarity of the supply voltage.
Tri-color - The indicator has red and green LEDs, when both connected yellow is produced.

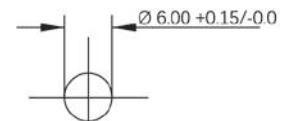
The company reserves the right to change specifications without notice.

LED characteristics are dependent upon environmental conditions. Therefore published data should be considered nominal.

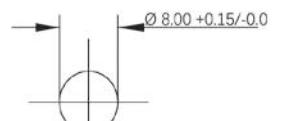


MOUNTING

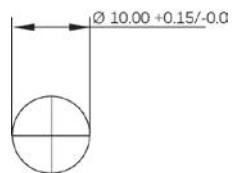
QS6 SERIES PANEL CUT-OUT



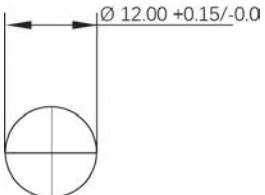
QS8 SERIES PANEL CUT-OUT



QS10 SERIES PANEL CUT-OUT



QS12 SERIES PANEL CUT-OUT



QS series

Snap-in panel mount LED indicators



GENERAL SPECIFICATIONS

- Max Reverse Voltage: 5V
- Life Expectancy: 100,000 hours



MATERIALS

- Molded polycarbonate

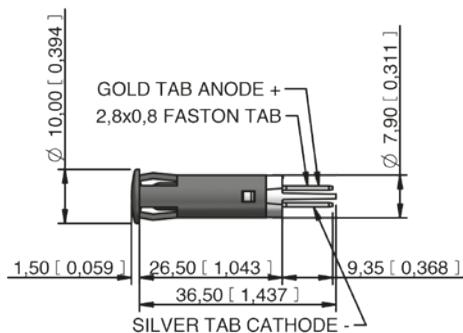


BUILD YOUR PART NUMBER

| QS | | | | | | |
|---------------------|---------------|----------------------|--------------------------------|-----------|-------------------------------------|---------|
| SERIES | MOUNTING HOLE | TYPE OF ILLUMINATION | | LED COLOR | | VOLTAGE |
| 6 | Ø6mm | XX | Fixed Light | R | Red | 02 |
| 8 | Ø8mm | YY | Bi-color | G | Green | 06 |
| 10 | Ø10mm | ZZ | Tri-color (10mm only) | Y | Yellow | 12 |
| 12 | Ø12mm | KK | Flashing light (12 - 28VDC) | B | Blue | 24 |
| TERMINALS | | | | W | White (clear) | 28 |
| | | | | O | Orange | 110 |
| | | | | RG | Red/Green | 220 |
| | | | | RYG | Red/Yellow/ Green (10mm Only) | |
| 1 Solder lug/faston | | | | | | |
| 3 Wires | | | | | | |

NOTICE : please note that not all combinations of above numbers are available.
Refer to www.apem.com for further information.

Ø 10MM - SOLDER LUG / FASTON TERMINALS



MG series

T1 3/4 Midget groove based LED's •
single or multichip LED illumination



DISTINCTIVE FEATURES

T1 3/4 Midget groove based LED for bulb replacement
Operating & Storage Temperature Range: -20° to +70°C
12vDC to 28VAC/DC 14mA, mcd range from 490 to 2070
dependent on version



MATERIALS

- Body : Polycarbonate
- Base : Nickel plated brass



BUILD YOUR PART NUMBER

| MF SINGLE CHIP | | | | | |
|----------------|-------------|------------------------------|-------------------------|---|-----------------|
| MG | | | | | |
| SERIES | TYPE | COLOR | VOLTAGE & CURRENT AC/DC | OPTIONS | |
| S | Single Chip | R Red G Green Y Yellow | B Blue W White | 12 12V - 14mA 24 24V - 14mA 28 28V - 14mA | A AC/DC version |

For other voltage options please contact APEM

LUMINOUS INTENSITY

| Color | Voltage |
|------------|----------------|
| R - Red | 12V, 24V & 28V |
| G - Green | 1750 mcd |
| Y - Yellow | 1610 mcd |
| B - Blue | 630 mcd |
| W - White | 490 mcd |
| | 2070 mcd |

The company reserves the right to change specifications without notice.

MG series

T1 3/4 Midget groove based LED's •
single or multichip LED illumination



BUILD YOUR PART NUMBER

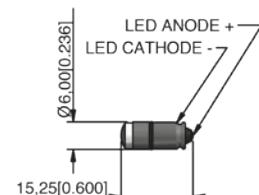
| MG MULTI CHIP | | | | |
|---------------|------------|----------|-------------------------|-----------------|
| SERIES | TYPE | COLOR | VOLTAGE & CURRENT AC/DC | OPTIONS |
| MG | | | | |
| M | Multi Chip | R Red | 12 12V - 30mA | A AC/DC version |
| | | G Green | 24 24V - 14mA | |
| | | Y Yellow | 28 28V - 14mA | |

For other voltage options please contact APEM

LUMINOUS INTENSITY

| Color | Voltage |
|------------|----------------|
| | 12V, 24V & 28V |
| R - Red | 40 mcd |
| G - Green | 35 mcd |
| Y - Yellow | 45 mcd |

MG - MULTI CHIP RED



MF series

T1 3/4 Midget flange based LED's •
single or multichip LED illumination



DISTINCTIVE FEATURES

T1 3/4 Midget flange based LED for bulb replacement
Operating & Storage Temperature Range: -20° to +70°C
12VDC to 28VAC/DC 14mA, mcd range from 490 to 2070
dependent on version



MATERIALS

- Body : Polycarbonate
- Base : Nickel plated brass



BUILD YOUR PART NUMBER

| MF SINGLE CHIP | | | | | |
|----------------|-------------|------------------------------|-------------------------|---|-----------------|
| MF | | | | | |
| SERIES | TYPE | COLOR | VOLTAGE & CURRENT AC/DC | OPTIONS | |
| S | Single Chip | R Red G Green Y Yellow | B Blue W White | 12 12V - 14mA 24 24V - 14mA 28 28V - 14mA | A AC/DC version |

For other voltage options please contact APEM

LUMINOUS INTENSITY

| Color | Voltage |
|------------|----------------|
| R - Red | 12V, 24V & 28V |
| G - Green | 1750 mcd |
| Y - Yellow | 1610 mcd |
| B - Blue | 630 mcd |
| W - White | 490 mcd |
| | 2070 mcd |

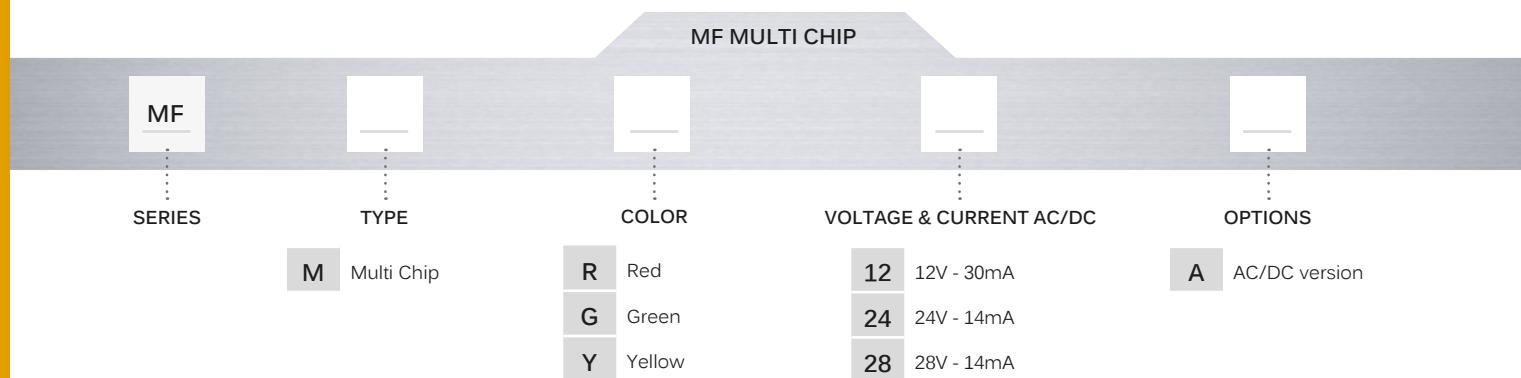
The company reserves the right to change specifications without notice.

MF series

T1 3/4 Midget flange based LED's •
single or multichip LED illumination



BUILD YOUR PART NUMBER

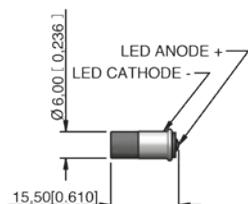


For other voltage options please contact APEM

LUMINOUS INTENSITY

| | Voltage |
|------------|----------------|
| Color | 12V, 24V & 28V |
| R - Red | 40 mcd |
| G - Green | 35 mcd |
| Y - Yellow | 45 mcd |

MF - SINGLE CHIP RED



E10 series

Screw cap based LED's •
single or multichip LED illumination



DISTINCTIVE FEATURES

Screw cap based LED for bulb replacement

Operating & Storage Temperature Range: -20° to +70°C

6vDC to 230VAC 9 to 17mA, mcd range from 105 to 2070
dependent on version



MATERIALS

- Body : Polycarbonate
- Base : Nickel plated brass



BUILD YOUR PART NUMBER

| E10 SINGLE CHIP | | | | | | | |
|-----------------|---------------|----------|-------------------------|------------|------|------------|--|
| E10 | | | | | | | |
| SERIES | TYPE | COLOR | VOLTAGE & CURRENT AC/DC | | | | |
| | S Single Chip | R Red | 6A | 6V_9/17mA | 48A | 48V_9/8mA | |
| | | G Green | 12A | 12V_9/17mA | 130A | 130VAC_9mA | |
| | | Y Yellow | 24A | 24V_9/17mA | 230A | 230VAC_9mA | |
| | | | 28A | 28V_9/17mA | | | |

For other voltage options please contact APEM

LUMINOUS INTENSITY

| Color | Voltage | | | |
|------------|--------------------|------|--------|--------|
| | 6V, 12V, 24V & 28V | 48V | 130VAC | 230VAC |
| R - Red | 1750 mcd | 990 | 685 | 375 |
| G - Green | 1610 mcd | 920 | 570 | 345 |
| Y - Yellow | 630 mcd | 360 | 225 | 135 |
| B - Blue | 490 mcd | 280 | 175 | 105 |
| W - White | 2070 mcd | 1180 | 710 | 470 |

The company reserves the right to change specifications without notice.

E10 series

Screw cap based LED's •
single or multichip LED illumination



BUILD YOUR PART NUMBER

E10 MULTI CHIP

E10

...
SERIES

...
TYPE

...
COLOR

VOLTAGE & CURRENT AC/DC

C Multi Chip

R

Red

B

Blue

24A

24V - 9/17mA

130A

130VAC - 5mA

G

Green

W

White

28A

28V - 9/17mA

230A

230VAC - 3mA

Y

Yellow

48A

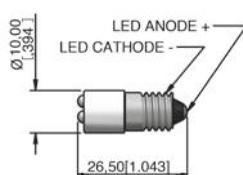
48V - 8mA

For other voltage options please contact APEM

LUMINOUS INTENSITY

| Color | Voltage | | | | |
|------------|--------------|----------|---------|---------|--|
| | 24V & 28V | 48V | 130VAC | 230VAC | |
| R - Red | 3 x 1750 mcd | 3 x 990 | 3 x 685 | 3 x 375 | |
| G - Green | 3 x 1610 mcd | 3 x 920 | 3 x 570 | 3 x 345 | |
| Y - Yellow | 3 x 630 mcd | 3 x 360 | 3 x 225 | 3 x 135 | |
| B - Blue | 3 x 490 mcd | 3 x 280 | 3 x 175 | 3 x 105 | |
| W - White | 3 x 2070 mcd | 3 x 1180 | 3 x 710 | 3 x 470 | |

E10 - MULTICHIP WHITE



Ba9 series

Bayonet cap based LED's •
single or multichip LED illumination



DISTINCTIVE FEATURES

Bayonet Cap based LED for bulb replacement

Operating & Storage Temperature Range: -20° to +70°C

6 vDC to 230VAC 9 to 17mA, mcd range from 105 to 2070
dependent on version



MATERIALS

- Body : Polycarbonate
- Base : Nickel plated brass



BUILD YOUR PART NUMBER

| BA9 SINGLE CHIP | | | | |
|-----------------|------|----------|-------------------------|------------|
| SERIES | TYPE | COLOR | VOLTAGE & CURRENT AC/DC | |
| BA9 | | | 6A | 6V_9/17mA |
| | | R Red | 12A | 12V_9/17mA |
| | | G Green | 24A | 24V_9/17mA |
| | | Y Yellow | 28A | 28V_9/17mA |
| | | | B Blue | 48A |
| | | | W White | 48V_9/8mA |
| | | | | 130A |
| | | | | 130VAC_9mA |
| | | | | 230A |
| | | | | 230VAC_9mA |

For other voltage options please contact APEM

LUMINOUS INTENSITY

| Color | Voltage | | | |
|------------|--------------------|------|--------|--------|
| | 6V, 12V, 24V & 28V | 48V | 130VAC | 230VAC |
| R - Red | 1750 mcd | 990 | 685 | 375 |
| G - Green | 1610 mcd | 920 | 570 | 345 |
| Y - Yellow | 630 mcd | 360 | 225 | 135 |
| B - Blue | 490 mcd | 280 | 175 | 105 |
| W - White | 2070 mcd | 1180 | 710 | 470 |

The company reserves the right to change specifications without notice.

Ba9 series

Bayonet cap based LED's •
single or multichip LED illumination



BUILD YOUR PART NUMBER

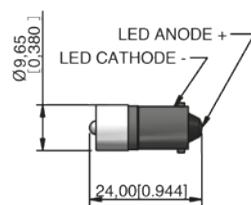
| BA9 MULTICHIP | | | | |
|---------------|--------------|------------------------------|-------------------------|---|
| BA9 | | | | |
| SERIES | TYPE | COLOR | VOLTAGE & CURRENT AC/DC | |
| | C Multi Chip | R Red G Green Y Yellow | B Blue W White | 24A 24V - 9/17mA 28A 28V - 9/17mA 48A 48V - 8mA |
| | | | | 130A 130VAC - 5mA 230A 230VAC - 3mA |

For other voltage options please contact APEM

LUMINOUS INTENSITY

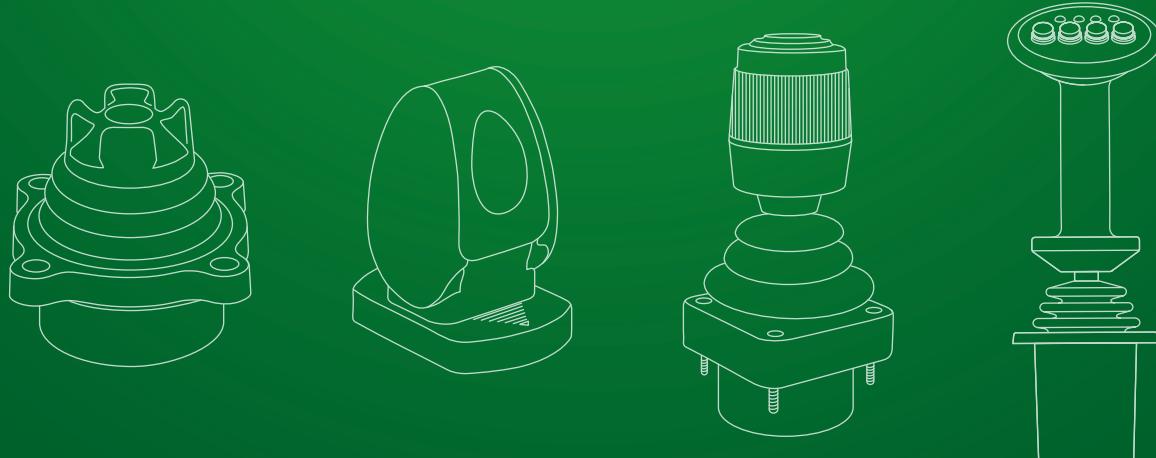
| Color | Voltage | | | | |
|------------|--------------|----------|---------|---------|--|
| | 24V & 28V | 48V | 130VAC | 230VAC | |
| R - Red | 3 x 1750 mcd | 3 x 990 | 3 x 685 | 3 x 375 | |
| G - Green | 3 x 1610 mcd | 3 x 920 | 3 x 570 | 3 x 345 | |
| Y - Yellow | 3 x 630 mcd | 3 x 360 | 3 x 225 | 3 x 135 | |
| B - Blue | 3 x 490 mcd | 3 x 280 | 3 x 175 | 3 x 105 | |
| W - White | 3 x 2070 mcd | 3 x 1180 | 3 x 710 | 3 x 470 | |

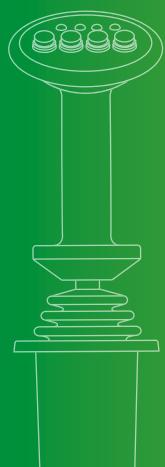
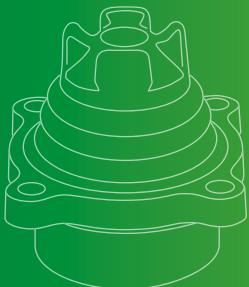
BA9 - SINGLE CHIP WHITE





JOYSTICKS





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JOYSTICKS

OUR RANGE

| THUMB CONTROL | | | | | | FINGERTIP | | | | |
|----------------------|-------------------------------------|----------------------|--------------------------|-------------------------------------|---------------|-----------|-----------|-----------|--------------------------|--------------------------|
| SERIES | TS | NV | FR | HS | HR | CW | TW | PC | HF | 3000 |
| Pages | 439 | 443 | 447 | 451 | 455 | 459 | 461 | 463 | 465 | 469 |
| Sealing | IP67 & IP69K | IP67 & IP69K | IP67 | IP67 & IP69K | IP68 | - | IP67 | IP67 | IP67 | IP65 |
| Mechanical lifecycle | 1 million | 1 million | 3 million | 300,000 | 5 million | 3 million | 5 million | 1 million | 5 million | 10 million |
| Technology | | | | | | | | | | |
| Hall effect | X | | X | | X | X | X | X | X | X |
| Potentiometer | | | | | | | | | | |
| Switching | | X | | X | | | | X | | |
| Axis | | | | | | | | | | |
| Single | | | X | | X | X | X | | | |
| 1 to 2 axis | X | X | | X | | | | X | | |
| Up to 3 axis | | | | | | | | | X | X |
| Output option | | | | | | | | | | |
| Single | X | | X | | X | X | X | | X | X |
| Dual | X | | X | | X | | X | | X | X |
| Analog | X | | | | X | X | X | X | X | X |
| PWM | X | | | | | X | | | X | X |
| USB | X | | | | | | | X | X | |
| CANbus | | | | | | | | | X | |
| Mounting option | | | | | | | | | | |
| | Drop-in, rear mounting & bush mount | Drop-in & bush mount | Drop-in or rear mounting | Drop-in, rear mounting & bush mount | Rear mounting | Snap-in | Drop-in | | Drop-in or rear mounting | Drop-in or rear mounting |

APEM
INNOVATION

HF SERIES

PRECISION FINGERTIP CONTROL

ERGONOMICALLY DESIGNED
FOR REPETITIVE OPERATION
OVER EXTENDED PERIODS

EASY TO OPERATE

HIGHLY RELIABLE :
UP TO IP67 SEALED,
HALL EFFECT TECHNOLOGY

AVAILABLE IN 2 & 3 AXIS : ANALOG,
DIGITAL USB & CANBUS OUTPUT

ERGONOMIC: SEVERAL HANDLE
OPTIONS AVAILABLE

APEM
EXCLUSIVE

For more information,
see APEM website

FINGERTIP



| SERIES | BH | BL | BF/BD | M | 4000 | 1000 | 1000HE | 8000 | SN | NZ |
|------------------------|------------|------------|-----------|---------------|---------------|--------------------------------|-----------|--------------------------|--------------------------|-----------|
| Pages | 473 | 475 | 477 | 481 | 485 | 489 | 493 | 495 | 499 | 501 |
| Sealing | IP67 | IP67 | IP67 | IP65 | IP65 | IP67 | IP67 | IP65 | - | IP67 |
| Mechanical lifecycle | 10 million | 10 million | 5 million | 1 million | 5 million | 5 million | 1 million | 1 million | 1 million | 1 million |
| Technology | | | | | | | | | | |
| Hall effect | X | X | X | | | | | | | X |
| Potentiometer | | | | | X | X | | | | |
| Switching | | | | | | | X | X | X | X |
| Axis | | | | | | | | | | |
| Single | X | X | X | | | | | | | X |
| 1 to 2 axis | | | | | | | X | X | X | X |
| Up to 3 axis | | | | | X | X | | | | |
| Output option | | | | | | | | | | |
| Single | X | X | X | X | X | | | | | X |
| Dual | X | X | X | | | | | | | |
| Analog | X | X | X | X | X | | | | | X |
| PWM | X | X | X | | | | | | | X |
| USB | | | | | | | | | | |
| CANbus | | | | | | | | | | |
| Mounting option | | | | | | | | | | |
| | Drop-in | Drop-in | Drop-in | Rear mounting | Rear mounting | 22 mm bushing 4 point screw | | Drop-in or rear mounting | Drop-in or rear mounting | Bush |

The most common configurations are presented in this catalog. Other commercially available configurations already existing in our different ranges of products, non-standard and custom products are available upon request. Standard modifications include varying cable length, connector choice and the use of a variety of standard components within the joystick handle – please refer to factory.

JOYSTICKS

OUR RANGE

HANDGRIP



| SERIES | SC | CJ | HJ | XD | MS | FG |
|------------------------|--------------|-----------|-----------|-----------------------------|------------|---------|
| Pages | 503 | 505 | 509 | 511 | 513 | 517 |
| Sealing | IP67 & IP69K | IP67 | IP67 | IP67 & IP69K | IP67 | IP67 |
| Mechanical lifecycle | 10 million | 5 million | 5 million | 10 million | 10 million | - |
| Technology | | | | | | |
| Hall effect | X | X | X | X | X | |
| Axis | | | | | | |
| Single | X | | | | | |
| 1 to 2 axis | | X | | X | | |
| Up to 3 axis | | | X | | X | |
| Output option | | | | | | |
| Single | X | X | X | | X | |
| Dual | X | X | X | X | X | |
| Analog | X | X | X | | X | X |
| USB | | X | X | | X | X |
| CANbus | | X | X | X | X | X |
| Mounting option | | | | | | |
| | Drop-in | Drop-in | Drop-in | Drop-in or rear mounting | Drop-in | Drop-in |



CJ SERIES MULTI-FUNCTION HAND GRIP CONTROL

ERGONOMIC AND VERSATILE
DESIGN FOR SAFETY CRITICAL
APPLICATIONS

EASY TO INSTALL AND
OPERATE

APEM
EXCLUSIVE

HIGHLY RELIABLE: SEALED
UP TO IP67 / HALL EFFECT
TECHNOLOGY

ANALOG, CANBUS AND USB OUTPUTS
AVAILABLE / 1 & 2 AXIS CONTROL

ERGONOMIC AND VERSATILE HAND
GRIP WITH MULTIPLE BUTTON
OPTIONS

For more information,
see APEM website

DESKTOP



| SERIES | IPD | VM | RS |
|----------------------|-----------|-----------|-----------|
| Pages | 519 | 521 | 523 |
| Sealing | - | - | - |
| Mechanical lifecycle | 3 million | 3 million | 3 million |
| Technology | | | |
| Hall effect | X | X | X |
| Axis | | | |
| Up to 3 axis | X | X | X |
| Output option | | | |
| USB | X | X | X |

The most common configurations are presented in this catalog. Other commercially available configurations already existing in our different ranges of products, non-standard and custom products are available upon request. Standard modifications include varying cable length, connector choice and the use of a variety of standard components within the joystick handle – please refer to factory.

TS series

Proportional miniature thumb controls •
non-contacting Hall effect technology



DISTINCTIVE FEATURES

- One or two axis
- Analog, PWM or USB outputs
- Submersible up to 1m (3.28 ft)
- Rear or drop-in mounting
- Pushbutton option



ENVIRONMENTAL SPECIFICATIONS

- Operating Temperature: -40°C to +85°C
- Storage Temperature: -40°C to +85°C
- Above Panel Sealing: IP67, IP69K¹ (subject to mounting style & final specifications)
- EMC Immunity Level: EN61000-4-3
- EMC Emissions Level: EN61000-6-3:2001
- ESD: EN61000-4-2



ELECTRICAL SPECIFICATIONS

- Supply Voltage Range: 5.00V ±0.250VDC
- Reverse Polarity max: -10V
- Oversupply max: 16V
- Output Impedance: 2Ω
- Return to Center Voltage Tolerance: ±200mV initial



MECHANICAL SPECIFICATIONS

- Operating Force: 3.1N ±0.5N (0.70lbf ±0.11lbf)²
- Maximum Vertical Load: 200N (45lbf)²
- Maximum Horizontal Load: 150N (33.7lbf)²
- Mechanical Angle of Movement: 50° X & Y axis (subject to limiter plate)
- Expected Life: 1 million cycles
- Mass/Weight: 18.25g ±5.0g (0.64oz ±0.18oz)
- Lever Action (centering): Spring

The company reserves the right to change specifications without notice.

¹ All options are IP68 and IP69K rated, however drop-in mounting does not prevent panel ingress.
² Force applied to the top of the castle cap.

TS series

Proportional miniature thumb controls •
non-contacting Hall effect technology



MATERIALS

- Body: Glass filled nylon
- Threaded Housing: Black oxide plated brass
- Boot: Silicone
- Handles:
 - 1, 2, 3 - Glass filled nylon
 - 4, 5, 6, 7, 8 - Silicone
 - B, C, D - Thermoplastic elastomer



PUSHBUTTON SWITCH (OPTION 6 HANDLE)

- Electrical Life: 100,000 cycles
- Rating: 50mA, 12VDC.
- Terminal: Brass with silver plating
- Contact Resistance: 100mΩ max
- Insulation Resistance: 100MΩ min. 500VDC
- Dielectric Strength: 250VAC /1 minute
- Contact Arrangement: 1 pole 1 throw
- Stop Strength: Max 3kgf vertical static load for 15 seconds
- Operating Temperature: -25°C to +70°C
- Storage Temperature: -30°C to +85°C
- Vibration Resistance: MIL-STD-202F METHOD 201A
- Shock Resistance: MIL-STD-202F METHOD 213B



CONNECTIONS

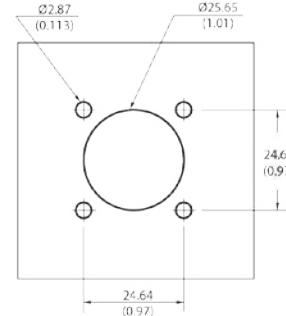
WIRING SPECIFICATION (Termination options 1 & 2)

| | |
|---------------------|-------------------------------------|
| Black | Ground & button common |
| Red | Power (5V) |
| Blue | X axis output (alpha) |
| Yellow | Y axis output (alpha) |
| Orange | Pushbutton switch (option 6 handle) |
| Blue/White Stripe | X axis output (beta) |
| Yellow/Black Stripe | Y axis output (beta) |
| Red/White Stripe | Power (5V) (beta) |
| Black/White Stripe | Ground (beta) |

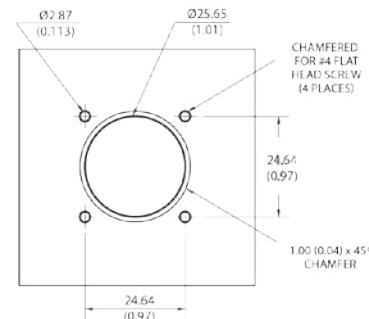


MOUNTING

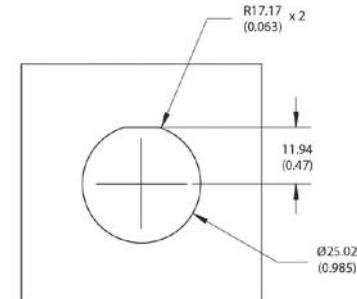
PLASTIC HOUSING - DROP-IN CUTOUT



PLASTIC HOUSING - REAR MOUNT OPTION CUTOUT



METAL THREADED HOUSING - DROP-IN CUTOUT



TS series

Proportional miniature thumb controls •
non-contacting Hall effect technology



BUILD YOUR PART NUMBER

| TS | HANDLE | MOUNTING OPTIONS | TERMINATION ¹ | LIMITER |
|----------------------|--|---|--|----------------------------|
| 0 | None | N None | 1 22AWG 25cm PTFE | U Single axis |
| 1 | Castle | D Drop-in | 2 28AWG 25cm PTFE | S Square |
| 2 | Winged Hat | R Rear mount | 3 72" Overmold Cable with USB Male Type Connector | G Guided feel |
| 3 | Conical | A Drop-in and Rear Mount | 4 2.54mm (0.100") Pitch TE Connector | P Plus |
| 4 | Finger Tip | T Threaded housing | 5 2.54mm (0.100") Pitch TE Connector with 10" Mating Harness | |
| 5 | Round Jog | | | |
| 6 | Pushbutton | | | |
| 7 | Mushroom* | | | |
| 8 | Low Profile* | | | |
| A | Handles 1, 2, 3 | | | |
| B | Castle, elastomer | | | |
| C | Winged Hat, elastomer | | | |
| D | Conical, elastomer | | | |
| OUTPUT OPTIONS | | | | |
| 00 | 0V to 5V | 06 0.5V to 4.5V - Sensor 1 0.5V to 4.5V - Sensor 2 | 11 1V to 4V - Sensor 1 4V to 1V - Sensor 2 | A Single |
| 01 | 0.25V to 4.75V | 07 1V to 4V - Sensor 1 1V to 4V - Sensor 2 | 12 Customer specified | B Independent ³ |
| 02 | 0.5V to 4.5V | 08 0V to 5V - Sensor 1 5V to 0V - Sensor 2 | 13 PWM ² | |
| 03 | 1V to 4V | 09 0.5V to 4.5V - Sensor 1 4.5V to 0.5V - Sensor 2 | 14 USB (Game Controller) | |
| 04 | 0V to 5V - Sensor 1 0V to 5V - Sensor 2 | 10 0.25V to 4.75V - Sensor 1 4.75V to 0.25V - Sensor 2 | 15 Joyball (Cursor emulation) | |
| 05 | 0.5V to 4.5V - Sensor 1 0.5V to 4.5V - Sensor 2 | | | |
| POWER SUPPLY OPTIONS | | | | |
| | | | | |

* = Not available with threaded housing (mounting style option "T").

¹⁻¹ – Wires are thick, robust, and best suited for stand alone applications.

¹⁻² – Wires are thin and best suited for tightly constrained wire routing.

² Contact factory for PWM configuration.

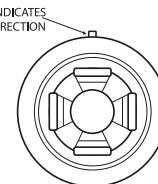
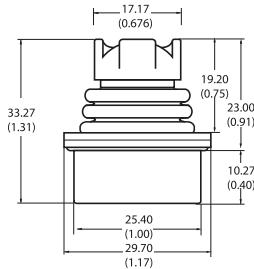
³ Only available on dual output. Not available with Handle 6 (Pushbutton).

Not available with termination options 4 or 5.

TS series

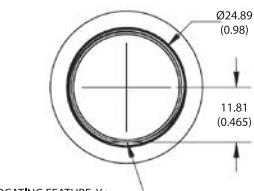
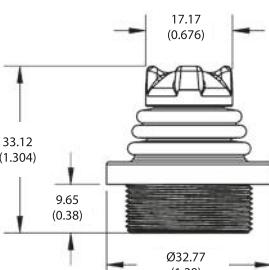
Proportional miniature thumb controls •
non-contacting Hall effect technology

PLASTIC HOUSING

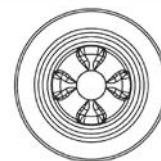


Top view

METAL THREADED HOUSING



Bottom view

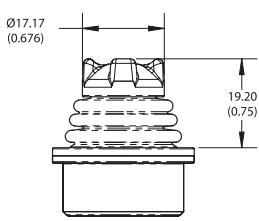


Top view

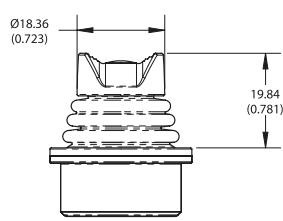


HANDLE OPTIONS

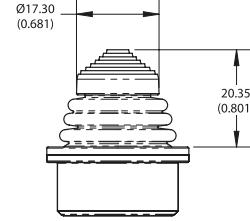
1. CASTLE
B. CASTLE (ELASTOMER)



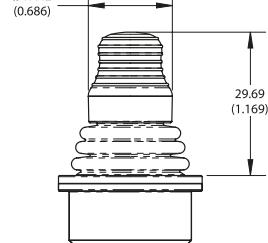
2. WINGED HAT
C. WINGED HAT (ELASTOMER)



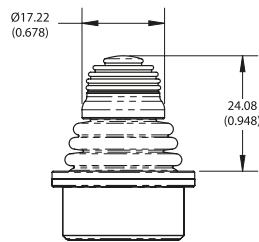
3. CONICAL
D. CONICAL (ELASTOMER)



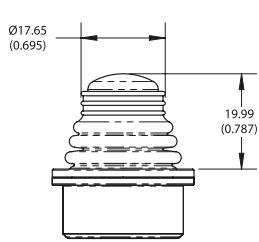
4. FINGER TIP



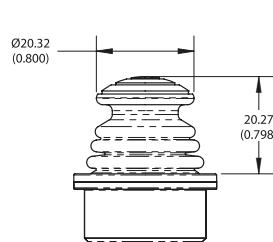
5. ROUND JOG



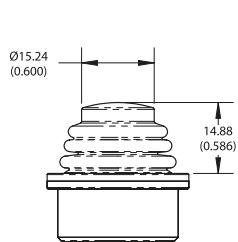
6. PUSHBUTTON



7. MUSHROOM



8. LOW PROFILE



NV series

Compact 5-way navigation thumb controls • switching technology



DISTINCTIVE FEATURES

- Tactile feedback in all directions & optional pushbutton
- Compact and low profile behind panel
- Shock, vibration & salt spray resistant
- 1 million lifecycles
- Sealed to IP69K



ENVIRONMENTAL SPECIFICATIONS

- Front Panel Sealing : IP69K according to DIN 40050-9, IP67 according to IEC 60529
- Shock Resistance per IEC 60068-2-27 : 3 sinusoidal impulse 300m/s² 18ms on 3 axis
- Vibrations (random, 3 axis) per IEC 60068-2-64 : 10-350Hz
- Vibrations (sinus) per IEC 60068-2-6 : 10-200Hz / 20m/s² ; dwell period 30 minutes
- Salt Spray : 96 h per IEC 60068-2-11/KA
- Damp Heat per IEC 68-2-78 : 40°C 93% HR - 10 days
- Cold and Dry Heat, Temperature Shock per IEC 68-2-14/Na : -40°C to +85°C - 10 cycles
- Operating Temperature: -40°C / +65°C



ELECTRICAL SPECIFICATIONS

- Electrical Function : 4 or 5 momentary NO
- Max. Current/Voltage Rating with Resistive Load : 50mA 12VDC
- Electrical Life at Full Load :
1,000,000 cycles per direction
1,000,000 cycles for validation
- Output :
MOLEX 6 pin connector (Ref: 53398-0671)
Mating connector Molex 51021-0600

The company reserves the right to change specifications without notice.

NV series

Compact 5-way navigation thumb controls • switching technology



MECHANICAL SPECIFICATIONS

- Expected Life : 1 million cycles per direction
- Angular Travel : 12°
- Pushbutton Travel : 1,5mm
- Operating force : (customizable on request)
Direction : 4N ±1N
Validation : 11N ±2N
- Panel Thickness : 1 to 10 mm (.0039in to .39in)
- Torque : 2Nm min. applied to nut
- Mechanical Strength : The switch can withstand a force of 100N applied in any directions
- Mass/Weight : 17,5g ±2g (0.6oz ±0.07oz)

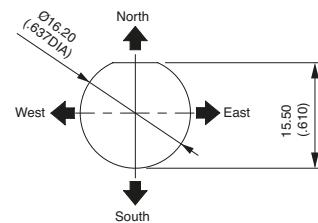


MATERIALS

- Sealing Gasket : Elastomeric
- Case : Brass, black chrome plated
- Actuator : ABS
- Lever : Steel
- Nut : Brass, black chrome plated

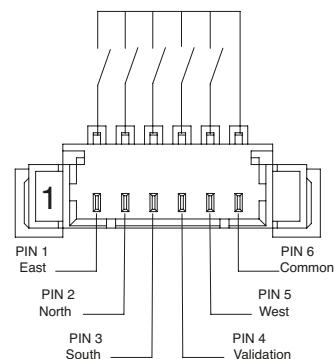


PANEL CUT-OUT



CONNECTIONS

REAR VIEW



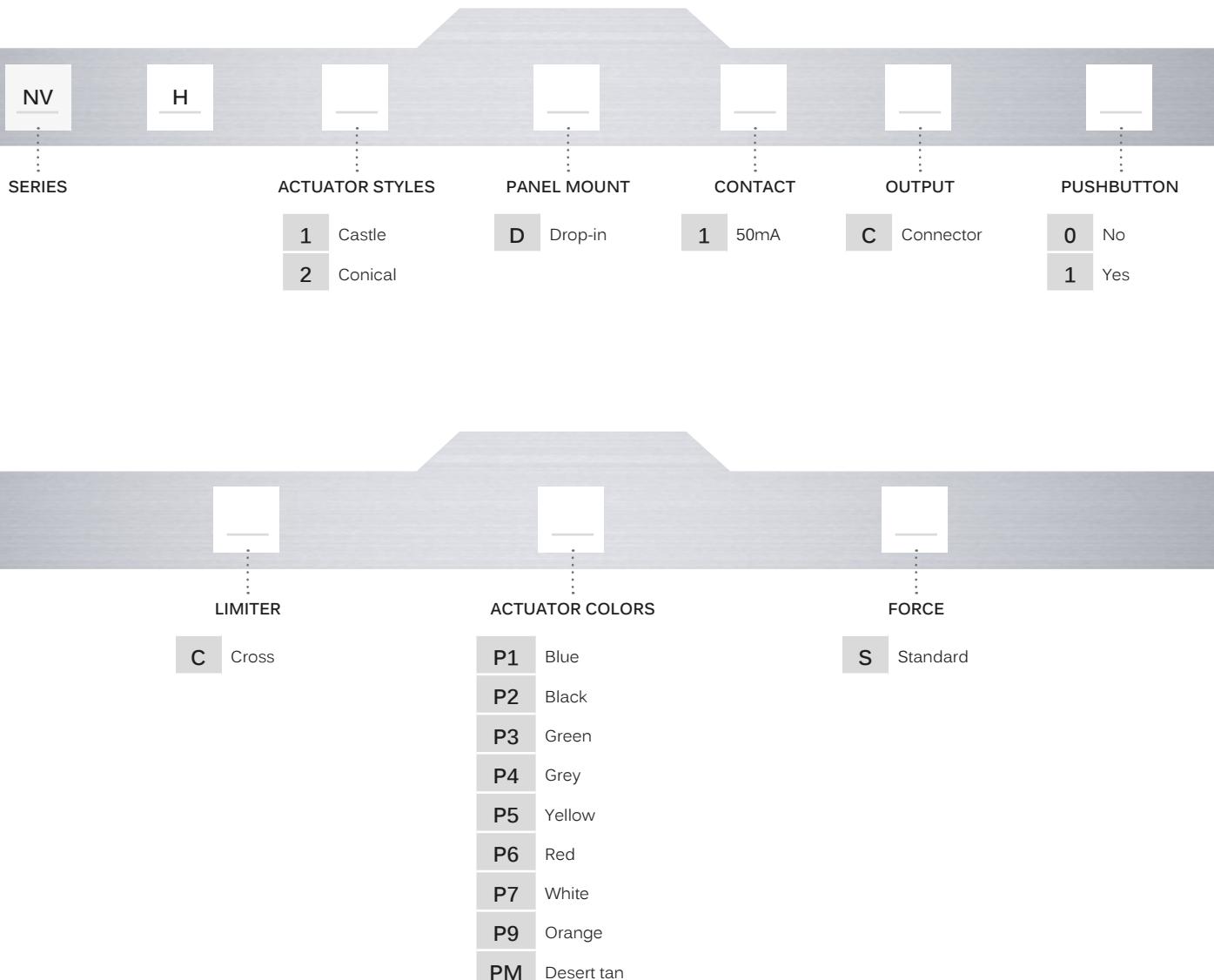
PIN 4 for validation version only

NV series

Compact 5-way navigation thumb controls • switching technology



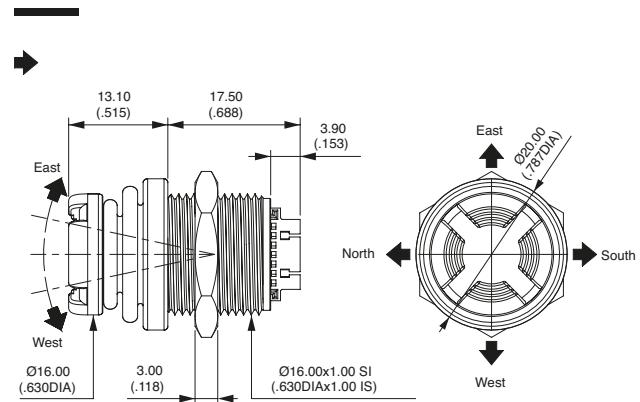
BUILD YOUR PART NUMBER



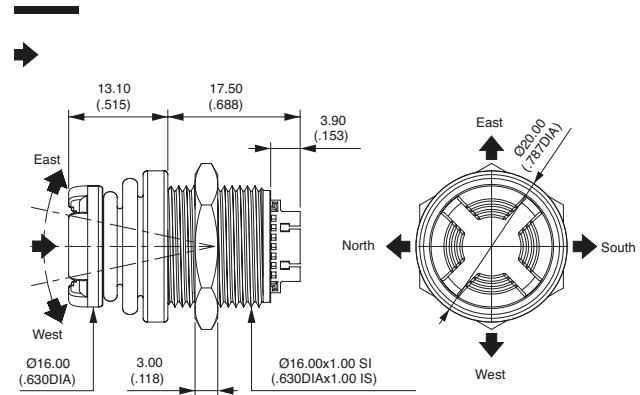
NV series

Compact 5-way navigation thumb controls • switching technology

4 DIRECTIONS



4 DIRECTIONS + PUSHBUTTON



FR series

Three position single axis thumb controls •
non-contacting Hall effect technology



DISTINCTIVE FEATURES

- Forward-neutral-reverse operation
- ON-OFF-ON analog output
- Choice of 3 actuator colors
- 3 million lifecycles
- Sealed up to IP67



ENVIRONMENTAL SPECIFICATIONS

- Operating Temperature: -40°C to +85°C
- Storage Temperature: -40°C to +85°C
- Above Panel Sealing: Up to IP67 (subject to configuration)
- EMC Immunity Level: EN61000-4-3
- EMC Emissions Level: EN61000-6-3: 2001
- ESD: EN61000-4-2



ELECTRICAL SPECIFICATIONS

- Supply Voltage Range: 5.00VDC ±0.250VDC
- Reverse Polarity Max: 10VDC
- Oversupply Max: 20VDC
- Minimum load: 1KΩ
- Return to Center Voltage Tolerance (POS2): 2.50VDC ±0.50VDC



MECHANICAL SPECIFICATIONS

- Operating Force: 260g Nominal into position 2; 360g Nominal out of position 2
- Maximum Vertical Load: 200N (45lbf)
- Maximum Horizontal Load: 150N (33.7lbf)
- Mechanical Angle of Movement: 50°
- Expected Life: 3 million lifecycles
- Mass/Weight: 18.25g ±5.0g (0.64oz ±0.18oz)
- Lever Action (centering): Friction

The company reserves the right to change specifications without notice.



FR series

Three position single axis thumb controls •
non-contacting Hall effect technology

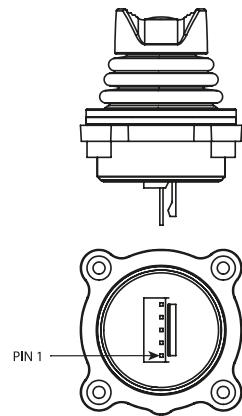


MATERIALS

- Body: Glass filled nylon
- Boot: Silicone
- Handles: Glass filled nylon



CONNECTIONS



PINOUT SPECIFICATION

| | TE 3-647166-5 | TE 3-647166-7 |
|-------|---------------|---------------|
| Pin 1 | Not used | Not used |
| Pin 2 | 5VDC | GND |
| Pin 3 | X (alpha) | X (alpha) |
| Pin 4 | GND | Not used |
| Pin 5 | Not used | Not used |
| Pin 6 | - | 5VDC |
| Pin 7 | - | X (beta) |

WIRING SPECIFICATION

| | |
|--------------------|------------------------|
| Black | Ground & button common |
| Red | Power (5V) |
| Blue | X axis output (alpha) |
| Blue/White Stripe | X axis output (beta) |
| Red/White Stripe | Power (5V) (beta) |
| Black/White Stripe | Ground (beta) |

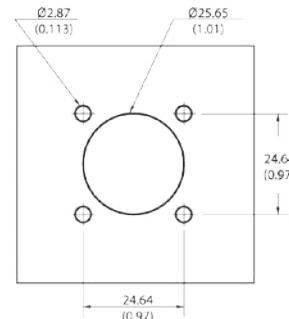
CONNECTOR TERMINATION OPTION

Single output configurations feature a five position TE 3-647166-5 connector. Dual output configurations feature a seven position TE 3-647166-7 connector. A mating harness is not included, but may be specified for single output configurations at the time of order for an additional charge. The five function harness is part number 505-499.

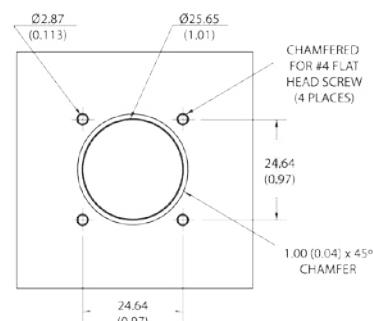


PANEL CUT-OUT

DROP-IN MOUNT



REAR MOUNT



FR series

Three position single axis thumb controls •
non-contacting Hall effect technology



BUILD YOUR PART NUMBER

| FR | | | | | |
|--------|----------------|--------------------------|--|---------------|--|
| SERIES | HANDLE | MOUNTING OPTIONS | TERMINATION ¹ | OPERATION | |
| 0 | None | N None | 1 22 AWG 25cm PTFE | U Single Axis | |
| 1 | Castle | D Drop-in | 2 28 AWG 25cm PTFE | | |
| 2 | Winged Hat | R Rear Mount | 3 2.54mm (0.100") Pitch TE Connector | | |
| 3 | Conical | A Drop-in and Rear Mount | 4 2.54mm (0.100") Pitch TE Connector with wire harness | | |
| A | Handle 1, 2, 3 | | | | |

| | OUTPUT OPTIONS | POWER SUPPLY | HANDLE COLOR |
|----|--------------------------------------|----------------------------|--------------|
| | POS1/POS2/POS3 | A Single | 1 Black |
| 01 | 0.25/2.5/4.75VDC | B Independent ² | 2 Red |
| 02 | 0.5/2.5/4.5VDC | | 3 Yellow |
| 03 | 1.0/2.5/4.0VDC | | |
| 05 | 0.25/2.5/4.75VDC 0.25/2.5/4.75VDC | | |
| 06 | 0.5/2.5/4.5VDC 0.5/2.5/4.5VDC | | |
| 07 | 1.0/2.5/4.0VDC 1.0/2.5/4.0VDC | | |
| 09 | 0.5/2.5/4.5VDC 4.5/2.5/0.5VDC | | |
| 10 | 0.25/2.5/4.75VDC 4.75/2.5/0.25VDC | | |
| 11 | 1.0/2.5/4.0VDC 4.0/2.5/1.0VDC | | |

NOTES:

¹⁻¹ - Wires are thick, robust, and best suited for stand alone applications.

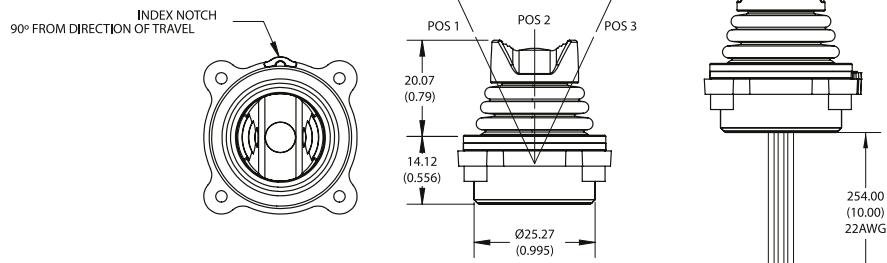
¹⁻² - Wires are thin and best suited for tightly constrained wire routing.

² - Only available on dual output. Not available with Termination Options 3 or 4.

FR series

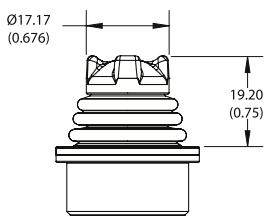
Three position single axis thumb controls •
non-contacting Hall effect technology

DIMENSIONS

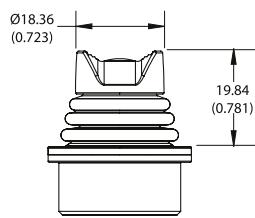


HANDLE OPTIONS

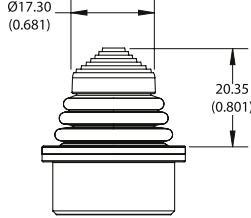
1. CASTLE



2. WINGED HAT



3. CONICAL



HS series

Micro switch 5-way thumb controls • switching technology



DISTINCTIVE FEATURES

- 2, 4 & 5-way (5-way with pushbutton option)
- Positive tactile feedback
- MOM-OFF-MOM
- Connectorized housing
- Several handle options available



ENVIRONMENTAL SPECIFICATIONS

- Operating Temperature: -25°C to +80°C
- Storage Temperature: -30°C to +85°C
- Above Panel Sealing: Up to IP67 & IP69K (subject to mounting style and final specifications)



ELECTRICAL SPECIFICATIONS

- Current Rating: Gold - 10mA @ 30VDC; Silver – 100mA @ 30VDC
- Insulation Resistance: Min 100MΩ (250VDC by insulation resistance meter)
- Voltage Withstand: 500VAC for 1 minute
- Contact Resistance: Max 200mΩ (by YHP4328A)
- Electrical Function: Mom-off-mom



MECHANICAL SPECIFICATIONS

- Operating Force: 5.0N ± 1.0N (1.12lbf ± 0.22lbf)
- Maximum Vertical Load: 200N (45lbf)
- Maximum Horizontal Load: 150N (33.7lbf)
- Mechanical Angle of Movement: 30°
- Expected Life: 300,000 lifecycles
- Mass/Weight: 17g (0.60oz) (Option HS1DXXXX)
- Lever Action (centering): Spring

The company reserves the right to change specifications without notice.

HS series

Micro switch 5-way thumb controls • switching technology



MATERIALS

- Body: Glass filled nylon
- Handles:
 - 1, 2, 3 - Glass filled nylon
 - 4, 5, 6, 7, 8 - Silicone
 - B, C, D - Thermoplastic elastomer



PUSHBUTTON SWITCH (OPTION 6 HANDLE)

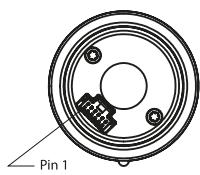
- Electrical Life: 100,000 cycles
- Rating: 50 mA, 12VDC
- Terminal: Brass with silver plating
- Contact Resistance: 100 milliohms max.
- Insulation Resistance: 100 megohms min. 500VDC
- Dielectric Strength: 250VAC / 1 minute
- Contact Arrangement: 1 pole 1 throw
- Operation Force: 1.5lbf
- Stop Strength: Max 3kgf vertical static load for 15 seconds
- Operating temperature: -25°C to +70°C
- Storage Temperature: -30°C to +85°C



CONNECTIONS

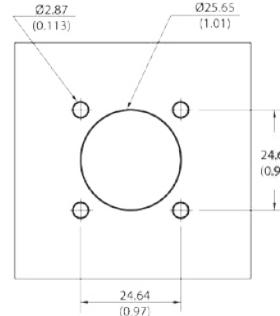
| CONNECTOR POSITION | FUNCTION | WIRE HARNESS |
|--------------------|-------------|--------------|
| 1 | Top Switch* | Orange |
| 2 | X+Switch | Blue |
| 3 | Y+Switch | Yellow |
| 4 | X-Switch | Blue/White |
| 5 | Y-Switch | Yellow/Black |
| 6 | Common | White |

*Optional

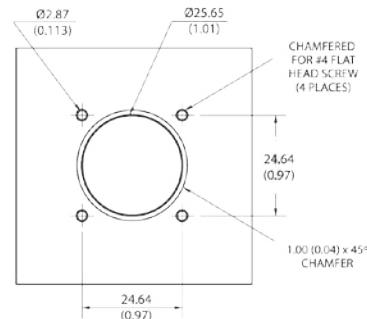


MOUNTING

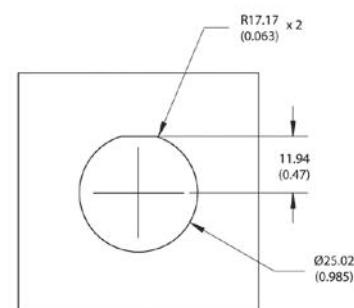
PLASTIC HOUSING - DROP-IN CUTOUT



PLASTIC HOUSING - REAR MOUNT OPTION CUTOUT



METAL THREADED HOUSING - DROP-IN CUTOUT

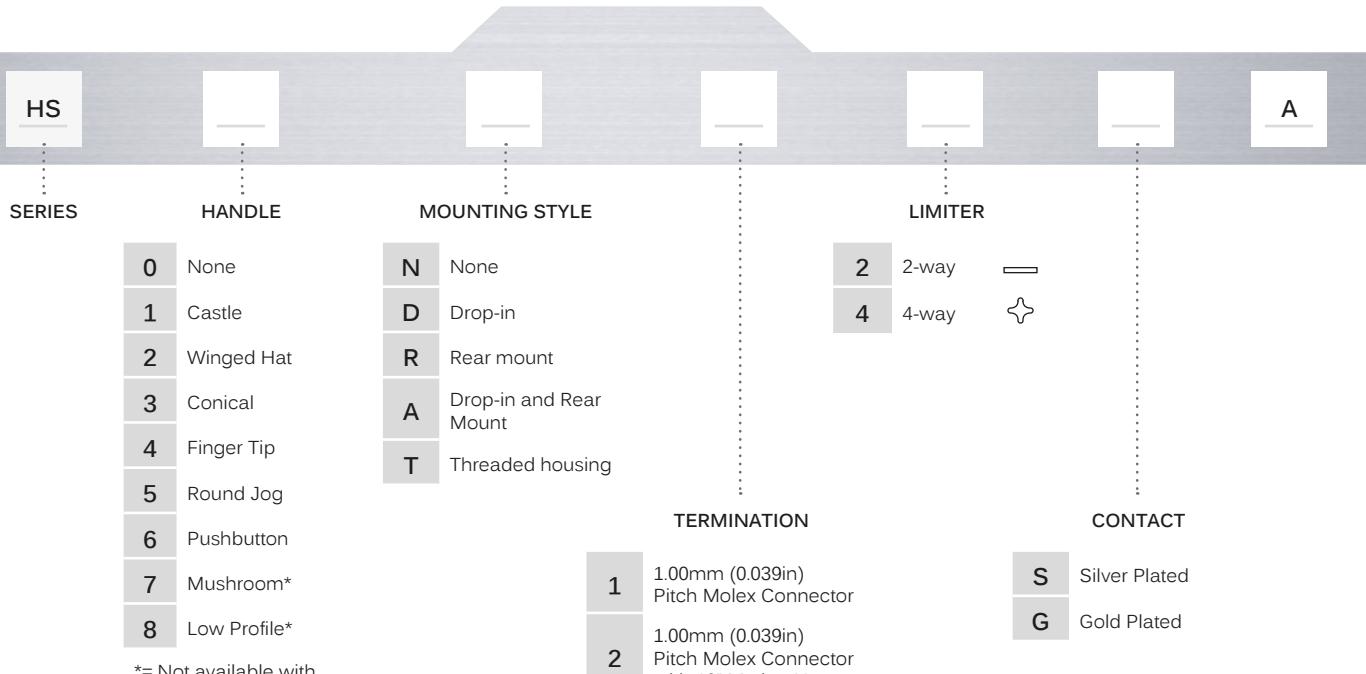


HS series

Micro switch 5-way thumb controls • switching technology



BUILD YOUR PART NUMBER

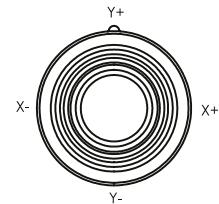
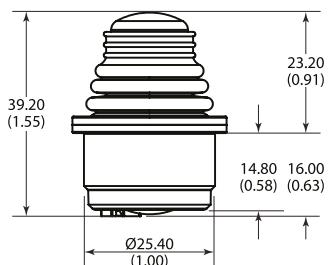


*= Not available with
Threaded Housing
(Mounting Style Option "T")

HS series

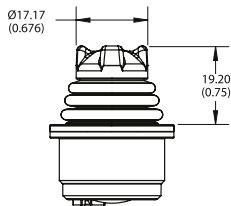
Micro switch 5-way thumb controls • switching technology

DIMENSIONS

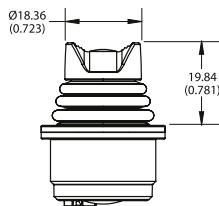


HANDLE OPTIONS

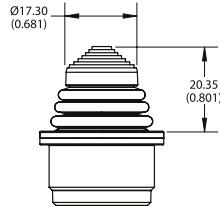
1. CASTLE



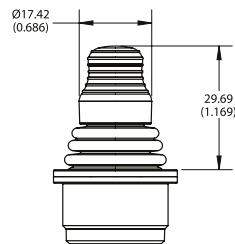
2. WINGED HAT



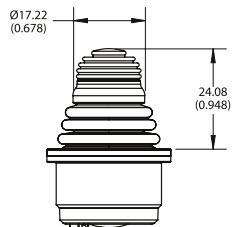
3. CONICAL



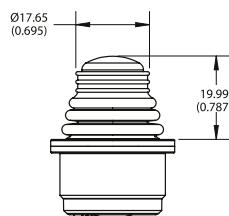
4. FINGER TIP



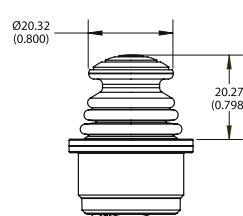
5. ROUND JOG



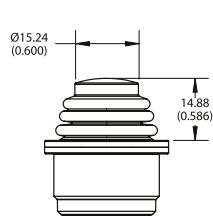
6. PUSHBUTTON



7. MUSHROOM



8. LOW PROFILE



HR series

Proportional single axis thumb controls •
non-contacting Hall effect technology



DISTINCTIVE FEATURES

- Single or dual analog outputs
- Backlighting option
- 5 million lifecycles (without detent)
- Electronics sealed to IP68
- Spring to center or Friction hold



ENVIRONMENTAL SPECIFICATIONS

- Operating Temperature: -30°C to +70°C
- Storage Temperature: -40°C to +85°C
- Electronics sealed to IP68 according IEC 60529
- EMC Immunity Level: EN61000-4-3 and ISO 11452-2 (100V/m)
- EMC Emissions Level: EN61000-6-3: 2001
- ESD: 16kV according to EN61000-4-2



ELECTRICAL SPECIFICATIONS

- Supply Voltage Range: 5.00VDC ±0.50VDC
- Reverse Polarity Max: -10VDC max
- Oversupply Max: 20V
- Consumption: 11mA max (single output), 22mA max (dual output)
- Return to Center Voltage Tolerance on Spring version (no load):
2.5VDC ±0.2VDC



MECHANICAL SPECIFICATIONS

- Spring Version Operating Force: 4N ±0.5N (with detent); 2N ±0.5N (without detent)
- Friction Hold Detent Operating Force: 1.75N ±0.5N (with 11 detents); 2.5N ±0.5N (with 1 detent)
- Mechanical Angle of Movement: ±35° (versions S/G/L)
±20° (version K - not available on Friction hold)
- Expected Life : Spring to Center Version : 5 million lifecycles
Friction Hold : 100,000 lifecycles
- Mass/Weight : 11g ±2g (0.4oz ±0.07oz)

The company reserves the right to change specifications without notice.

HR series

Proportional single axis thumb controls •
non-contacting Hall effect technology

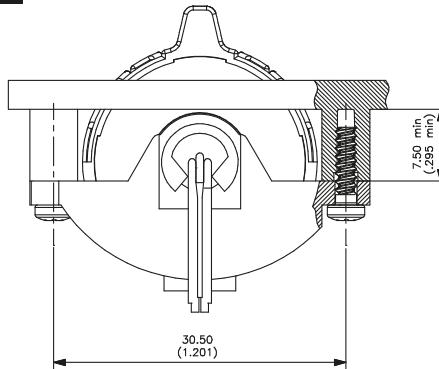


MATERIALS

- Body: Polyamide
- Wheel: Polyamide



MOUNTING



CONNECTIONS

SINGLE OUTPUT WITHOUT BACKLIGHTING

| PIN | FUNCTION | COLOR |
|-----|-----------------------|-------|
| 1 | | |
| 2 | Power supply: +VDC 5V | Red |
| 3 | | |
| 4 | | |
| 5 | | |
| 6 | Output | |
| 7 | Ground 0V | Black |

SINGLE OUTPUT WITH BACKLIGHTING

| PIN | FUNCTION | COLOR |
|-----|-----------------------|--------|
| 1 | | |
| 2 | Power supply: +VDC 5V | Red |
| 3 | LED + | Yellow |
| 4 | LED - | Blue |
| 5 | | |
| 6 | Output | White |
| 7 | Ground 0V | Black |

DUAL OUTPUT WITHOUT BACKLIGHTING

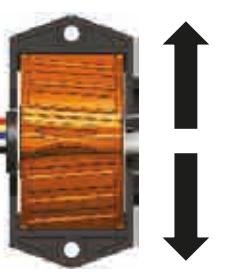
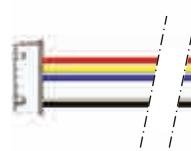
| PIN | FUNCTION | COLOR |
|-----|-----------------------|-------|
| 1 | | |
| 2 | Power supply: +VDC 5V | Red |
| 3 | | |
| 4 | | |
| 5 | Output 2 | Green |
| 6 | Output 1 | White |
| 7 | Ground 0V | Black |

DUAL OUTPUT WITH BACKLIGHTING

| PIN | FUNCTION | COLOR |
|-----|-----------------------|--------|
| 1 | | |
| 2 | Power supply: +VDC 5V | Red |
| 3 | LED + | Yellow |
| 4 | LED - | Blue |
| 5 | Output 2 | Green |
| 6 | Output 1 | White |
| 7 | Ground 0V | Black |



Wiring harness with multiwire leads
AWG28 - Length 140mm (5.51in)



HR series

Proportional single axis thumb controls •
non-contacting Hall effect technology



BUILD YOUR PART NUMBER



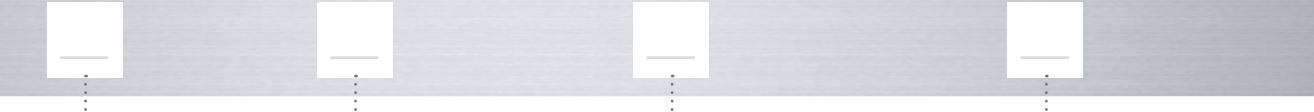
SERIES

ACTUATOR

MOUNTING OPTIONS

| | |
|----------|--|
| S | Wheel with 1 tab |
| G | Reversed wheel with 1 tab |
| K | Wheel with 2 tabs (not available in Friction hold) |
| L | Wheel without tab |

| | |
|----------|------|
| 2 | Rear |
|----------|------|



BACKLIGHTING

WHEEL COLORS

OUTPUT OPTIONS

MECHANICAL FUNCTIONS

| | |
|----------|-----|
| 1 | Yes |
| 2 | No |

| | |
|----------|-----------|
| 1 | Blue |
| B | Dark blue |
| 2 | Black |
| 3 | Green |
| 5 | Yellow |
| 7 | White |
| 9 | Orange |

| | |
|----------|---------------------------|
| A | Single 0V to 5V |
| B | Single 0.5V to 4.5V |
| C | Dual 0V to 5V |
| D | Dual 0.5V to 4.5V |
| E | Inverse dual 0.5V to 4.5V |
| F | Inverse dual 0V to 5V |

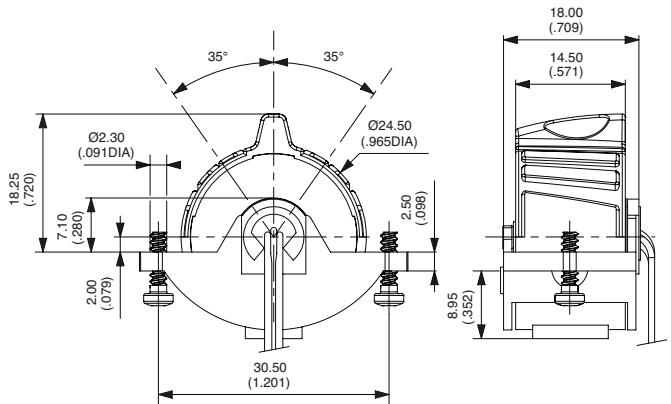
| | |
|----------|---|
| 0 | Spring to center, without center detent |
| 1 | Spring to center, with center detent |
| 7 | Friction hold with 11 detents |
| 8 | Friction hold with center detent |

NOTE:
Other detent options available upon request.

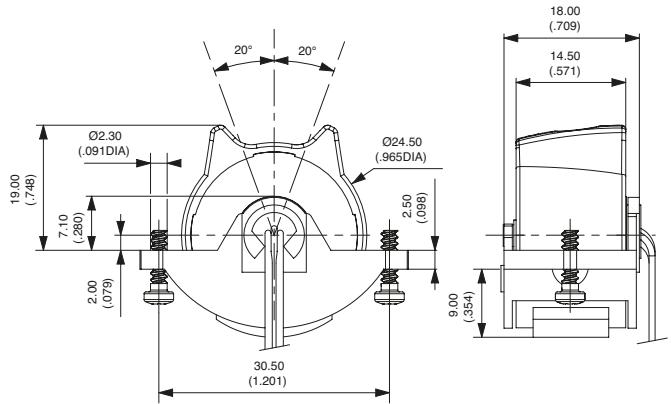
HR series

Proportional single axis thumb controls •
non-contacting Hall effect technology

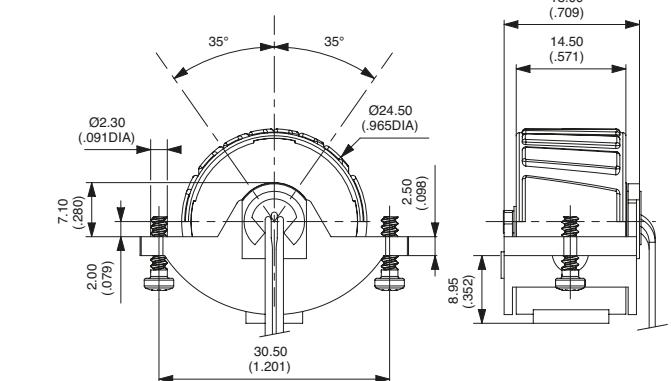
WHEEL WITH 1 TAB - OPTION S & G



WHEEL WITH 2 TABS - OPTION K



WHEEL WITHOUT TAB - OPTION L



CW series

Proportional miniature thumb controls •
non-contacting Hall effect technology



DISTINCTIVE FEATURES

- Single axis
- Analog or PWM outputs
- Spring return to center
- Snap-in mounting
- Designed for joysticks, armrests and panel mounting



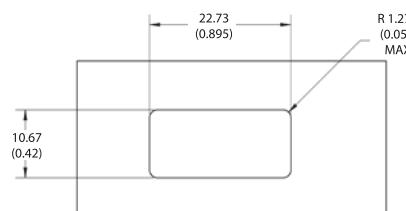
ENVIRONMENTAL SPECIFICATIONS

- Operating Temperature: -40°C to +85°C
- Storage Temperature: -40°C to +85°C
- Sealing: No sealing
- EMC Immunity Level: EN61000-4-3
- EMC Emissions Level: EN61000-6-3: 2001
- ESD: EN61000-4-2

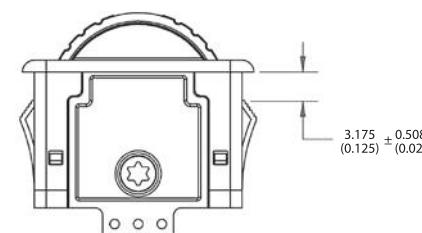


MOUNTING

PANEL CUT-OUT



PANEL THICKNESS



ELECTRICAL SPECIFICATIONS

- Supply Voltage Range: 5.00VDC ±0.250VDC
- Reverse Polarity max: -10VDC
- Oversupply max: 16V
- Output Impedance: 2Ω
- Return to Center Voltage Tolerance: ±200mV initial



MECHANICAL SPECIFICATIONS

- Operating Force: 0.7N (0.15lbf)
- Maximum Vertical Load: 111N (25lbf)
- Maximum Horizontal Load: 67N (15lbf)
- Mechanical Angle of Movement: ±45°
- Expected Life: 3 million lifecycles
- Mass/weight: 4.2g ±1.0g (0.15oz ±0.03oz)
- Lever Action (centering): Spring



MATERIALS

- Body: Delrin
- Actuator: Glass filled nylon

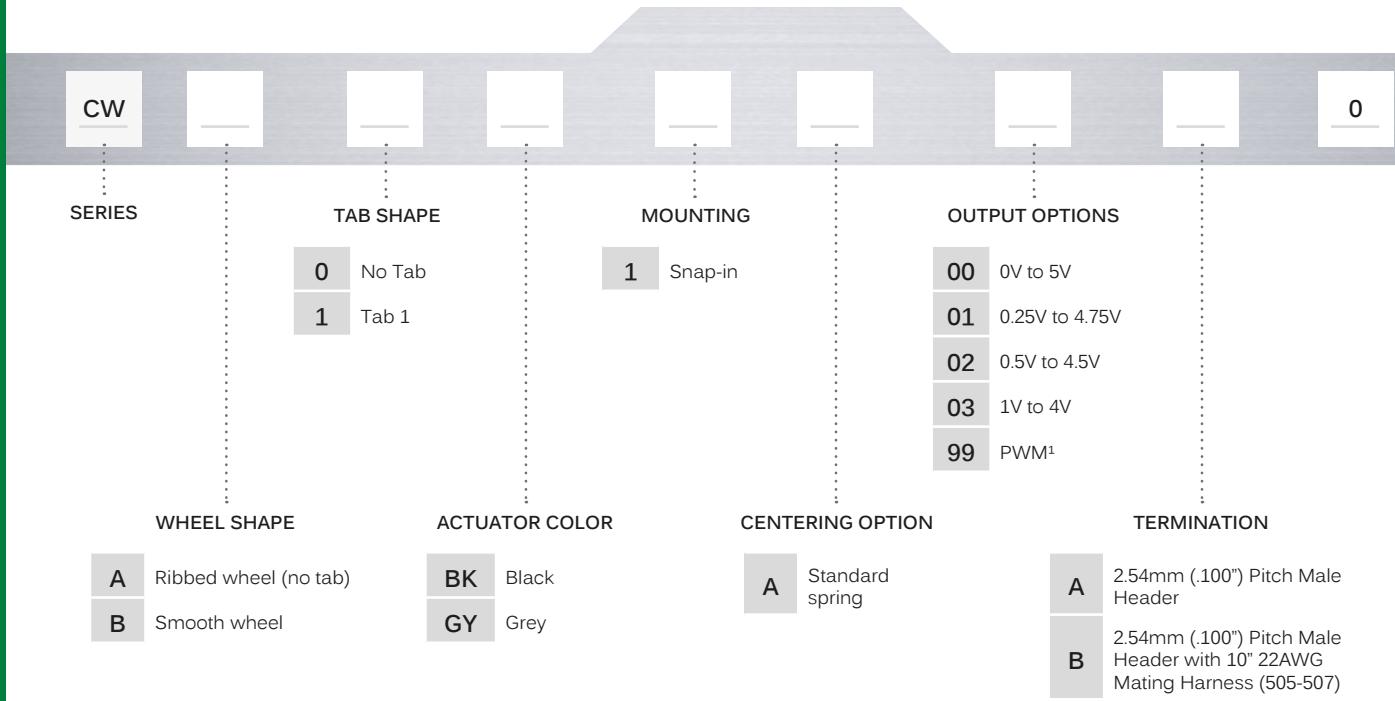
The company reserves the right to change specifications without notice.

CW series

Proportional miniature thumb controls •
non-contacting Hall effect technology



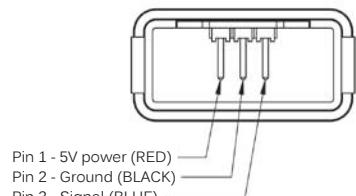
BUILD YOUR PART NUMBER



¹ - Contact factory for PWM configuration.



CONNECTIONS



| OPTIONAL MATING HARNESS ¹ | |
|--------------------------------------|--|
| Part number: 505-507 | |
| Wire type: 22 AWG 25cm PTFF | |
| Connector: Molex 0050579503 | |

WIRING SPECIFICATION

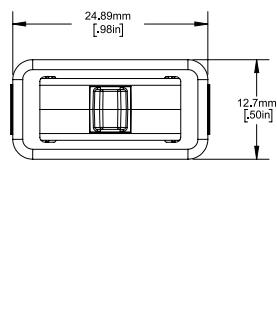
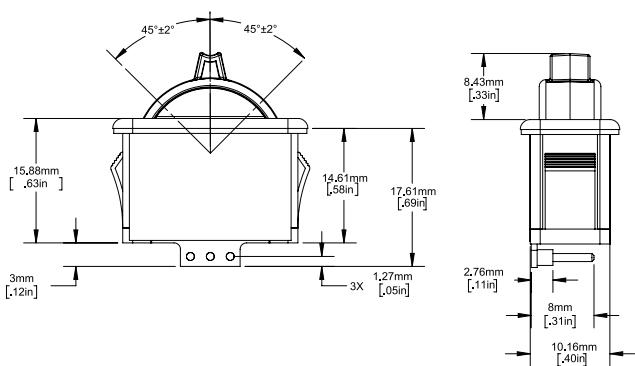
Red: Power (5V)

Black: Ground

Blue: Signal

¹ - The CW Series is fitted with a three terminal SAMTEC (TLW-103-05-T-S) 2.54mm header. An optional 22AWG Mating Harness (PN 505-507) may be specified from the "Terminal" category of the Option Selection Guide.

DIMENSIONS



TW series

Single axis self-centering thumb controls •
non-contacting Hall effect technology



DISTINCTIVE FEATURES

- Analog outputs
- Spring return to center
- Choice of 4 wheel colors
- 5 million lifecycles
- Electronics sealed up to IP67



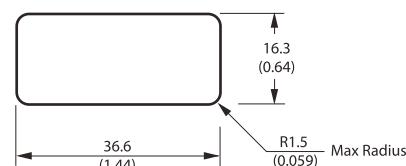
ENVIRONMENTAL SPECIFICATIONS

- Operating Temperature: -40°C to +85°C
- Storage Temperature: -40°C to +85°C
- Sealing: Up to IP67 (electronics)
- EMC Immunity Level: EN61000-4-3 (extended)
- EMC Emissions Level: EN61000-6-3: 2001
- ESD: EN61000-4-2 (extended)

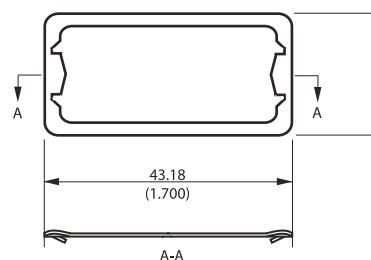


MOUNTING

MOUNTING OPTIONS



STEEL SPRING RETAINER



ELECTRICAL SPECIFICATIONS

- Supply Voltage Range: 5.00VDC ±0.250VDC
- Reverse Polarity Max: -10VDC
- Oversupply Max: 16V
- Minimum load: 1 KΩ
- Return to Center Voltage Tolerance (no load): ±200mV



MECHANICAL SPECIFICATIONS

- Operating Force: 0.7N (0.15lbf)
- Maximum Vertical Load: 111N (25lbf)
- Maximum Horizontal Load: 133N (30lbf)
- Mechanical Angle of Movement: 80°(±40° from center)
- Expected Life: 5 million lifecycles
- Mass/Weight: 35g ±5g (1.23oz ±0.18oz)
- Lever Action (centering): Spring

The company reserves the right to change specifications without notice.



MATERIALS

- Body: Glass filled nylon
- Handles: Glass filled nylon

TW series

Single axis self-centering thumb controls •
non-contacting Hall effect technology



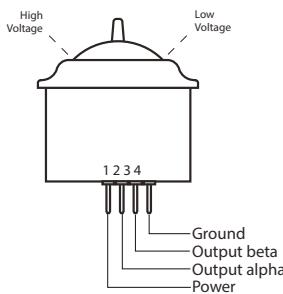
BUILD YOUR PART NUMBER

| | | | | | |
|------------|---------------|--|--|----------------|---|
| TW | | | | | |
| SERIES | MODEL | TAB SHAPE | ACTUATOR COLOR | SPRING TENSION | |
| 0 With Tab | 1 Without Tab | 1 0V to 5V 2 0.5V to 4.5V 3 1V to 4V 4 0V to 5V - Sensor 1 0V to 5V - Sensor 2 5 0.5V to 4.5V - Sensor 1 0.5V to 4.5V - Sensor 2 6 1V to 4V - Sensor 1 1V to 4V - Sensor 2 7 0V to 5V - Sensor 1 5V to 0V - Sensor 2 8 0.5V to 4.5V - Sensor 1 4.5V to 0.5V - Sensor 2 9 1V to 4V - Sensor 1 4V to 1V - Sensor 2 | BLK Black RED Red BLU Blue GRY Grey | 1 Standard | TERMINATION |
| | | | | | 1 2.54mm (.100") Pitch Male Header 2 22AWG 41cm PTFE 3 28AWG 41cm PTFE 4 2.54mm (.100") Pitch Male Header with Mating Harness 25cm |
| | | | | | NOTE: Mounting accessories : Steel spring retainer, insertion tool and sealing gasket. |



CONNECTIONS

CONNECTOR PINOUT



| CONNECTOR TERMINATION OPTION | | |
|---|--|--|
| The TW Series Thumbwheel may be specified with a TE Connectivity 2.54mm pitch male header. When selected from the "Option Selection" guide, both single and dual output configurations feature a four position TE 3-647166-4 connector. | | |

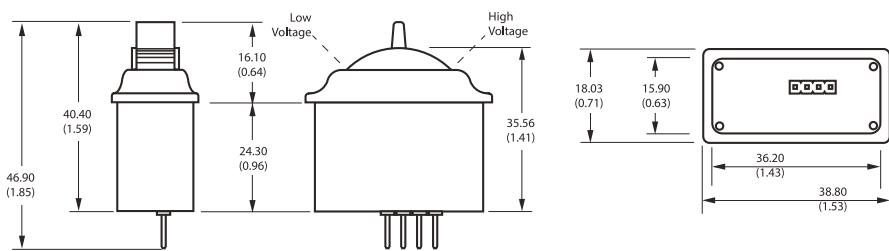
Wire type: 22AWG 25cm PTFE Connector: Molex 0050579504

| DEFAULT WIRE COLOR CODE | | | |
|-------------------------|--------------|-----|--|
| COLOR | FUNCTION | AWG | |
| Red | +5V | 22 | |
| Black | Ground | | |
| Blue | Output alpha | | |
| Blue/White | Output beta | | |

OPTIONAL MATING HARNESS

The TW Series is available with an optional mating harness. the four function harness is part number 505-498.

WITH CENTER TAB



PC series

Ergonomic pendant controllers •
custom configurable one-handed operation



DISTINCTIVE FEATURES

- Analog and USB output options
- Lightweight one-handed operation
- Configured to order
- Standard configuration with APEM TS Thumbstick and IP series pushbutton
- Optional sealing up to IP67



ENVIRONMENTAL SPECIFICATIONS

- Operating Temperature: -40°C to +85°C
- Storage Temperature: -40°C to +85°C
- Sealing: Up to IP67 & IP69K



ELECTRICAL SPECIFICATIONS (WHEN CONFIGURATED WITH TS SERIES)

- Supply Voltage Range: 5.00VDC ±0.250VDC
- Reverse Polarity Max: -10VDC
- Oversupply Max: 20VDC
- Minimum load: 1 Ω
- Return to Center Voltage Tolerance: ±200mV initial



MECHANICAL SPECIFICATIONS

- Operating Force: 3N ±0.5N (TS); 6N ±2N (IP)
- Maximum Vertical Load: 200N (45lbf) (TS)
- Maximum Horizontal Load: 150N
- Mechanical Angle of Movement: ±25°
- Expected Mechanical Life: 1 million lifecycles
- Mass/weight: 226.8g (8oz)
- Lever Action (centering): Spring



MATERIALS

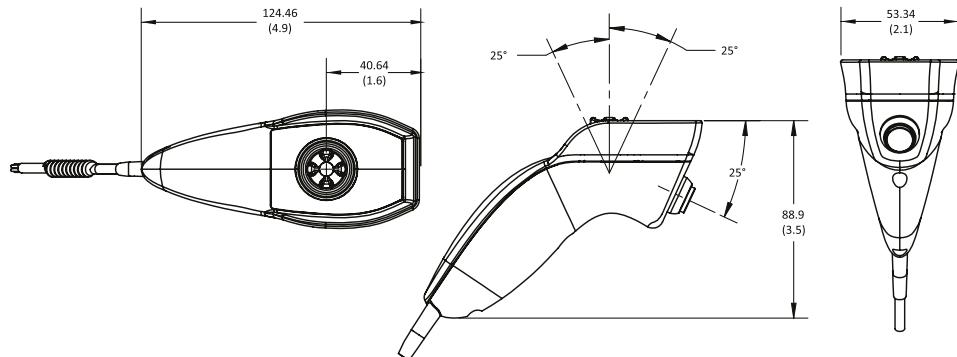
- Body: Thermoplastic

The company reserves the right to change specifications without notice.

PC series

Ergonomic pendant controllers •
custom configurable one-handed operation

HANDLE DIMENSIONS



STANDARD CONFIGURATIONS

TWO AXIS TS AND MOMENTARY PUSHBUTTON WITH LED



PC 2430

TWO AXIS TS AND MOMENTARY PUSHBUTTON



PC 2441

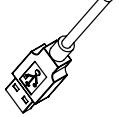
TWO AXIS TS WITH MOMENTARY PUSHBUTTON, COILED CABLE



PC 3566

Two axis thumbstick

TS1R2S00A



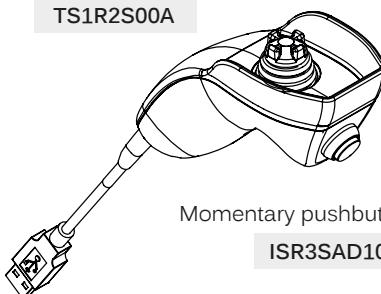
Momentary pushbutton
with green LED

IPP3SAD2LOG

OUTPUT - USB "Game Controller"

Two axis thumbstick

TS1R2S00A



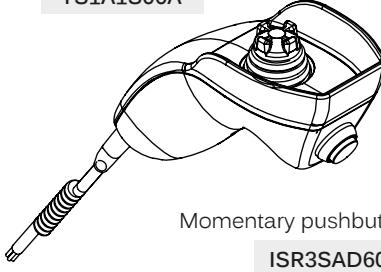
Momentary pushbutton

ISR3SAD100

OUTPUT - USB "Game Controller"

Two axis thumbstick

TS1A1S00A



Momentary pushbutton

ISR3SAD600

OUTPUT - 0V to 5V

HF series

Proportional multi-axis fingertip controllers •
non-contacting Hall effect technology



DISTINCTIVE FEATURES

- One, two or three axis
- Analog outputs
- CANbus J1939 and CANopen options
- USB 2.0 HID interface option
- Connectorized housing



ENVIRONMENTAL SPECIFICATIONS

- Operating Temperature: -40°C to +85°C
- Storage Temperature: -40°C to +85°C
- Above Panel Sealing: Up to IP67 (excluding some handles)
- EMC Immunity Level: EN61000-4-3
- EMC Emissions Level: EN61000-6-3:2001
- ESD: EN61000-4-2



ELECTRICAL SPECIFICATIONS

- Supply Voltage Range: 5.00VDC ±0.250VDC
- Reverse Polarity Max: -10VDC
- Oversupply Max: 20V
- Output Impedance: 2 Ω



MECHANICAL SPECIFICATIONS

- Operating Force: 2.8N (0.63lbf)
- Maximum Vertical Load: 200N (45lbf)
- Maximum Horizontal Load: 200N (45lbf)
- Mechanical Angle of Movement: 36° X & Y axis (subject to limiter), 80° Z axis (subject to handle)
- Expected Mechanical Life: 5 million cycles (X & Y axis)
- Mass/weight: 18.25g ±5.0g (0.64oz ±0.18oz)
- Lever Action (centering): Spring

The company reserves the right to change specifications without notice.

HF series

Proportional multi-axis fingertip controllers •
non-contacting Hall effect technology



MATERIALS

- Body: Glass filled nylon
- Boot: Silicone
- Handles: Glass filled nylon



CONNECTIONS

WIRING SPECIFICATION

| WIRE COLOR | DESCRIPTION |
|--|----------------------------|
| Black | Ground |
| Red | Power - Supply (+35V max.) |
| Blue/White | X-Axis (Dual Output) |
| Blue | X-Axis output |
| Yellow/Black | Y-Axis (Dual Output) |
| Yellow | Y-Axis output |
| Green/Black | Z-Axis (Dual Output) |
| Green | Z-Axis output |
| White | Pushbutton common wire |
| Orange, violet, grey, brown, pink, bl/wt/y/bk, gn/bk, gy/w | Pushbutton outputs |



Fig 1



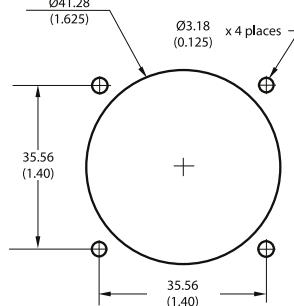
Fig 2

The HF Series joysticks are supplied with a Hirose DF11-12DP-2DS9(24) connector (male receptacle). (Fig 1)
Cable not included. Please request at order entry. Cable connector (female socket) is Hirose DF11-12DS-2C. (Fig 2)
Connector specifications: 12 position 2mm pitch dual row (2x6) pin header.

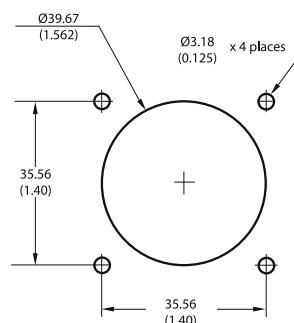


PANEL CUT OUT

DROP-IN



REAR MOUNT

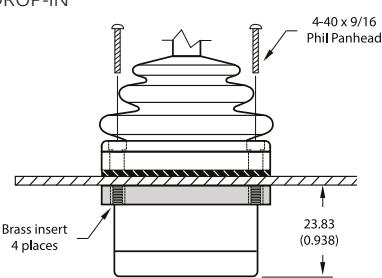


* Not available for Option 11 and 55 Handles

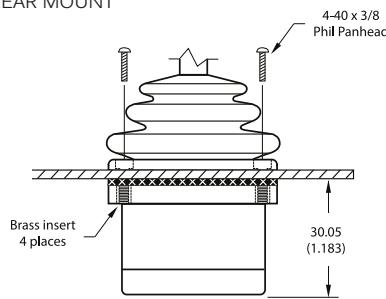


MOUNTING

DROP-IN



REAR MOUNT



HF series

Proportional multi-axis fingertip controllers •
non-contacting Hall effect technology



BUILD YOUR PART NUMBER



| SERIES | HANDLE | LIMITER PLATE |
|--|---|---|
| 10 Ball Tip (2 Axis) | 45 2 Pushbuttons (3 Axis) | S Square <input type="checkbox"/> |
| 11 Tapered (2 Axis) | 46 Low Profile (3 Axis) | R Round <input type="checkbox"/> |
| 22 1 Pushbutton (2 Axis) | 50 3 Axis, IP67 Sealed | X Slotted <input type="checkbox"/> |
| 27 1 Pushbutton (2 Axis), IP67 Sealed | 51 3 Axis, 1 Pushbutton, IP67 Sealed | Y Slotted <input type="checkbox"/> |
| 33 3 Axis | 52 3 Axis, 2 Pushbutton, IP67 Sealed | P Plus <input type="checkbox"/> |
| 44 1 Pushbutton (3 Axis) | 55 3 Axis, 2 Pushbutton, IP67 Sealed | C Cross <input type="checkbox"/> |
| | | W Guided Feel – Square <input type="checkbox"/> |
| | | Z Guided Feel – Round <input type="checkbox"/> |



| MOUNTING | OUTPUT OPTIONS |
|--------------|---|
| 1 Drop-in | 0 0V to 5V |
| 4 Rear Mount | 1 0.5V to 4.5V |
| | 2 0.25V to 4.75V |
| | 3 1V to 4V |
| | 4 0V to 5V – Sensor 1 0V to 5V – Sensor 2 |
| | 5 0.5V to 4.5V – Sensor 1 0.5V to 4.5V – Sensor 2 |
| | 6 0.25V to 4.75V – Sensor 1 0.25V to 4.75V – Sensor 2 |
| | 7 1V to 4V – Sensor 1 1V to 4V – Sensor 2 |
| | 8 0V to 5V – Sensor 1 5V to 0V – Sensor 2 |
| | 9 0.5V to 4.5V – Sensor 1 4.5V to 0.5V – Sensor 2 |
| | 10 0.25V to 4.75V – Sensor 1 4.75V to 0.25V – Sensor 2 |
| | 11 1V to 4V – Sensor 1 4V to 1V – Sensor 2 |
| | 0-U USB-Horizontal, Mini B termination |
| | 2-U USB-Vertical cable exit |
| | 1-J Cursor Emulation |
| | 0-V 0V to 5V (Voltage regulator)* |
| | B-V ±10V (Voltage regulator)** |
| | 2-C CANbus J1939 |
| | 3-C CANopen |

NOTES :

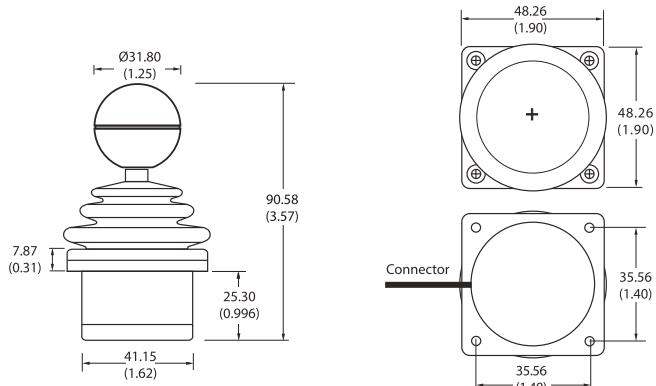
*Requires operating voltage 6V ≥ 35V

**Requires operating voltage 11V ≥ 35V

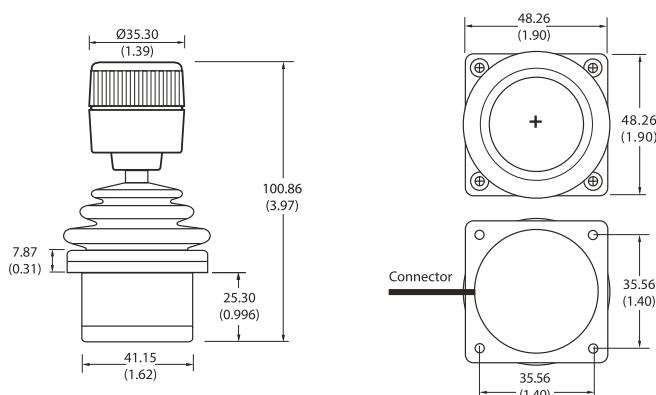
HF series

Proportional multi-axis fingertip controllers •
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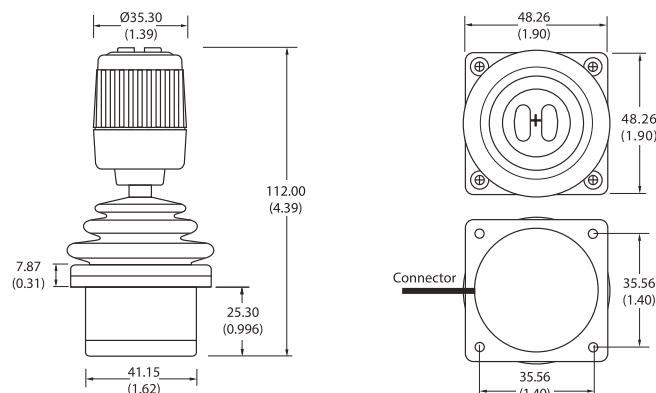
WITH HANDLE N°10 - BALL TIP - 2 AXIS



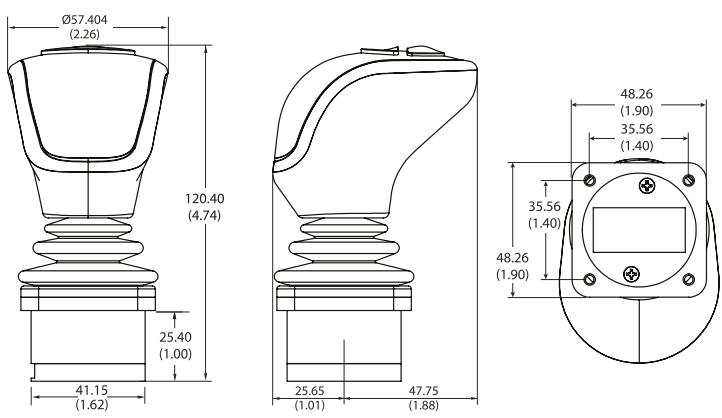
WITH HANDLE N°33 - 3 AXIS



WITH HANDLE N°45 - 3 AXIS 2 PUSHBUTTONS



WITH HANDLE N°55 3 AXIS 2 PUSHBUTTONS IP67 SEALED



3000 series

Robust proportional fingertip controllers •
non-contacting Hall effect technology



DISTINCTIVE FEATURES

- One, two or three axis
- Analog or PWM outputs
- Low profile less than 20mm below panel depth
- 5V or 3.3V operation
- Metal mechanism



ENVIRONMENTAL SPECIFICATIONS

- Operating Temperature: -25°C to +70°C
- Storage Temperature: -40°C to +70°C
- Sealing: IP65 (above panel subject to handle and final specification)
- EMC Immunity Level: EN61000-4-3 (extended)
- EMC Emissions Level: EN61000-6-3:2001, CISPR 22:2005,
Class B 30 MHz-11GHz
- ESD: EN61000-4-2 (extended)



ELECTRICAL SPECIFICATIONS

- Output Voltage Range: $\pm 10\% \times V$ to $\pm 50\% \times V$
- Output at Center: $V/2 \pm (5\% \times \text{gain})$
- Power Supply: 5V $\pm 0.5\text{V}$ transient free; 3.3V $\pm 0.1\text{V}$ (configuration 2)
- Output impedance: 10 Ω
- Oversupply max: +20V



MECHANICAL SPECIFICATIONS

- Operating Force: 1.3N (2.86lbf)
- Maximum Load: 400N (89.921lbf) (subject to handle)
- Mechanical Angle of Movement: 36° X & Y axis (subject to limiter);
50° Z axis (subject to handle)
- Expected Mechanical Life: 10 million lifecycles
- Mass/weight: 100g (3.53oz) nominal
- Lever Action (centering): Spring

The company reserves the right to change specifications without notice.

3000 series

Robust proportional fingertip controllers •
non-contacting Hall effect technology



MATERIALS

- Shaft: Stainless steel
- Boot: Neoprene
- Handles:
BL, E, Q, AL - Nylon
AR - Aluminum
K - ABS
T - Stainless steel



CONNECTIONS

The joystick is fitted, as standard, with 150mm long BS6360 rated cables and an industry standard 2.5mm pitch connector(s). Further non-standard connectors and cable options are available upon request.

CONFIGURATIONS 1 & 2

Joysticks are supplied with a seven way connector as standard. If the joystick is specified with a pushbutton handle, the connector will be nine way.

| PIN | FUNCTION | COLOR |
|-----|---------------------------------|--------|
| 1 | 0V | Black |
| 2 | Center Tap Reference | Green |
| 3 | Z Axis Output - Where Specified | Purple |
| 4 | Y Axis Output | Yellow |
| 5 | X Axis Output- Where Specified | Blue |
| 6 | +V | Red |
| 7 | Center Detect | Orange |
| 8 | Pushbutton | Orange |
| 9 | Pushbutton | Orange |

CONFIGURATIONS 3 & 4

Joysticks are supplied with two completely independent cable assemblies for a truly dual system.

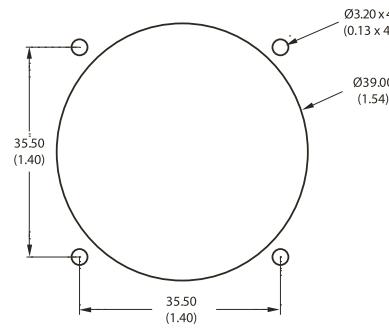
| PIN | FUNCTION | COLOR |
|-----|--------------------------------|--------|
| 1 | 0V | Black |
| 2 | Center Tap Reference | Green |
| 3 | No connection | |
| 4 | Y Axis Output | Yellow |
| 5 | X Axis Output- Where Specified | Blue |
| 6 | +V | Red |
| 7 | No connection | |

For details on configuration 5 pinout, please contact Customer Support.

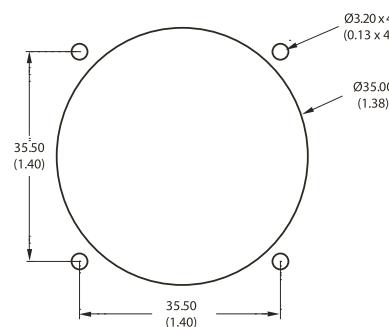


PANEL CUT-OUT

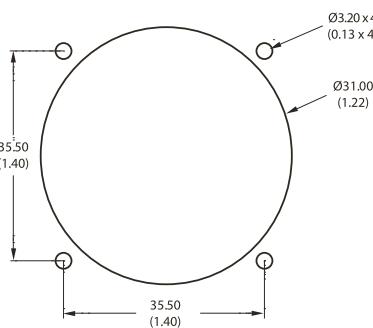
DROP-IN MOUNTING



SUB-MOUNTING OPTION A



SUB-MOUNTING OPTION B

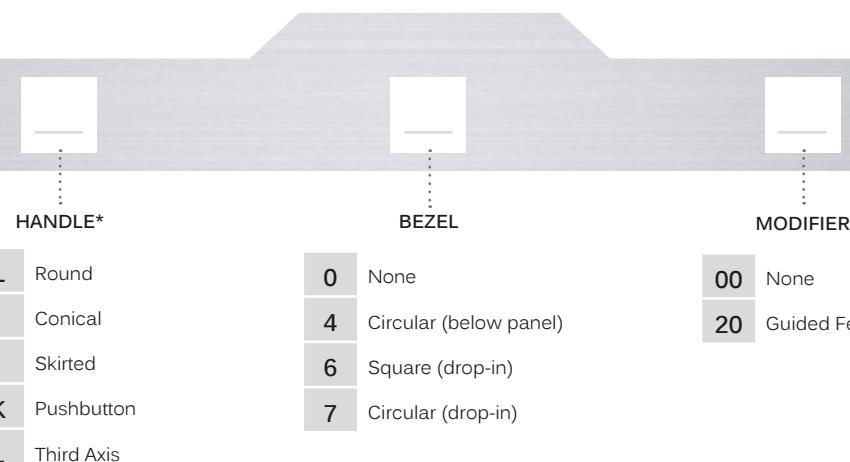
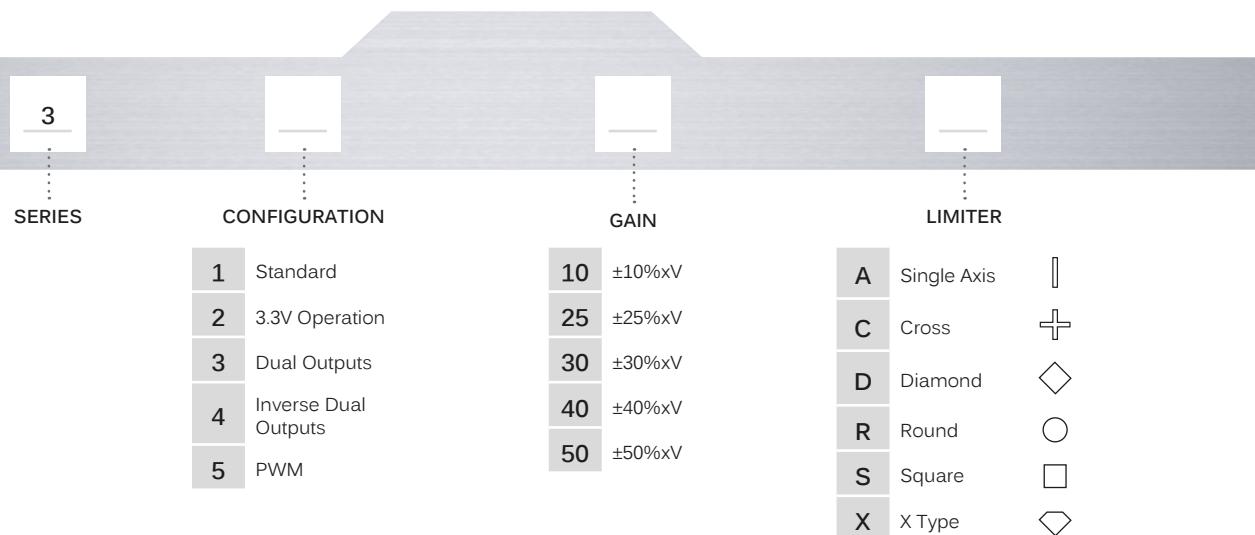


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BUILD YOUR PART NUMBER



*For more handles see www.apem.com

NOTES :

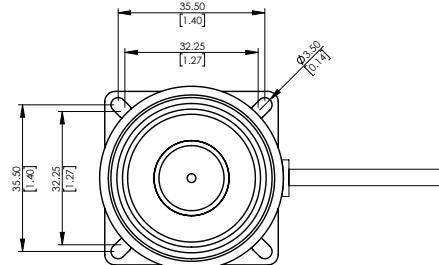
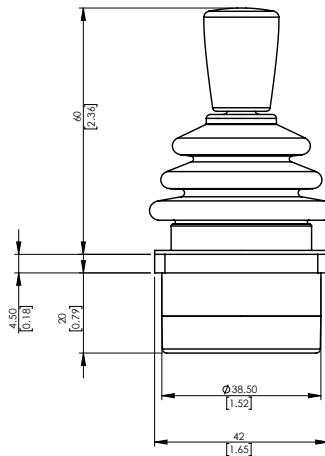
NOTES: Standard option availability : The following table shows which permutations of options are possible.

| CONFIGURATION | CT | CD | AXIS | | SUPPLY | | GAIN | | | | | LIMITERS | | | | | ALL HANDLES | ALL BEZELS |
|---------------|----|----|------|---|--------|------|------|----|----|----|----|----------|---|---|---|---|-------------|------------|
| | | | X | Y | Z | 3.3V | 5V | 10 | 25 | 30 | 40 | 50 | A | C | D | R | S | X |
| 1 | ✓ | ✓ | ✓ | ✓ | ✓ | ✗ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 2 | ✗ | ✗ | ✓ | ✓ | ✓ | ✓ | ✗ | ✗ | ✗ | ✗ | ✗ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 3 | ✗ | ✗ | ✓ | ✓ | ✓ | ✗ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 4 | ✗ | ✗ | ✓ | ✓ | ✓ | ✗ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 5 | ✗ | ✗ | ✓ | ✓ | ✓ | ✗ | ✓ | ✗ | ✗ | ✗ | ✗ | ✗ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

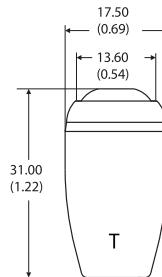
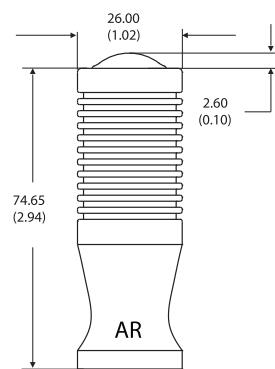
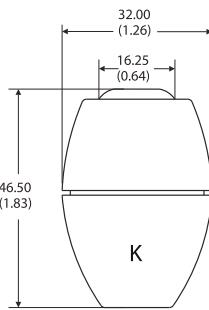
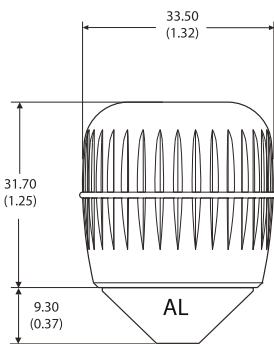
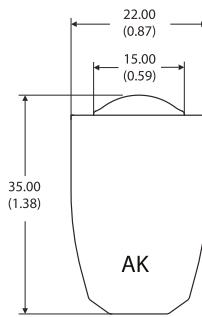
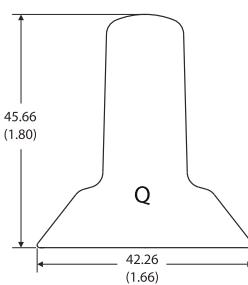
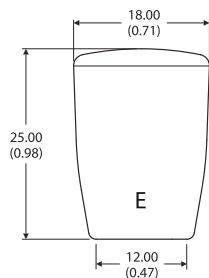
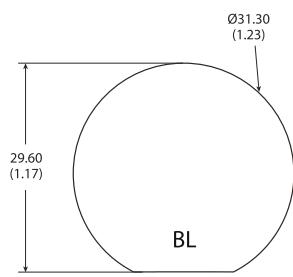
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WITH HANDLE OPTION E



HANDLE OPTIONS



For more handle options, see www.apem.com

BH series

Proportional single axis paddle joystick controllers • non-contacting Hall effect technology



DISTINCTIVE FEATURES

- Hall effect and switch function
- Custom levers available in 5 colors
- Analog or PWM outputs
- 5V operation with standard dual redundant outputs
- Sealed up to IP67



ENVIRONMENTAL SPECIFICATIONS

- Operating Temperature: -25°C to +70°C
- Storage Temperature: -40°C to +85°C
- Above Panel Sealing: IP67
- EMC Immunity Level: EN61000-6-2: 2005
- EMC Emissions Level: EN61000-6-4: 2011, CISPR 25: 2008 Ed. 3.0
- ESD: EN61000-4-2



ELECTRICAL SPECIFICATIONS

- Maximum Voltage: 5V ±0.5V Transient free
- Output Impedance: 10K Ω Minimum recommended
- Return to Center Voltage Tolerance: V/2± (5% x Gain)



MECHANICAL SPECIFICATIONS

- Mechanical Angle of Movement: 60°
- Expected Mechanical Life: 10 million lifecycles
- Mass/weight: 50g (1.76oz.)
- Lever Action (centering): Spring

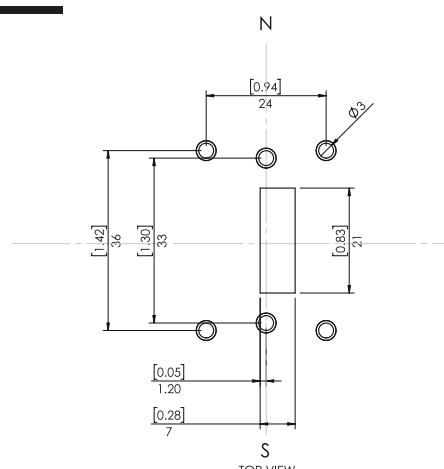


MATERIALS

- Body: PA
- Actuator: PA & PC
- Rubber Grip: TPE



PANEL CUT-OUT



CONNECTIONS

Paddles are supplied with an eight way connector as standard.

| PIN | FUNCTION |
|-----|---------------------|
| 1 | 5V |
| 2 | Switch 1(+) |
| 3 | 0V |
| 4 | Analog/PWM output 1 |
| 5 | Analog/PWM output 2 |
| 6 | 0V |
| 7 | Switch 2(-) |
| 8 | 5V |

BH series

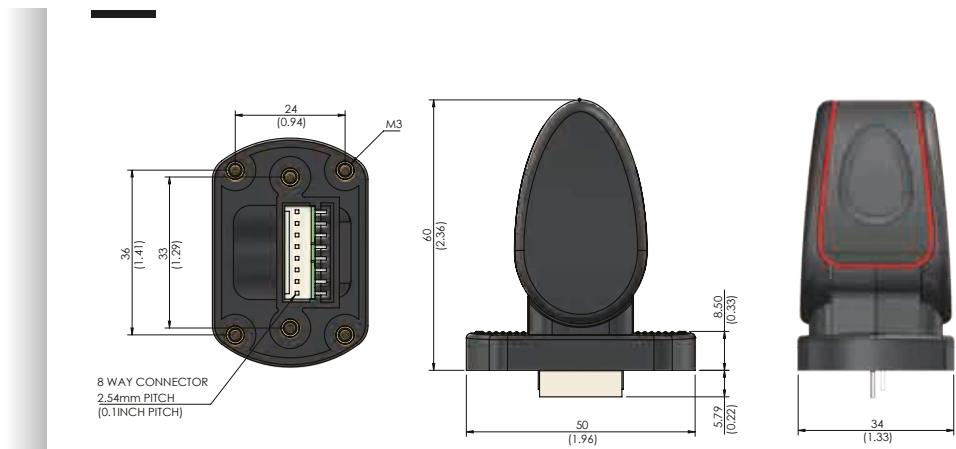
Proportional single axis paddle joystick controllers •
non-contacting Hall effect technology



BUILD YOUR PART NUMBER

| | | | |
|--|---|---|-----------------------------|
| BH | | | |
| SERIES | CONFIGURATION | GAIN | LEVER OPERATION |
| BH 60mm (2.36in) above the panel | 1 Standard Dual Outputs 2 Inverse Dual Outputs 3 PWM | 10 $\pm 10\% \times V$ 25 $\pm 25\% \times V$ 30 $\pm 30\% \times V$ 40 $\pm 40\% \times V$ 50 $\pm 50\% \times V$ | A01 Spring to Center |
| HANDLE | DETAIL COLOR | SWITCHING POINTS | MODIFIER |
| BK Black | BK Black RE Red BL Blue YE Yellow GR Green | 00 No Switches 05 ± 5 Degrees 15 ± 15 Degrees 30 ± 30 Degrees | 00 None |

DIMENSIONS



BL series

Proportional single axis paddle joystick controllers • non-contacting Hall effect technology



DISTINCTIVE FEATURES

- Hall effect and switch function
- Custom levers available in 5 colors
- Analog or PWM outputs
- 5V operation with standard dual redundant outputs
- Sealed up to IP67



ENVIRONMENTAL SPECIFICATIONS

- Operating Temperature: -25°C to +70°C
- Storage Temperature: -40°C to +85°C
- Above Panel Sealing: IP67
- EMC Immunity Level: EN61000-6-2: 2005
- EMC Emissions Level: EN61000-6-4: 2011, CISPR 25: 2008 Ed. 3.0
- ESD: EN61000-4-2



ELECTRICAL SPECIFICATIONS

- Maximum Voltage: 5V ±0.5V Transient free
- Output Impedance: 10K Ω Minimum recommended
- Return to Center Voltage Tolerance: V/2± (5% x Gain)



MECHANICAL SPECIFICATIONS

- Mechanical Angle of Movement: 60°
- Expected Mechanical Life: 10 million lifecycles
- Mass/weight: 50g (1.76oz.)
- Lever Action (centering): Spring



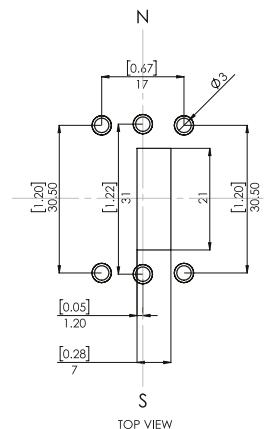
MATERIALS

- Body: PA
- Actuator: PA & PC
- Rubber Grip: TPE

The company reserves the right to change specifications without notice.



PANEL CUT-OUT



CONNECTIONS

Paddles are supplied with an eight way connector as standard.

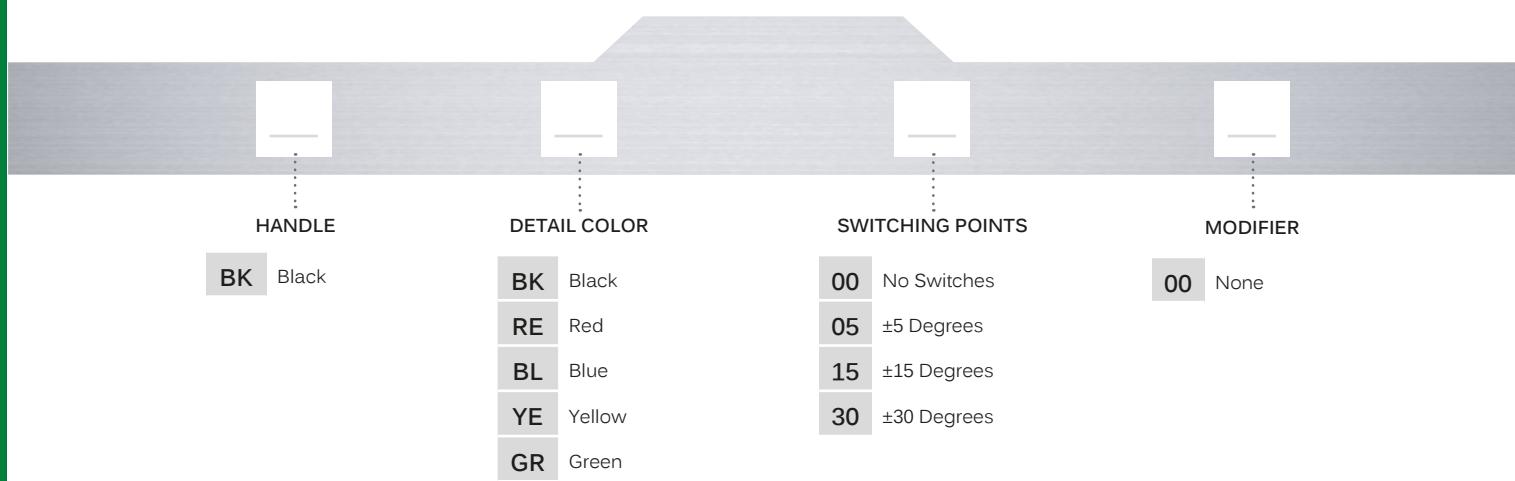
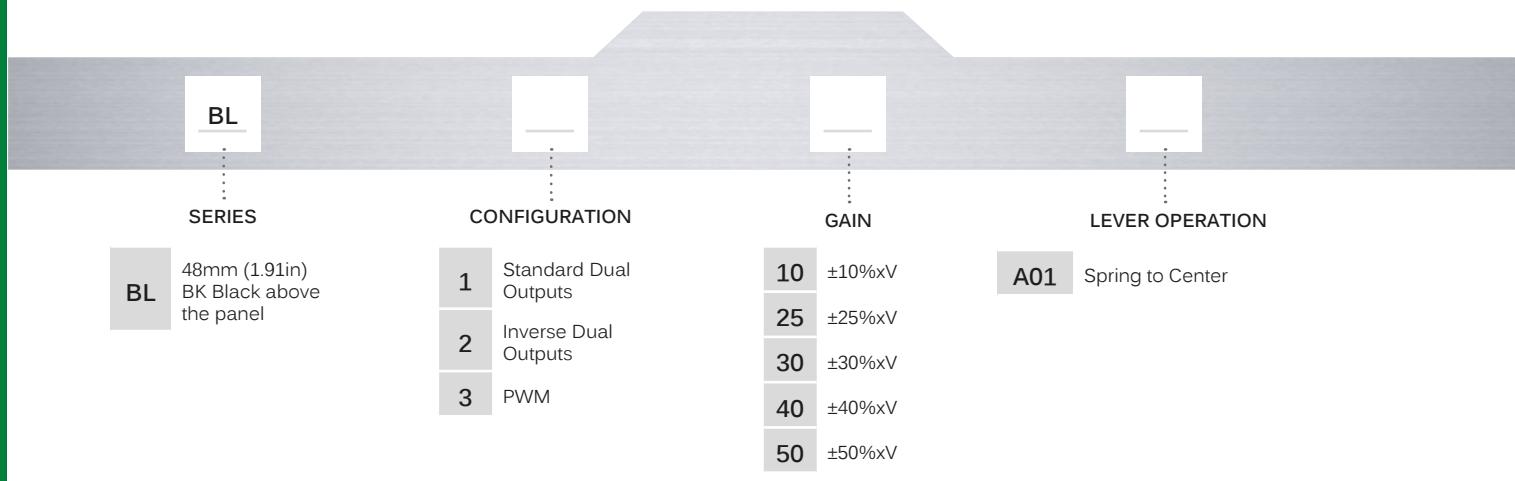
| PIN | FUNCTION |
|-----|---------------------|
| 1 | 5V |
| 2 | Switch 1(+) |
| 3 | 0V |
| 4 | Analog/PWM output 1 |
| 5 | Analog/PWM output 2 |
| 6 | 0V |
| 7 | Switch 2(-) |
| 8 | 5V |

BL series

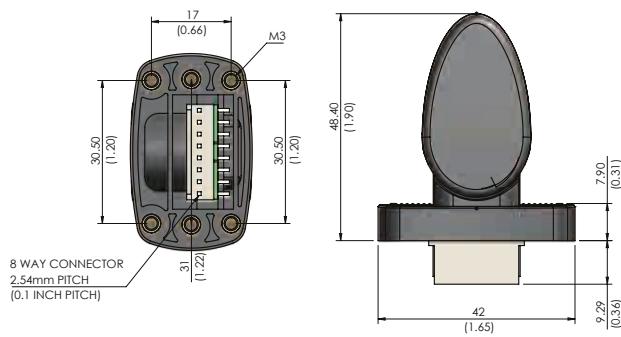
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BUILD YOUR PART NUMBER



DIMENSIONS



BF & BD series

Proportional single axis paddle joystick controllers • non-contacting Hall effect technology



DISTINCTIVE FEATURES

- Spring or friction control options
- Two lever heights available
- Inserts available in black, red, blue, yellow & green
- Analog or PWM outputs
- Zero below panel depth



ENVIRONMENTAL SPECIFICATIONS

- Operating Temperature: -25°C to +70°C
- Storage Temperature: -40°C to +70°C
- Above Panel Sealing: IP67
- EMC Immunity Level: EN61000-4-3 (extended) 100V/m
- EMC Emissions Level: EN61000-6-3:2001, CISPR 22: 2005 Class B 30MHz – 11GHz
- ESD: EN61000-4-2 (extended)



ELECTRICAL SPECIFICATIONS

- Supply Voltage Range: 5V ± 0.25V
- Reverse Polarity Max: -10V
- Oversupply Max: +20V
- Output Impedance: 10 Ω
- Return to Center Voltage Tolerance: V/2 ± (5% x Gain)



MECHANICAL SPECIFICATIONS

- Maximum Vertical Load: IK08 (BSEN62262:2002)
- Maximum Horizontal Load: 75N (16.86lbf)
- Mechanical Angle of Movement: 50°
- Expected Mechanical Life: 5 million (spring version); 2 million (detent version) lifecycles
- Mass/weight: 50g (1.76oz.)
- Lever Action (centering): Spring and friction

The company reserves the right to change specifications without notice.

BF & BD series

Proportional single axis paddle joystick controllers •
non-contacting Hall effect technology



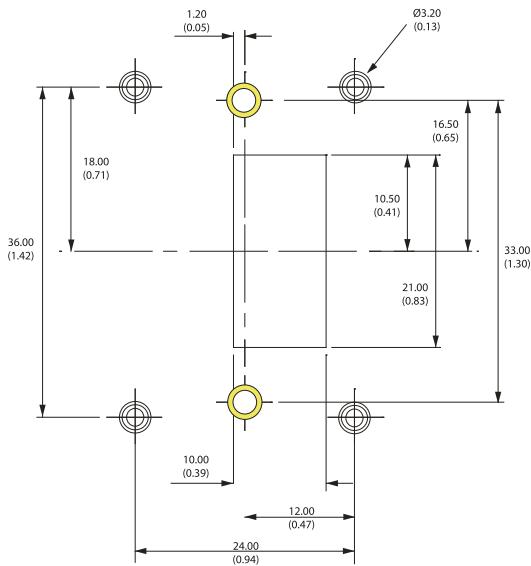
MATERIALS

- Housing: Polyetherimide, polycarbonate
- Handles: Polyetherimide, polycarbonate



MOUNTING

PANEL CUT-OUT - DROP-IN MOUNTING



The Paddle may be mounted with two different hole patterns:

- Two screws – in line on the Y axis (shown as yellow screws)
- Four screws – one in each corner (shown as silver screws)

The Paddle is fitted with M3 bushes in all six positions, as standard.

Fasteners are not supplied as standard. The appropriate length of fastener is dependent on panel thickness.



CONNECTIONS

Paddles are supplied with an eight way connector as standard.

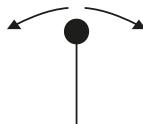
| PIN | FUNCTION |
|-----|---------------------|
| 1 | 5V |
| 2 | Switch 1(+) |
| 3 | 0V |
| 4 | Analog/PWM output 1 |
| 5 | Analog/PWM output 2 |
| 6 | 0V |
| 7 | Switch 2(-) |
| 8 | 5V |



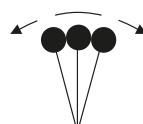
LEVER OPERATION

DETENT OPTIONS

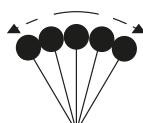
D01 = CENTER DETENT



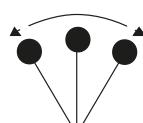
D02 = +/- 12.5 DEGREES



D03 = +/- 12.5 & 25 DEGREES

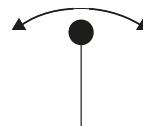


D04 = +/- 25 DEGREES

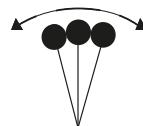


SPRING TO CENTER WITH DETENT OPTIONS

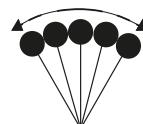
SD1 = CENTER DETENT



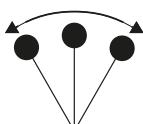
SD2 = +/- 12.5 DEGREES



SD3 = +/- 12.5 & 25 DEGREES



SD4 = +/- 25 DEGREES



BF & BD series

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non-contacting Hall effect technology



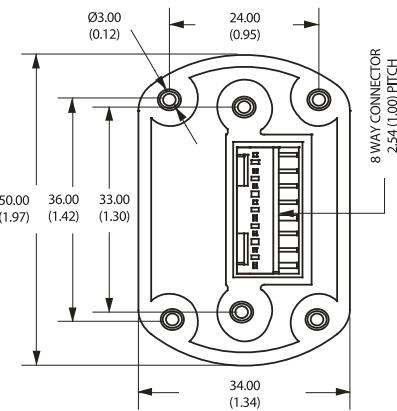
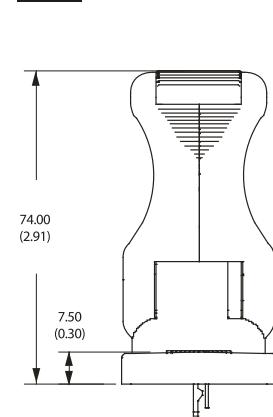
BUILD YOUR PART NUMBER

| PADDLE | | CONFIGURATION | |
|--------------|----------------------------------|------------------|--------------------------|
| GAIN | | LEVER OPERATION | |
| BF | 74mm (2.91in) above the panel | 1 | Standard Dual Outputs |
| BD | 50mm (1.97in) above the panel | 2 | Inverse Dual Outputs |
| | | 3 | PWM |
| | | 10 | $\pm 10\% \times V$ |
| | | 25 | $\pm 25\% \times V$ |
| | | 30 | $\pm 30\% \times V$ |
| | | 40 | $\pm 40\% \times V$ |
| | | 50 | $\pm 50\% \times V$ |
| | | A01 | Spring to Center |
| | | D01 | Center Detent |
| | | D02 | 12.5 Degree Detents |
| | | D03 | 12.5 & 25 Degree Detents |
| | | D04 | 25 Degree Detents |
| | | SD1 | Spring to Center with D1 |
| | | SD2 | Spring to Center with D2 |
| | | SD3 | Spring to Center with D3 |
| | | SD4 | Spring to Center with D4 |
| | | | |
| INSERT COLOR | | SWITCHING POINTS | |
| MODIFIER | | | |
| BK | Black | 00 | No Switches |
| RE | Red | 05 | ± 5 Degrees |
| BL | Blue | 12 | ± 12.5 Degrees |
| YE | Yellow | 25 | ± 25 Degrees |
| GR | Green | 00 | None |

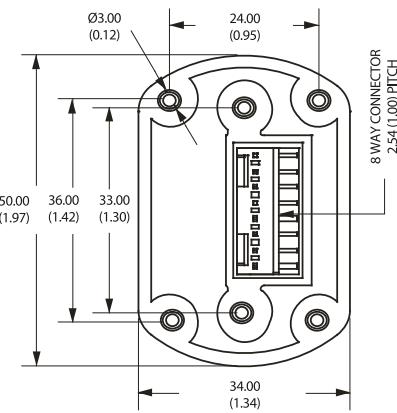
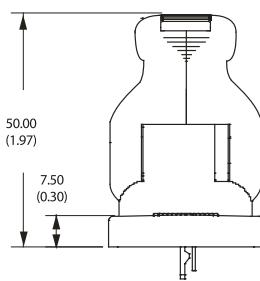
BF & BD series

Proportional single axis paddle joystick controllers •
non-contacting Hall effect technology

BF PADDLE WITH BLUE INSERT



BD PADDLE WITH GREEN INSERT



M series

Proportional resistive fingertip controllers •
potentiometer technology



DISTINCTIVE FEATURES

One, two or three axis

Analog output

Low profile mounting depth

Friction centering option

Multiple handles available



ENVIRONMENTAL SPECIFICATIONS

- Operating Temperature: -25°C to +70°C
- Storage Temperature: -40°C to +70°C
- Above Panel Sealing: Up to IP65 (subject to configuration)
- EMC Immunity Level: EN61000-4-3
- EMC Emissions Level: EN61000-6-3:2001
- ESD: EN61000-4-2



MECHANICAL SPECIFICATIONS

- Operating Force: 1.3N (0.29lbf)
- Maximum Vertical Load: 100N (22.5lbf)
- Maximum Horizontal Load: 100N (22.5lbf)
- Mechanical Angle of Movement: 56° X & Y axis, 90° Z axis
- Expected Mechanical Life: Subject to potentiometer option
- Mass/weight: Varies
- Lever Action (centering): Spring or friction



MATERIALS

- Body: Nylon
- Handles: Nylon

The company reserves the right to change specifications without notice.

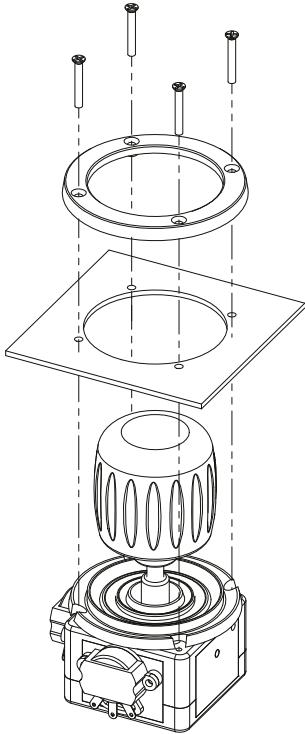
M series

Proportional resistive fingertip controllers •
potentiometer technology



MOUNTING

INSTALLATION



FRONT MOUNTING BEZELS (FM)



C = Split Bezel
Cutout dimensions = 39.70mm(1.562in)



L = Rubber Boot
Cutout dimensions = 39.70mm(1.562in)

REAR MOUNTING BEZELS (RM)



F = Square Bezel
Cutout dimensions = 30.15mm(1.187in)



WIRING DIAGRAM

DEFAULT WIRE COLOR CODE

| COLOR | FUNCTION | AWG |
|--|---------------|-----|
| 2 OR 3 AXIS JOYSTICK WITH 1 PUSHBUTTON - OPTIONS 5,E,G,H,9,N | | |
| Orange | Switch 1 | |
| Orange | Switch Common | 28 |
| 3 AXIS JOYSTICK WITH 2 PUSHBUTTONS - OPTION Q | | |
| Orange | Switch 1 | |
| Brown | Switch 2 | |
| Green | Switch Common | |
| Z AXIS IN A 3 AXIS JOYSTICK - OPTIONS 8,9,M,N,Q | | |
| Red | Supply | |
| White | Signal | |
| Blue | Return | 28 |



OUTPUTS

POTENTIOMETER OPTIONS

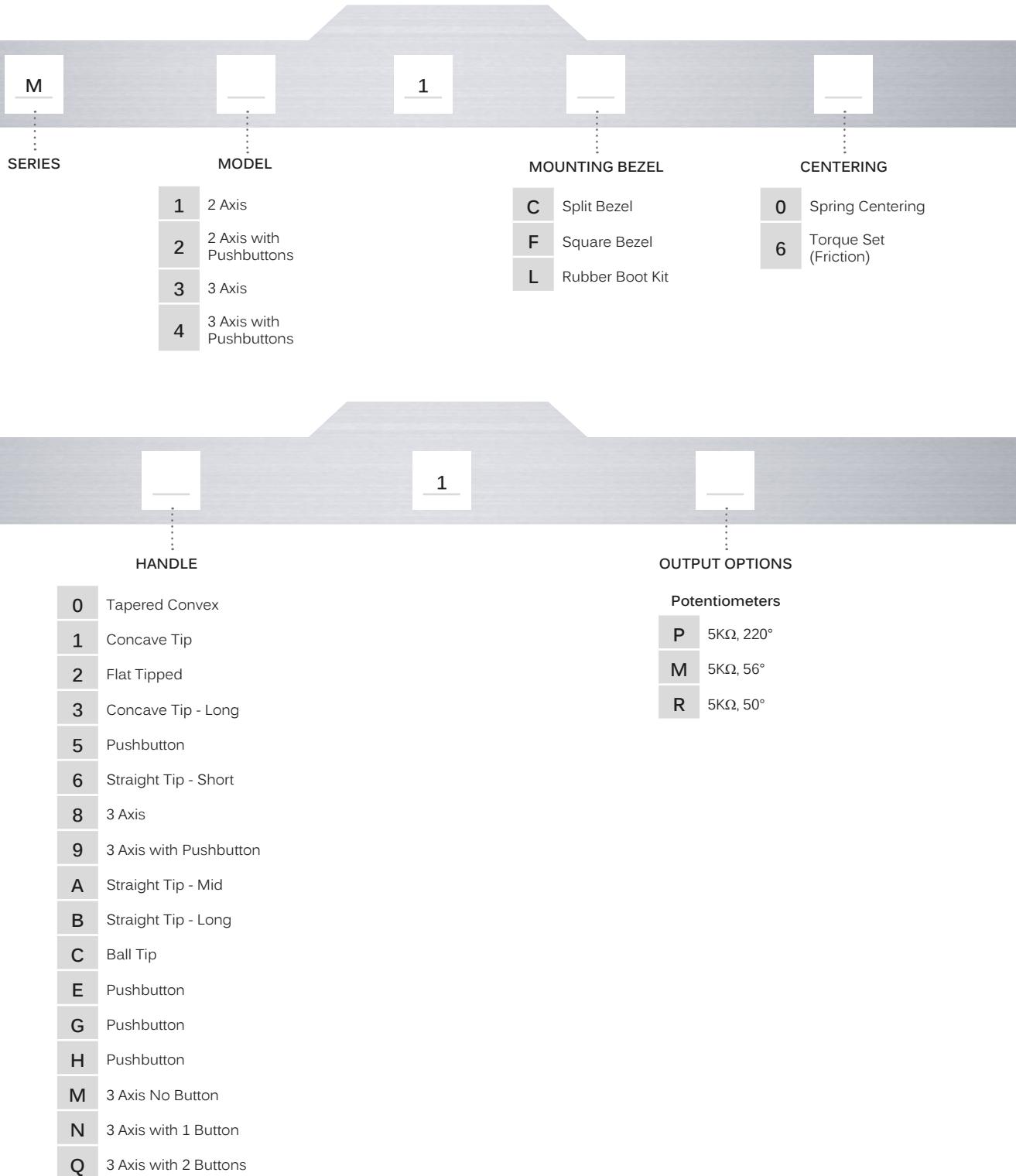
| POTENTIOMETER | P | M | M |
|-----------------------|--------------------|-----------|------------|
| Electrical Element | Conductive Plastic | | |
| Track Resistance | 5K | | |
| Linearity | ±1.0% | ±5.0% | ±1.0% |
| Track Operating Angle | 220° | 56° | 50° |
| CRV | ±1.5% | ±1.5% | ±1.0% |
| Power Dissipation | 0.25W@40°C | 0.5W@70°C | 1W |
| Rotational Life | 1,000,000 | 1,000,000 | 10,000,000 |

M series

Proportional resistive fingertip controllers •
potentiometer technology



BUILD YOUR PART NUMBER



NOTES :

Mounting accessories : Standard hardware includes:

C= Ring, cup, and 4 black Phl screws 2-56x1/2in

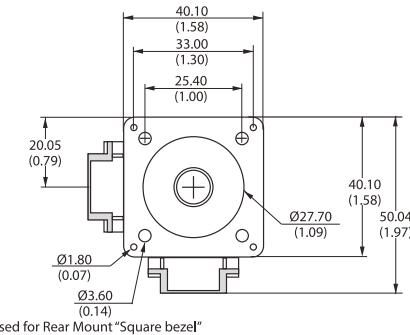
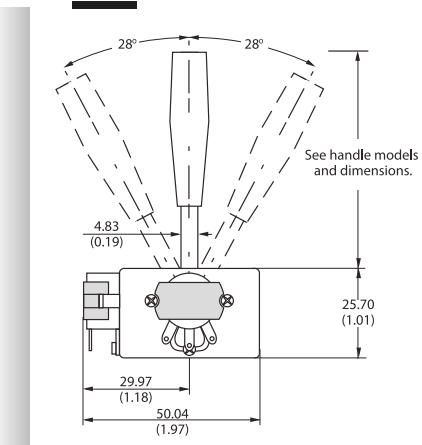
L= Ring and 4 black Phl screws 2-56x1/2in

F= Square bezel, 4 screws 2-56x1/2in Phl, and 4 screws 2-56x1/4in Phl

M series

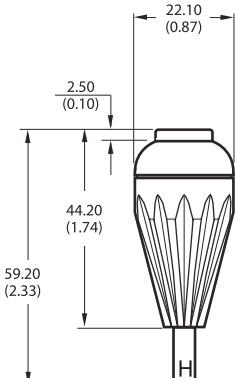
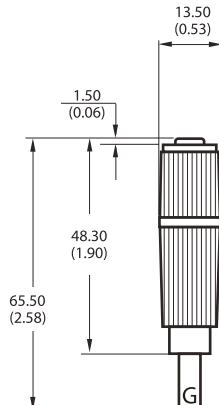
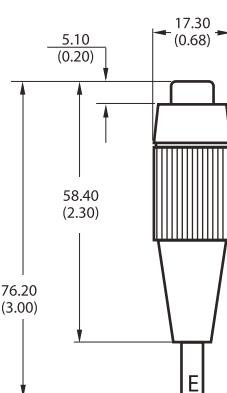
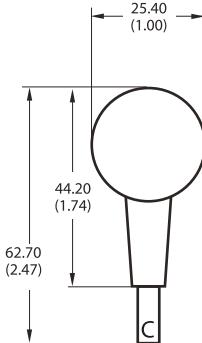
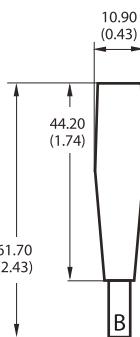
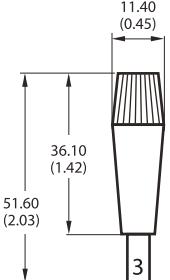
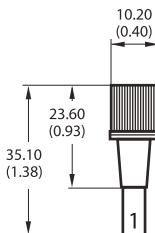
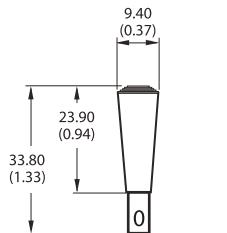
Proportional resistive fingertip controllers •
potentiometer technology

WITH HANDLE OPTION A 2 AXIS

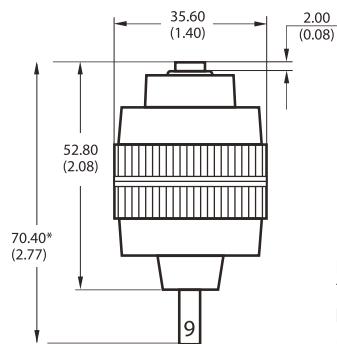
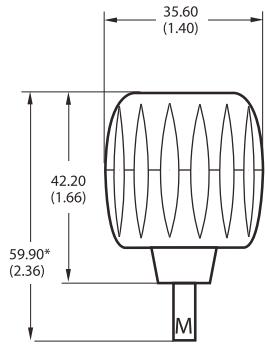
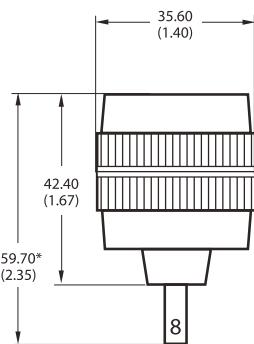


HANDLE OPTIONS

2 AXIS



3 AXIS



NOTES:

*Wires for the Z axis and for the pushbuttons are 292mm (11.5in) and stripped.
For more handle options, see www.apem.com

4000 series

Proportional metal fingertip controllers •
potentiometer technology



DISTINCTIVE FEATURES

- One or two axis
- All metal mechanism
- Two standard mounting options
- Variety of potentiometer options
- Optional center detect microswitching



ENVIRONMENTAL SPECIFICATIONS

- Operating Temperature: -20°C to +55°C
- Power Rating: 1W at 70°C - Derate to 0W at 125°C
- Sealing: IP65 (above panel, subject to handle)



ELECTRICAL SPECIFICATIONS

- Maximum Voltage: 24VDC
- Reverse Polarity Max: -24VDC
- Oversupply Max: 70V
- Output Impedance: 0 to 5K Ω or 0 to 10K Ω (subject to potentiometer)
- Return to Center Voltage Tolerance: V/2 ±(V*2%)



MECHANICAL SPECIFICATIONS

- Operating Force: 1.3N (0.29lbf)
- Resistance Tolerance: ±20%
- Mechanical Angle of Movement: 27.5° X & Y axis
- Expected Mechanical Life: >5 million lifecycles
- Mass/weight: 110g (3.88oz)

The company reserves the right to change specifications without notice.

4000 series

Proportional metal fingertip controllers •
potentiometer technology



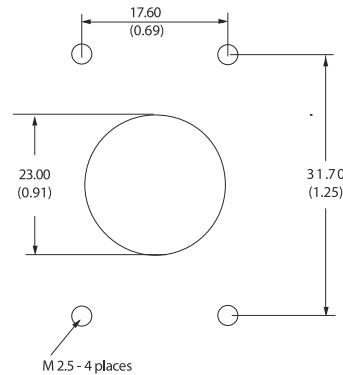
MATERIALS

- Shaft: Stainless steel
- Boot: Neoprene
- Handles:
 - BL, E, Q, AT - Nylon
 - D, AK - Aluminum
 - J, X - ABS

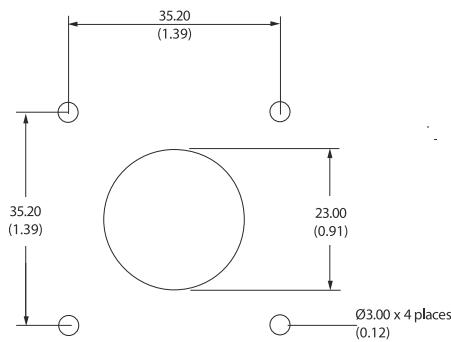


MOUNTING AND PANEL CUT-OUT

OPEN FRAME



CLOSED FRAME

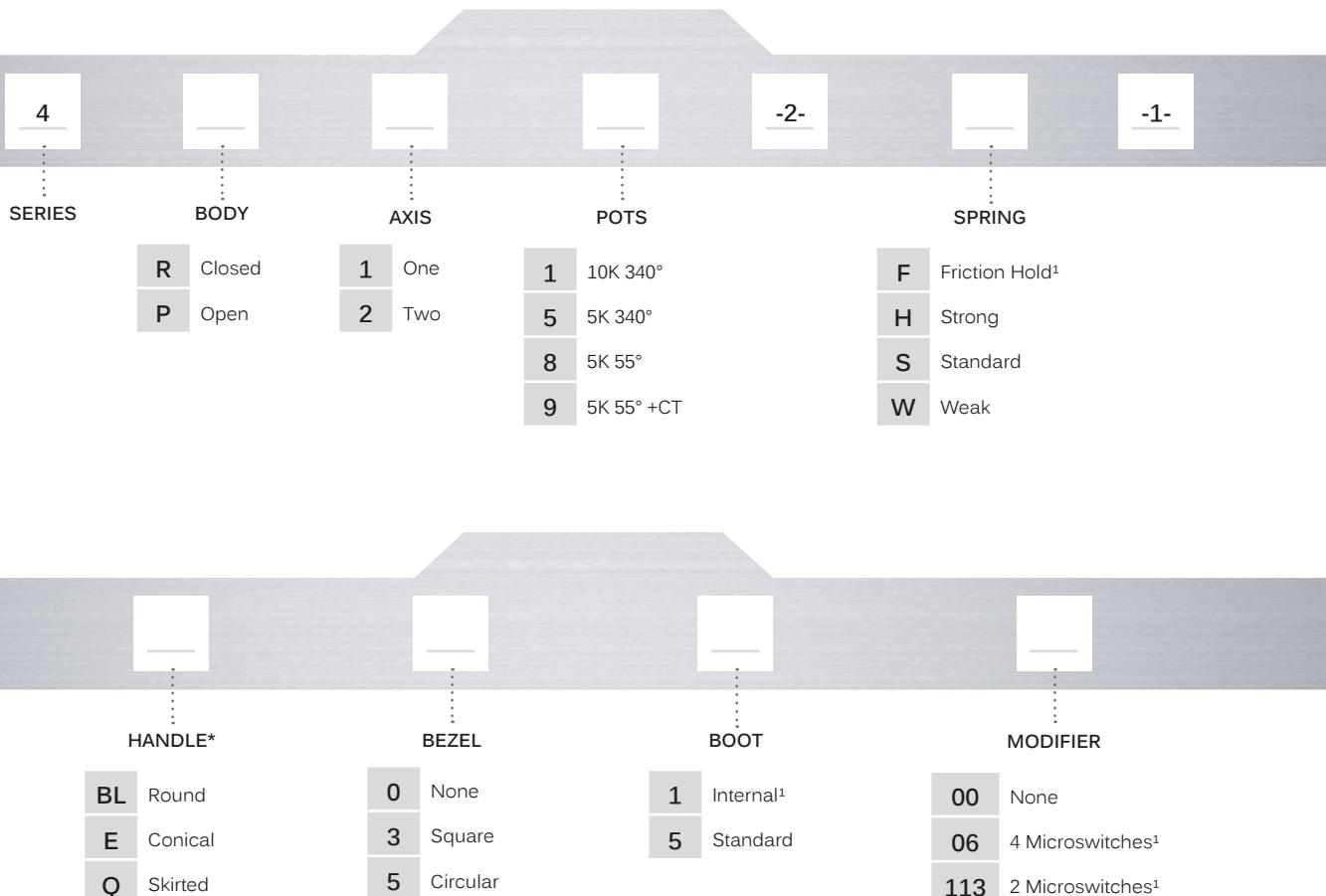


4000 series

Proportional metal fingertip controllers •
potentiometer technology



BUILD YOUR PART NUMBER



*For more handles see www.apem.com

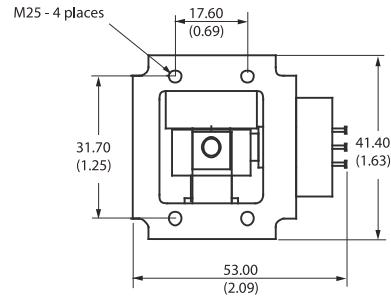
NOTE:

¹ Only available on 4P types.

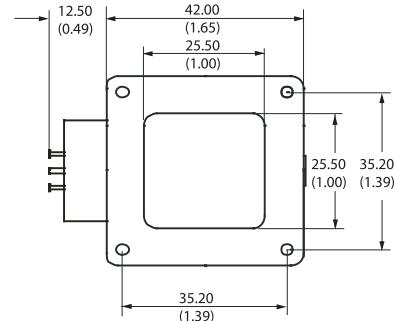
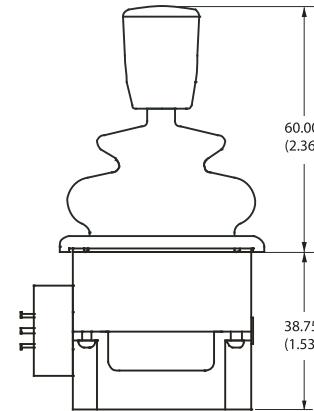
4000 series

Proportional metal fingertip controllers •
potentiometer technology

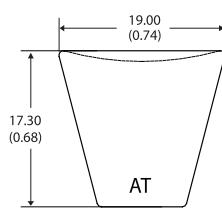
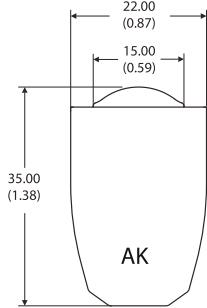
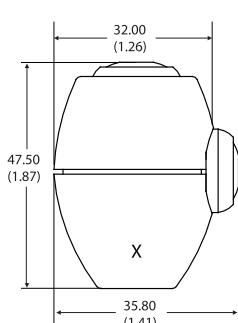
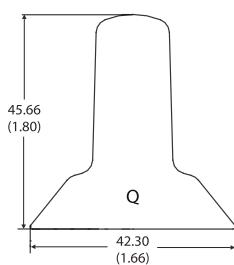
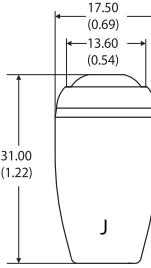
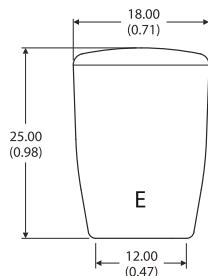
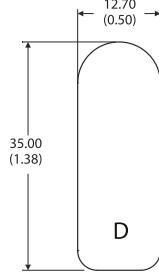
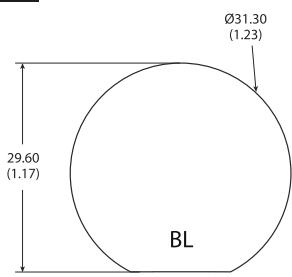
OPEN BODY



CLOSED BODY



HANDLE OPTIONS



For more handle options, see www.apem.com

1000 series

Compact fingertip controllers •
switching technology



DISTINCTIVE FEATURES

- One or two axis
- 5A – 16A switch solutions
- Single or double pole
- Bushing or screw mount
- Variety of handle options



ENVIRONMENTAL SPECIFICATIONS

- Operating Temperature: -20°C to +50°C
- Sealing: IP67 (above panel, subject to handle)



ELECTRICAL SPECIFICATIONS

- Maximum Voltage: 250VAC



MECHANICAL SPECIFICATIONS

- Mechanical Angle of Movement: 24° X & Y axis (subject to limiter plate)
- Expected Mechanical Life: 10 million lifecycles
- Mass/weight: 40g (1.41oz) (subject to handle)



MATERIALS

- Shaft: Stainless steel
- Boot: Neoprene
- Handles :
 - BL - Phenolic
 - D, M, AE - Aluminum
 - F - Nylon
 - H, T, AJ - Stainless steel
 - J, V - ABS

The company reserves the right to change specifications without notice.

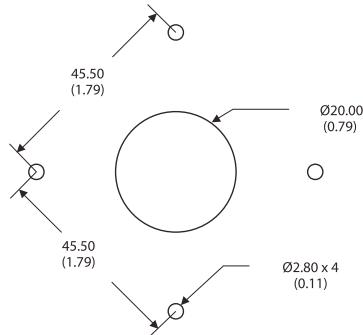
1000 series

Compact fingertip controllers • switching technology

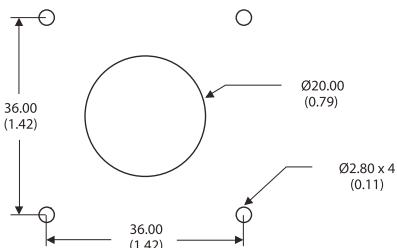


PANEL CUT-OUT

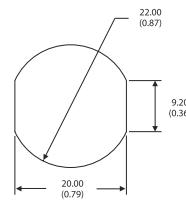
V3 SCREW MOUNT CUT-OUT



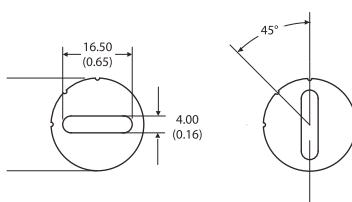
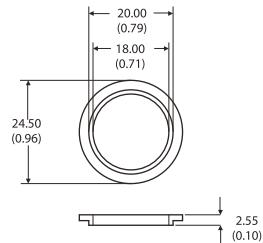
V4 SCREW MOUNT CUT-OUT



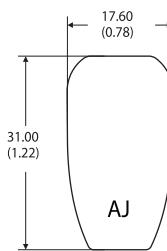
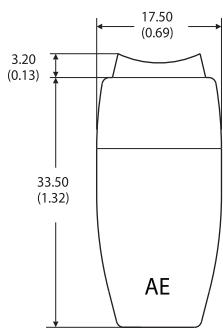
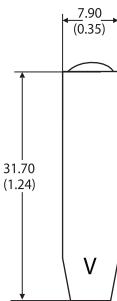
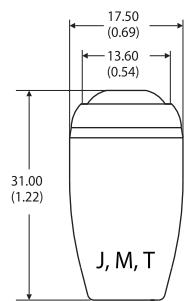
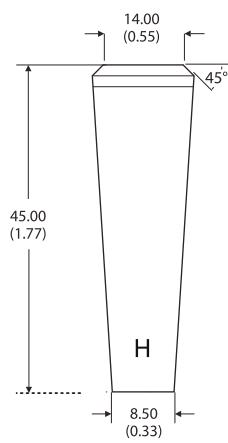
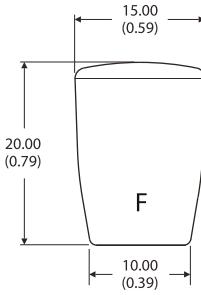
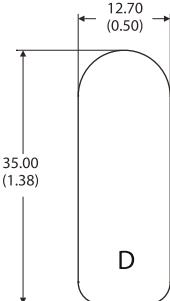
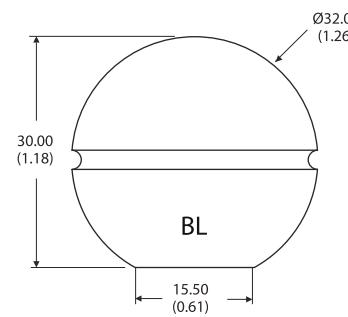
V4 BUSH MOUNT CUT-OUT



LIMITERS AND BEZEL SETS



HANDLE OPTIONS



1000 series

Compact fingertip controllers • switching technology



BUILD YOUR PART NUMBER

| SWITCHES | MOUNTING | POLES | LEVER |
|--|-----------------|----------------|-------------------------------------|
| 1 6A - V4* | D 22mm Bush* | 1 Single Pole | 1 Long* |
| 2 16A - V3 | V 4 Point Screw | 2 Double Pole* | 5 Standard V4* |
| 3 10A - V4* | | | 6 For Pushbutton V4* |
| 4 Right Angle V4* | | | 7 For Double Pole V4 or V3 |
| 5 5A/250V AC - V4* Faston Style | | | 9 Double Pole and Pushbutton V4* |
| 6 5A/250V AC - V3 Faston Style with screw fixing | | | |
| 7 10A/250V AC - V4* IP67 | | | |

| HANDLE | LIMITER AND BEZEL SET | BOOT | MODIFIER |
|--------------------|-----------------------|---------------|---------------------------|
| BL Round | 0 Not Supplied | 1 Screw Mount | 00 None |
| D Cylindrical | 1 Standard | 5 Bush Mount* | 34 + Limiter Fitted |
| F Conical | | | 39 Slot Limiter Fitted |
| H Tall Conical | | | |
| J Pushbutton* | | | |
| M Pushbutton* | | | |
| T Pushbutton* | | | |
| V Bullet | | | |
| AE Rocker* | | | |
| AJ Stainless Steel | | | |

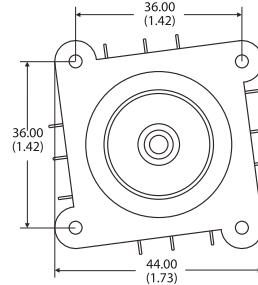
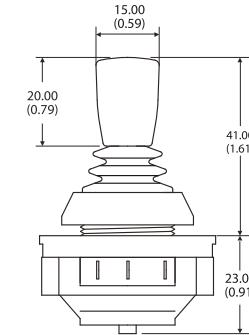
NOTES:

*Unavailable with V3 construction

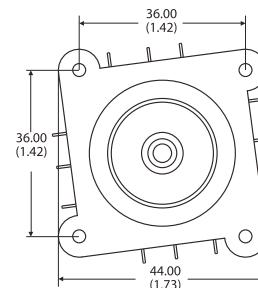
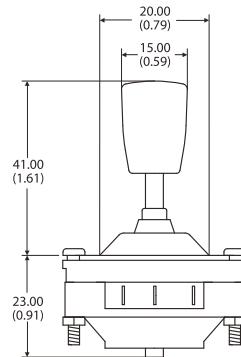
1000 series

Compact fingertip controllers • switching technology

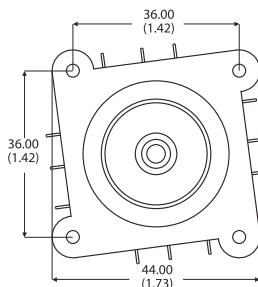
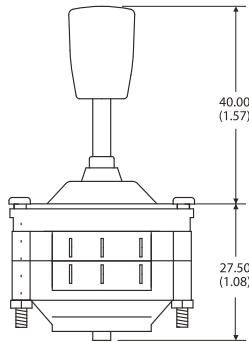
V4 BUSH MOUNT



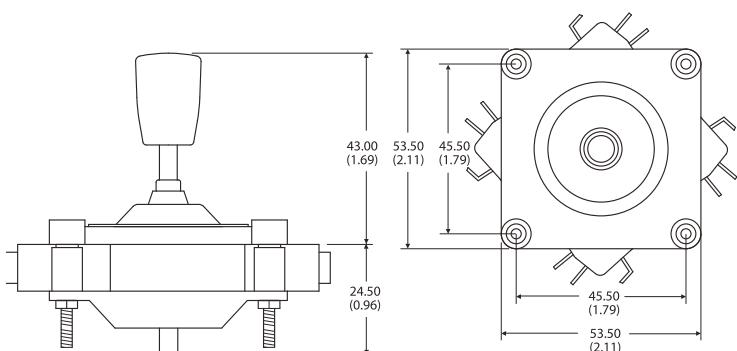
V4 SCREW MOUNT



V4 SCREW MOUNT DOUBLE POLE



V3 SCREW MOUNT



1000HE series

Compact & rugged switch fingertip controllers • switching technology



DISTINCTIVE FEATURES

- One or two axis
- Switches up to 10A
- Single or double pole
- 22 mm bush mounting
- Sealed up to IP67



ENVIRONMENTAL SPECIFICATIONS

- Operating Temperature (sealed): -20°C to +50°C
- Above Panel Sealing: IP67 (with sealing boot)



ELECTRICAL SPECIFICATIONS

- Maximum Voltage: 240VAC



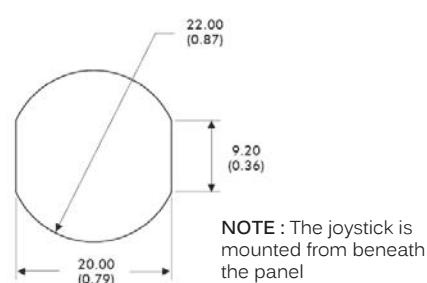
MECHANICAL SPECIFICATIONS

- Mechanical Angle of Movement: 24°
- Expected Mechanical Life: 1 million lifecycles
- Mass/weight: 70g (2.47oz)



MOUNTING

PANEL CUT-OUT



Apply the assembled base through the mounting cut-out.



MATERIALS

- Shaft: Stainless steel
- Boot: Neoprene
- Housing: Mineral filled nylon-6
- Handles:
 - BH - Aluminum
 - BE - Aluminum and phenolic

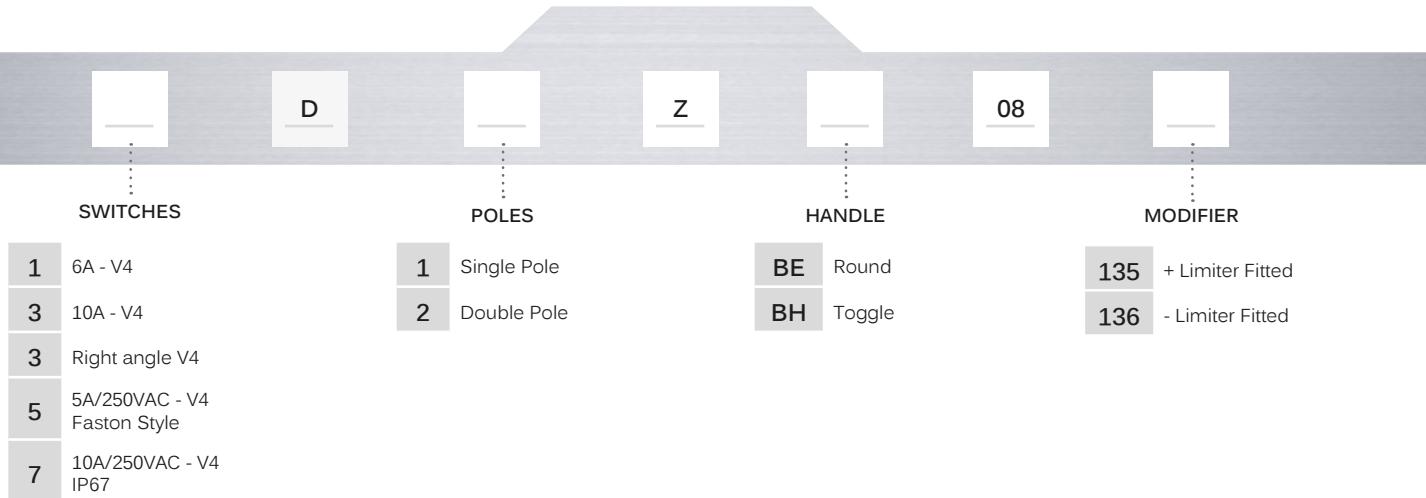
The company reserves the right to change specifications without notice.

1000HE series

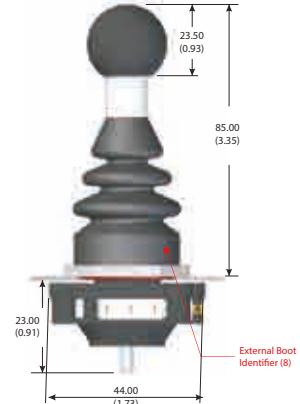
Compact & rugged switch fingertip controllers • switching technology



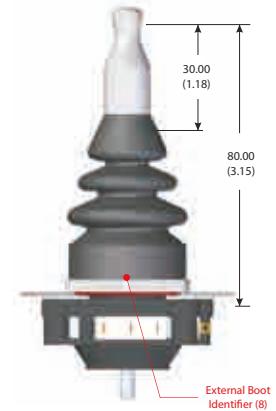
BUILD YOUR PART NUMBER



BE



BH



8000 series

Rugged switch fingertip controllers • switching technology



DISTINCTIVE FEATURES

- One or two axis
- Single step or progressive switching
- Up to 1AMP operation
- Gold plated contacts
- Variety of handle options



ENVIRONMENTAL SPECIFICATIONS

- Operating Temperature: -25°C to +70°C
- Sealing: IP65 (above panel)



ELECTRICAL SPECIFICATIONS

- Maximum Voltage: 125VAC
- Output Impedance: <1 Ω



MECHANICAL SPECIFICATIONS

- Maximum Load: to 1A
- Angle of Movement: 36° X & Y axis (subject to configuration)
- Expected Mechanical Life: 1 million lifecycles
- Mass/weight: 98g (3.46oz)



MATERIALS

- Shaft: Stainless steel
- Boot: Neoprene
- Housing: Glass filled ABS
- Handles:
 - BL, E, Q - Nylon
 - D, AK, AM - Aluminum
 - K, X - ABS

The company reserves the right to change specifications without notice.

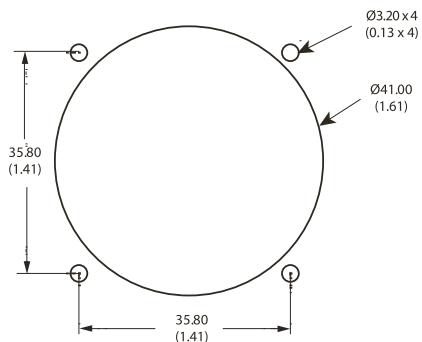
8000 series

Rugged switch fingertip controllers • switching technology

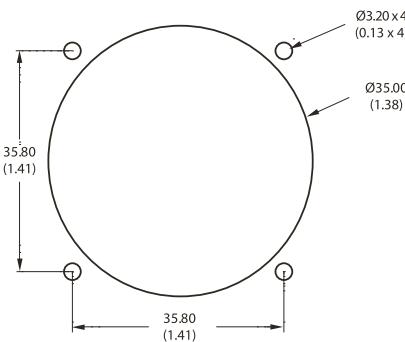


PANEL CUT-OUT

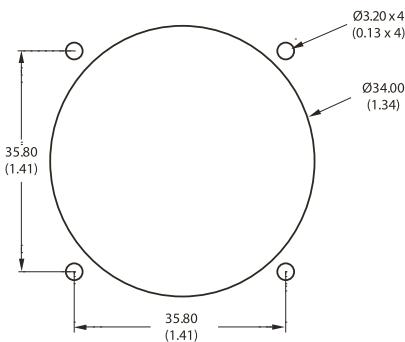
DROP-IN MOUNTING



OPTION A MOUNTING



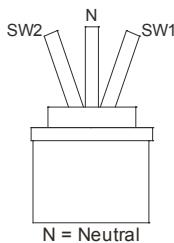
OPTION B MOUNTING



SWITCHING OPTIONS

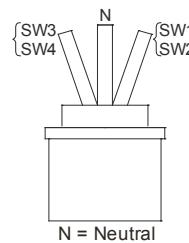
SINGLE AXIS CONFIGURATION

SWITCHING OPTION A



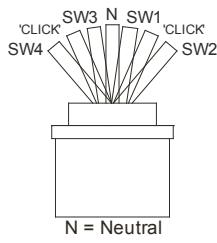
One switch will actuate as the joystick moves away from center in either direction.

SWITCHING OPTION B



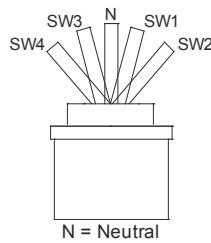
Two switches will actuate as the joystick moves away from center in either direction.

SWITCHING OPTION C



As per option D, but with a mechanical detent between actuation of the first and second switch.

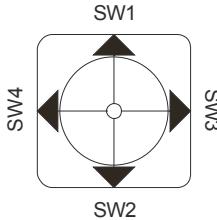
SWITCHING OPTION D



One switch will actuate after 50% of travel, with a further switch at the end of travel in either direction.

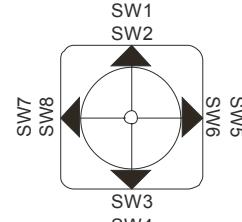
TWO AXIS CONFIGURATION

SWITCHING OPTION E



One switch will actuate in each of the four directions: North, South, East & West.

SWITCHING OPTION F



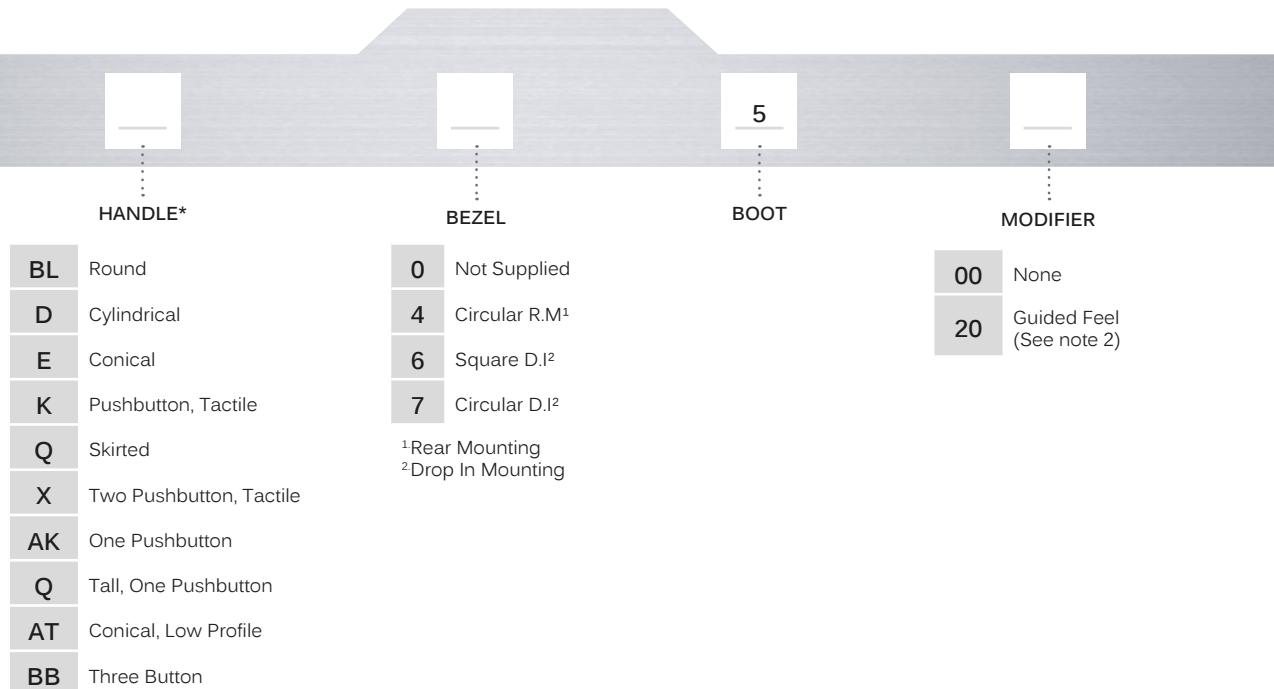
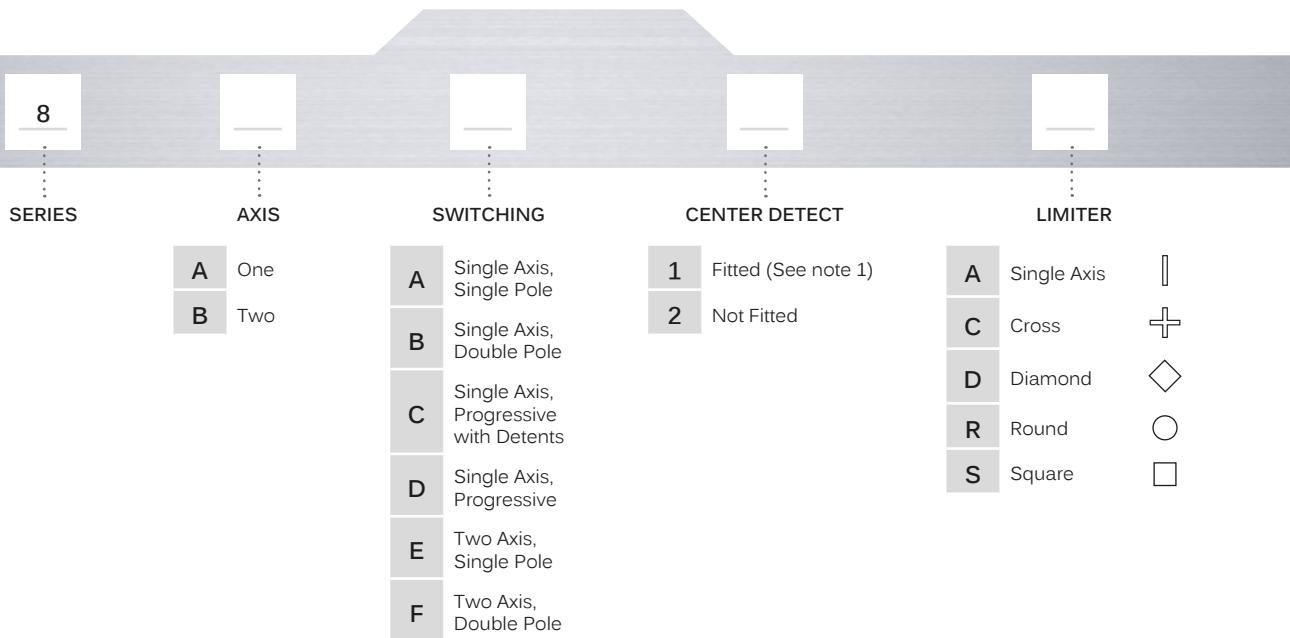
Two switches will actuate in each of the four directions: North, South, East & West.

8000 series

Rugged switch fingertip controllers • switching technology



BUILD YOUR PART NUMBER



*For more handles see www.apem.com

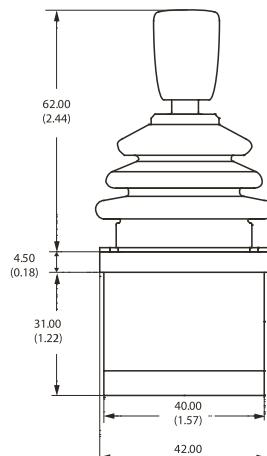
NOTES:

- ¹ The additional center detect switch is not available on joysticks with progressive switching.
- ² Guided feel is only available on two axis joysticks. Further non-standard options including custom handles, special limiters and detents are available. Please refer to APEM.
- ³ Only a square limiter will allow sufficient travel in a diagonal direction to activate both speed and steer switches.

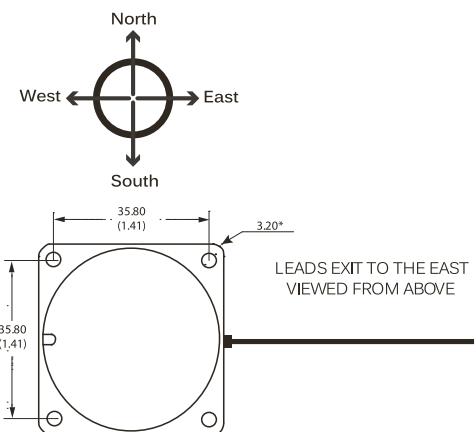
8000 series

Rugged switch fingertip controllers • switching technology

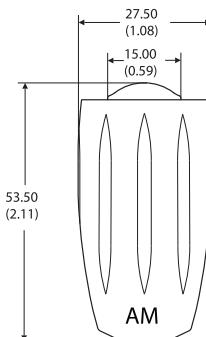
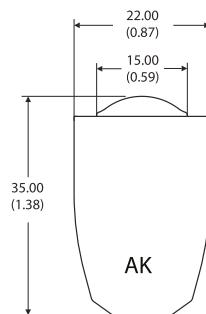
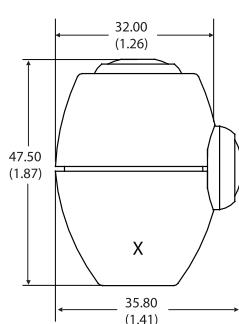
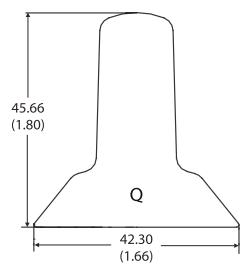
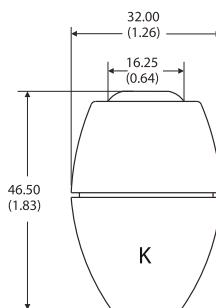
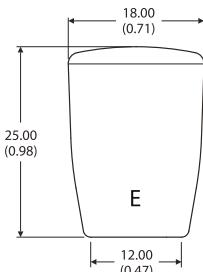
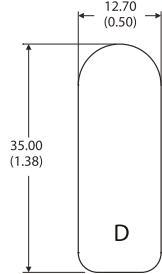
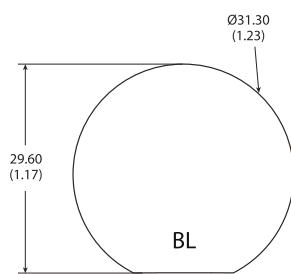
DIMENSIONS



POLARITY



HANDLE OPTIONS



For more handle options, see www.apem.com

SN series

Proportional single axis fingertip controllers •
non-contacting Hall effect technology



DISTINCTIVE FEATURES

- Analog or PWM outputs
- Smooth and noise-free movement
- Friction "stay-put" centering
- 12 bit resolution
- Barrel and bullet style handles available



ENVIRONMENTAL SPECIFICATIONS

- Operating Temperature: -20°C to +70°C
- Storage Temperature: -40°C to +70°C
- Sealing: No sealing, for internal use only.



ELECTRICAL SPECIFICATIONS

- Power supply: 5V ±0.5V transient free
- Reverse Polarity Max: -10VDC
- Oversupply Max: 20V
- Output Impedance: 10Ω



MECHANICAL SPECIFICATIONS

- Operating Force: 0.5N
- Mechanical Angle of Movement: 63°
- Expected Mechanical Life: 1 million lifecycles
- Mass/weight: 65g (0.14lbs)
- Lever Action (centering): Friction clutch



MATERIALS

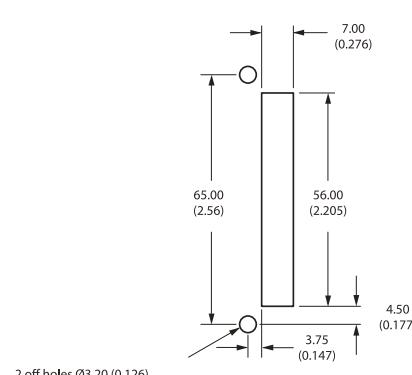
- Lever: Acetyl (black)
- Housing: Mineral filled nylon (black)
- Handles: Aluminum (silver anodized)
- Screening plates: Mild steel (zinc plated)

The company reserves the right to change specifications without notice.



MOUNTING

INSTALLATION DIMENSIONS



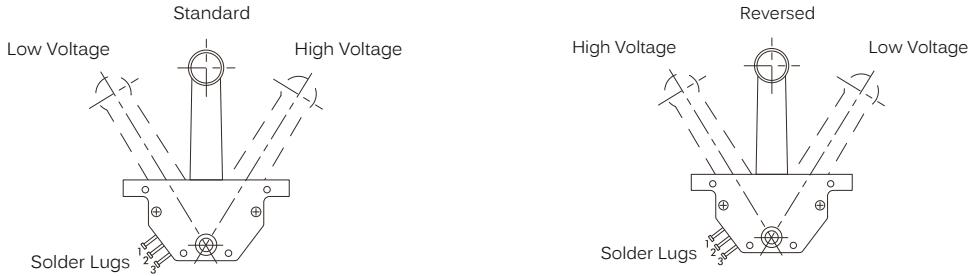
SN series

Proportional single axis fingertip controllers •
non-contacting Hall effect technology

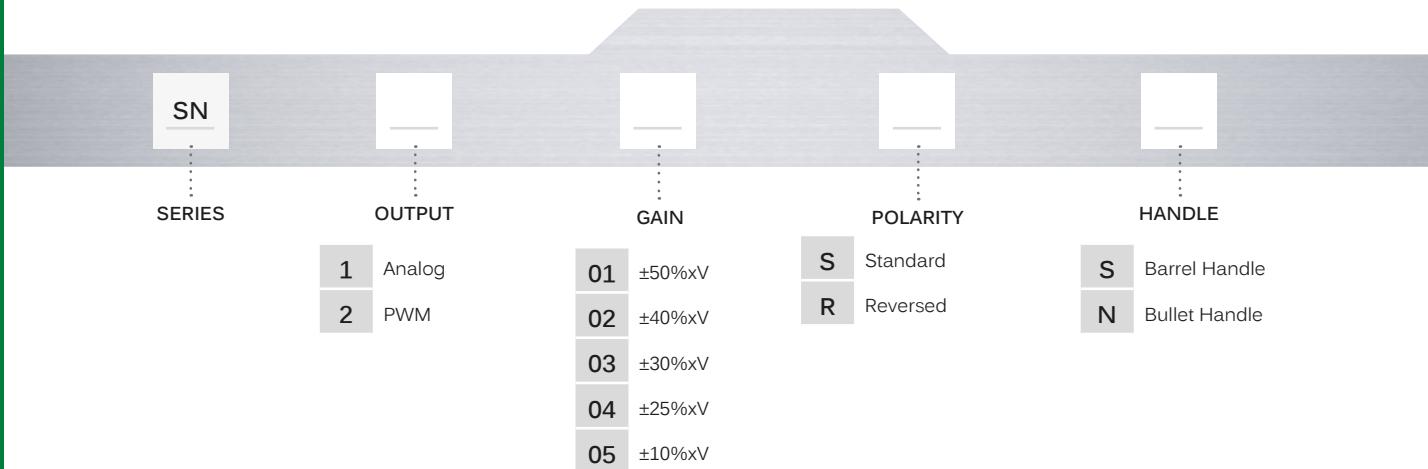


CONNECTIONS

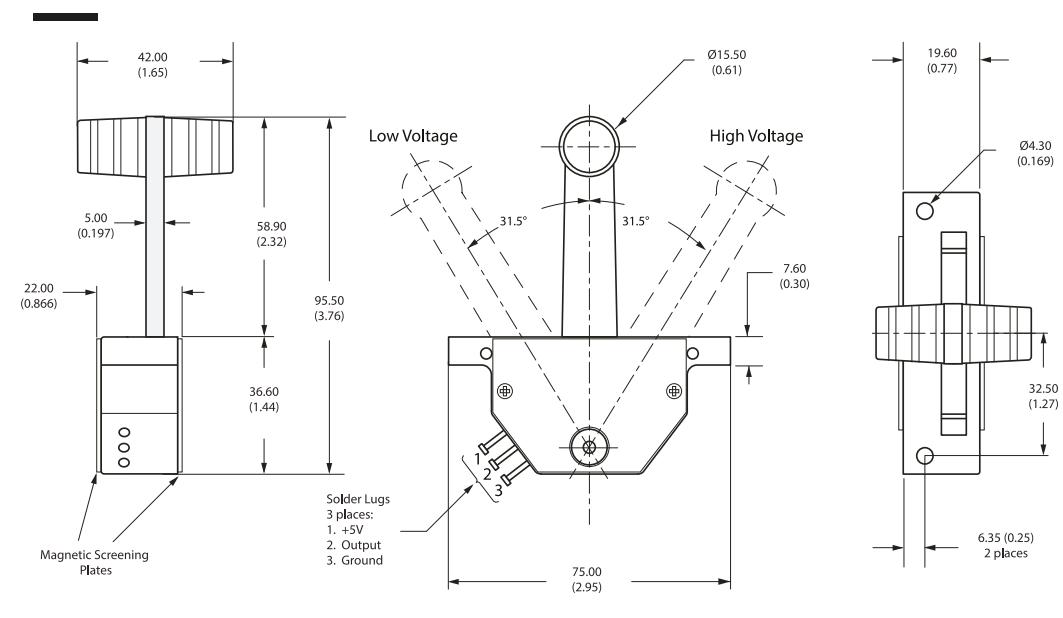
OUTPUT VOLTAGE POLARITY



BUILD YOUR PART NUMBER



DIMENSIONS



NZ series

Compact switch fingertip controllers • switching technology



DISTINCTIVE FEATURES

- One or two axis
- Switches up to 2A
- Single or double pole
- 11.9mm bush mounting
- Sealed up to IP67

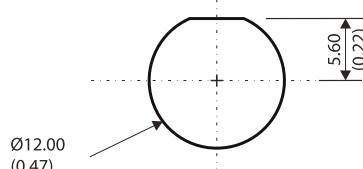


ENVIRONMENTAL SPECIFICATIONS

- Operating Temperature (sealed): -40°C to +70°C
- Storage Temperature: -40°C to +70°C
- Sealing: IP67 (above panel with sealing boot)



PANEL CUT-OUT



ELECTRICAL SPECIFICATIONS

- Maximum Voltage: 125VAC
- Output Impedance: <1 Ω



MECHANICAL SPECIFICATIONS

- Mechanical Angle of Movement: 15°
- Expected Life: 1 million lifecycles
- Mass/weight: 35g - 45g (0.08-1.0lbs) – subject to configuration type
- Lever Action (centering)

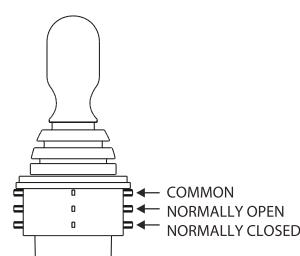


CONNECTIONS

CONNECTION OPTION 0

No Harness

Switches suitable for 125VAC @ 2A
(Resistive load)



For Polyimide tail options see
www.apem.com



MATERIALS

- Shaft: Stainless steel
- Boot: Silicone rubber
- Housing: Mineral filled nylon-6

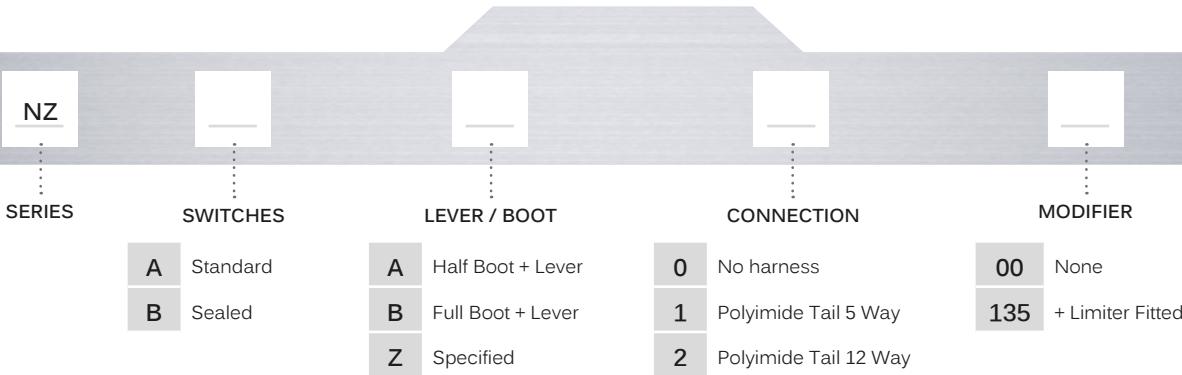
The company reserves the right to change specifications without notice.

NZ series

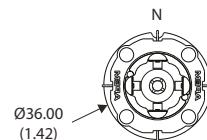
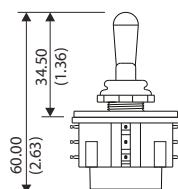
Compact switch fingertip controllers • switching technology



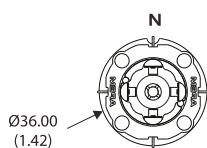
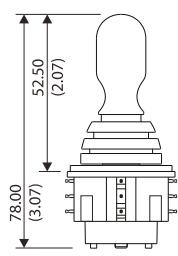
BUILD YOUR PART NUMBER



NZ WITH HALF BOOT



NZ WITH FULL BOOT



SC series

Single axis hand grip controllers •
non-contacting Hall effect technology



DISTINCTIVE FEATURES

- Spring return to center
- MOM-OFF-MOM rocker switch
- Operator presence lever
- IP67 / IP69K sealed
- 10,000,000 lifecycles



ENVIRONMENTAL SPECIFICATIONS

- Above Panel Sealing: IP67, IP69K
- Operating Temperature: -40°C to +85°C
- Storage Temperature: -40°C to +85°C
- Radiated Emissions: EN55011 Class A limits, 30-230 MHz 40 dBuV/m @10m; 230-1Ghz, 47 dBuV/M @10m
- Electrostatic Discharge: EN61000-6-2 (EN 61000-4-2:1995), ±4kV contact; ±8kV air
- Radiated Immunity: EN61000-6-2 (EN 61000-4-3:2002), up to 30V/m
- Magnetic Immunity: EN61000-6-2 (EN 61000-4-8:2001), 50-60Hz, 30 A/m
- Vibration: MIL STD810F Category 20, ground mobile
- Thermal Shock: SAE J1455, -40°C to +65°C
- Chemical Resistance: SAE J1455, industrial chemicals
- Salt Environment: ASTMB117, 96 hours



ELECTRICAL SPECIFICATIONS

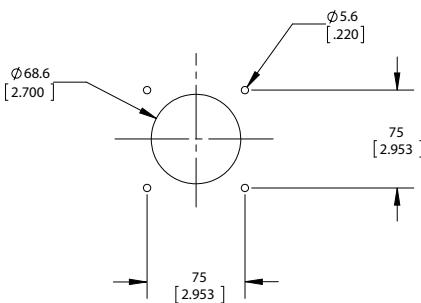
- Sensor : Hall effect
- Supply Voltage : 5.0V ± 0.2 VDC Regulated
- Reverse Polarity max: -10V max
- Oversupply max : +20V max
- Current Consumption max: 11mA max (single output)
- Output Voltage: See configuration guide
- Output Voltage Tolerance (Handle centered): ± 0.1VDC
- Output Voltage Tolerance (Full positive deflection): ± 0.1VDC
- Output Voltage Tolerance (Full negative deflection): ± 0.1VDC
- Expected Life : 1 million lifecycles
- Rocker Switch: Electrical rating – 50A/24VDC
- Operator Presence Paddle: Electrical rating – 3A/28VDC

The company reserves the right to change specifications without notice.



PANEL CUT-OUT

DROP-IN PATTERN ONE



MECHANICAL SPECIFICATIONS

- Mechanical Operating Angle: 40° (±20° from center) ±2°
- Pull Force: 120 lbs. in any direction
- Weight: 450g (15.87oz)
- Expected Mechanical Life: 10 million lifecycles
- Lever Action: Spring centering



MATERIALS

- Body : Glass filled nylon
- Handles : Glass filled nylon
- Boot : Silicone
- Shaft: Stainless steel

SC series

Single axis hand grip controllers •
non-contacting Hall effect technology

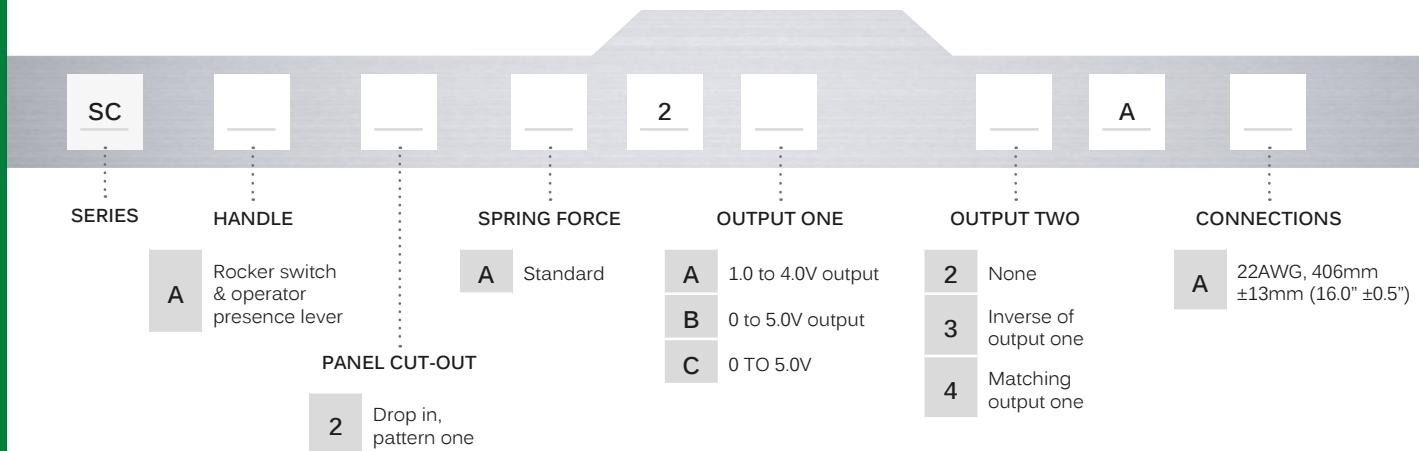


CONNECTIONS - OPTION 2

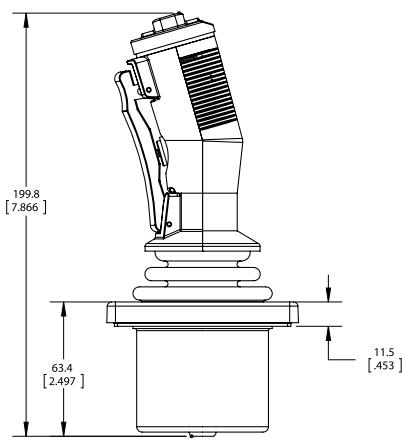
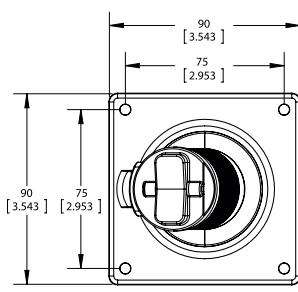
| WIRE HARNESS & CONNECTOR | PIN NUMBER | WIRE COLOR | DESCRIPTION |
|---|------------|--------------|--|
| AMP 1480707-0 22AWG; 406 mm ±13 mm (16.0" ±0.5") | 1 | Black | 5DVC |
| | 2 | Red | GND |
| | 3 | Blue/White | Y axis signal output |
| | 4 | Blue | Y axis signal output-two (if required) |
| | 5 | Yellow/Black | Operator presence |
| | 6 | Yellow | Rocker switch (right) |
| | 7 | Green/Black | Rocker switch (left) |
| | 8 | Green | Button common |
| | 9 | White | Not connected |



BUILD YOUR PART NUMBER



DIMENSIONS



CJ series

Proportional multi-function hand grip controllers •
non-contacting Hall effect technology



DISTINCTIVE FEATURES

- One and two axis control
- Analog outputs
- 5 million lifecycles
- CANbus and USB output options
- Redundant output available



ENVIRONMENTAL SPECIFICATIONS

- Operating Temperature: -40°C to +85°C
- Storage Temperature: -40°C to +85°C
- Above Panel Sealing: Up to IP67 (subject to final specifications)
- EMC Immunity Level: EN61000-4-3: 2006
- EMC Emissions Level: EN61000-4-8: 2009
- ESD: EN61000-4-2: 2008



ELECTRICAL SPECIFICATIONS

- Supply Voltage Range: 5.00VDC ±0.250VDC
- Reverse Polarity Max: -10VDC
- Oversupply Max: 20V
- Minimum load: 1 Ω
- Return to Center Voltage Tolerance: ±200mV initial



MECHANICAL SPECIFICATIONS

- Operating Force: 7.6N (1.70lbf)
- Maximum Vertical Load: 444.8N (100lbf)
- Maximum Horizontal Load: 667N (150lbf)
- Mechanical Angle of Movement: 40° (±20°)
- Expected Mechanical Life: 5 million lifecycles
- Mass/weight: 544.3g (19.2oz)
- Lever Action (centering): Spring

The company reserves the right to change specifications without notice.

CJ series

Proportional multi-function hand grip controllers •
non-contacting Hall effect technology



MATERIALS

- Body: Glass filled nylon
- Handles: Glass filled nylon



CONNECTIONS

WIRING SPECIFICATION

- Red Wire: Supply Power
- Black Wire: Ground
- Green Wire: CAN high data
- White Wire: CAN low data
- Blue Wire: Identifier Select LSB
- Orange Wire: Identifier Select MSB

USB

Featuring USB 1.1 HID compliant interface, APEM's USB joysticks are recognized as standard HID "game controller" devices. Adhering to the HID specification, APEM's USB joysticks are plug-and-play with most versions of Windows. Joystick button and axis assignments are dependent upon the controlled application.

- Supplied wiring: USB Male Type A Connector with overmolded cable

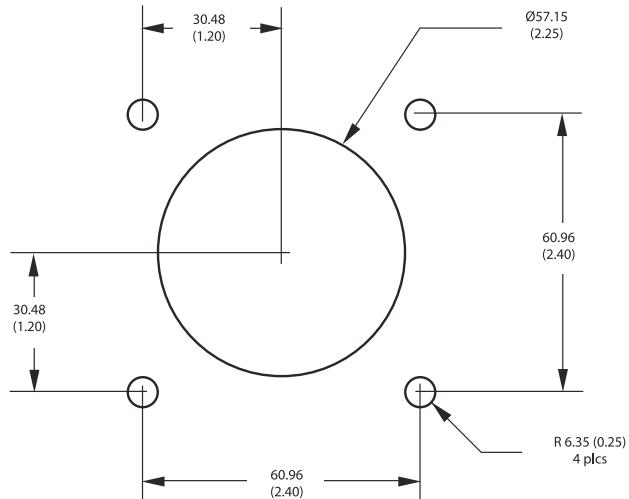
CANBUS J1939

APEM's CJ CANbus joysticks conform to the SAE J1939 serial bus specification used for communications between electronic control units and vehicle components. The CJ CANbus option provides I/O extension for up to 24 digital and 11 analog inputs.

- Connector options : Cable assembly with Deutsch DT04 style plugs
- CANbus configuration : Contact technical support for assistance



PANEL CUT-OUT



CJ series

Proportional multi-function hand grip controllers •
non-contacting Hall effect technology



BUILD YOUR PART NUMBER

| CJ | | LOWER FACE BUTTONS | UPPER FACE BUTTONS | OPERATOR PRESENCE PADDLE | LIMITER PLATE |
|--------------------|--|--------------------|--|--------------------------|---|
| Series | | | | | |
| N | None | 0 | None | N | None |
| A | One switch in position A | 1 | One | D | Operator Presence Paddle |
| B | One switch in position B | 2 | Two | | Square <input type="checkbox"/> |
| C | One switch in center | 3 | Three | | Round <input type="checkbox"/> |
| W | Two switches | 4 | Four | | Slotted <input type="checkbox"/> |
| X | Custom ¹ | 5 | Five | | Slotted <input type="checkbox"/> |
| | | 6 | Six | | Plus <input type="checkbox"/> |
| | | X | Custom ¹ | | Diamond <input type="checkbox"/> |
| | | | | | Guided Feel Square <input type="checkbox"/> |
| | | | | | Guided Feel Round <input type="checkbox"/> |
| | | | | | |
| OUTPUT OPTIONS | | | | | |
| 00 | 0V to 5V | 06 | 0.25V to 4.75V - Sensor 1 0.25V to 4.75V - Sensor 2 | 11 | 1V to 4V - Sensor 1 4V to 1V - Sensor 2 |
| 01 | 0.5V to 4.5V | 07 | 1V to 4V - Sensor 1 1V to 4V - Sensor 2 | 13 | USB |
| 02 | 0.25V to 4.75V | 08 | 0V to 5V - Sensor 1 5V to 0V - Sensor 2 | 14 | Cursor Emulation |
| 03 | 1V to 4V | 09 | 0.5V to 4.5V - Sensor 1 4.5V to 0.5V - Sensor 2 | 15 | CANbus J1939 |
| 04 | 0V to 5V - Sensor 1 0V to 5V - Sensor 2 | 10 | 0.25V to 4.75V - Sensor 1 4.75V to 0.25V - Sensor 2 | 16 | CANopen |
| 05 | 0.5V to 4.5V - Sensor 1 0.5V to 4.5V - Sensor 2 | XX | Custom ¹ | XX | Custom ¹ |
| ADDITIONAL OPTIONS | | | | | |
| N | None | | | | |
| V | Voltage Regulator ² | | | | |
| E | Environmental Sealing ³ | | | | |

NOTES:

¹ Contact Technical Sales for custom options.

² Not available on dual output.

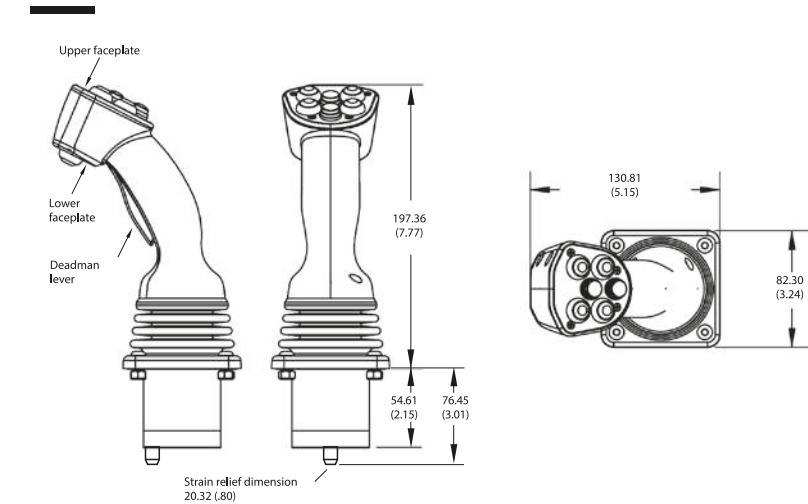
³ Environmental sealing level available up to IP68. Dependent upon handle configuration.

⁴ Mounting accessories. Standard hardware includes: 4 Phil. screws (6-32x7/8).

CJ series

Proportional multi-function hand grip controllers •
non-contacting Hall effect technology

DIMENSIONS



LOWER FACE BUTTONS OPTIONS



N



A



B



C



W

HJ series

Proportional rugged hand grip controllers •
non-contacting Hall effect technology



DISTINCTIVE FEATURES

- Analog output
- CANbus J1939 & CANOpen output options
- Operator presence paddle option
- Several different handle options
- 5 million lifecycles



ENVIRONMENTAL SPECIFICATIONS

- Operating Temperature: -40°C to +85°
- Storage Temperature: -40°C to +85°C
- Above Panel Sealing: Up to IP67 (subject to final specifications)
- EMC Immunity Level: EN61000-4-8: 2009
- EMC Emissions Level: EN61000-4-3:2006
- ESD: EN61000-4-2:2008



ELECTRICAL SPECIFICATIONS

- Supply Voltage Range: Analog: 5.00VDC ±0.25VDC,
CAN/CANOpen: 6-35VDC
- Reverse Polarity Max: -14.5V
- Oversupply Max: 16V
- Minimum load: 1 Ω
- Return to Center Voltage Tolerance (no load): ±0.2V



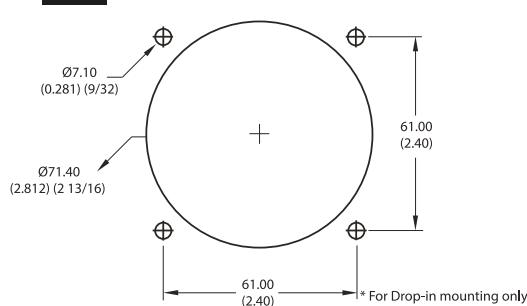
MECHANICAL SPECIFICATIONS

- Operating Force: 14.0N (3.10lbf)
- Maximum Vertical Load: 2000N (450lbf)
- Maximum Horizontal Load: 2000N (450lbf)
- Mechanical Angle of Movement: 38°
- Expected Mechanical Life: 5 million lifecycles
- Mass/weight: 544.3g (19.2oz)
- Lever Action (centering): Spring

The company reserves the right to change specifications without notice.



PANEL CUT-OUT



MATERIALS

- Body: Glass reinforced nylon
- Handles: Glass reinforced nylon

HJ series

Proportional rugged hand grip controllers •
non-contacting Hall effect technology



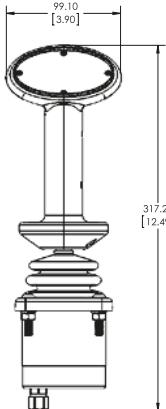
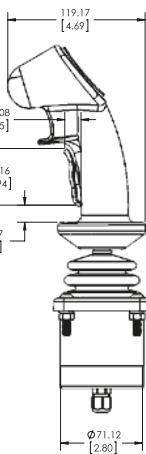
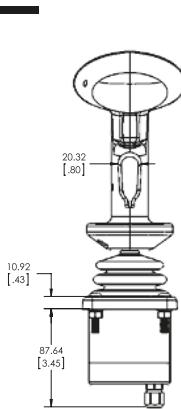
BUILD YOUR PART NUMBER

| | | | | | | | | | | |
|------------------------|---|---|--|--------------------------|---------------------------------------|--|--|--|---|---|
| HJ | | | | | | | | | | |
| SERIES | AXIS | SPRING | | OPERATOR PRESENCE PADDLE | INDEX TRIGGER | | | | CUSTOM | |
| A 1 B 2 C 3 | A Standard B Heavy | | | Y Yes N No | Y Yes N No G Trigger with guard | | | | E Environmental Sealing up to IP67 (pending specification) | |
| HANDLE | LIMITER PLATE | OUTPUT | | | | | | | | |
| RM Round Multifunction | S Square R Round P + Limiter X X axis only Y Y axis only G Square, guided feel H Round, guided feel | A 0-5 B 0.25-4.75 C 0.5-4.5 D 1-4 E (0-5) (5-0) F (0.25 - 4.75) (4.75 - 0.25) G (0.5 - 4.5) (4.5 - 0.5) H (1 - 4) (4 - 1) N CANbus J1939 P Canopen U USB Joystick, Game Controller T USB Mouse, Cursor Control X Volt Reg. 0-10 Y Volt. Reg. +/-10 | | | | | | | | |
| | | | | | | | | | FACEPLATE | |
| | | | | | | | | | A Two Pushbuttons B Four Pushbuttons C Five Pushbuttons D Six Pushbuttons E Eight Pushbuttons F Toggle Switch & Two Pushbuttons G Two Pushbuttons & Toggle Switch H Toggle Switch, Thumbwheel, Two Pushbuttons J Two Pushbuttons, Thumbwheel, Toggle Switch | K Two Axis Miniature Joystick & Two Pushbuttons L Toggle Switch, Mini Joystick, Two Pushbuttons M Two Toggle Switches N Two Pushbuttons, Mini Joystick, Thumbwheel P Four Pushbuttons, Mini Joystick Q Two Pushbuttons, Mini Joystick, Toggle Switch R Thumbwheel, Mini Joystick, Two Pushbuttons |

NOTES:

- For more details about :
- Thumbwheel : see CW series
- Mini Joystick: see TS series
- Toggle switch : see MT series
- Pushbuttons : see IM series

DIMENSIONS



XD series

Proportional, industrial hand grip controllers •
non-contacting Hall effect technology



DISTINCTIVE FEATURES

- Resists high load 670Nm (400lbf)
- Shallow mounting depth of <60mm
- Rated for 10 million lifecycles
- CANbus J1939 & CANopen



ENVIRONMENTAL SPECIFICATIONS

- Operating Temperature: -40°C to +85°C
- Storage Temperature: -40°C to +85°C
- Above Panel Sealing: Up to IP67/IP69K (subject to handle)
- EMC Immunity Level: EN61000-4-3
- EMC Emissions Level: EN61000-6-3:2001
- ESD: EN61000-4-2 Extended



ELECTRICAL SPECIFICATIONS

- Supply Voltage: Analog: 5.00VDC ±0.25VDC, CAN/CANOpen: 6-35VDC
- Reverse Polarity Max: -10V
- Output Impedance: 1100Ω
- Oversupply max: 20V



MECHANICAL SPECIFICATIONS

- Maximum Horizontal Load: 670Nm (400lbf)
- Mechanical Angle of Movement: 40° ±2°
- Expected Life: 10 million lifecycles
- Lever Action (centering): Spring

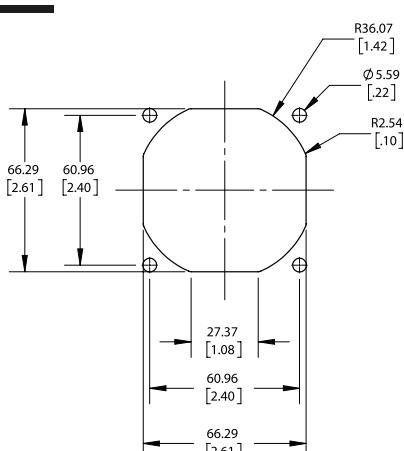


MATERIALS

- Shaft: Stainless steel
- Boot: Silicone
- Handles: Depends on handle



PANEL CUT-OUT



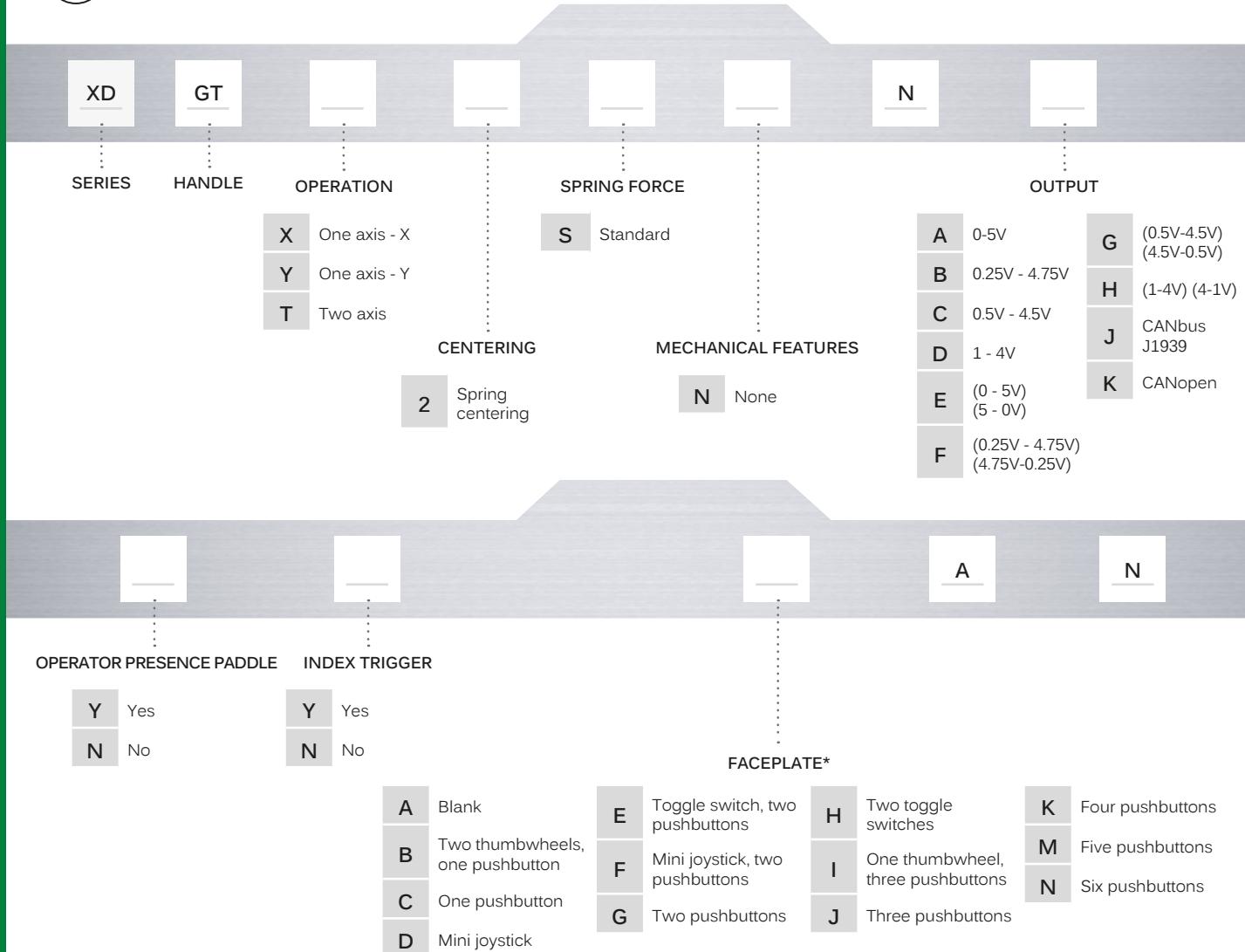
The company reserves the right to change specifications without notice.

XD series

Proportional, industrial hand grip controllers •
non-contacting Hall effect technology

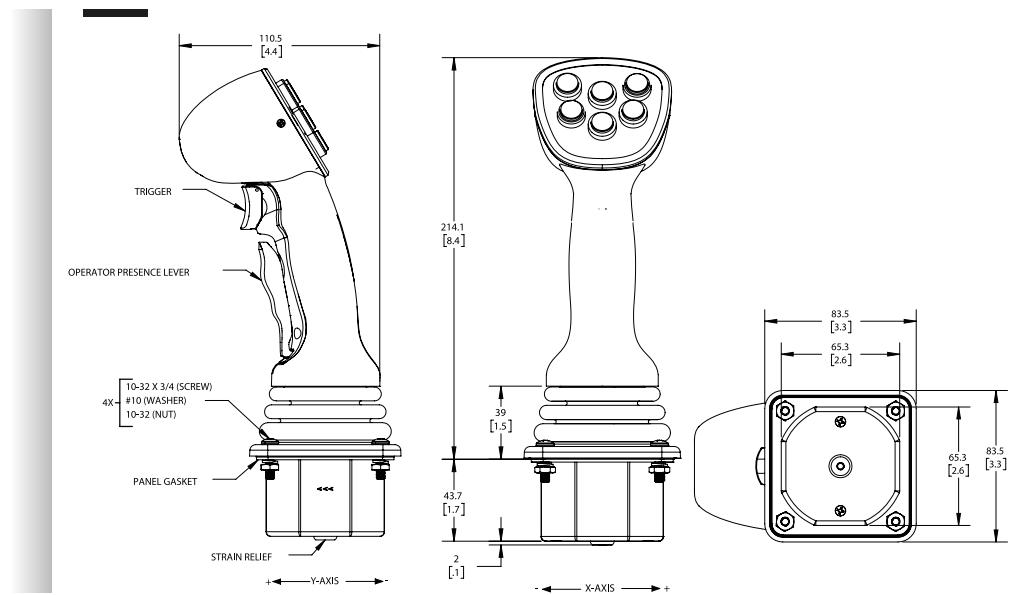


BUILD YOUR PART NUMBER



*See website for faceplate drawings PANEL SWITCHES

DIMENSIONS



MS series

Proportional compact hand grip controllers •
non-contacting Hall effect technology



DISTINCTIVE FEATURES

- One, two and three axis control
- Analog outputs
- 5 million lifecycles
- J1939 CANbus and CANopen outputs available
- Redundant output available



ENVIRONMENTAL SPECIFICATIONS

- Operating Temperature: -40°C to +85°C
- Storage Temperature: -40°C to +85°C
- Above Panel Sealing: Up to IP67 (subject to handle and final specifications)
- EMC Immunity Level: EN61000-4-3: 2006
- EMC Emissions Level: EN61000-4-8:2009
- ESD: EN61000-4-2:2008



ELECTRICAL SPECIFICATIONS

- Supply Voltage Range: 5.00VDC ±0.250VDC
- Reverse Polarity Max: -10VDC
- Oversupply Max: 16V
- Minimum load: 1 Ω
- Return to Center Voltage Tolerance (no load): ±200mV initial



MECHANICAL SPECIFICATIONS

- Operating Force: 7.6N (1.70lbf)
- Maximum Vertical Load: 444.8N (100lbf)
- Maximum Horizontal Load: 667N (150lbf)
- Mechanical Angle of Movement: 40° X & Y axis (subject to limiter plate)
- Expected Mechanical Life: 5 million lifecycles
- Mass/weight: 362.9g (12.8oz)
- Lever Action (centering): Spring

The company reserves the right to change specifications without notice.

MS series

Proportional compact hand grip controllers •
non-contacting Hall effect technology

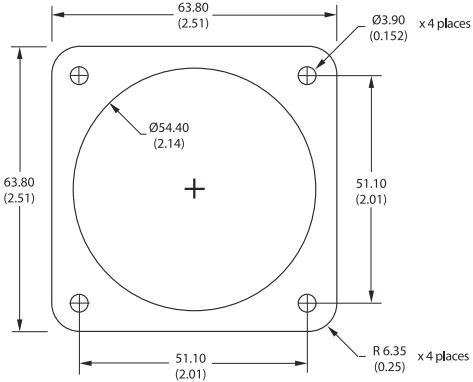


MATERIALS

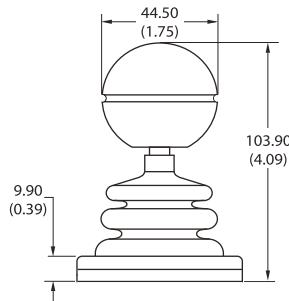
- Body: Glass filled nylon
- Boot: Silicone
- Handles: Glass filled nylon



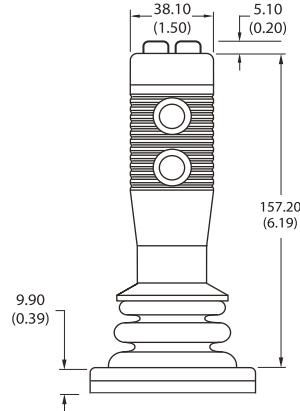
PANEL CUT-OUT



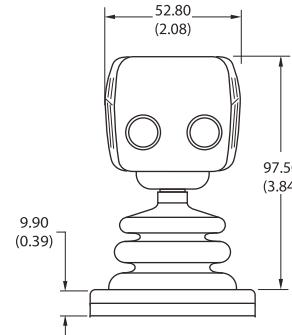
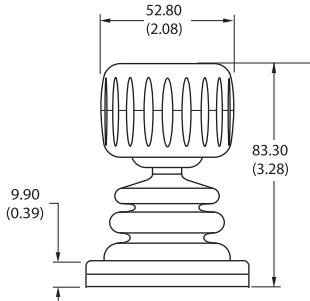
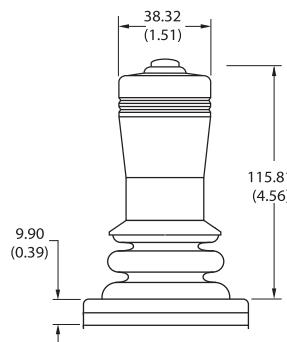
HANDLE OPTIONS



MS10



MS42

MS54
MS55MS23
MS24

MS31

MS series

Proportional compact hand grip controllers •
non-contacting Hall effect technology



BUILD YOUR PART NUMBER

| MS | HANDLE | FRONT BUTTONS | TOP BUTTONS | SIDE BUTTONS | LIMITER |
|----|--|---------------|-------------|----------------------|------------------------|
| 10 | Ball Tip | N None | 0 None | 0 None | S Square |
| 42 | Stock Grip | O One | 1 One | U One Upper Position | R Round |
| 31 | Short Stock Grip | W Two | 2 Two | L One Lower Position | X Slotted |
| 23 | Low Profile ¹ (2 Axis) | | R Rocker | F Two | Y Slotted |
| 24 | Low Profile ¹ (3 Axis) | | | D Deadman | P Plus |
| 54 | Low Profile ¹ Square Front (2 Axis) | | | | D Diamond |
| 55 | Low Profile ¹ Square Front (3 Axis) | | | | G Guided Feel – Square |
| | | | | | H Guided Feel – Round |

| SPRING TENSION | OUTPUT OPTIONS | ADDITIONAL OPTIONS | |
|----------------|---|---|--|
| 00 Standard | 0 0V to 5V (Rail to Rail) 1 0.5V to 4.5V 2 0.25V to 4.75V 3 1V to 4V 4 0V to 5V – Sensor 1 0V to 5V – Sensor 2 5 0.5V to 4.5V – Sensor 1 0.5V to 4.5V – Sensor 2 | 6 0.25V to 4.75V – Sensor 1 0.25V to 4.75V – Sensor 2 7 1V to 4V – Sensor 1 1V to 4V – Sensor 2 8 0V to 5V – Sensor 1 5V to 0V – Sensor 2 9 0.5V to 4.5V – Sensor 1 4.5V to 0.5V – Sensor 2 10 0.25V to 4.75V – Sensor 1 4.75V to 0.25V – Sensor 2 | 11 1V to 4V – Sensor 1 4V to 1V – Sensor 2 0-U USB 13 Cursor Emulation 1-J CANbus J1939 3-C CANopen |
| | | V Voltage Regulator | |
| | | E Environmental Sealing | |

Low Profile



Low Profile Square Front

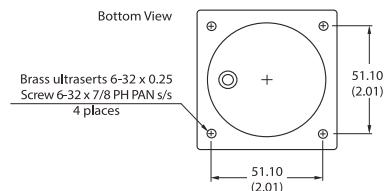
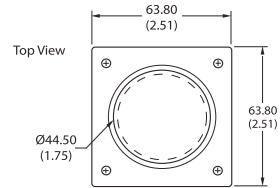
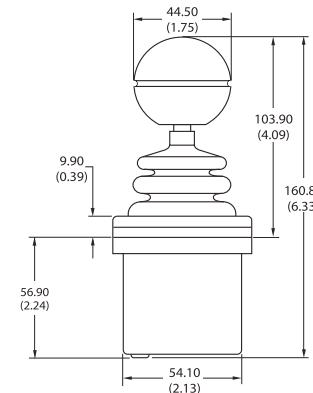
NOTES :

- ¹ Low Profile handles are offered in two options: «Low Profile » and «Low Profile Square Front» - see pictures below.
- ² CANbus, USB or Voltage Regulator are mutually exclusive.
- ³ Environmental sealing level available up to IP68. Dependent upon handle configuration.
- ⁴ Mounting accessories. Standard hardware includes: 4 screws (6-32x7/8) Phil.

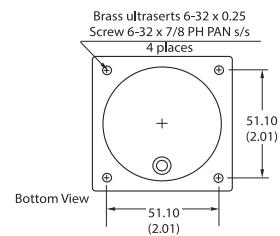
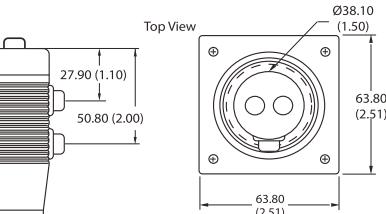
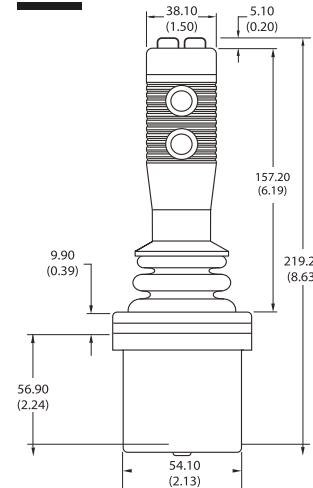
MS series

Proportional compact hand grip controllers •
non-contacting Hall effect technology

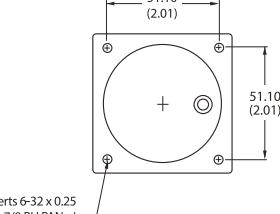
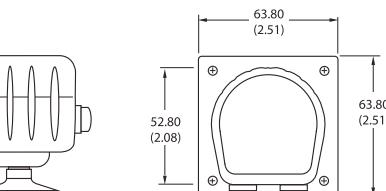
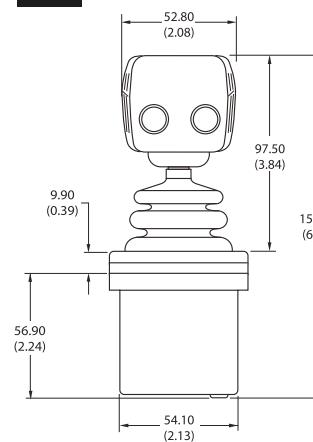
WITH HANDLE N°10 - BALL TRIP



WITH HANDLE N°42 - STOCK GRIP



WITH HANDLE N°54 OR 55 LOW PROFILE SQUARE FRONT



FG series

Fixed Grip™ hand grip controllers •
fully customizable & ambidextrous operation



DISTINCTIVE FEATURES

- Custom configured
- Analog or USB outputs
- Rugged hand operation
- Readily available with TS series thumbstick
- Operator presence paddle option



ENVIRONMENTAL SPECIFICATIONS

- Operating Temperature: -40°C to +85°C
- Storage Temperature: -40°C to +85°C
- Above Panel Sealing: Up to IP67 (subject to final specifications)
- EMC Immunity Level: Subject to configuration
- EMC Emissions Level: Subject to configuration
- ESD: Subject to configuration



ELECTRICAL SPECIFICATIONS

- Electrical Resistive Load: 5A*
- Electrical Inductive Load: 3A*
- Low Level: 10mA @ 30mV*

*Subject to chosen switch



MECHANICAL SPECIFICATIONS

- Operating Force: 7.55N ±2.0N (1.70lbf ±0.11lbf)
- Maximum Vertical Load: 1000N (224.8lbf)
- Maximum Horizontal Load: 600N (134.9lbf)
- Mechanical Angle of Movement: 40°
- Expected Mechanical Life: 1 million lifecycles
- Mass/weight: 317.5g (11.2oz)



MATERIALS

- Body: Glass filled nylon
- Handles: Glass filled nylon

The company reserves the right to change specifications without notice.

FG series

Fixed Grip™ hand grip controllers •
fully customizable & ambidextrous operation



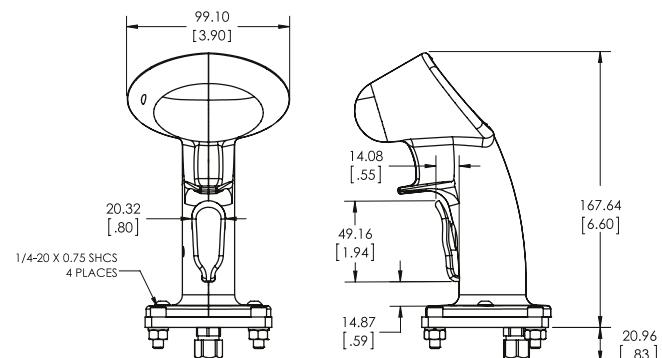
BUILD YOUR PART NUMBER

| | | | | | | | | | |
|--------|--|--|---|--|--|------------------|--|--|--|
| FG | | | | | | | | | |
| SERIES | INDEX TRIGGER | OPERATOR PRESENCE PADDLE | | TERMINATION | | SEALING | | | |
| | N None M Momentary P Proportional ¹ D DP/DT ² | 1 None 2 Proximity sensor ^{3,4} 3 Mechanical paddle | | A 22AWG 10in PTFE B 28AWG 10in PTFE X Customer specified | | A None B IP67 | | | |
| HANDLE | INDEX TRIGGER GUARD | MOUNTING HARDWARE | ELECTRICAL OUTPUT OR INTERFACE | | | | | | |
| 1 Oval | 1 None 2 Red 3 Black | 1 None 2 Plate and screws | 1 Voltage output 2 USB 5 Cursor Emulation | | | | | | |

NOTES :

- ¹- 0.5V to 4.5V output.
- ²- Double pole/double throw.
- ³- Not available with trigger.
- ⁴- The proximity sensor used in this joystick is based on an auto calibrating integrated circuit.
- ⁵- Up to IP67 available.
- ⁶- Mounting accessories. Screws: 1/4-20 x 1.25in stainless steel screws, lock washers, and hex nuts.

DIMENSIONS



HANDLE OPTIONS



Index trigger with trigger guard



Index trigger



No index trigger

IP Desktop

Proportional USB desktop controllers •
non-contacting Hall effect technology



DISTINCTIVE FEATURES

- Three axis ideal for PTZ control
- USB 2.0 HID compliant "game controller"
- 12 tactile pushbuttons
- Easy to install and operate
- Two color options



ENVIRONMENTAL SPECIFICATIONS

- Operating Temperature: 0°C to +50°C
- Storage Temperature: 0°C to +50°C
- Sealing: None
- EMC Immunity Level: CE/compliant, EMC directive 2004/108/EC, FCC Part 15, sub part B
- EMC Emissions Level: CE/compliant, EMC directive 2004/108/EC, FCC Part 15, sub part B



MECHANICAL SPECIFICATIONS

- Operating Force: 2.8N (0.63lbf)
- Maximum Vertical Load: 200N (45lbf)
- Maximum Horizontal Load: 200N (45lbf)
- Mechanical Angle of Movement: 36° X & Y axis, 80° Z axis
- Expected Mechanical Life: 3 million lifecycles
- Mass/weight: 440g (0.97oz)
- Lever Action (centering): Spring



MATERIALS

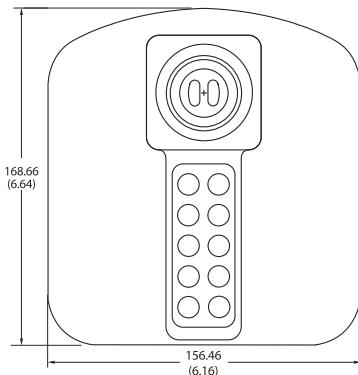
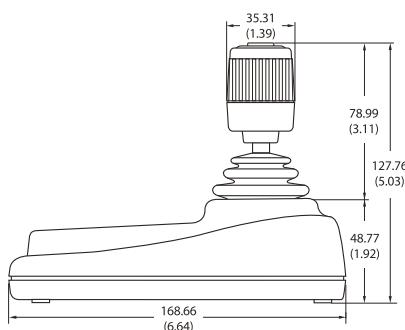
- Body: ABS
- Joystick Shaft: Stainless steel
- Joystick Boot: Silicone
- Handle: Glass filled nylon

The company reserves the right to change specifications without notice.

IP Desktop

Proportional USB desktop controllers •
non-contacting Hall effect technology

DIMENSIONS



NOTES:

Dimensions are in mm/(inch).

To order the IP Desktop please refer to Part Number 100-550 (Grey or Black).

VM Desktop

Proportional USB multifunction controllers •
non-contacting Hall effect technology



DISTINCTIVE FEATURES

- Proportional three axis for PTZ control
- 27 pushbuttons
- USB 2.0 HID compliant "game controller"
- Jog/shuttle dial
- LED backlighting or tactile pushbutton options



ENVIRONMENTAL SPECIFICATIONS

- Operating Temperature: 0°C to +50°C
- Storage Temperature: 0°C to +50°C
- Sealing: None
- EMC Immunity Level: CE/compliant, EMC directive 2004/108/EC, FCC Part 15, sub part B
- EMC Emissions Level: CE/compliant, EMC directive 2004/108/EC, FCC Part 15, sub part B



MECHANICAL SPECIFICATIONS

- Operating Force: 2.8N (0.63lbf)
- Maximum Vertical Load: 200N (45lbf)
- Maximum Horizontal Load: 200N (45lbf)
- Joystick Mechanical Angle of Movement: 36° X & Y axis, 80° Z axis
- Jog/shuttle Performance: Spring loaded ring travel: ±40°
- Knob rotation: 360°
- Mass/weight: 1330g (47oz)
- Lever Action (centering): Spring



MATERIALS

- Body: ABS
- Joystick Shaft: Stainless steel
- Joystick Boot: Neoprene
- Handle: Glass filled nylon

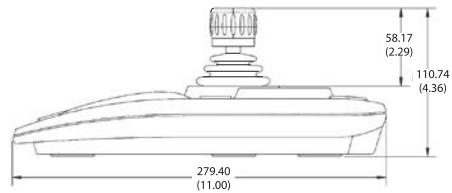
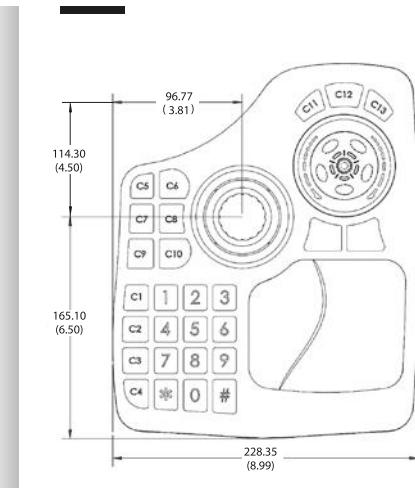
The company reserves the right to change specifications without notice.



VM Desktop

Proportional USB multifunction controllers •
non-contacting Hall effect technology

DIMENSIONS



NOTES:

Dimensions are in mm/inch.

To order the VM Desktop with LED backlighting, refer to part number 100-590.

To order the VM Desktop with tactile switches, refer to part number 100-600.

RS Desktop

Proportional USB desktop controllers •
non-contacting Hall effect technology



DISTINCTIVE FEATURES

- Three axis ideal for PTZ control
- Proportional control
- Ambidextrous design for right or left handed use
- 6 tactile pushbutton switches
- USB 2.0 HID compliant "game controller"



ENVIRONMENTAL SPECIFICATIONS

- Operating Temperature: 0°C to +50°C
- Storage Temperature: 0°C to +50°C
- Sealing: None
- EMC Immunity Level: CE/compliant, EMC directive 2004/108/EC, FCC Part 15, sub part B
- EMC Emissions Level: CE/compliant, EMC directive 2004/108/EC, FCC Part 15, sub part B



MECHANICAL SPECIFICATIONS

- Operating Force: 2.8N (0.63lbf)
- Maximum Vertical Load: 200N (45lbf)
- Maximum Horizontal Load: 200N (45lbf)
- Mechanical Angle of Movement: 36° X & Y axis, 80° Z axis
- Expected Mechanical Life: 3 million lifecycles
- Mass/weight: 943.5g (33.3oz)
- Lever Action (centering): Spring



MATERIALS

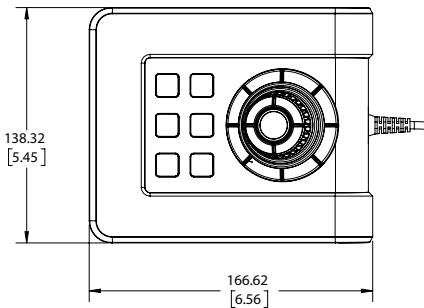
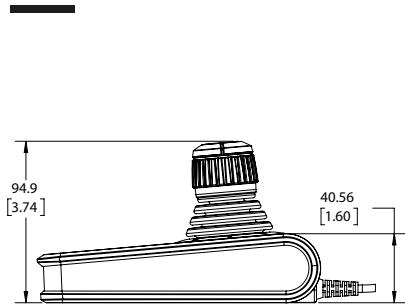
- Body: ABS
- Joystick Shaft: Stainless steel
- Joystick Boot: Silicone
- Handle: Glass filled nylon

The company reserves the right to change specifications without notice.

RS Desktop

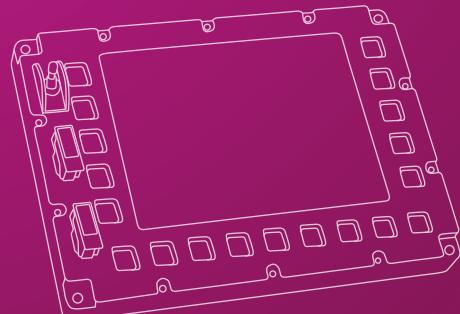
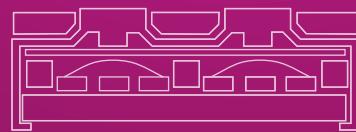
Proportional USB desktop controllers •
non-contacting Hall effect technology

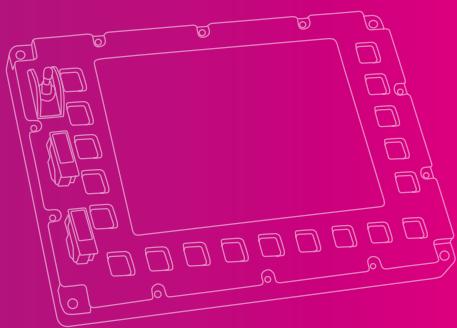
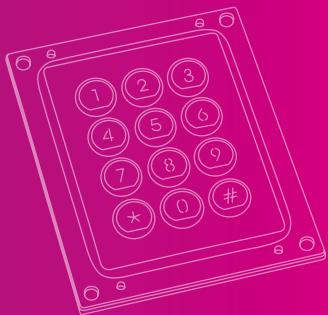
DIMENSIONS





SWITCH PANELS





SELECTION GUIDE

SWITCH PANELS

532

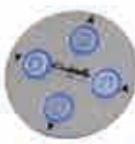
SWITCH PANELS

OUR RANGE



EQUIPMENT

APEM designs and manufactures complete custom panels incorporating keyboards, switches, joysticks and other discrete components from our extensive range of products or qualified suppliers.



| HARSH ENVIRONMENT KEYBOARD | MEMBRANE KEYPAD | THIN BACKLITTED | FILM IN MOLD | METAL KEYBOARD |
|--|--|--|---|--|
| <p>Our ruggedized keyboards combine critical electronic and software design expertise, along with our core knowledge of milling, printing and discrete switch integration.</p> <p>APEM's extensive development process allows us to meet critical military specifications such as MIL, STANAG and GAM.</p> | <p>Our ISO9001 and ISO14000 qualified facilities allow the supply of high quality membrane keypads, meeting the expectations of demanding applications, markets and customers, at a competitive price.</p> | <p>The APEM thin backlit panel enables the use of front mounted interface products with a high quality backlit design and status LED indicators.</p> <p>This 3mm thick keyboard will easily allow membrane keypad users to bring backlit features to their products.</p> | <p>The APEM Film In Mold (FIM) technology features molded pushbuttons designed into a printed plastic film.</p> <p>The FIM technology combines an extremely low profile keypad with durable markings at a competitive price for large quantities.</p> | <p>APEM's stainless steel keyboards meet the highest level of vandal resistant specifications (IK10) with a visually appealing design.</p> <p>Resistant to the harshest environments, our stainless steel keyboards are weather proof and can withstand most corrosive agents.</p> |

APEM
INNOVATION

ELECTRONIC & SOFTWARE DESIGN

APEM
EXCLUSIVE

INTEGRATION OF
COMMUNICATION PROTOCOLS
SUCH AS CANOPEN, CAN J1939,
ISOBUS, USB & RS432



EASY FRONT MOUNTING



CONSISTENT BACKLIGHTING,
NO VISUAL FATIGUE



FRONT MOUNTED EXTRA SLIM
BACKLIT KEYBOARD

3.24 mm +0.4/-0.2

2.94 mm +0.4/-0.2

For more information,
see APEM website

Our internal electronic team supports the integration of:

- Communication protocols: LIN, CAN, RS4xx, USB, ...
- Display management: LCDs graphics, 5 segments & NVIS LEDs
- Extreme ambient conditions: ESD, EMI, hot & cold
- Power supply: power converter, filter and protection of power network



| CAPACITIVE | ELASTOMER KEYBOARD | PIEZO KEYBOARD | MEC BASED KEYBOARD |
|--|---|---|--|
| <p>APEM designs and manufactures capacitive keyboards to compliment its range of capacitive buttons. Made with either polycarbonate or glass filled materials, the APEM capacitive keyboards meet the strict requirements necessary in critical applications including shock resistance.</p> | <p>The APEM elastomer keyboards offer a low cost, customizable solution for harsh environments with sealing up to IP69K and standard communication protocols including CAN, USB & RS432. Designs may include detailed backlighting options and custom actuation travel up to 3.5mm.</p> | <p>The APEM Piezo keyboards incorporate a highly reliable pressure sensitive keypad in a visually appealing package. With the highest level of sealing, the Piezo keyboards consume no power when idle.</p> | <p>MEC based keyboards offer high end features including extreme sealing, exceptional illumination, durability and elegance. In the event of machine upgrades or accidental damage, the foil overlay is easily exchangeable.</p> |

TECHNICAL INFORMATION

FOR PANEL AND PCB SWITCHES

SPECIFICATIONS

Dimensions, specifications and data shown in this catalog are subject to change without notice. Consequently, they are not contractual in any way. Electrical, mechanical and endurance specifications are based upon in-house tests made by APEM. These tests are conducted using internationally recognized procedures. In the event of a product being used under different conditions, the user must ensure the products suitability for use under those conditions. Incorrect storage, handling, operation or application of the product may result in damage to the product or equipment. The negative value indicated under "Operating temperature" is given for normal usage conditions (products free of moisture, which could generate frost or ice and block the mechanism).

The specifications give the technical performances of the switches. If the equipment on which our products are mounted is submitted to safety standards, the customer should select approved models or models conforming to the standards (marked CE only). Consult factory for details of models that can be marked CE.

DRAWINGS

Products are shown with their standard actuator (for other actuators, see options).

Scale : drawings in this catalog are to different scales: request data sheet if you need other dimensions for a specific part number.

TOLERANCES

Unless otherwise specified, the general tolerance for dimensions in this catalog is $\pm 0,3$ (.012).

Overall dimension tolerance is $\pm 0,5$ (.020).

Request data sheet for further information.

SOLDERING CONDITIONS

Hand soldering with iron : 300°C, 3 seconds max.

SEALING OF TERMINALS

Due to the new generations of active flux, epoxy sealing of terminals is preferred to prevent any risk of switch contamination.

ROHS II COMPLIANCE

The RoHS directive 2011/65/EC of the European parliament and of the Council of June 8, 2011 restricts the use of certain hazardous substances in electrical and electronic equipment: Mercury (Hg), Cadmium (Cd), Hexavalent Chrome (Cr+6), Polybrominated biphenyls (PBB) and Polybrominated diphenyl ethers (PBDE including decaBDE), Lead (Pb). There is no change of part number for RoHS compliant products. Some specific products or options can still be supplied in non-RoHS version with customer's agreement.

Standard products manufactured by APEM are already and will remain in compliance with the restriction of the marketing and use of the above mentioned substances imposed by such directive.

Switches for printed circuit boards with tin/lead plated terminals (SnPb) have been replaced by components with pure tin plating.

For specific options using LED illumination, wires are soldered with lead-free solder.

TECHNICAL INFORMATION

Contacts and ratings

CONTACT MATERIALS

Several contact technologies are available depending on models :

FOR MINIATURE SWITCHES

| | |
|----------|--|
| A | <ul style="list-style-type: none">> End contacts : silver.> Center contacts and terminals : brass, silver plated.> For high ratings at 125VAC - 250VAC or over 0,1A 30VDC (levels III and IV). |
| AD | <ul style="list-style-type: none">> End contacts : silver with gold plating over nickel barrier.> Center contacts and terminals : brass, gold plated.> For low level applications (levels I and II).> Can be used for high ratings (level IV), the gold layer being considered only as a protection against oxidation during storage. |
| CD or LD | <ul style="list-style-type: none">> Contacts and terminals : brass with gold plating over nickel barrier.> For low level applications up to 20mA 20VDC or 80mA 5VDC (levels I and II). |
| X780 | <ul style="list-style-type: none">> Silver rivet, gold plated (11000 and 12000 series). |

FOR INDUSTRIAL SWITCHES

| | |
|---|--|
| A | <ul style="list-style-type: none">> End contacts : silver rivet or silver inlay.> If not specified in model number, the contact material is indicated in the specifications of each series. |
| C | <ul style="list-style-type: none">> Silver plated copper or brass. |

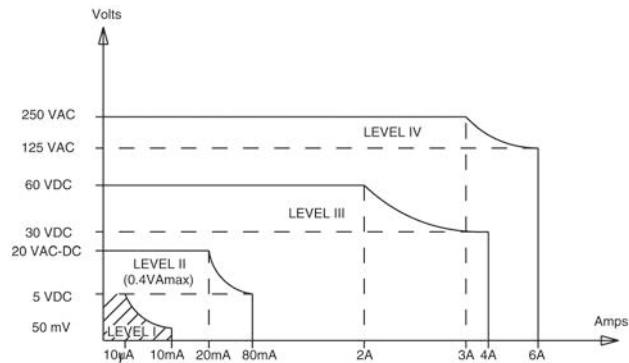
Silver cadmium oxide contacts (S) available on the 4000 - 600H - 600NH and 2600 series, can be replaced by silver tin oxyde contacts.

HIGH INRUSH CURRENTS

Special contact materials and switch constructions allow particularly high inrush currents to be taken by some models of the 5000, 11000 and 12000 series.

ELECTRICAL LEVELS

STANDARD MINIATURE SWITCHES



Recommended contacts

Level I : very low level

Telecommunications

D, AD or CD contacts

Level II : low level

General electronic applications

D, AD or CD contacts

Level III : intermediate level

Low voltage

Electric appliances

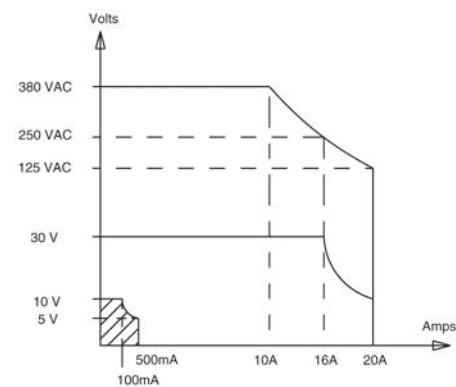
A or AD contacts

Level IV :

Mains power supply

A contact

INDUSTRIAL SWITCHES - SILVER CONTACTS



The above curves feature all the ratings available in our product range. Hatched areas show minimum ratings. Maximum ratings are indicated in the specifications of each series. Note that max. current is given for standard life expectancy. For specific applications, higher currents can be applied, resulting in reduced life expectancy and vice-versa. Consult factory.

LOW CURRENT OR DRY CIRCUIT (LEVEL I)

The quality of the gold plating (hardness, porosity, adherence) and the design of the contacts (pressure or sliding contact) allow the use of very low currents down to 10µA 5V or 10mA 50mV depending on models, measurable according to IEC 512-2, test 2a.

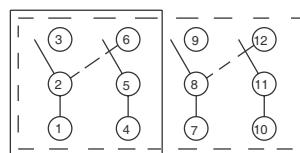
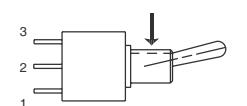
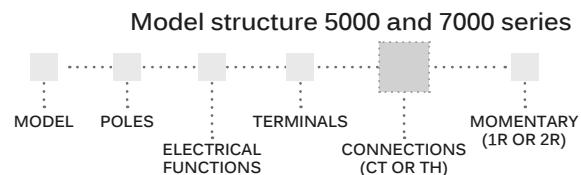
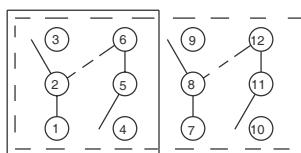
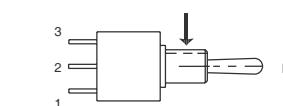
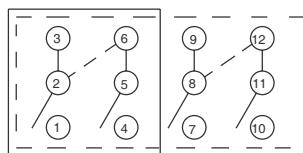
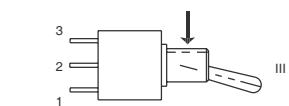
TECHNICAL INFORMATION

Positions and connections for 3-way switches • Function 4

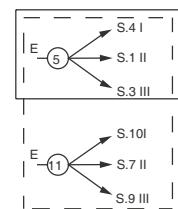
MINIATURE SWITCHES

5000 and 7000 series are available with CT or TH connections. Desired connections are to be specified in enlarged box of model structure. 12000 and S series are available with TH connections only.

FUNCTION 4 - TYPE TH (PREFERRED) - 5000 - 7000 - 12000 - S - SR SERIES

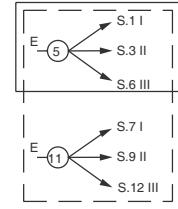
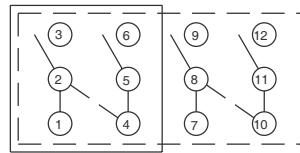
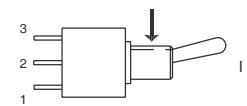
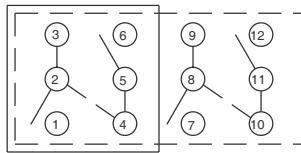
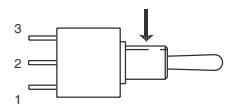
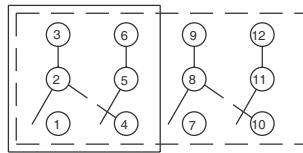
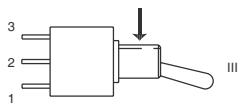


E : input
S : output



TH

FUNCTION 4 - TYPE CT (REVERSED) - 5000 - 7000 SERIES



CT

Single pole switches in a double pole case
Double pole switches in a four pole case

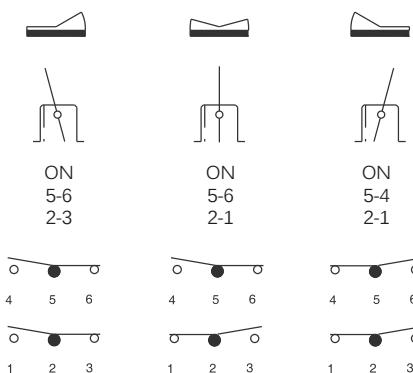
□ SP [] DP



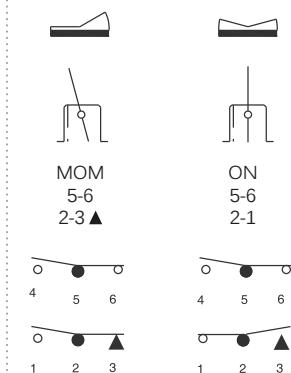
Dotted line between poles : jumper
to be wired by the user.

INDUSTRIAL SWITCHES : 600 600H - 3600NF - 6000 AND 2600 SERIES

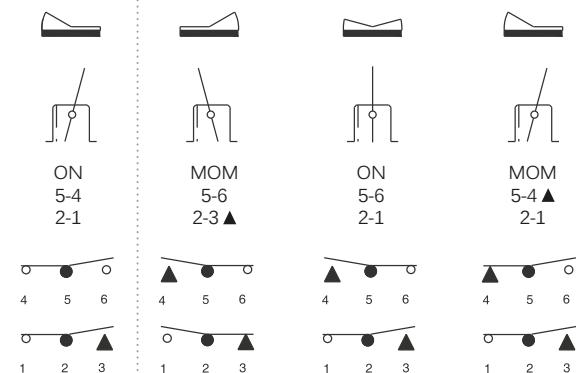
FUNCTION 4



FUNCTION 4-1R (MOMENTARY ONE SIDE)

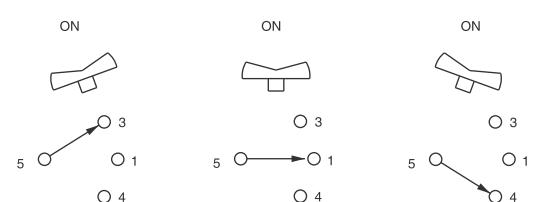


FUNCTION 4-2R (MOMENTARY BOTH SIDES)



● Common ○ Maintained ▲ Momentary

Terminals 2 and 6 must be connected by the user
for a 3 way switch. Single pole switches in a double pole case.



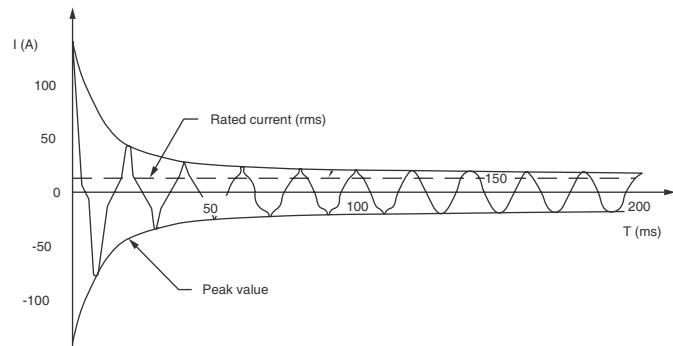
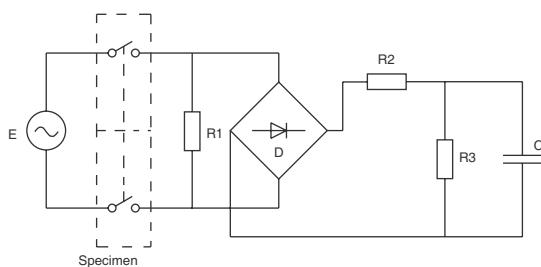
TECHNICAL INFORMATION

Switches for peak currents

- For switching power supplies, DC-DC converters, motors...
- Peak current with 125/250VAC according to IEC 1058 (Fig 1) and direct current 60VDC (Fig 2)
- 2 maintained positions

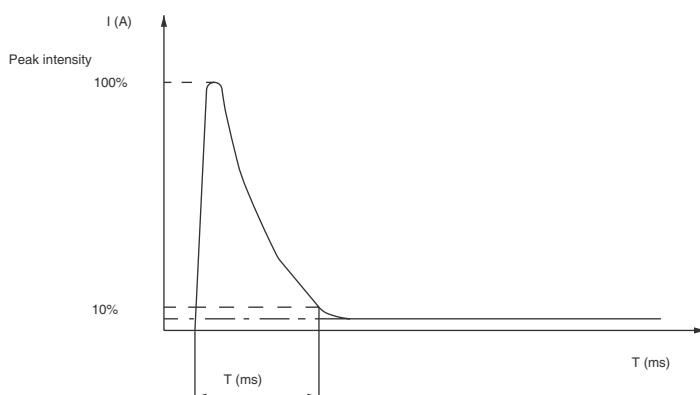
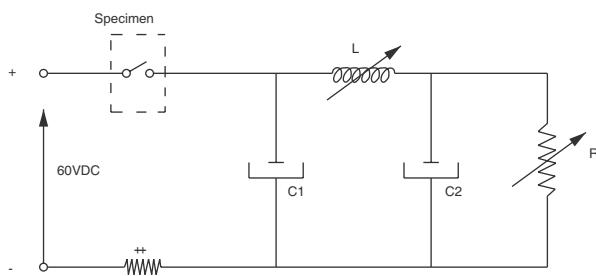
TESTING CIRCUIT AC VOLTAGE

Figure 1



TESTING CIRCUIT DC VOLTAGE

Figure 2



CURRENT/VOLTAGE RATING EXAMPLES

| | | | | |
|---------------|---|------------------------|---|--------------------|
| 4 / 100A | ↓ | Inrush current (Fig 1) | ↓ | Nominal AC current |
| 250VAC | ↓ | Max. AC voltage | ↓ | Life |
| 10.000 cycles | ↓ | | | |
| 3 / 80A | ↓ | Inrush current (Fig 2) | ↓ | Nominal AC current |
| (10 ms) | ↓ | | ↓ | Inrush duration |
| 60VDC | ↓ | Max. voltage | ↓ | Life |
| 10.000 cycles | ↓ | | | |

See 11000 and 12000 series, special option X910.

TECHNICAL INFORMATION

Degrees of protection : IP and IK codes

The degree of protection is indicated by 2 letters and 2 numbers.

IP** degree of protection provided by the enclosures of electric appliances according to IEC 60529 and DIN 40050.

IK** degree of protection provided by the enclosures of electric appliances against external mechanical impacts according to EN 62262.

Example : IP 65

protection
against dust

protection
against water

1ST NUMBER : PROTECTION AGAINST INGRESS OF SOLID OBJECTS

| IP | TESTS | |
|----|-------|---|
| 0 | | Non-protected |
| 1 | | Protected against solid objects of 50 mm (.1968) and greater |
| 2 | | Protected against solid objects of 12.5 mm (.492) and greater |
| 3 | | Protected against solid objects of 2.5 mm (.098) and greater |
| 4 | | Protected against solid objects of 1 mm (.039) and greater |
| 5 | | Dust-protected (no harmful ingress) |
| 6 | | Dust-tight (no ingress) |



For an additional protection of switches used in harsh environments against sand, frost or other contaminants that may cause switch failure, we recommend the use of sealing boots.

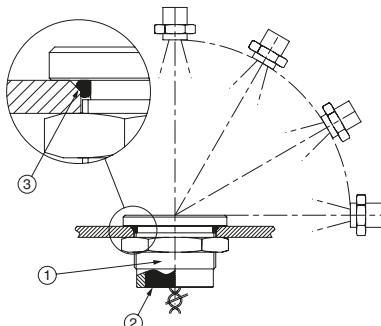
2ND NUMBER : PROTECTION AGAINST LIQUIDS

| IP | TESTS | |
|----|-------|--|
| 0 | | Non-protected |
| 1 | | Protected against vertically falling water drops |
| 2 | | Protected against vertically falling water drops when enclosure tilted up to 15° |
| 3 | | Protected against water sprayed vertically at an angle up to 60° |
| 4 | | Protected against splashing water |
| 5 | | Protected against water jets from any direction |
| 6 | | Protected against powerful water jets |
| 7 | | Protected against the effects of temporary immersion in water (1 m water, 30 minutes) |
| 8 | | Protected against the effects of continuous immersion in water (depth x to be specified) |

IK CODE : MECHANICAL PROTECTION

The degree of mechanical protection is now defined by the letters IK according to EN 62262.

SEALING IP69K



High pressure, high temperature wash down IP69K test conditions

- . Pressure : 80 - 120 bars
- . Distance : 15 cm
- . Temperature : 80°C ± 5°C
- . Flow : 14 - 16 l/mn
- . Duration : 30 seconds per position

Illustration : PBA series switch.

① - One-piece bushing

② - Epoxy sealed terminals

③ - O-ring

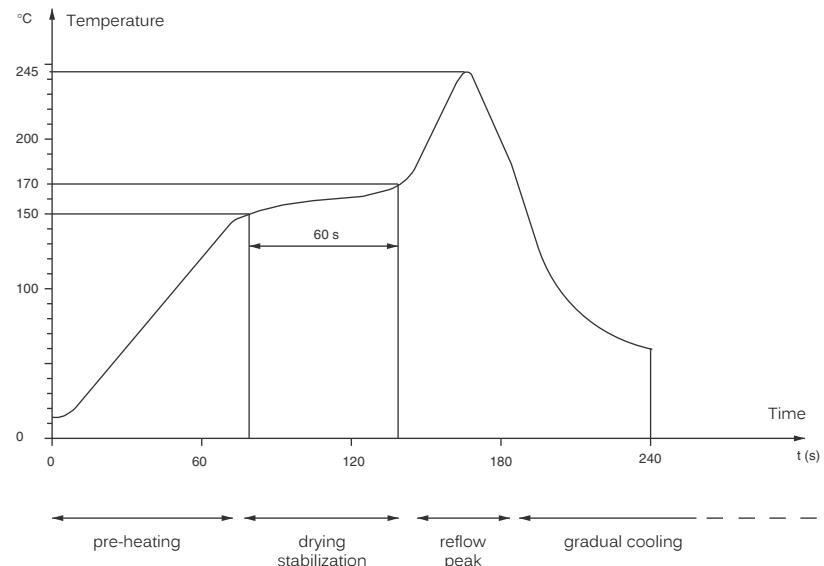
TECHNICAL INFORMATION

Surface mount

TYPICAL SMT REFLOW PROFILE

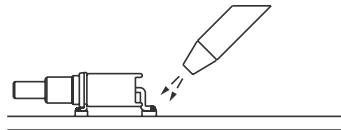
The PC board, carried by a conveyor belt, goes through the different areas of a reflow soldering oven :

- pre-heating (maximum 170°C, 60 secs)
- reflow peak (maximum 245°C)
- final cleaning (optional)



BOARD REWORK TECHNIQUE

Hot air reflow technique is preferred. Avoid use of a traditional soldering iron.

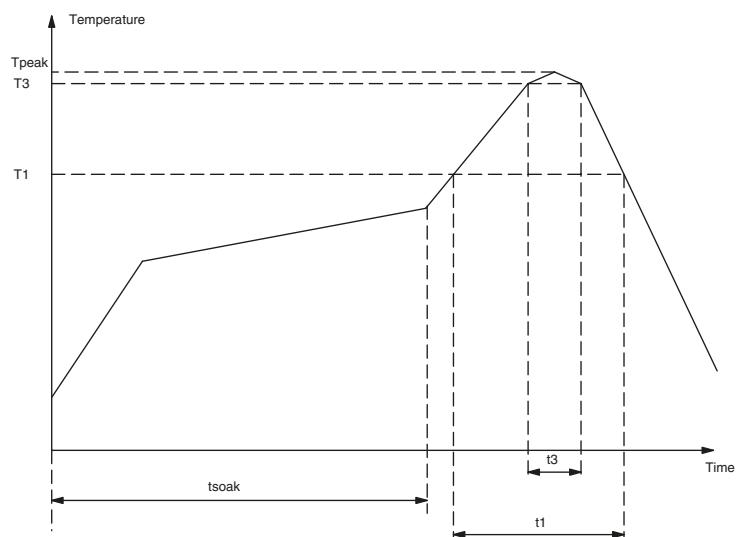


Caution : Excessive and/or repeated high temperature exposure may affect switch performance and reliability.

TYPICAL LEAD-FREE SMT REFLOW PROFILE

Complying with the ROHS directive.

| Example of Pb-free profile requirements for soldering heat resistance | | |
|--|-----------|-------------------------------|
| Parameter | Reference | Specification (small case) |
| Temperature gradient in preheating | | 3°C/s max. |
| Soak time | tsoak | 2-3 minutes |
| Time above 217°C | t1 | 60-150 seconds |
| Time within 5°C of actual peak temperature | t3 | 20-40 seconds |
| Peak temperature in reflow | Tpeak | 260°C (+0/-5°C) |
| Temperature gradient in cooling | | 6°C/second max. |
| Time 25°C to peak temperature | | 8 minutes max. |



GLOSSARY

AC

Alternating current; electric current that continually reverses direction at a fixed frequency (see VAC).

ACTUATION FORCE

(Operating Force) : The force required to change the actuator of a switch from one position to another. Torque for rotary products.

ACTUATOR

A movable part of a switch which causes a change in the electrical configuration of the switch. e.g.: Toggle, Rocker, Slider, Paddle, Pushbuttons, Shaft.

ALLOY

A metal created by combining two or more metals to obtain a specific physical property.

ALTERNATE ACTION

Push to close and push to open the switch. A given circuit condition remains after removal of actuating force. Also known as «push-push switching action». Typically, alternate action pushbuttons do not visually indicate the position of the contacts. Contrast to latching action.

ANGLE OF THROW

Indicates total travel arc on toggle or rocker switches. Unit of measure : degrees.

ANTISTATIC

An antistatic device will withstand a specified potential without conducting between the actuator and any conducting element. Usually the terminals or bushing. Unit of measure : typical value 8-20 kilovolts DC.

ANSI

American National Standard Institute; a standard-setting agency of the United States which approves the design and/or performances of electronic/electrical components distributed in the world market.

ARCING

The flow of electric current between switch contacts during opening or closing of the contacts. This current flow can be damaging to the contacts of a switch.

BIFURCATED CONTACT

A wiping movable contact consisting of spring fingers

that grip fixed contacts.

Typically found in slide switches. Self cleaning action. See Wiping Contact.

BOUNCE

The repeated rebounding of the moveable contact during the transfer from one throw to the next.

BRASS

An alloy of zinc and copper.

BREAK-BEFORE-MAKE (Non shorting - B.B.M.)

On actuation, the movable contact breaks contact with one fixed contact before making contact with another fixed contact. Contrast with make-before break. Typical of toggle and pushbutton switches.

BUTT CONTACT

A contact mechanism in which the movable contact makes contact with the fixed (stationary) contact without wiping motion between the surfaces. Typical of toggle and pushbutton switches. See Wiping Contact.

CAPACITIVE LOAD

A load in which the initial current on making (closing) of the contacts is higher than the steady state current. Current leads voltage in capacitive loads. See Resistive Load, Inductive Load, Power Factor, Inrush.

CARRYING CURRENT

The maximum current that can be passed through the already closed contacts of a switch. Contrast with «Contact Rating».

CLEARANCE (spacing)

Distance through air between electrically live parts of opposite polarity or to ground.

CONTACT (Contact area)

The metal surfaces that come into physical contact to complete an electrical circuit. These surfaces are found on movable contacts (see) and terminals (see).

CONTACT BLOCK

A switching element which is added singly or in groups to an operator to make a complete switch. Typically used with industrial controls (APEM A01 and A02 series).

CONTACT BOUNCE

(Bounce)

The time during switching in which electrical instability (bounce) caused by the rebound of the contacts is observed. Relative mass of the contacts, forces and frequency of supporting members are all components that determine the extent of bounce. Total transfer time consists of the time for the contacts to close plus bounce. Transfer time should be rapid so natural bounce time is short.

CONTACT GAP

The distance between a stationary contact and a movable contact in the open position.

CONTACT RATING (Switching rating)

The capacity to switch (connect or interrupt) an electrical load. Load characteristic (resistive, inductive, capacitive, power factor). Contrast with non-switching rating.

CONTACT RESISTANCE

The resistance across the two closed contacts : contact interface and terminals.

CREEPAGE

The unwanted flow of electrical current from one conductive part to another.

CSA

Canadian Standard Association

CYCLE

The complete sequence of indexing through all successive switch positions and returning to the original position.

DC

Direct Current : electric current that flows only in one direction (see VDC).

DETENT

A mechanical stop that holds the contacts in a given position after the actuation force is removed or prevents the changing of contact position at less than a specified actuation force. Can also be referred to as tactile feel.

DIELECTRIC STRENGTH

The ability of an insulating material to withstand a voltage without arcing across its surface. The standard voltage that can be applied between two open terminals or between a terminal and ground without causing

a short. Most often applied to insulator between switch terminals and metal exposed to operator of the switch. Also known as Dielectric Withstanding Voltage, DWV, Leakage resistance, Breakdown Voltage.

DIFFERENTIAL TRAVEL

The distance an actuator moves between the point where contacts snap over and where they snap back, or when contact is made and then brakes.

DIP

DIP-in-line Package (in Europe also, DIL : Dual-in-line) refers to a component with two rows of PC terminals. The terminals are most commonly on a 0,100 inch pitch with 0,300 inch between rows.

DOUBLE-BREAK CONTACTS

A contact mechanism using two sets of contacts to make or break a given circuit. The contact gap opens twice as fast, reducing the arc duration, contact surface temperature and material erosion. This improves heat dissipation and provides better power handling capacity for a longer switch life. Typical of high power industrial switches and DC Circuit application. See Single-Break Contacts.

DP

Double pole. See pole.

DRY CIRCUIT

An application in which power levels do not cause arcing melting, or softening of the contacts . Typically requires gold plated contacts for reliable switch operation. At such low levels, and since no arc occurs, silver contacts would not be self-cleaned and would be less reliable. Typical Definition : for ex. 0.4VA max. 20 V DC or peak AC max. Also known as "Low Energy", "Logic Level", TTL.

DWV

Dielectric Withstanding Voltage. See Dielectric Strength.

DT

Double Throw. See Throw.

DUST TIGHT

Sealed switch will withstand sand and dust contamination.

ELECTRICAL LIFE

The number of operations at a given electrical load

GLOSSARY

that does not result in a degradation of any electrical or mechanical parameter beyond the standard set by the applicable end-of-life criteria.

END OF LIFE CRITERIA

Those specifications that a switch must meet at the end of its specified electrical life. Typically contact resistance and/or heat rise of contacts at full rated load at end of life.

ENVIRONMENTAL SEAL

A seal that totally encapsulates the switch providing a specified level of protection against intrusion of solids, liquids or gases into the body of the device.

ESD

Electrostatic discharge.

FIXED CONTACT (Stationary contact)

The non-moving contact. Typically integral to the end of the terminal inside the switch body.

FLASH PLATING

A very thin or «instant» plating (usually less than 0.25 microns in thickness).

FLUX

Chemical used for cleaning metal surfaces for welding. Fluxes turn contaminated metal surfaces into clean, solderable part.

GOLD FLASH

A plating of gold typically less than 0,25 µm (millionths) thick. Used only as a barrier to oxidation or corrosion of terminals to maintain solderability.

GULL WING

A type of surface mount terminal which extends from the side of the switch and has a L-shaped bend at its end (terminals are formed away from the switch body).

HEAT RISE

An indirect measurement of contact resistance used by rating agencies. The temperature rise over ambient of a contact set carrying a prescribed current is measured to determine whether it falls within safe limits.

IEC

International Electrotechnical Commission.

IECQ

IEC's Quality Assessment system for Electronic Components, created in 1983 to facilitate national and international trade in certified electronic components. A worldwide certification system which provides a method whereby electronic components made and handled by approved manufacturers and distributors can be used anywhere without further testing.

INDUCTIVE LOAD

A load in which the initial current on making (closing) of the contacts is lower than steady state and rises slowly. On breaking (opening) of the contacts, the current is greater than steady state. The stored energy of the inductor provokes a long and severe arcing time. Current lags voltage in inductive loads. Motors are the most common inductive load. Inductive loads are the most troublesome of circuit conditions. See Resistive Load. Capacitive Load.

INFRARED REFLOW

A method of mass soldering Surface Mount Devices with Infrared (IR) thermal radiation heating the PCB solder paste and components.

INRUSH

The initial transitory high-level of current at contact closing (making). A characteristic of capacitive and some resistive loads. The inrush currents can be large and long enough to cause severe degradation of the contacts. See Resistive Load. Capacitive Load. Power Factor.

INSERT MOLD

In switches and relays used to refer to terminations that are placed in the mold so that plastic is molded around the terminations. The chief benefit is an inherent seal against the intrusion of flux into the body of the device. Therefore no epoxy terminal seal is required.

INSULATION RESISTANCE

The electrical resistance between two normally

insulated parts measured at a specified DC voltage.

IP

An industrial specification (Part of the IEC 60529 standard) used worldwide to indicate the degree of protection provided by components against accidental contact, penetration of solids or liquids into or through the component. See NEMA.

LAMP LOAD (Tungsten)

A load characterised by a high inrush current at make (approximately 10 to 16 times the steady state).

LATCHING ACTION

See alternate action (or push-push). Actuator position typically indicates contact position.

LEAKAGE BARRIER

A ridge or web molded into a switch housing between terminals or contacts to increase the surface distance between them.

LEAKAGE RESISTANCE

Dielectric strength.

LED

Light Emitting Diode. Long life and low consumption illumination.

LIFE

See Electrical life, Mechanical Life.

LOGIC LEVEL

Refers to power levels typical of solid state electronic circuits (TTL, CMOS, etc.). Levels at which no arcing, melting or softening of the contacts occur. Typically require gold contacts for reliability since no arcing occurs to self clean the contacts. See Dry circuit. Also referred to as low energy.

LOW ENERGY

See Dry circuit.

MAINTAINED

A position of a switch which remains unchanged when actuation force is removed from switch actuator. Contrast with Momentary.

MAKE-BEFORE-BREAK (shorting, MBB)

Movable contacts make the next circuit before breaking the first circuit. Typically found

in slide switches. Contrast with Break-before-make.

MAKE AND BREAK

Opening one circuit before completing another on the same pole.

MECHANICAL LIFE

The number of operations of a switch without electrical load that does not result in a degradation of parameters beyond the standard set by the applicable end-of-life criteria.

MOISTURE PROOF

Sealed switch will withstand high humidity and limited exterior environment such as rain.

MOMENTARY ACTION

Mechanically returning from a temporary switch position to the normal switch position.

MOVABLE CONTACT

The contact moved by the switch actuator into and away from contact with a fixed contact thus forming the electrical circuits possible for a given device.

NC

See Normally Closed.

NEMA

National Electrical Manufacturers' Association. A US Standards setting group. For switch products most often applied to switches mounted in various enclosures offering specified degrees of protection against intrusion of liquids, dust, corrosive elements, etc. NEMA ratings are common in industrial or outdoor applications. See IP.

NO

See Normally Open.

NON-SHORTING

See Break-Before-Make

NON-SWITCHING RATING

The power carrying capacity of a switch after contact closure and end of contact bounce. Typically far higher than the contact rating (switching rating) of a switch.

NORMALLY CLOSED (NC)

Normally closed contacts are closed when the switch actuator is in its unactuated position (e.g., the plunger is in the resting position in the case of a pushbutton switch).

GLOSSARY

NORMALLY OPEN (NO)

Normally open contacts are open when the switch actuator is in its unactuated or resting position.

OIL-TIGHT

A generic term for a panel seal (see) commonly used in industrial settings. Defined by NEMA (see) standard.

OPEN FRAME

Typical to slide switches ; open frame construction allows for automatic solder process and post solder cleaning. Contrast with «washable».

OPERATING FORCE

See Actuation Force.

OPERATING TEMPERATURE

The range of temperature within which the device may be used.

OPERATOR

A panel-mounted mechanical device (pushbutton, selector, keylock, etc.) without contacts to which one or more contact blocks may be added to make a complete switch (See APEM A01-A02 Series).

OVERTRAVEL

The distance the actuator may move between initial electrical contact position and the extreme mechanical position of the actuator. See Travel, Pretravel.

PANEL SEAL

A panel seal provides a defined level of protection against penetration of liquids through the switch and switch-to-panel interface to the rear of a panel.

PCB

Printed circuit board.

POLE

Single common electrical input having one or more outputs. The number of separate circuits that can be active through a switch at any one time. A single-pole switch allows one closed circuit at a time. A double-pole switch allows two closed circuits, etc.

POWER FACTOR (PF)

A measure of the inductive or capacitive character of an electrical load.

PRETRAVEL

The distance the actuator moves from a rest position

(or free position) to electrical make at another position. See Travel, Overtravel.

PUSH-ON / PUSH-OFF

See Alternate Action.

PUSH-PUSH

See Alternate Action.

QUICK-CONNECT TERMINAL

Flat tab or blade style terminals designed to accept push-on female wire connectors (instead of soldering). The most popular sizes are : 0.250 / 0.187 / 0.110 inch wide.

RATING

See contact rating

RESISTIVE LOAD

Current and voltage are in steady state on opening or closing the switch. See capacitive load, Inductive load, Power factor, Inrush.

SHORTING CONTACT

Contacts which make-before-break. See Make-before-Break

SILICON RUBBER

Rubber made from silicone elastomers which keeps its high level of flexibility, resilience and tensile strength over a wide temperature range.

SINGLE BREAK CONTACTS

A contact mechanism using one set of contacts to make or break a given circuit. Typical of electronic or low power switches. See Double-Break Contacts.

SNAP ACTION

The fast transfer of contacts from one position to another, this action is rather independent of the speed of actuator travel.

SPACING

See Clearance.

SPDT

Single pole double throw. See Pole, See Throw.

SPLASHPROOF

Sealed switch will withstand heavy rain or stream of water. See Panel Seal.

SPRING RETURN

See momentary.

STORAGE TEMPERATURE

The range of temperature within

which the device may be stored. Typically this is a wider range than operating temperature.

SURFACE MOUNT DEVICES (SMD)

Components that are compatible with surface mount PC board technology. Holes are not used for component mounting. Component leads are soldered to pads on the surface of the PC board (on the same side as the components). For switches, typically defined by surface mount terminations (e.g., J-Bend, L-Bend, butt, etc.) and compatibility with surface mount soldering (e.g., vapor phase reflow, infrared, etc.) and cleaning processes.

SURFACE MOUNT TECHNOLOGY (SMT)

See SMD.

TACTILE FEEL (FEEDBACK)

The switching action felt by the operator of the switch (same as click action or positive action). Audible or «feel» snap or click that indicates contact movements.

TERMINAL

The metal portion of a switch, exterior to the body, that is used to connect the switch to an electrical circuit. Example: PC, wire lug, quick-connect, wire-wrap, etc.

THROW

The number of circuits that can be controlled by any one pole of a switch. Example : In a single-pole-double-throw (SPDT) switch, only one circuit may be completed at a time. However, there are two possible circuits (throws) that can be made.

TRANSLUCENT

Transmitting light so that objects lying beyond cannot be seen distinctly.

TRANSPARENT

Transmitting light so that objects lying beyond can be seen distinctly.

TRAVEL

The total distance the actuator can move. See Pretravel, Overtravel.

TWO CIRCUITS

A circuit in which one circuit is completed in one position and another separate circuit is completed in an other position.

UL

Underwriters laboratories Inc.

VAC

Voltage, alternating current (see AC).

VDC

Voltage, direct current (see DC).

VDE

Verband Deutscher Elektrotechniker of Germany.

WASHABLE

Applied to PC board mounted devices indicating compatibility with cleaning processes used after soldering. No degradation of electrical or mechanical parameters occurs. The switch is sealed to keep contaminants out of the contact area.

WAVE SOLDERING

A method of soldering in which a wave of molten solder contacts the components on the PCB as the PC Board with the components is conveyed through the process.

WIPING ACTION

Sliding of contacts over one another resulting in cleaning of the contacts.

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