

APEM

PANEL SWITCHES

PCB SWITCHES

LED INDICATORS

JOYSTICKS

SWITCH PANELS

HUMAN MACHINE INTERFACE PRODUCTS

www.apem.com

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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SWITCH PANELS

SWITCH PANELS	532
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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.

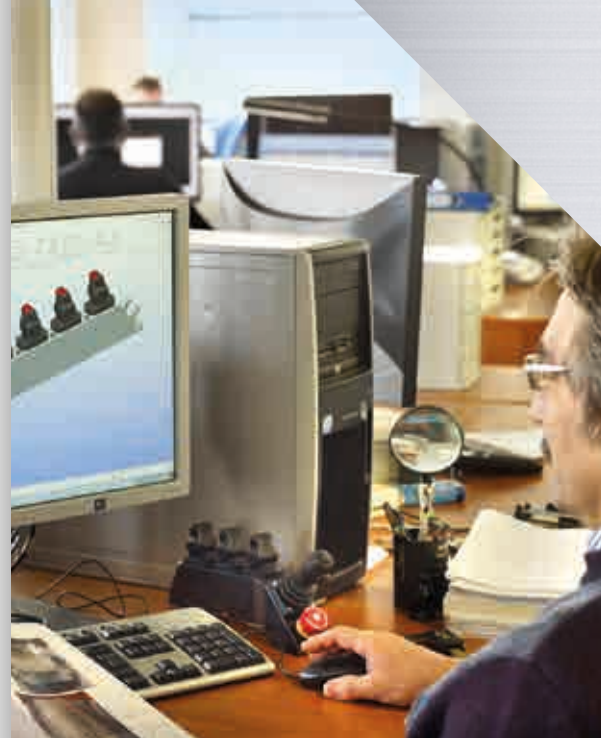
TECHNICAL EXPERTISE

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

★ SWITCHES, MEMBRANE
KEYPADS & CANBUS
CONNECTIVITY

★ APEM'S EXPERTISE WITH
COMPLETE INTERFACE
SOLUTIONS

○○○○ SPACE AND FUNCTION
OPTIMIZATION

☀ HIGH VISIBILITY WITH
BACKLIGHTING AND
ATTRACTIVE FINISH

APEM EXCLUSIVE

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

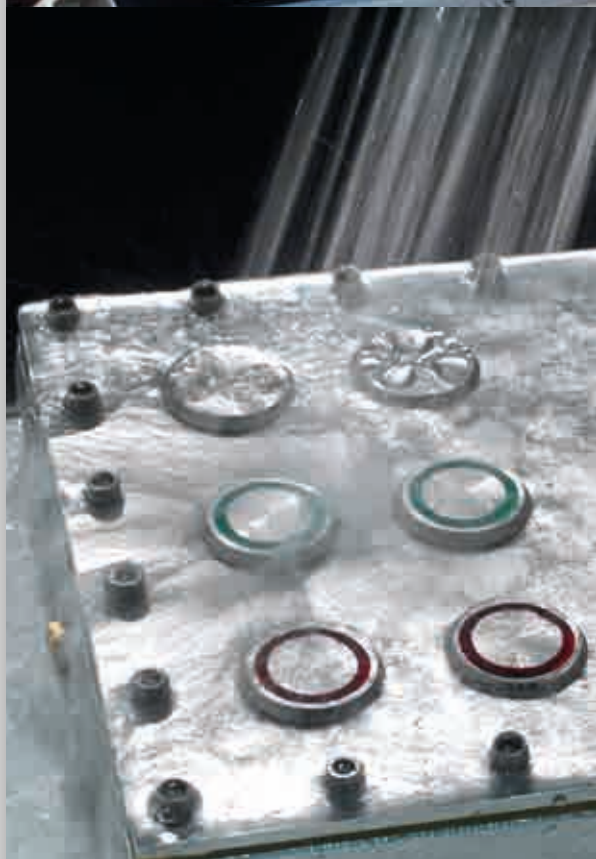
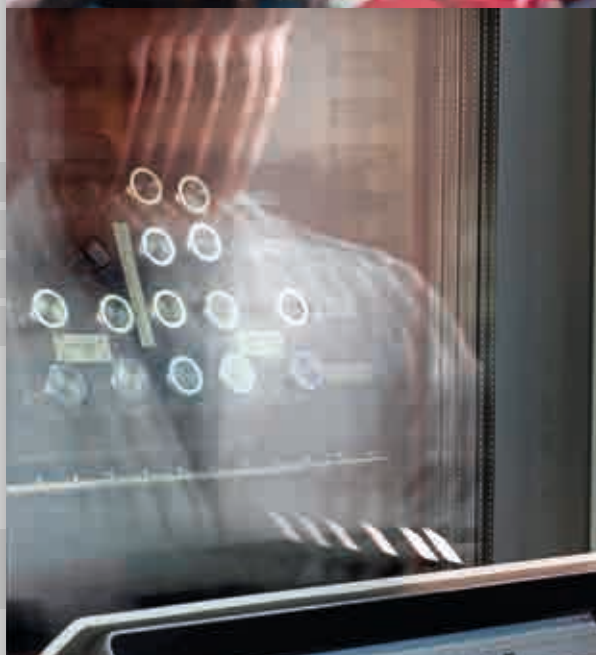
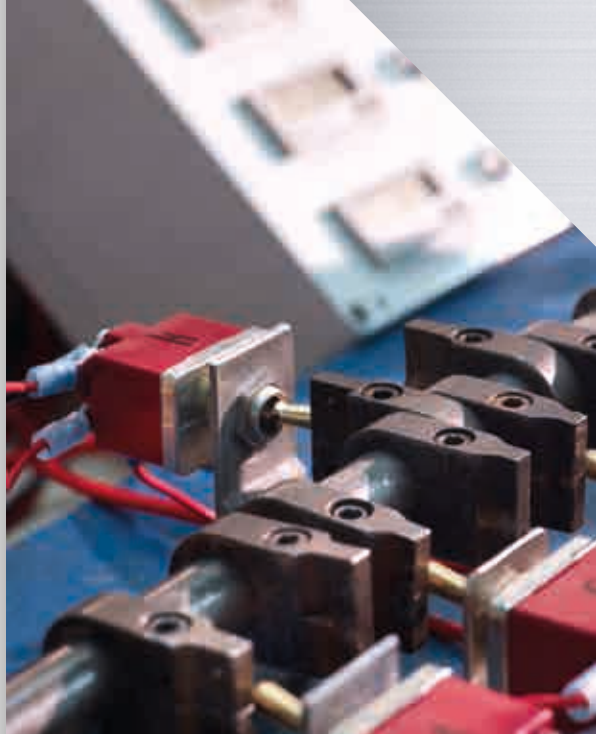
E CECC-IECQ (European)
No 008-95 Standard : CECC 96000

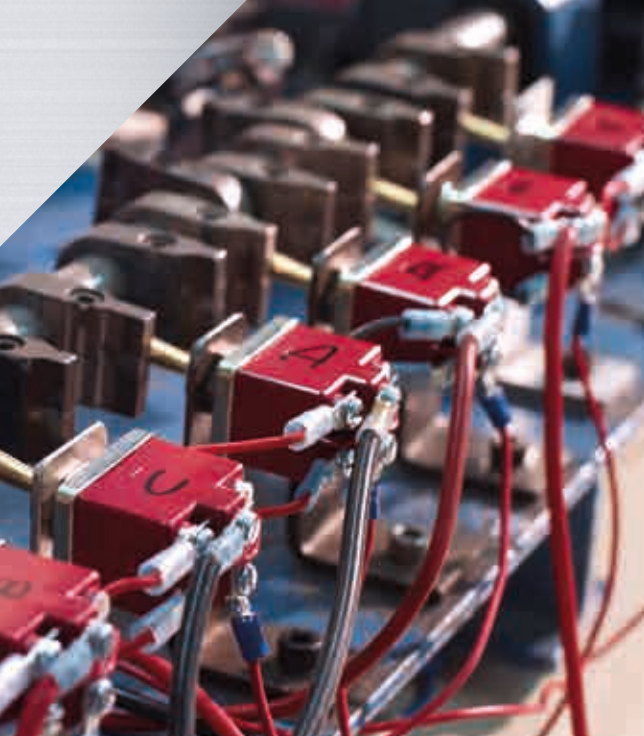
UL Underwriters Laboratories

CSA Canadian Standards Association

NF NF - Normes françaises

VDE VDE - Germany





MILITARY PRODUCT QUALIFICATIONS



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.

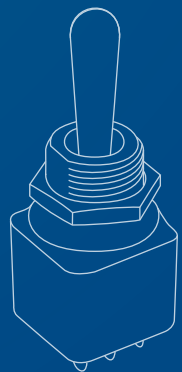
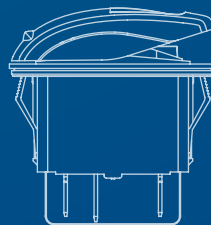
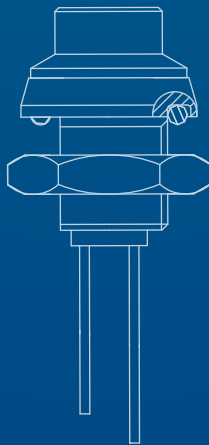
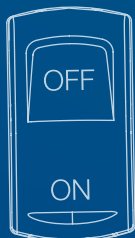
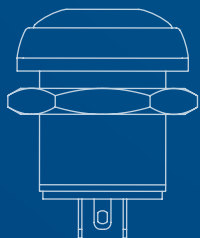
CECC-IEC TYPICAL TESTS

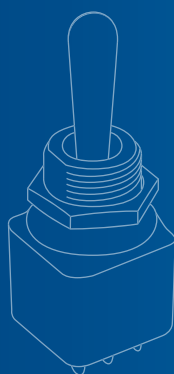
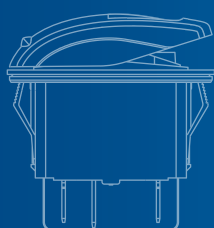
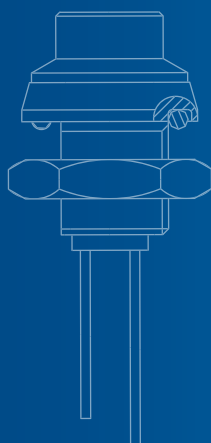
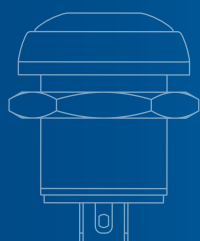
Visual examination:	IEC 521-2 test 1a
Outline dimensions:	IEC 521-2 test 1b
Functional operation:	CECC96000 - §-4-3-1-7
Initial contact resistance:	IEC 512-2 test 2a or 2b
Impact on actuator:	CECC 96000 §-4-3-7-1
Robustness of actuator:	CECC 96000 §-4-3-8-1
Robustness of mounting:	CECC 96000 §-4-3-8-2
Robustness of terminals:	IEC 512-8 test 16f
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 13a
Sealing water proof:	CECC 96000 § 4-3-14-2
Sealing immersion proof:	IEC 68-2-17 test 13f
Sealing (bubble test):	IEC 68-2-17 test 13c
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





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1000	55
4600-4400	57
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PUSHBUTTON SWITCHES "I" RANGE

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PUSHBUTTON SWITCHES

ZP	121
9100-9200-9500	123
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8000	129
9400-9600	133
10400	135
13000	137
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18000	147
AV	151
1200	171
4700-4800	175
CG	177
CP	179
PBA	181
FP	189
FD	195
MP	197
LPI	199
PR AND V	201

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
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EMERGENCY STOP SWITCHES

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A02ES-I	247
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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

12000 SERIES

ROBUST SWITCHES FOR HIGH SPECIFICATION ENVIRONMENTS

APEM
BEST SELLER

PINNED LEVER AS STANDARD
Preventing internal damage to the
contact arm and mechanism

APEM
EXCLUSIVE



CONFORMS TO MIL & CECC
SPECIFICATIONS



PROVEN RELIABILITY IN THE
HARSHEST ENVIRONMENTS



NUMEROUS RATING, SEALING,
LEVER FINISH OPTIONS AND
SEALING BOOTS



HIGH PERFORMANCE
VERSION



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						
Ø11,9 (15/32)				X		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

IR SERIES

INCREASED VISIBILITY

APEM EXCLUSIVE

★ ILLUMINATED BEZEL

★ SPECIFIC BACKLIGHTING
for visibility in any viewing
angleLARGE DIAMETER :
16 MM

FRONT PANEL SEALING

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

PUSHBUTTON SWITCHES



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

APEM EXCLUSIVE

★ 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, EMBOSSING, 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

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

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.

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

APEM
EXCLUSIVE



★ BACKLIT LEGENDS ON METAL INSERTS

★ CHEMICAL ETCHING OF METAL INSERT FOR LIGHT PASSAGE



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	
Straight PC							X
PCB mounting				Option			No

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

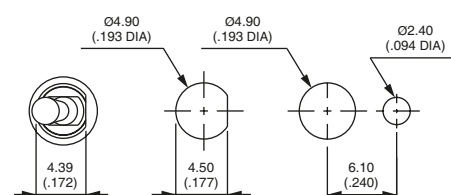
- Strength of terminals : pull-out force 10 N max.
- Torque : 1 Nm max. applied between the 2 nuts
- Max. panel thickness : 1,5 mm (.059) with 2 nuts

The company reserves the right to change specifications without notice.

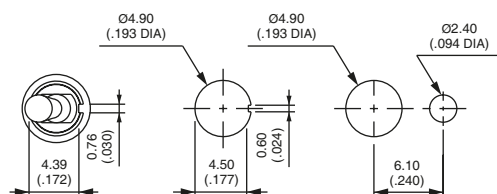


PANEL CUT-OUT

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

ZL

...

SERIES

...

NUMBER OF POLES

...

ELECTRICAL FUNCTIONS

...

TERMINALS

3 Single pole	<table style="width: 100%; border-collapse: collapse;"> <tr><td style="border: 1px solid black; padding: 2px;">1</td><td>ON</td><td>-</td><td>OFF</td></tr> <tr><td style="border: 1px solid black; padding: 2px;">6</td><td>ON</td><td>-</td><td>ON</td></tr> <tr><td style="border: 1px solid black; padding: 2px;">9</td><td>ON</td><td>OFF</td><td>ON</td></tr> <tr><td style="border: 1px solid black; padding: 2px;">7</td><td>MOM</td><td>OFF</td><td>MOM</td></tr> <tr><td style="border: 1px solid black; padding: 2px;">8</td><td>ON</td><td>OFF</td><td>MOM</td></tr> <tr><td style="border: 1px solid black; padding: 2px;">2</td><td>ON</td><td>-</td><td>MOM</td></tr> </table>	1	ON	-	OFF	6	ON	-	ON	9	ON	OFF	ON	7	MOM	OFF	MOM	8	ON	OFF	MOM	2	ON	-	MOM	S0 Solder lug P0 Straight PC
1	ON	-	OFF																							
6	ON	-	ON																							
9	ON	OFF	ON																							
7	MOM	OFF	MOM																							
8	ON	OFF	MOM																							
2	ON	-	MOM																							

OPTIONS

...

CONTACT AND TERMINAL MATERIALS

...

BUSHINGS

...

MODELS

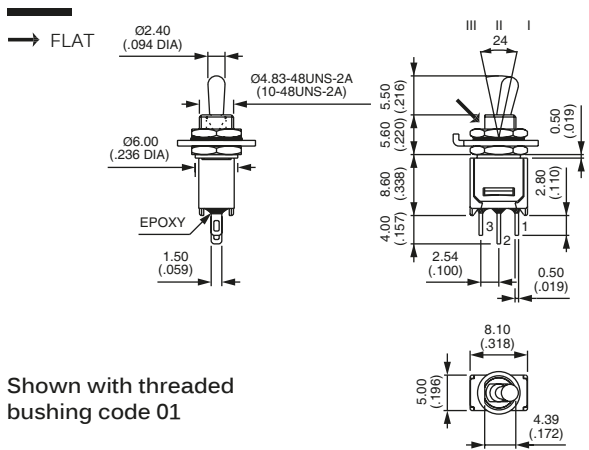
0 Brass, gold plated 1 Brass, silver plated 3 Brass, gold plated (1,27 micron gold)	01 Threaded, with flat 02 Threaded, with keyway	00 Standard model
---	--	---

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.



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.



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

AGENCY APPROVALS



2A 250VAC
4A 125VAC



CECC 96201-006

S series

Washable miniature toggle switches •
plain bushing



BUILD YOUR PART NUMBER

BASIC PART NUMBER

SERIES	TERMINALS	TERMINAL SPACING	NUMBER OF POLES	ELECTRICAL FUNCTIONS
S				
	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 Availability : Consult factory for details of approved models.	X601 Silver plated brass contacts	U270 For lever 13
AD Silver, gold plated	-13 Long	CECC	X696 Higher bushing (for insulated levers)	U1710 For lever 7
CD Brass, gold plated	Insulated levers			
	-11 Long			
	-8 Short			

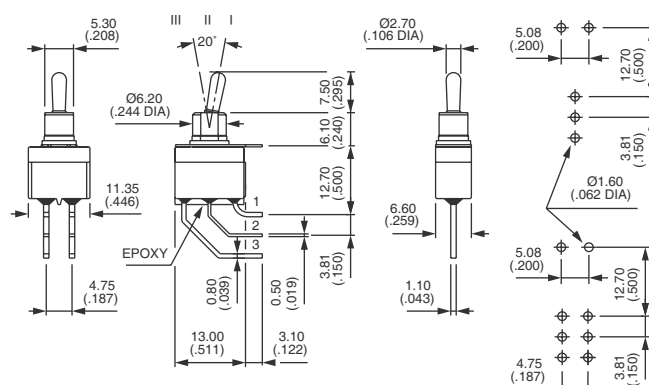
NOTICE : please note that not all combinations of above numbers are available.
Refer to www.apem.com for further information.

RIGHT ANGLE TERMINALS - VERTICAL



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

Shown with lever -7



*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



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



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

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.

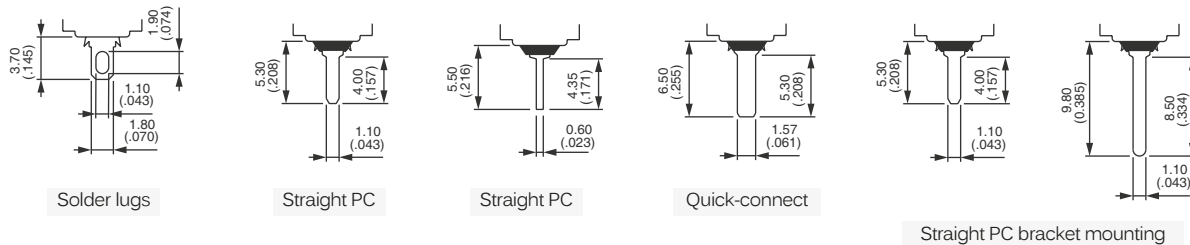
Marking : to order switches marked UL, CSA or CECC, complete appropriate box of ordering format. The preferential list does not appear on the switches.

5000 series

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

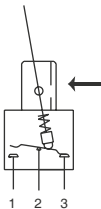


TERMINALS

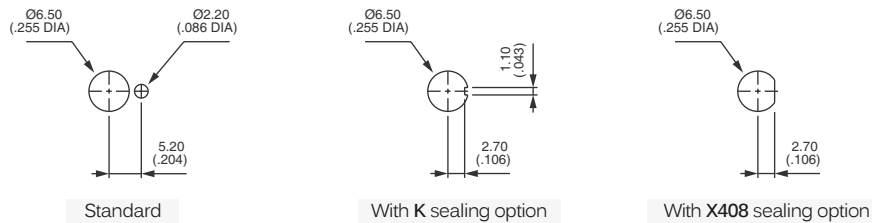


ELECTRICAL FUNCTION

→ KEYWAY

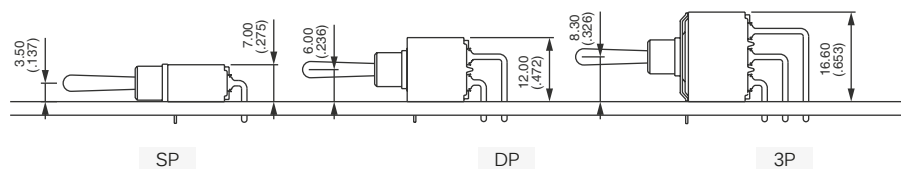


PANEL CUT-OUT

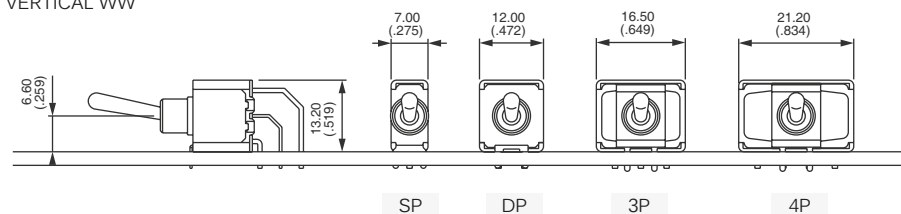


PCB MOUNTING FOR RIGHT ANGLE TERMINAL MODELS

HORIZONTAL W



VERTICAL WW



5000 series

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

BUILD YOUR PART NUMBER

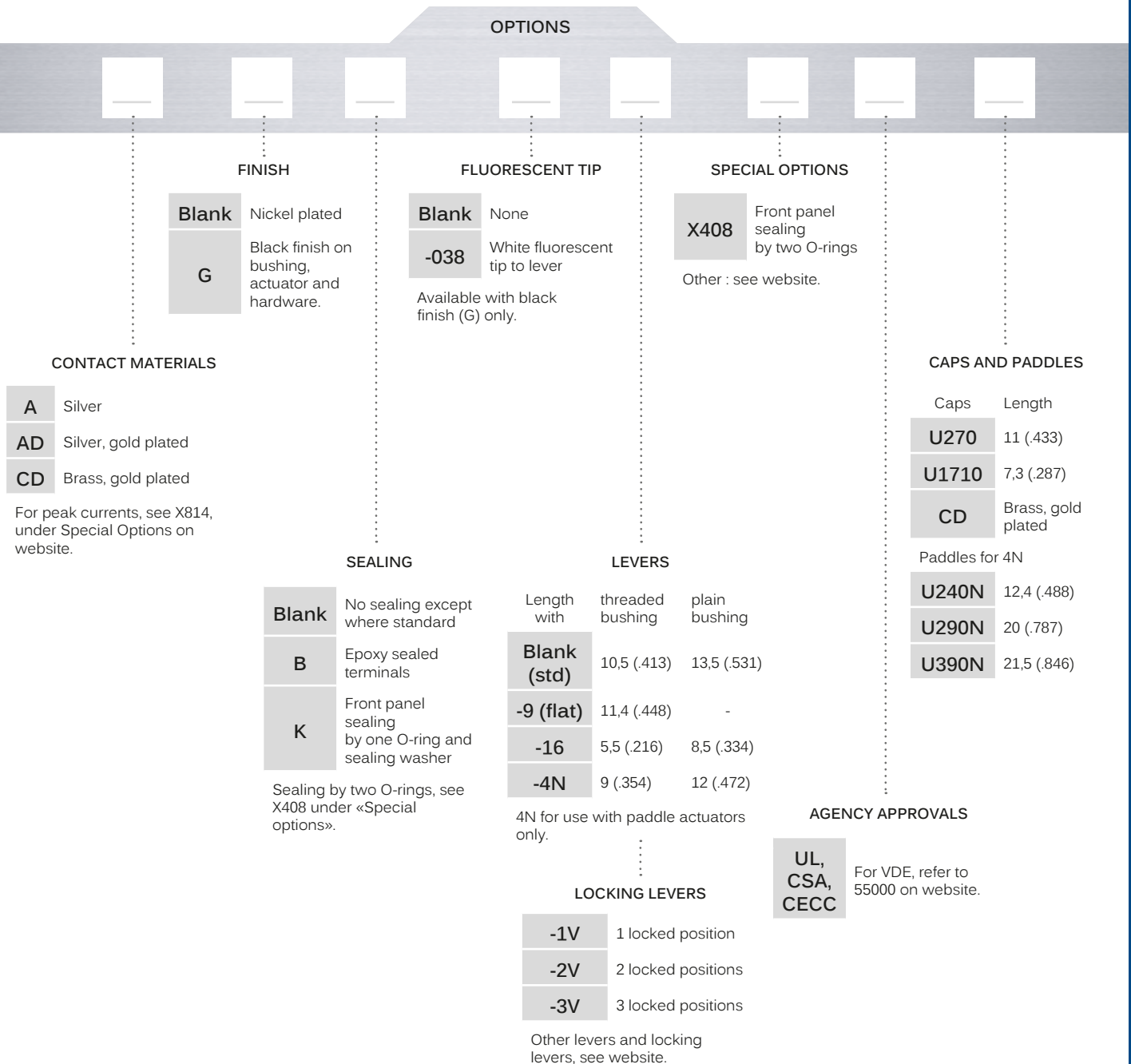
BASIC PART NUMBER

5 SERIES	NUMBER OF POLES 3 Single pole 4 Double pole 5 Three pole 6 Four pole	TERMINALS 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)	MOMENTARY FOR FUNCTION 4 1R ON ON MOM 2R MOM ON MOM	TERMINALS AND BUSHINGS 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	ELECTRICAL FUNCTIONS <table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 10%;">6</td><td style="width: 10%;">ON</td><td style="width: 10%;">-</td><td style="width: 10%;">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>2</td><td>ON</td><td>-</td><td>MOM</td></tr> <tr><td>4</td><td>ON</td><td>ON</td><td>ON</td></tr> <tr><td></td><td>ON</td><td>ON</td><td>MOM ▲</td></tr> <tr><td></td><td>MOM</td><td>ON</td><td>MOM ▲</td></tr> </table> Function 4 Must not have blank in «connections» box. ▲ Must not have blank in «momentary» box.	6	ON	-	ON	9	ON	OFF	ON	7	MOM	OFF	MOM	8	ON	OFF	MOM	2	ON	-	MOM	4	ON	ON	ON		ON	ON	MOM ▲		MOM	ON	MOM ▲	CONNECTIONS FOR FUNCTION 4 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.
6	ON	-	ON																																			
9	ON	OFF	ON																																			
7	MOM	OFF	MOM																																			
8	ON	OFF	MOM																																			
2	ON	-	MOM																																			
4	ON	ON	ON																																			
	ON	ON	MOM ▲																																			
	MOM	ON	MOM ▲																																			

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



	III	II	I
5636	2-3 ON	-	1-2 ON
5639	ON	OFF	ON
5637	MOM	OFF	MOM
5638	ON	OFF	MOM
5632	ON	-	MOM

SOLDER LUG TERMINALS DOUBLE POLE



	III	II	I
5646	2-3 ON	-	1-2 ON
5649	ON	OFF	ON
5647	MOM	OFF	MOM
5648	ON	OFF	MOM
5642	ON	-	MOM
5644*	ON	ON	ON
5644 1R*	ON	ON	MOM
5644 2R*	MOM	ON	MOM

SOLDER LUG TERMINALS THREE POLE



	III	II	I
5656	2-3 ON	-	1-2 ON
5659	ON	OFF	ON
5657	MOM	OFF	MOM
5658	ON	OFF	MOM
5652	ON	-	MOM

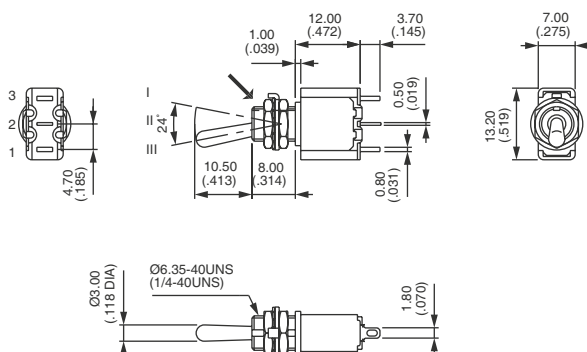
SOLDER LUG TERMINALS FOUR POLE



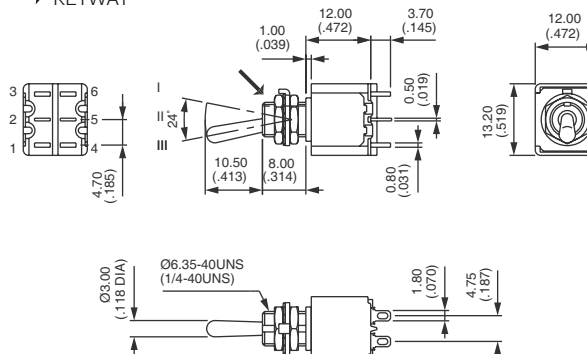
	III	II	I
5666	2-3 ON	-	1-2 ON
5669	ON	OFF	ON
5667	MOM	OFF	MOM
5668	ON	OFF	MOM
5662	ON	-	MOM
5664*	ON	ON	ON
5664 1R*	ON	ON	MOM
5664 2R*	MOM	ON	MOM

→ KEYWAY

Shown with standard lever

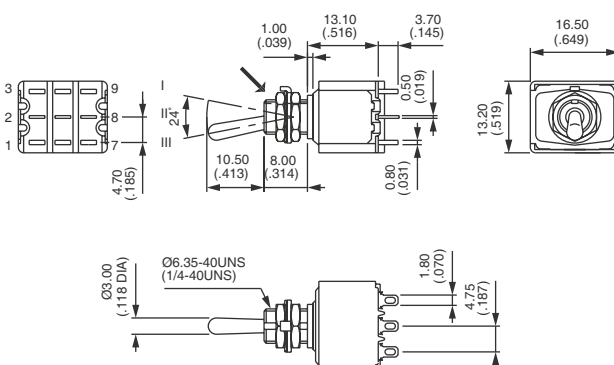


→ KEYWAY

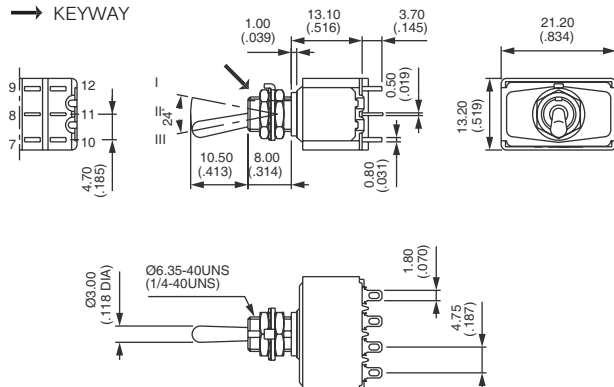


*Function 4 : SP in DP case - specify CT or TH connections.

→ KEYWAY



→ KEYWAY



*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.

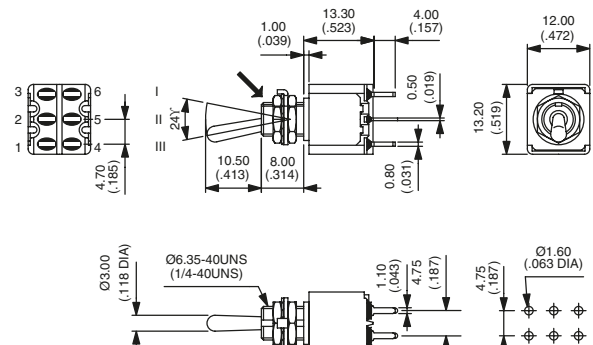
RIGHT ANGLE TERMINALS - HORIZONTAL SINGLE POLE



	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

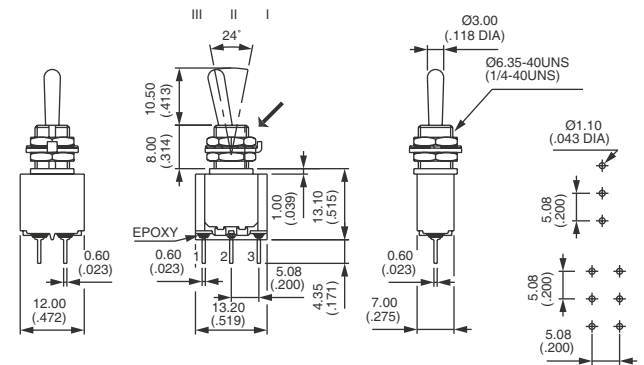
→ KEYWAY

Shown with standard lever



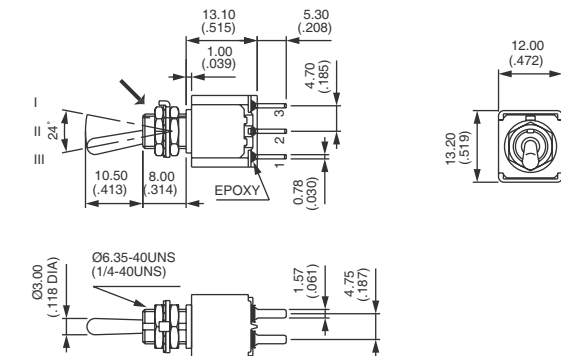
*Function 4 : SP in DP case - specify CT or TH connections.

→ KEYWAY



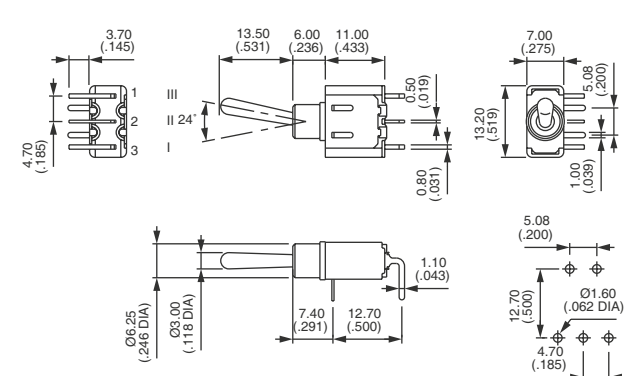
*Function 4 : SP in DP case - specify CT or TH connections.

→ 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		1-2
	5-6		4-5
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		1-2
	ON	-	ON
5236WW	ON	OFF	ON
5239WW	MOM	OFF	MOM
5237WW	ON	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		1-2
	5-6		4-5
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.

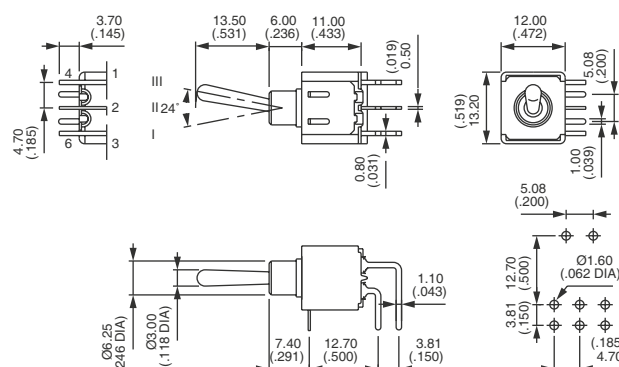
SHORT BRACKET - WIDTH 15,75 (.620) DOUBLE POLE



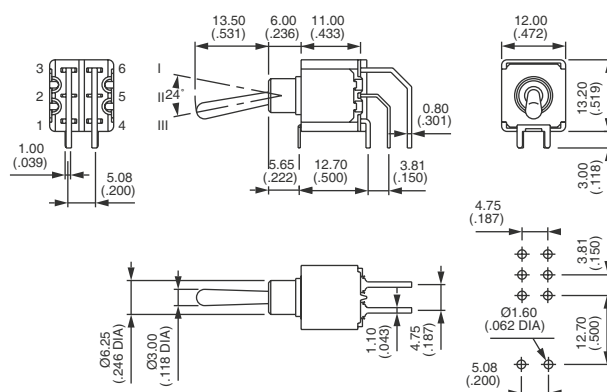
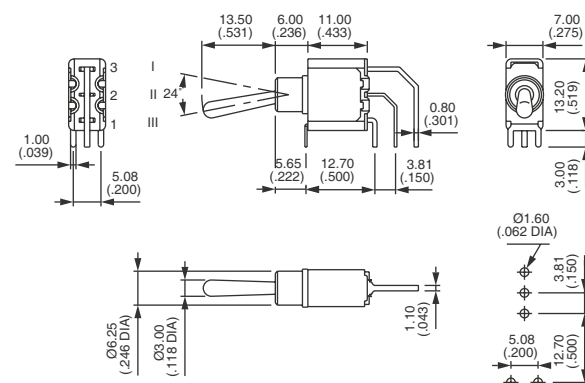
	III	II	I
	2-3		1-2
	5-6		4-5
5246Y B	ON	-	ON
5249Y B	ON	OFF	ON
5247Y B	MOM	OFF	MOM
5248Y B	ON	OFF	MOM
5242Y B	ON	-	MOM
5244Y B*	ON	ON	ON
5244Y 1R B*	ON	ON	MOM
5244Y 2R B*	MOM	ON	MOM

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

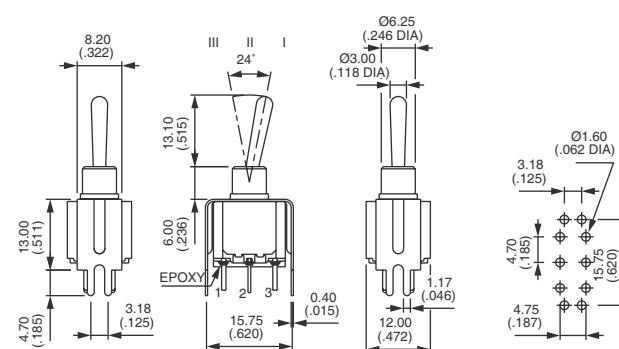
Shown with standard lever



*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

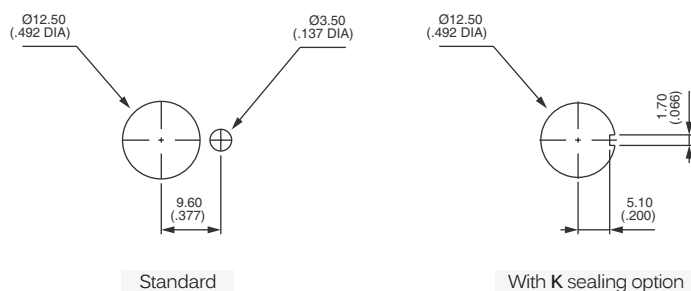
1 to 4 pole configurations

UL and CSA approved

SPECIFICATIONS : see 5000 series.

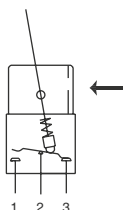


PANEL CUT-OUT

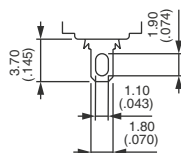


ELECTRICAL FUNCTION

→ 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

BASIC PART NUMBER

SERIES	TERMINALS	NUMBER OF POLES	TERMINALS	MOMENTARY FOR FUNCTION 4
5				
2	Straight PC terminals, 4,70 (.185) terminal spacing	3 Single pole	M Solder lugs with Ø 11,9 (15/32) bushing	1R ON ON MOM
6	Solder lug terminals	4 Double pole		2R MOM ON MOM
		5 Three pole		Leave blank for other functions.
		6 Four pole		

ELECTRICAL FUNCTIONS			CONNECTIONS FOR FUNCTION 4		
6	ON	- ON	8	ON	OFF MOM
9	ON	OFF ON	2	ON	- MOM
7	MOM	OFF MOM	4	ON ON MOM ▲	ON ON MOM ▲

Function 4
▲ Must not have blank in «momentary» box.
Wiring diagrams, see Technical information, end of catalog.

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.

OPTIONS

CONTACT MATERIALS	FINISH	SEALING	LEVERS	AGENCY APPROVALS
A Silver	Blank Nickel plated	Blank No sealing	Blank (std) Length 17,5 (.688)	UL, CSA Availability : Consult factory for details of approved models.
AD Silver, gold plated	G Black finish on bushing, actuator and hardware.	B Epoxy sealed terminals		
CD Brass, gold plated		K Front panel sealing by one O-ring and sealing washer		

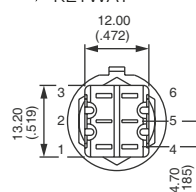
NOTICE : please note that not all combinations of above numbers are available.
Refer to www.apem.com for further information.

SOLDER LUG TERMINALS DOUBLE POLE

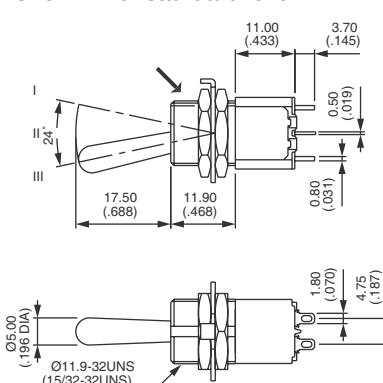


	III	II	I
	2-3		1-2
	5-6		4-5
5646M	ON	-	ON
5649M	ON	OFF	ON
5647M	MOM	OFF	MOM
5648M	ON	OFF	MOM
5642M	ON	-	MOM
5644 M*	ON	ON	ON
5644M 1R*	ON	ON	MOM
5644M 2R*	MOM	ON	MOM

KEYWAY



Shown with standard lever



*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



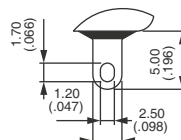
CECC 96201-005
CECC 96201-008

Availability : consult factory for details of approved models.

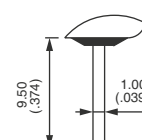
Marking : to order switches marked CECC, complete appropriate box of ordering format.



TERMINALS



Solder lugs

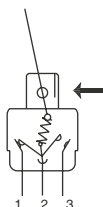


Straight PC

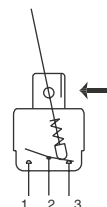


ELECTRICAL FUNCTIONS

→ KEYWAY



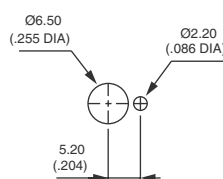
Function 6



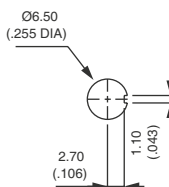
Other functions



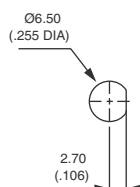
PANEL CUT-OUT



Standard



With K sealing option



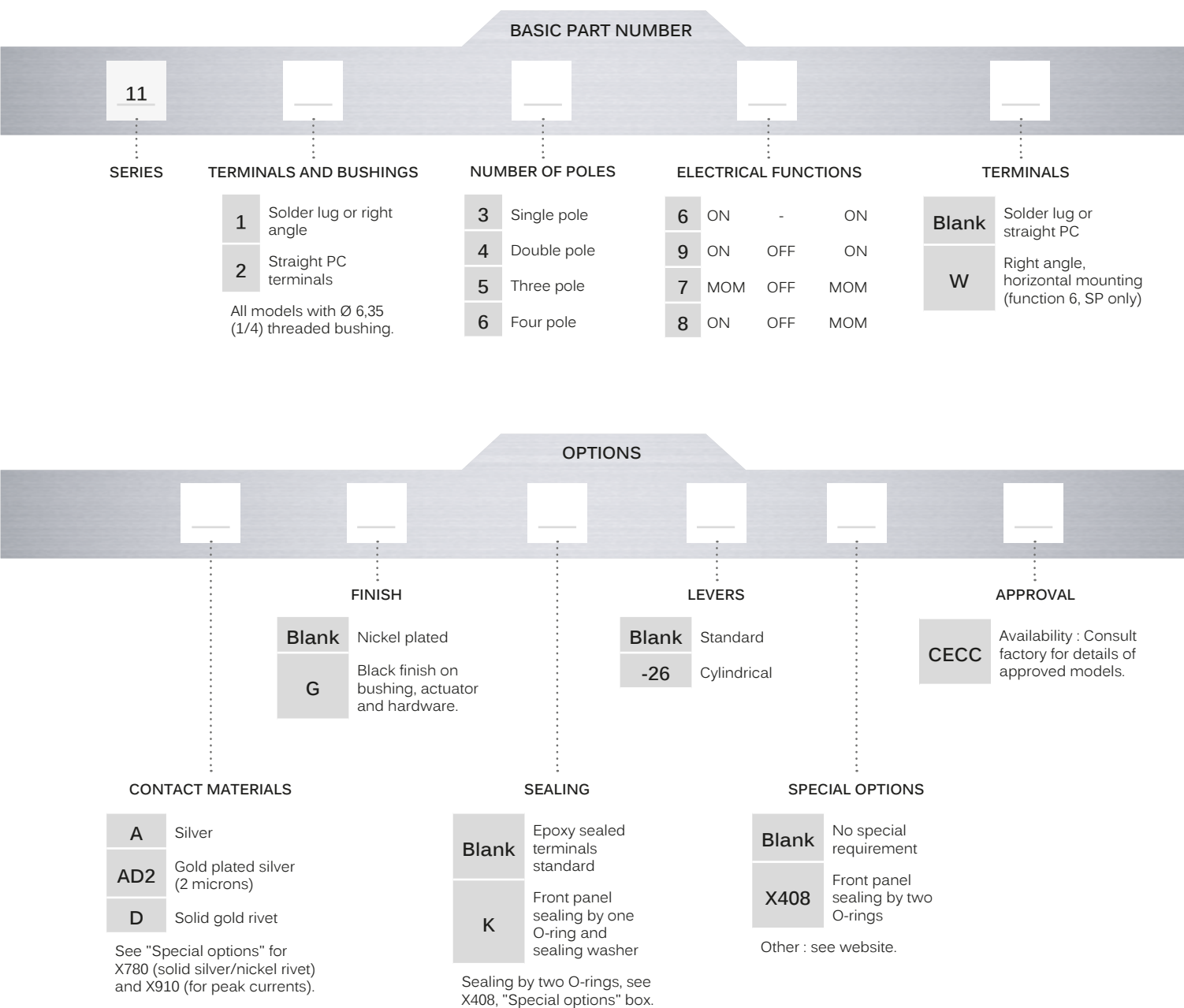
With X408 sealing option

11000 series

Professional toggle switches • threaded bushing Ø 6,35 mm



BUILD YOUR PART NUMBER



ABOUT THIS SERIES



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 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

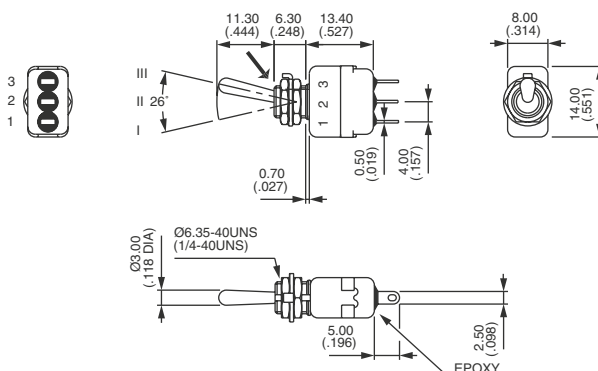
SOLDER LUG TERMINALS - FOUR POLE



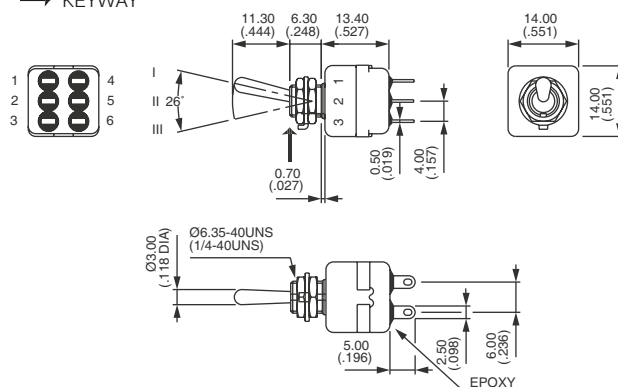
	I	II	III
11166	ON	-	ON
11169	ON	OFF	ON
11167	MOM	OFF	MOM
11168	ON	OFF	MOM

→ KEYWAY

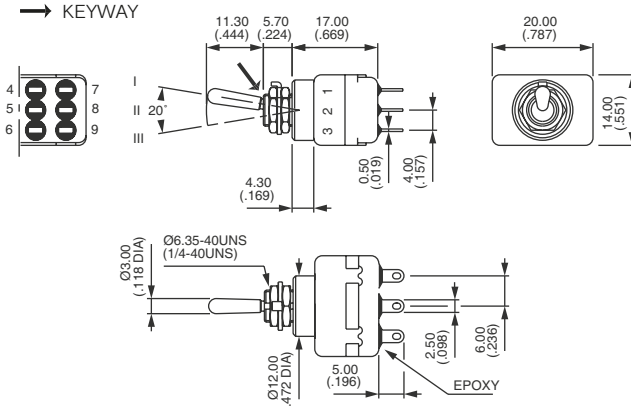
Shown with standard lever



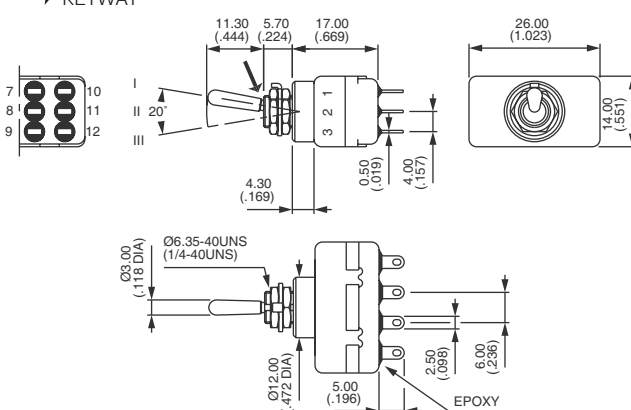
→ KEYWAY



→ 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

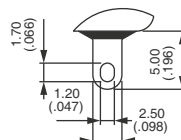
Designed to MIL specifications

Availability : consult factory for details of approved models.

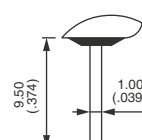
Marking : to order switches marked CECC, complete appropriate box of ordering format.



TERMINALS



Solder lugs

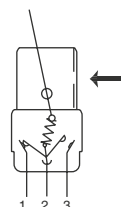


Straight PC

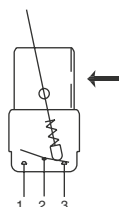


ELECTRICAL FUNCTIONS

→ KEYWAY



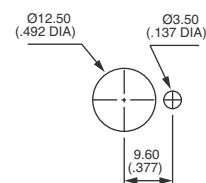
Function 6



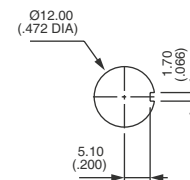
Other functions



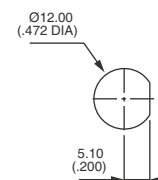
PANEL CUT-OUT



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 2 Straight PC terminals All models with threaded bushing Ø 11,9 (15/32). Bushing Ø 15 (.590), see website.	4 Double pole 5 Three pole 6 Four pole	6 ON - ON 9 ON OFF ON 7 MOM OFF MOM 8 ON OFF MOM 5 - ON MOM 4 ON ON ON ON ON MOM ▲ MOM ON MOM ▲	1R ON ON MOM 2R MOM ON MOM Leave blank for other functions.
Function 4 ▲ Must not have blank in «momentary» box.				
	FINISH	FLUORESCENT TIP	SPECIAL OPTIONS	
	Blank Bright chrome finish on actuator G Black finish on bushing, actuator and hardware. Other : see website.	Blank None -038 White fluorescent tip to lever Available with black finish (G) only.	Blank No special requirement X408 Front panel sealing by two O-rings X822 Bushing Ø 15 (.590) Other : see website.	
CONTACT MATERIALS	SEALING	LEVERS	APPROVALS	
A Silver AD2 Silver, gold plated (2 micron gold)) D Solid gold rivet Other : see website.	Blank Epoxy sealed terminals standard K Front panel sealing by one O-ring and sealing washer Sealing by two O-rings, see X408, "Special options" box.	Blank Standard lever -12 Short lever : LOCKING LEVERS -1V 1 locked position -2V 2 locked positions -3V 3 locked positions Other : see website.	CECC Availability : Consult factory for details of approved models.	



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 ▲

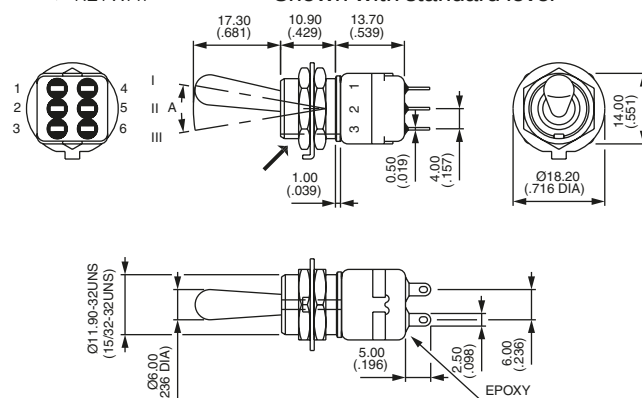


	Angle of throw (A)	I	II	III
12266	26°	ON	-	ON

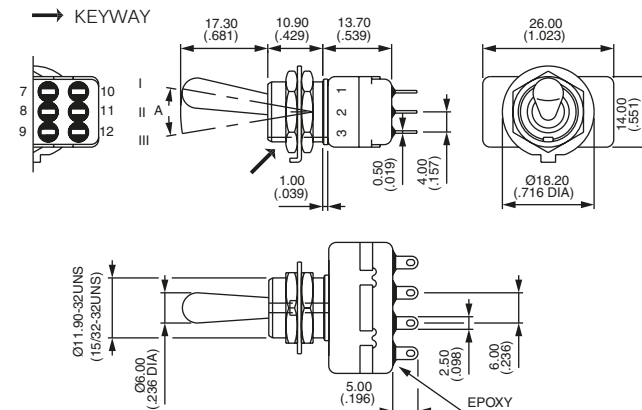
▲ 3,5 mm (.138) short terminals available on request for function 6. Standard for functions 9, 7, 8, 4 and 5.

→ KEYWAY

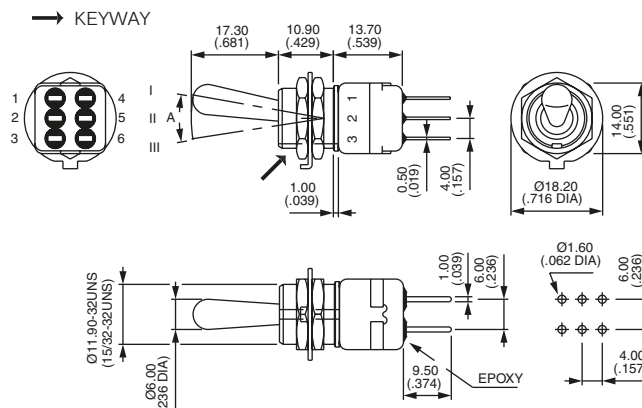
Shown with standard lever



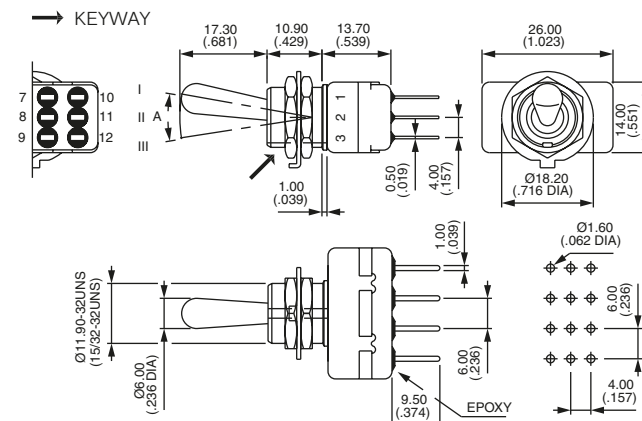
→ KEYWAY



→ KEYWAY



→ KEYWAY



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

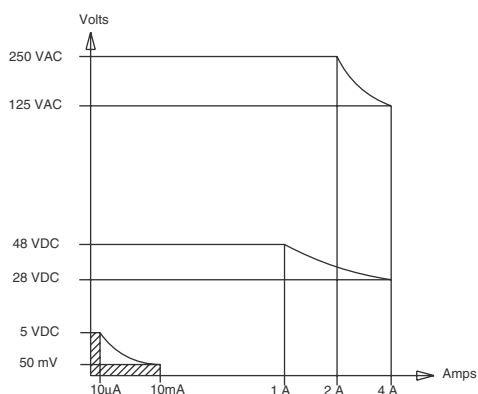
Double shell case for high mechanical strength and high electrical insulation

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



GENERAL SPECIFICATIONS

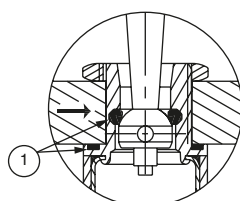
- Torque : 1,50 Nm (1.10 Ft.lb) max. applied to nut
- Panel thickness : 8 mm (.314) max. - 3 mm (.118) min.



SEALING

- Front panel sealing by two O-rings
Flatted 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

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.

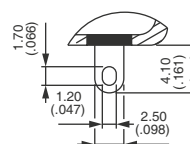


MATERIALS

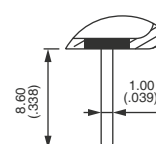
- Case : diallylphthalate (DAP) with plastic external shell (epoxy sealed)
- Actuator : brass, black chrome plated
- Bushing : brass, black chrome plated
- Contacts : solid rivet - gold plated silver/nickel alloy



TERMINALS



Solder lugs

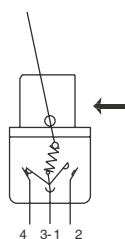


Straight PC

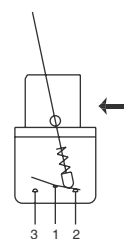


ELECTRICAL FUNCTIONS

→ FLAT



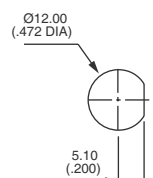
Function 6



Other functions



PANEL CUT-OUT



12000X778 series

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



BUILD YOUR PART NUMBER

BASIC PART NUMBER				
SERIES	TERMINALS AND BUSHINGS	NUMBER OF POLES	ELECTRICAL FUNCTIONS	MOMENTARY FOR FUNCTION 4
12	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 ON MOM Δ 4 ON ON 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
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 Other : see website.	High performance fully sealed black switches.	CECC Availability : Consult factory for details of approved models.



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 ▲

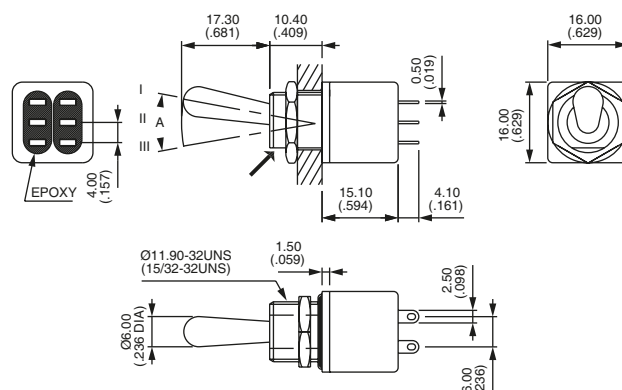


	Angle of throw (A)	I	II	III
12266 X778	26°	ON	-	ON

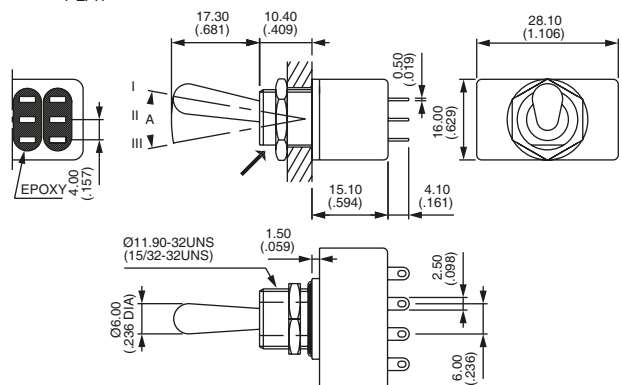
▲ 3,5 mm (.138) short terminals available on request for function 6. Standard for functions 9, 7, 8, 4 and 5.

→ FLAT

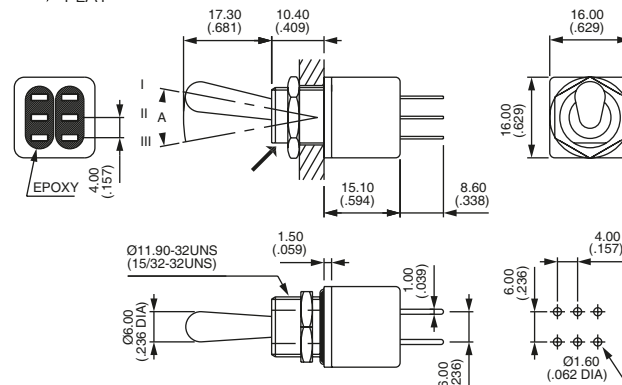
Shown with standard lever



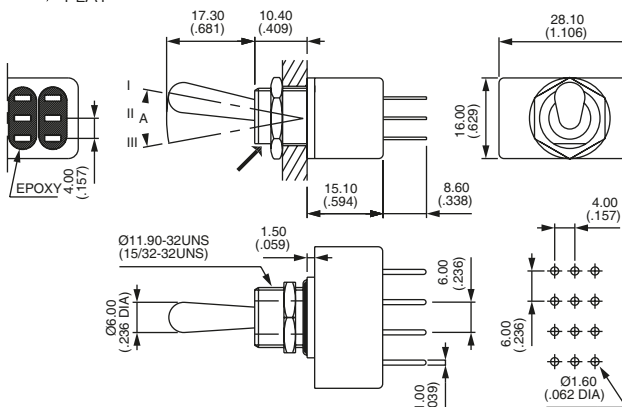
→ FLAT



→ FLAT



→ FLAT



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



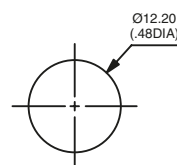
MATERIALS

- 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.



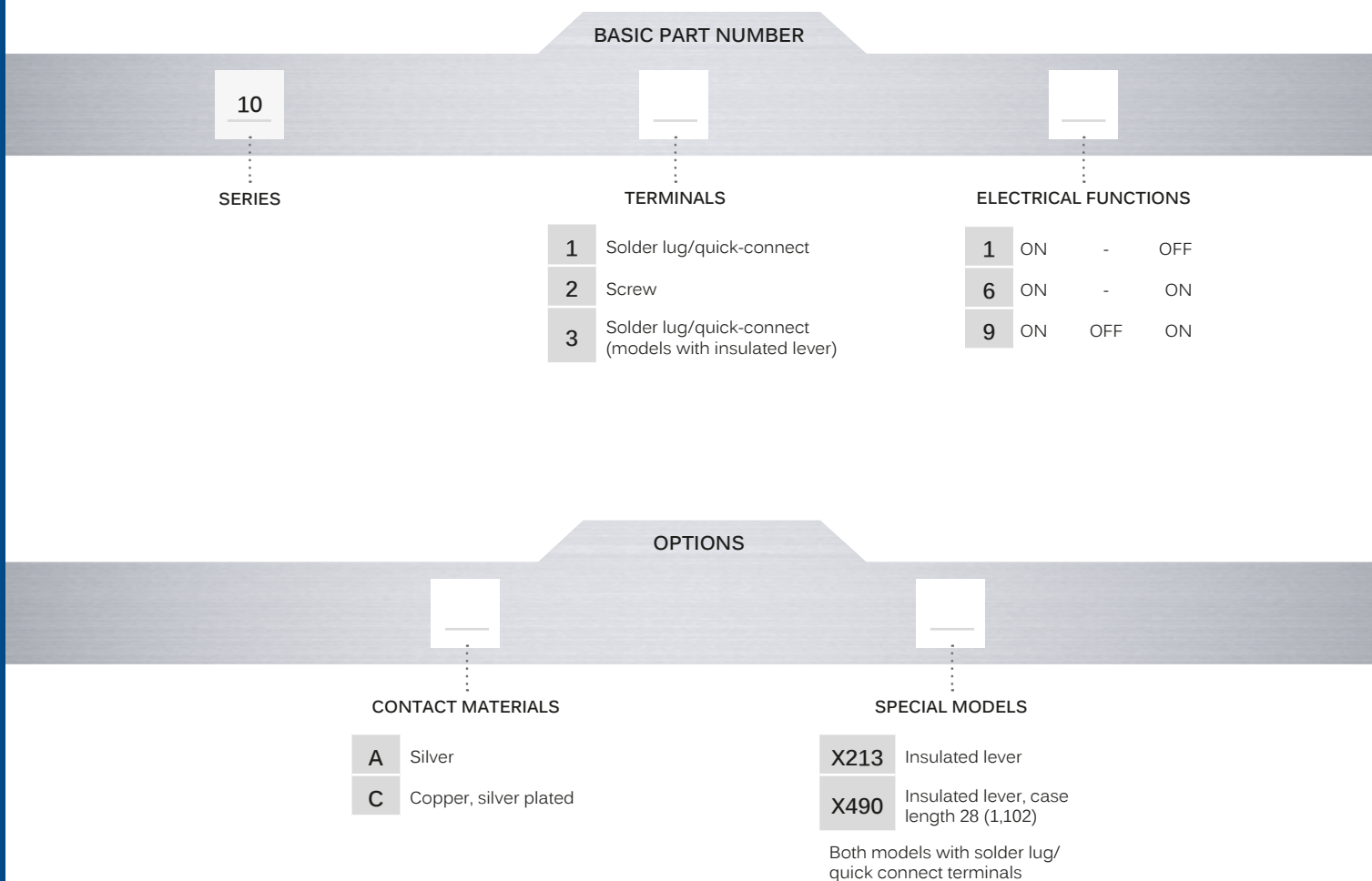
PANEL CUT-OUT



Toggle switches • metal lever • economy range



BUILD YOUR PART NUMBER

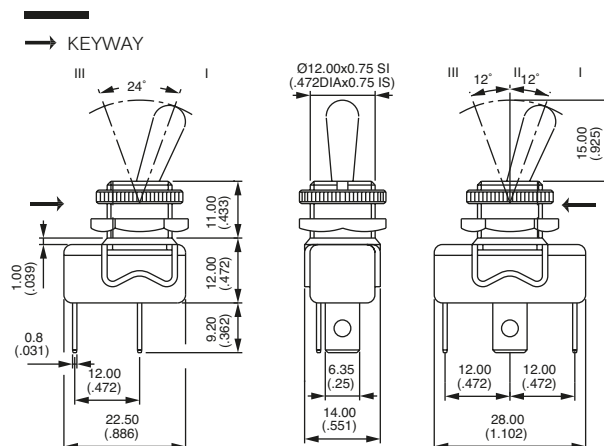


NOTICE : please note that not all combinations of above numbers are available. Refer to www.apem.com for further information.

SOLDER LUG/QUICK-CONNECT TERMINALS



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



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)



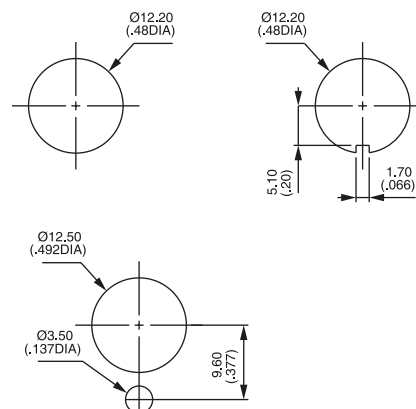
MATERIALS

- 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

SERIES	TERMINALS	NUMBER OF POLES	ELECTRICAL FUNCTIONS
4	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	ACTUATORS	ACTUATOR COLORS	APPROVALS
A Silver	1 and 2 pole models	1 Blue	UL CSA VDE (EN 61058-1)
	-2 Insulated flat lever Standard	2 Black (std)	
	3 pole models	3 Green	
	Blank Round metal lever	4 Grey	
	-32 Insulated round lever, black	5 Yellow	
		6 Red	
		7/1 White	
		9 Orange	

For SP and DP models only.

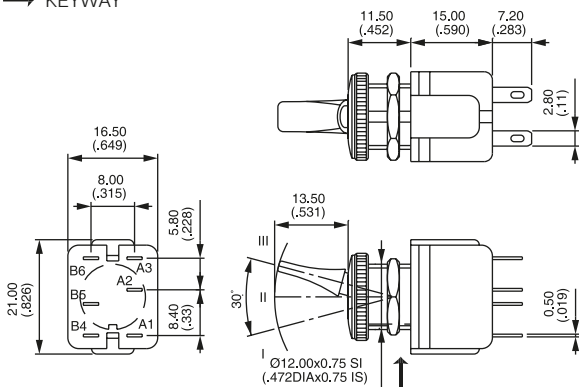
NOTICE : please note that not all combinations of above numbers are available. Refer to www.apem.com for further information.

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
		UL 1054	CSA 22-2	EN 61058-1
Single and double pole	ON - OFF (1)	15A 1/2 HP 125-250VAC		10(4)A 400VAC T 85/55 (600H)
	ON - ON (6)			
	Other (4-5-7-8-9)	10A 1/2 HP 125-250VAC		
Three pole	ON - OFF (1) & ON - ON (6)	15A 1/2 HP 125-250VAC		T 125/55 (600NH)
	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

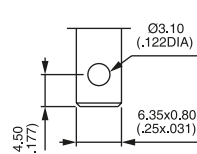


GENERAL SPECIFICATIONS

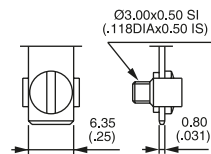
- Torque : 1,50 Nm (1.10 Ft.lb) max. applied to nut
- Panel thickness : 4,5 mm (.177) max. between 2 nuts
- Operating temperature : -20°C to +55°C



TERMINALS



600H/2



600H

AGENCY APPROVALS



EN 61058-1 EN 61058-1

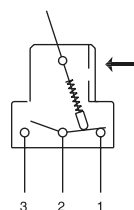
Availability : see chart on previous page.

Marking : approved models are standard marked.

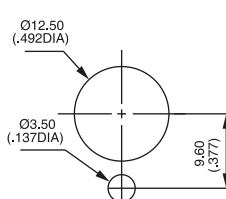
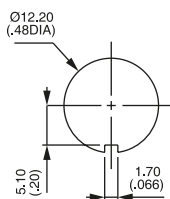
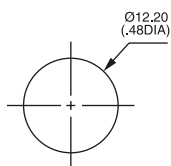


ELECTRICAL FUNCTIONS

→ KEYWAY



PANEL CUT-OUT



600H-600NH series

Toggle switches • high amperage



BUILD YOUR PART NUMBER

BASIC PART NUMBER									
6									
SERIES	NUMBER OF POLES	ELECTRICAL FUNCTIONS			ACTUATOR AND TERMINALS			MOMENTARY	
3	Single pole	1	ON	-	OFF	H	Metal lever, screw terminals	-1R	ON ON MOM
4	Double pole	5	MOM	-	ON	H/2	Metal lever, solder lug/quick-connect terminals	-2R	MOM ON MOM
5	Three pole	6	ON	-	ON	NH	Insulated lever, screw terminals		
For 4 pole, see 660 series on website.		7	MOM	OFF	MOM	NH/2	Insulated lever, solder lug/quick-connect terminals		
		8	ON	OFF	MOM	NH/3	Insulated lever, normalized quick-connect terminals		
		9	ON	OFF	ON				
		4	ON ON ON	ON ON ON	ON MOM Δ MOM Δ				
			MOM	ON	MOM Δ				
Δ Must not have blank in "momentary" box.									
OPTIONS									
OPTIONS					LOCKING LEVERS				
For models with metal lever only									
T	Tropicalized case								
K	Front panel sealing								
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								
-1V	1 locked position								
-2V	2 locked positions								
-3V	3 locked positions								

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	

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	

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	

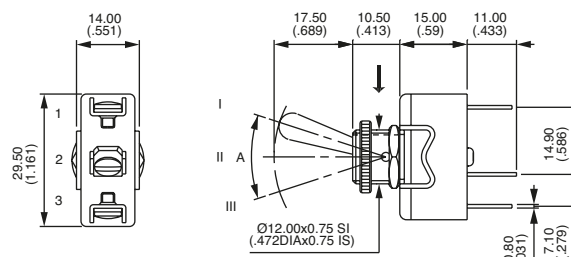
SINGLE POLE INSULATED LEVER



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	

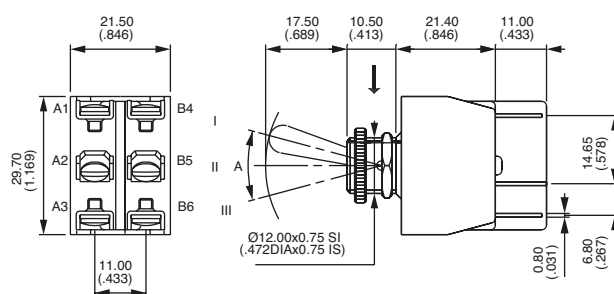
→ KEYWAY

A = Angle of throw



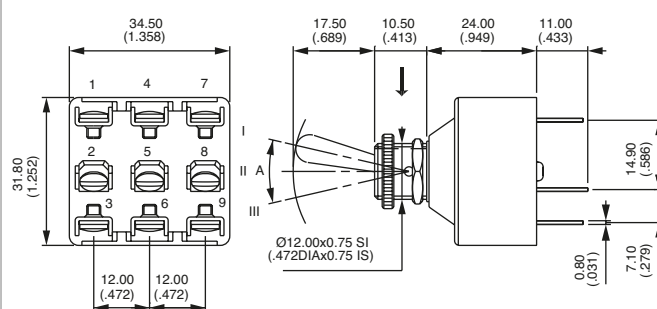
Angle of throw with K sealing option :
functions 1, 5, 6, 7 : 26° - functions 8, 9 : 32°

→ KEYWAY

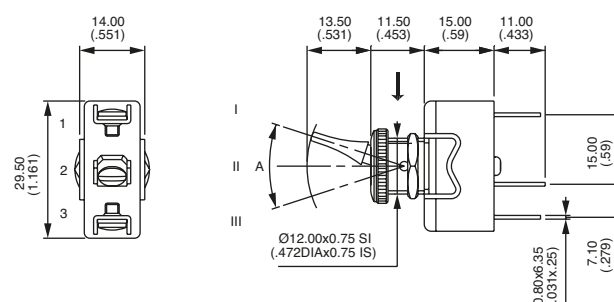


*Function 4 : SP in DP case - see end of catalog.

→ KEYWAY



→ 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.



MATERIALS

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

AGENCY APPROVAL



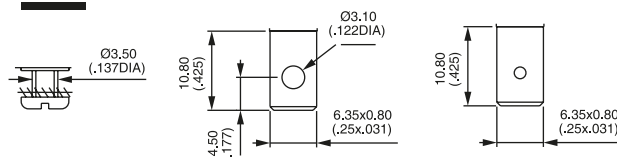
CECC 96201-004

Availability : consult factory for details of approved models.

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

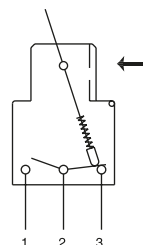


TERMINALS



ELECTRICAL FUNCTIONS

→ KEYWAY



PANEL CUT-OUT

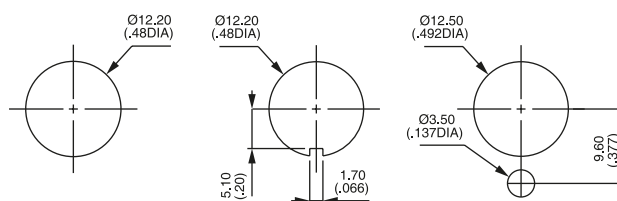


Figure 1

Figure 2

Figure 3

3500 series

High performance toggle switches • environmentally sealed



BUILD YOUR PART NUMBER

BASIC PART NUMBER

SERIES	NUMBER OF POLES	ELECTRICAL FUNCTIONS	TERMINALS
35			
	3 Single pole	1-0 ON - OFF	0 Screw
	4 Double pole	2-0 ON - m.OFF	2 Solder lug/quick-connect
		3-0 OFF - MOM	3 Normalized quick-connect
		4-1 ON ³ ON ⁴ ON ▲	4 Screw + clamp
		4-2 ON ³ ON ⁴ MOM ▲	
		4-3 MOM ³ ON ⁴ MOM ▲	
		4-4 ON ¹ ON ⁶ ON ▲	
		4-5 ON ¹ ON ⁶ MOM ▲	
		4-6 MOM ¹ ON ⁶ MOM ▲	
		5-0 ON - MOM	
		6-0 ON - ON	
		7-0 MOM OFF MOM	
		8-0 ON OFF MOM	
		9-0 ON OFF ON	

▲ Function 4 : double pole only

OPTIONS

LEVER FINISH

N	Bright nickel
B	Satin chrome
G*	Black
F*	Black with fluorescent tip (lever type 1 only)
C	Painted or anodized

*Black finish on bushing too.

AGENCY APPROVAL

0	None
1	CECC

LOCKING LEVER SPECIAL FINISH

(blank)	None
P5	Painted yellow
A6	Anodized red

Order with lever finish type C.
Other colors : on request.

LEVER STYLES

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)
4	Length 40 mm (1,574)
5	Length 50 mm (1.968)
6	Locking, length 25,4 mm (1.000)

LEVER LOCKING STYLES

0	No locking
A	Locked in 3 positions
D	Locked out of center position
G	Locked in keyway side

See drawings on website.

ACCESSORIES

0	2 hex nuts, 1 locking ring and 1 lockwasher (non-sealed mounting)
2	2 hex nuts and 1 sealing washer (sealed mounting)



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	I 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

SCREW TERMINALS DOUBLE POLE



	Angle of throw (A)	III A2-A3 B5-B6	II *A3-B5 **A1-B5	I A1-A2 B5-B4
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	I 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

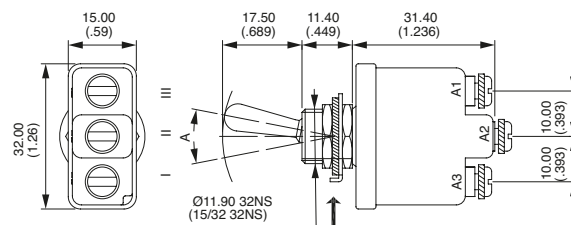
NORMALIZED QUICK-CONNECT DOUBLE POLE



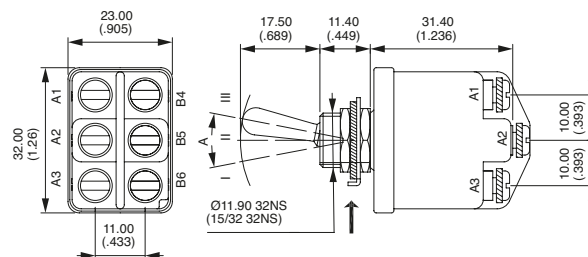
	Angle of throw (A)	III A2-A3 B5-B6	II *A3-B5 **A1-B5	I A1-A2 B5-B4
3541-03	22°	ON	-	OFF
3544-13	22°	ON	ON*	ON
3544-23	22°	ON	ON*	MOM
3544-33	22°	MOM	ON*	MOM
3545-03	22°	ON	-	MOM
3546-03	22°	ON	-	ON
3547-03	22°	MOM	OFF	MOM
3548-03	30°	ON	OFF	MOM
3549-03	30°	ON	OFF	ON

→ KEYWAY

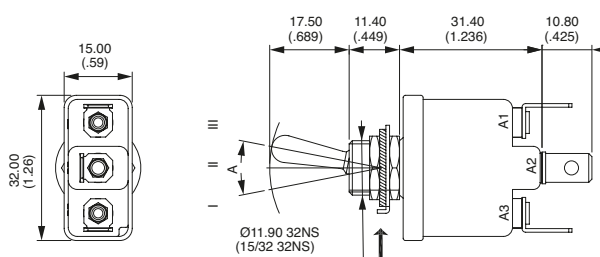
Shown with standard lever



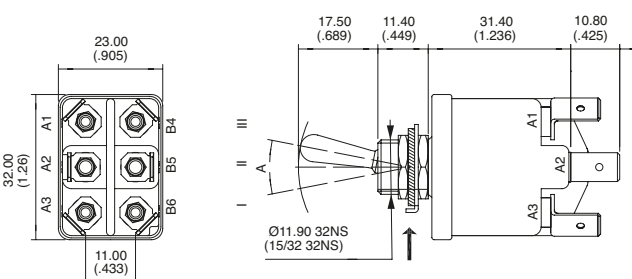
→ KEYWAY



→ KEYWAY



→ KEYWAY



*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



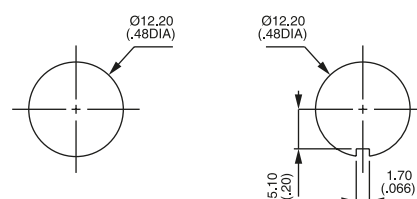
MATERIALS

- 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

SERIES	ELECTRICAL FUNCTIONS	NUMBER OF POLES	TERMINALS
36			
	1 ON - OFF	3 Single pole	NF Screw
	4 ON ON ON	4 Double pole	NF/2 Solder lug
	5 MOM - ON		
	6 ON - ON		
	7 MOM OFF MOM		
	8 ON OFF MOM		
	9 ON OFF ON		

OPTIONS

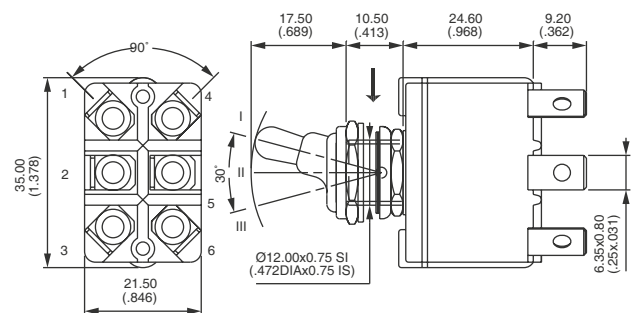
FINISH	SPECIAL LEVER	APPROVAL
G Black finish on lever and sealing boot nut	X1052 30 mm (1.181) long lever	UL Consult factory for detail of approved models.

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



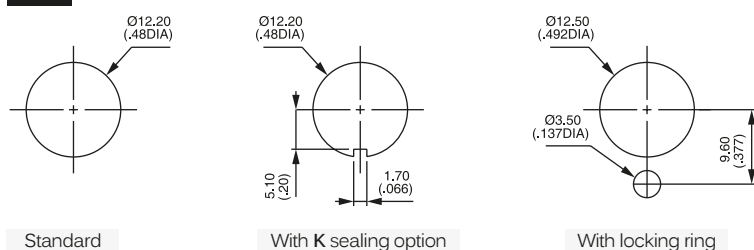
ELECTRICAL SPECIFICATIONS

- 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

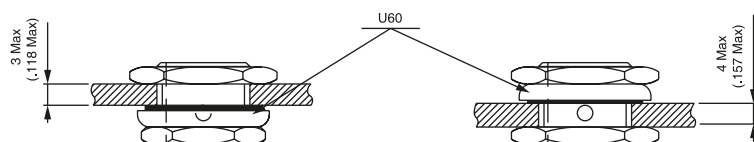


STANDARD PANEL CUT-OUT



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

SERIES	CASE	NUMBER OF POLES	ELECTRICAL FUNCTIONS
6			
	4 For single pole	3 Single pole	1-03 ON - OFF
	6 For other models	4 Double pole	2-03 ON - m.OFF
		5 Three pole	3-03 MOM - OFF
		6 Four pole	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	Blank Screw
LM Nickel plated bushing - lever and upper nut bright chrome plated		-2V 2 locked positions	/2 Solder lug
8 Black lever with fluorescent tip		-3V 3 locked positions	/3 Quick-connect 6,35 x 0,8 mm

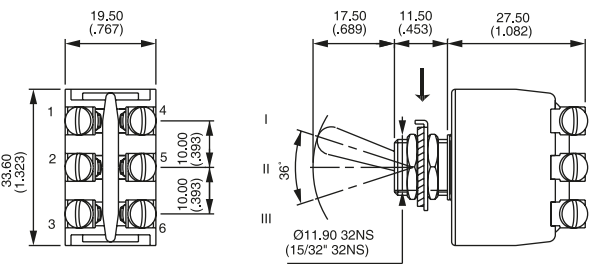
NOTICE : please note that not all combinations of above numbers are available. Refer to www.apem.com for further information.

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

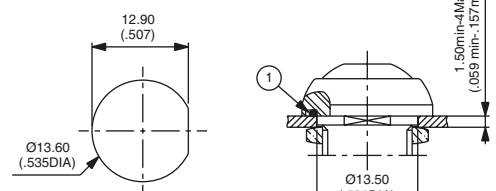
- Panel thickness : 1,5 mm (.059) min. 4 mm (.157 max.)
- Total travel : 1,7 mm (.067) +/- 0,3 mm
- Typical operating force : 4 N +/- 2 N
- Low level or mechanical life : 1.000.000 cycles
- Torque : 1,5 Nm max. applied to nut
- Soldering : 320°C max. for 3 sec.

The company reserves the right to change specifications without notice.



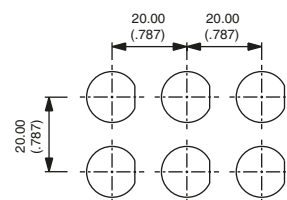
MOUNTING

PANEL CUT-OUT

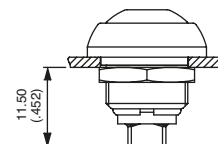


① - O-ring

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

SERIES	ACTUATOR SHAPES	ELECTRICAL FUNCTION	TERMINALS	CONTACTS
IC	C Square R Round, curved P Round, flat B Round curved with gloss finish	3 Normally open (NO)	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	OPTIONS
1 Blue 2 Black 3 Green 4 Grey 5 Yellow 6 Red	7/1 White 8 Bright chrome 9 Orange A Satin chrome B Dark blue
	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

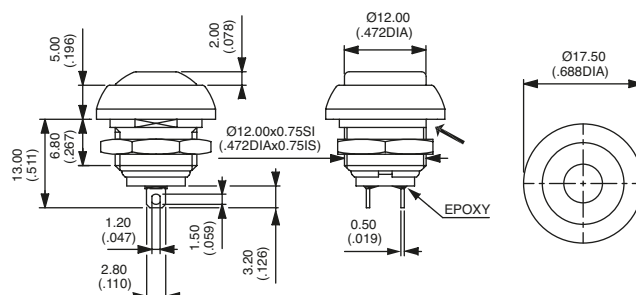
Flat actuator

ICP3SAD



Normally Open

→ FLAT



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 (LOS)	20mA	2,1V	2,3V
Yellow (LOY)	20mA	2,1V	2,3V
Green (LOG)	20mA	2,1V	2,3V
Blue (LOB)	20mA	3,2V	3,8V
White (LOW)	20mA	3,35V	4,25V

A resistor must be series-connected by the user.
Resistor value = $\frac{\text{supply voltage} - \text{LED forward voltage}}{\text{LED forward current}}$

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



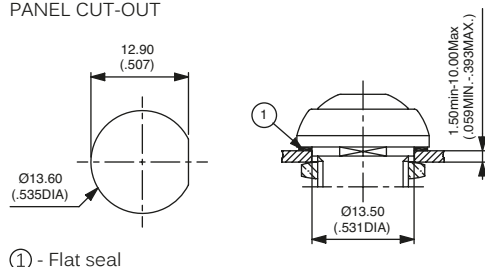
MATERIALS

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



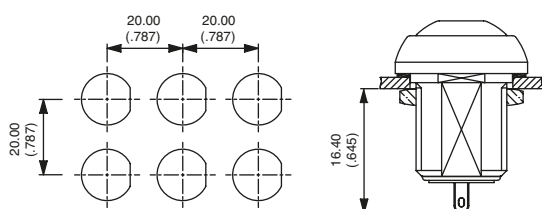
MOUNTING STANDARD BEZEL

PANEL CUT-OUT

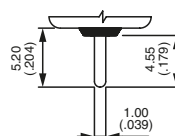


① - Flat seal

MATRIX MOUNTING - BACK OF PANEL SPACE REQUIREMENT



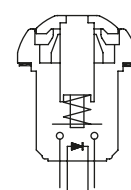
TERMINALS



Straight P



ELECTRICAL FUNCTIONS

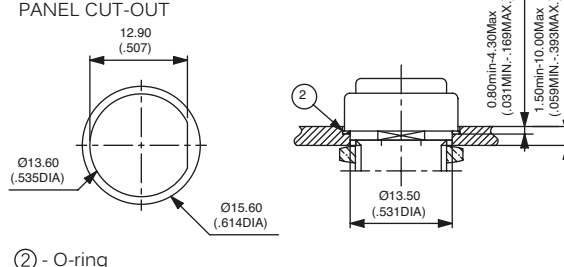


Function 3 (NO)



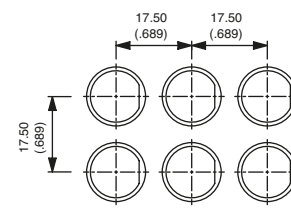
MOUNTING REDUCED MODEL

PANEL CUT-OUT



② - O-ring

MATRIX MOUNTING

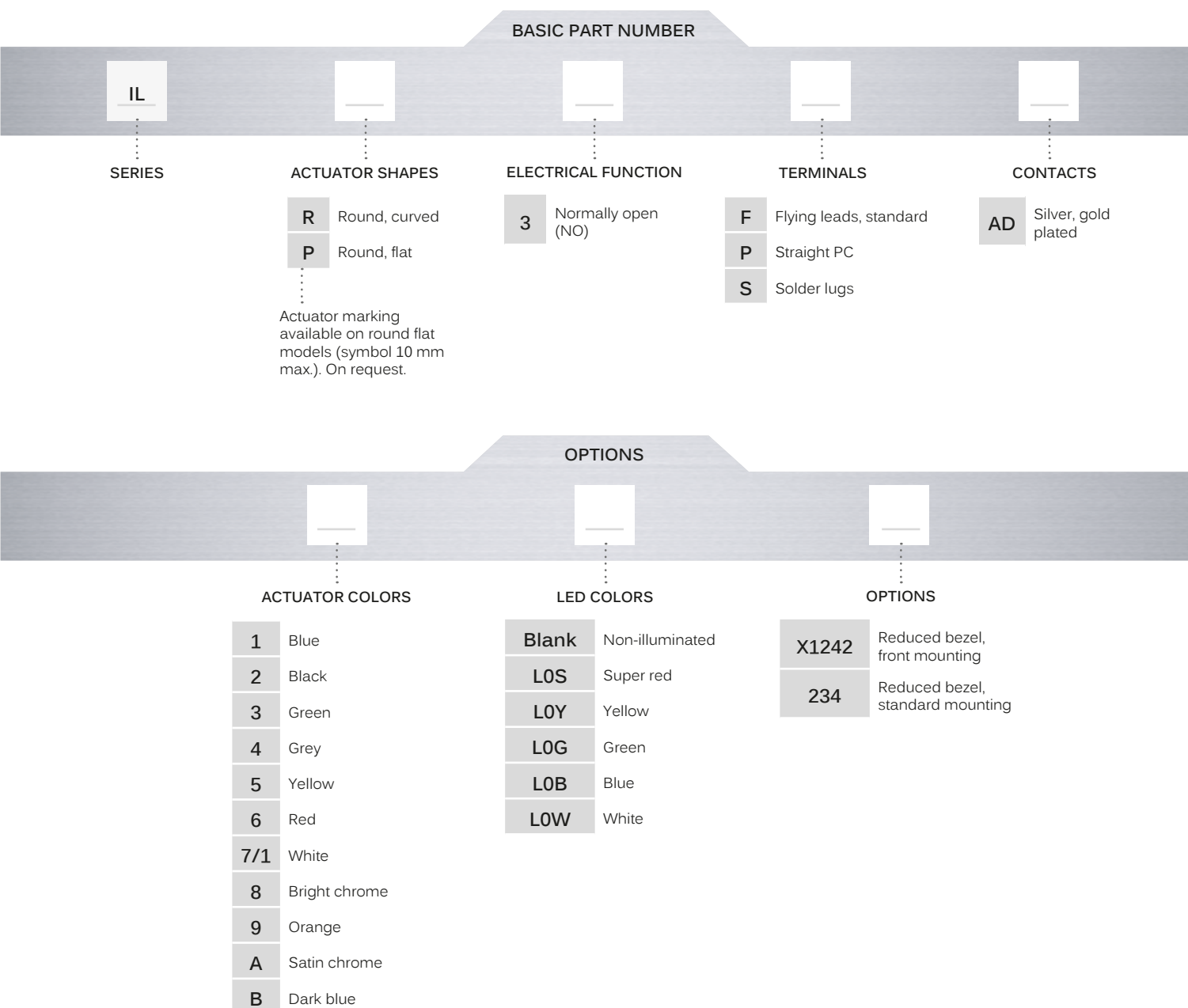


IL series

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
ILR3SAD  Normally open

Flat actuator
ILP3SAD  Normally open

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

NON ILLUMINATED FLYING LEAD TERMINALS



Curved actuator
ILR3FAD  Normally open

Flat actuator
ILP3FAD  Normally open

ILLUMINATED SEALED FLYING LEAD TERMINALS



Curved actuator
ILR3FAD  Normally open

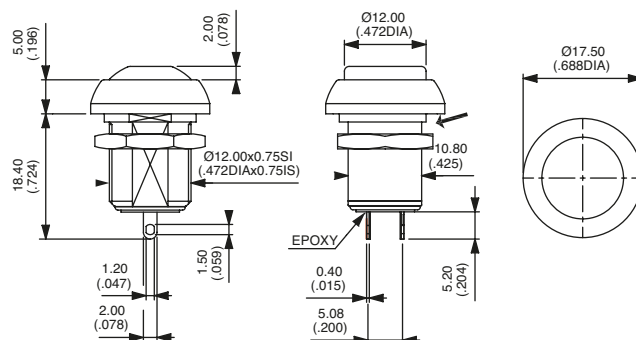
Flat actuator
ILR3FAD  Normally open

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

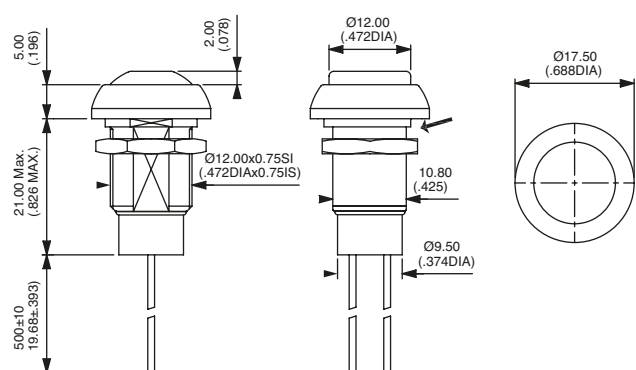
REDUCED BEZEL FOR COMPACT MATRIX MOUNTING - OPTION X1242

- 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.

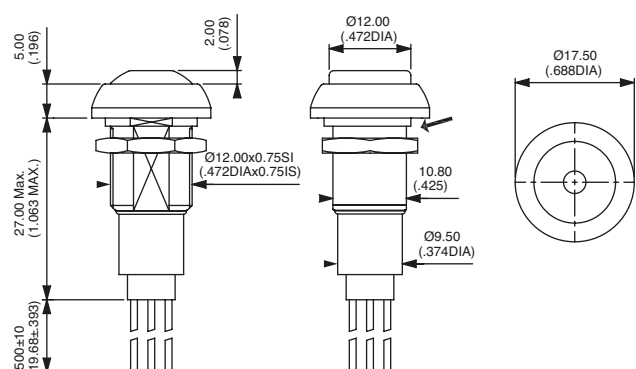
→ FLAT



→ FLAT



→ FLAT



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

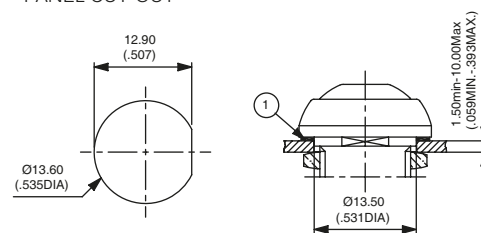
- Case : polyamide 4/6
- Actuator : polyamide 6/6
- Bushing/bezel : polyamide 6/6
- Contacts : silver, gold plated
- Terminal seal : epoxy

The company reserves the right to change specifications without notice.



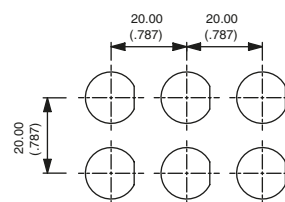
MOUNTING STANDARD BEZEL

PANEL CUT-OUT

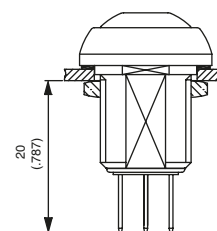


① - Flat seal

MATRIX MOUNTING

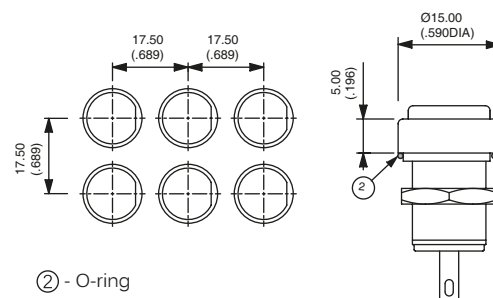


BACK OF PANEL SPACE REQUIREMENT



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

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

ELECTRICAL FUNCTION

7 NC + NO

TERMINALS

- P** Straight PC
- Z** Quick-connect

CONTACTS

4 Silver, gold
plated (standard)

OPTIONS

ACTUATOR COLORS

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

BUSHING & BEZEL FINISH

- 2** Black
- Other : on request

BEZEL OPTIONS

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

ACTUATOR OPTION

- Blank** Std actuator
- 104** High actuator

APPROVAL

- 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



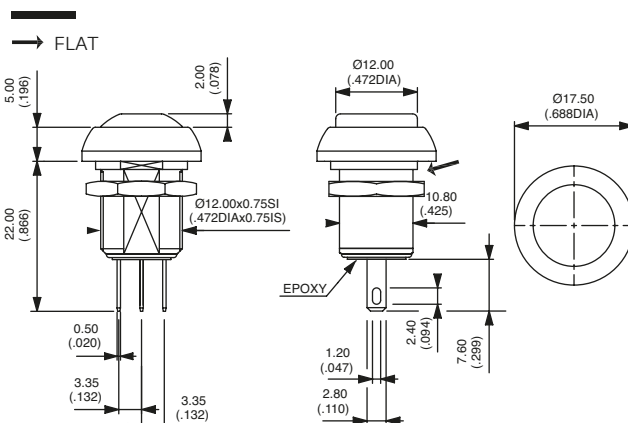
NC+NO

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
- Initial contact resistance : 100 mΩ max.
- Insulation resistance : 1 GΩ min. at 500VDC
- Dielectric strength : 1.500 Vrms
- Contact bounce : 10 ms

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	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 = $\frac{\text{supply voltage} - \text{LED forward voltage}}{\text{LED forward current}}$

The company reserves the right to change specifications without notice.

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

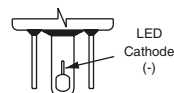
AGENCY APPROVAL



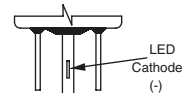
2A 125VAC/250VAC
File E83438
See following pages.

TERMINALS

ILLUMINATED MODELS

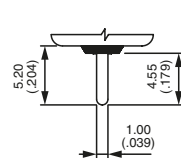


Solder lug **S**

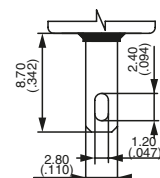


Straight **P**

NON-ILLUMINATED MODELS



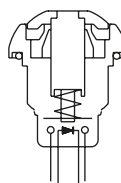
Straight **P**



Quick-connect **Z1**

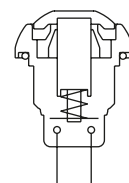
ELECTRICAL FUNCTIONS

ILLUMINATED MODELS

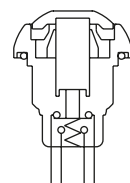


Function 3 (NO)

NON-ILLUMINATED MODELS



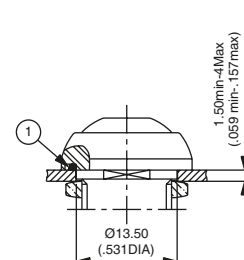
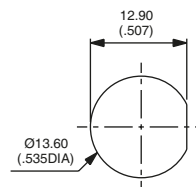
Function 3 (NO)



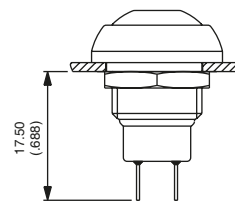
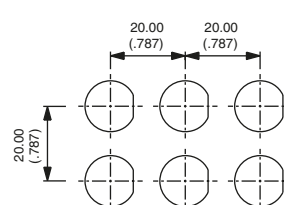
Function 5 (NC/NO)

MOUNTING

PANEL CUT-OUT



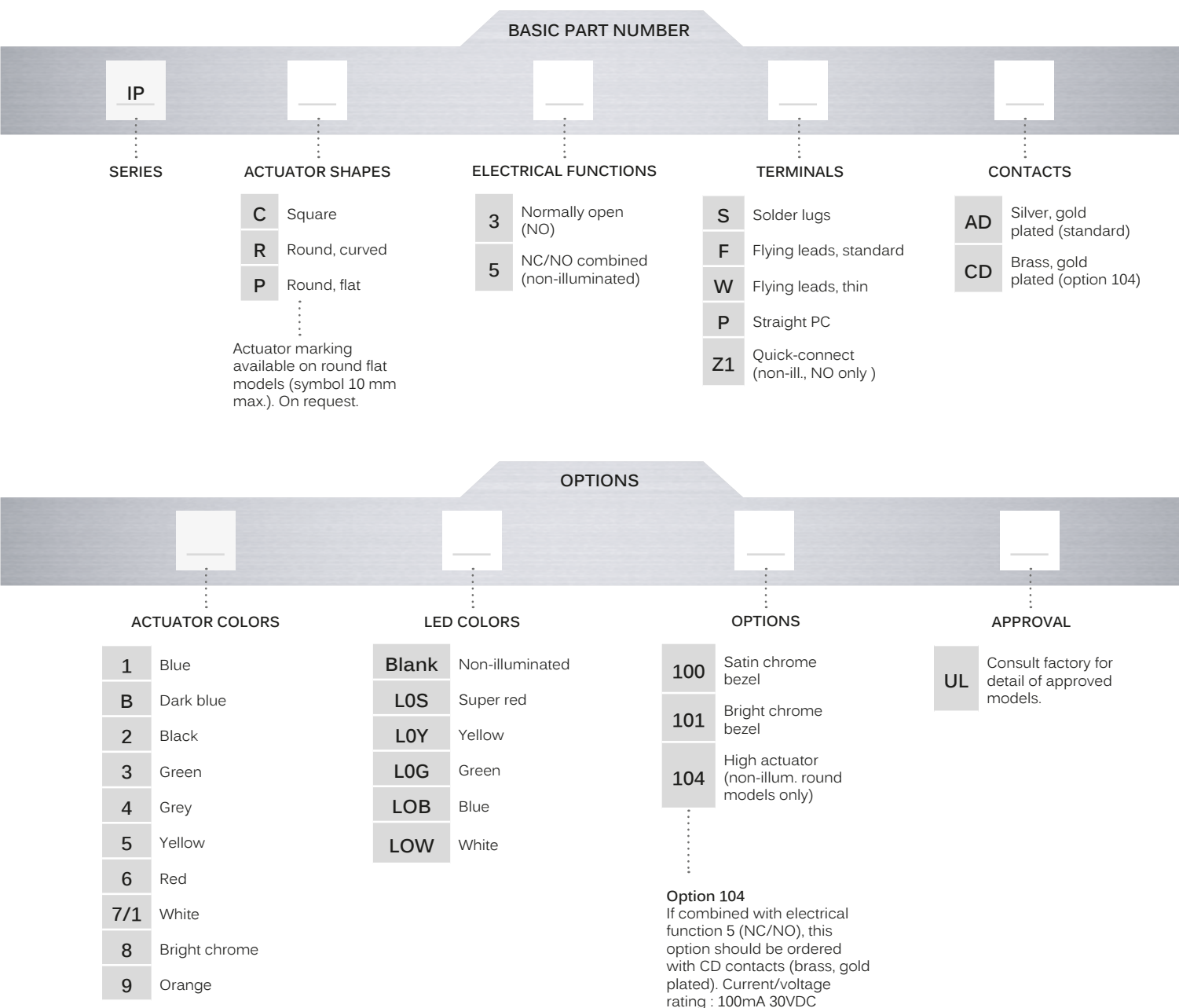
MATRIX MOUNTING - BACK OF PANEL SPACE REQUIREMENT



Pushbutton switches for harsh environments •
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. See Sealing Boot section.



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



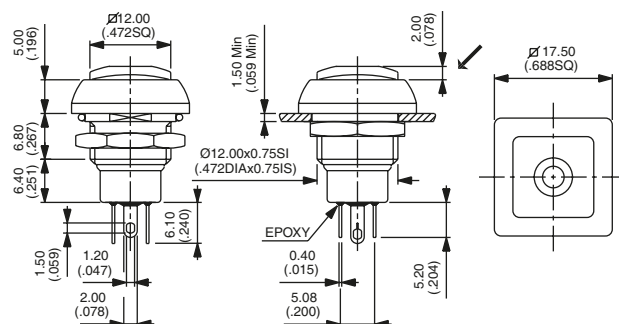
Flat actuator, NC/NO

IPP5SAD

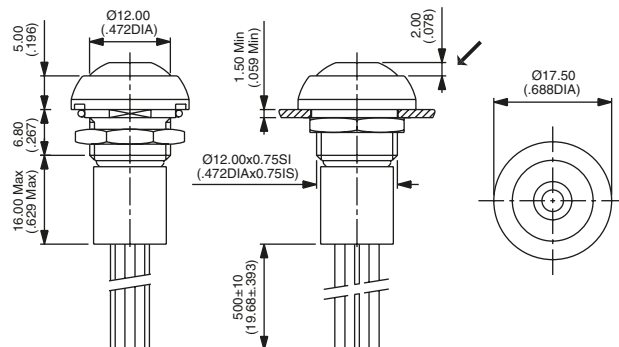


Also available with straight PC terminals : IPC3PAD
(NO) or IPC5PAD (NC/NO) and quick-connect terminals : IPC3Z1AD (NO only)

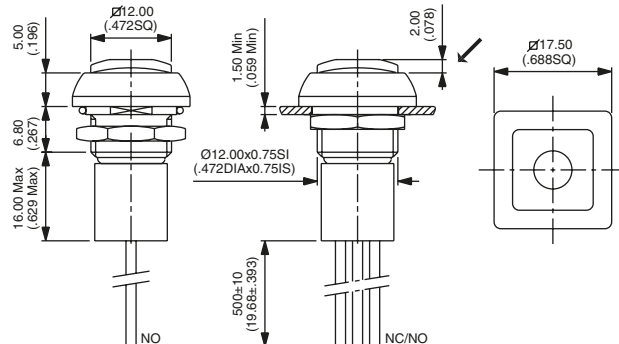
→ FLAT



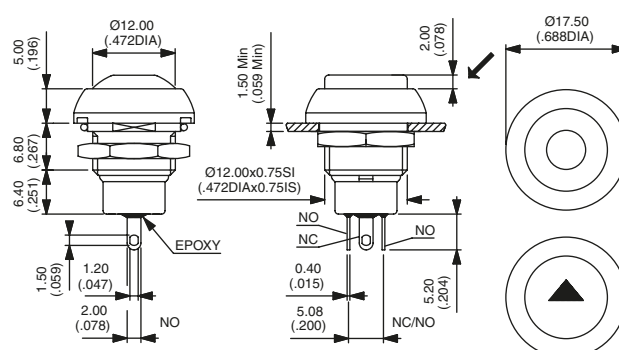
→ FLAT



→ FLAT



→ FLAT



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 (LOS)	20mA	1,95V	1,95V
Yellow (LOY)	20mA	2V	2,05V
Green (LOG)	20mA	2,1V	2,5V
Blue (LOB)	20mA	3,2V	4V

A resistor must be series-connected by the user.
Resistor value = $\frac{\text{supply voltage} - \text{LED forward voltage}}{\text{LED forward current}}$

The company reserves the right to change specifications without notice.

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.



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

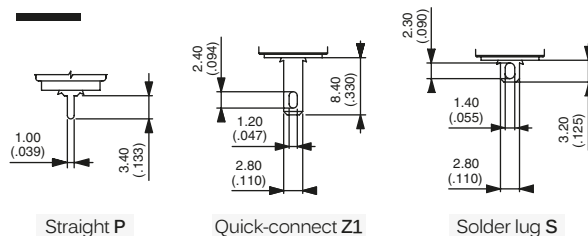
AGENCY APPROVAL



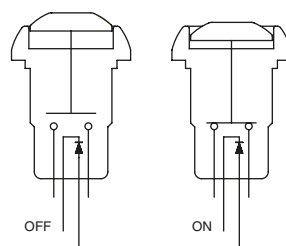
2A 125VAC/250VAC
File E83438
See following pages.



TERMINALS

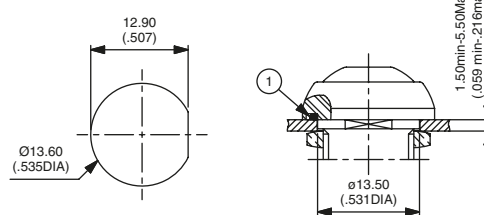


ELECTRICAL FUNCTIONS



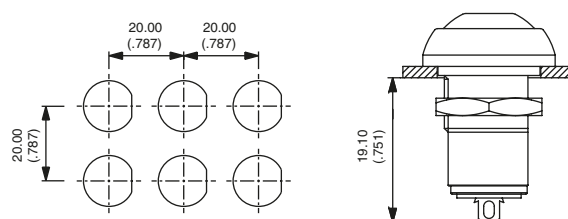
MOUNTING

PANEL CUT-OUT



① - Flat seal

MATRIX MOUNTING - BACK OF PANEL SPACE REQUIREMENT

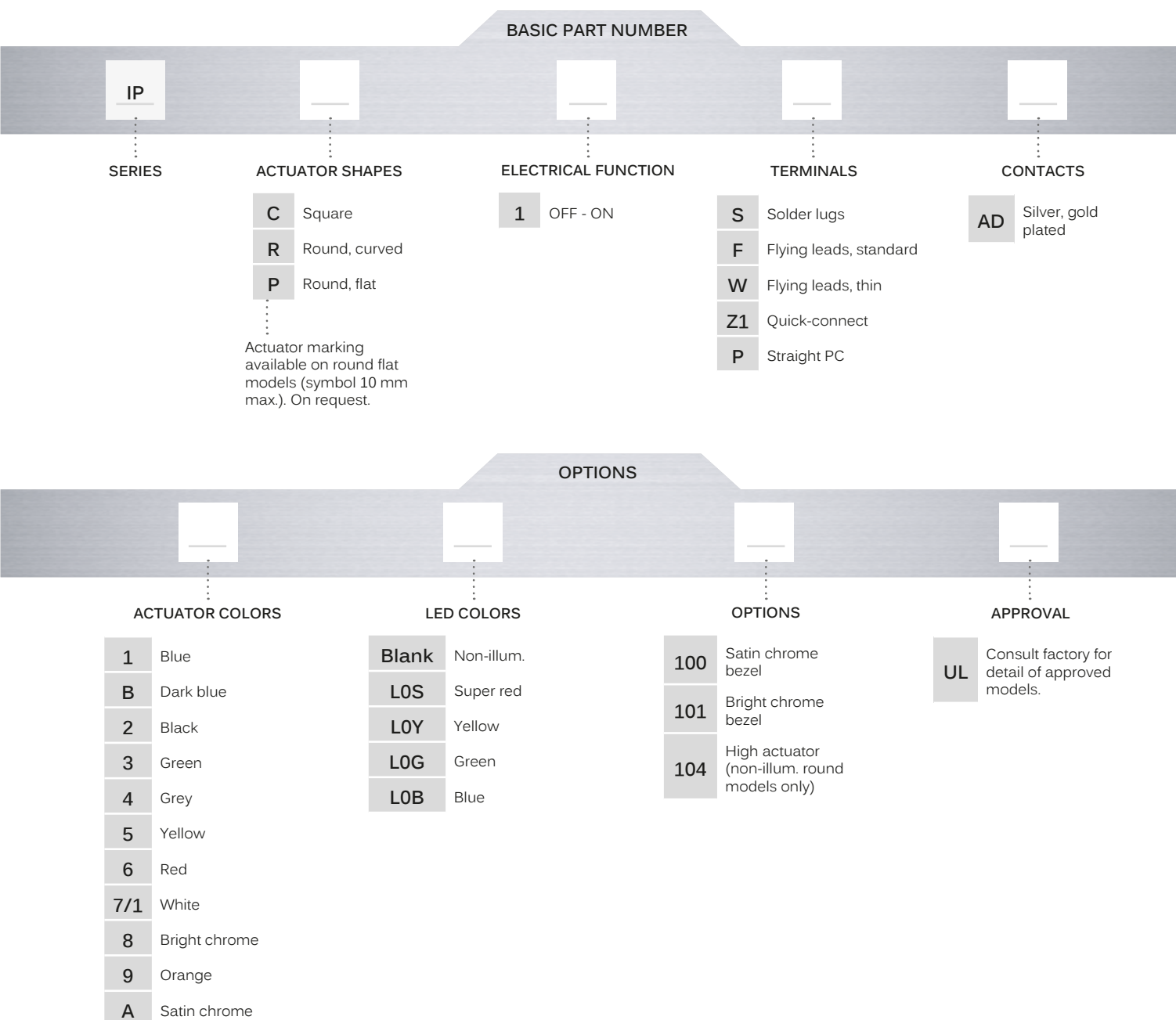


IP series

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(-)

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(-)

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 : **IPC1Z1AD**.

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

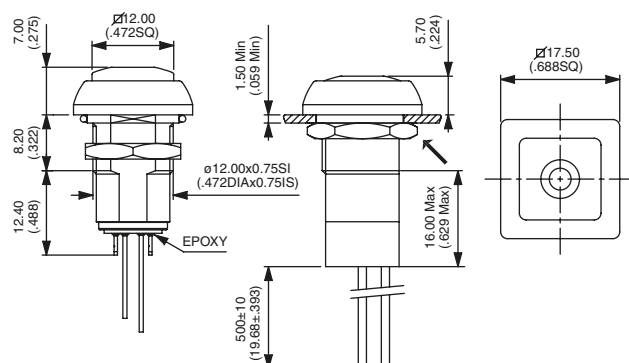
OFF - ON

For THIN flying leads, replace F with W.

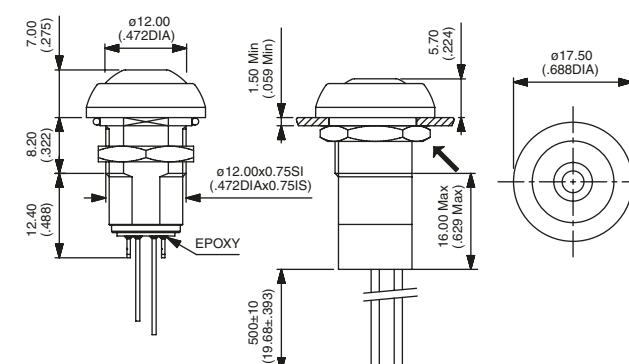
Also available with straight PC : **IP•1PAD** or quick-connect terminals : **IP•1Z1AD**

→ FLAT

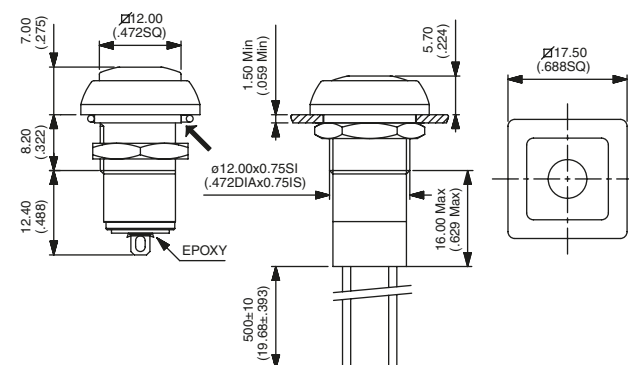
All drawings with standard flying lead terminals.



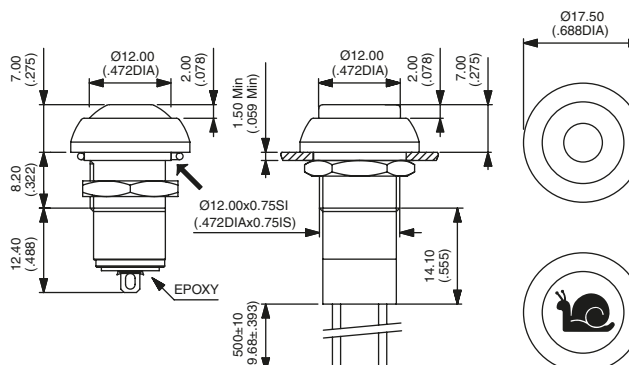
→ FLAT



→ FLAT



→ 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

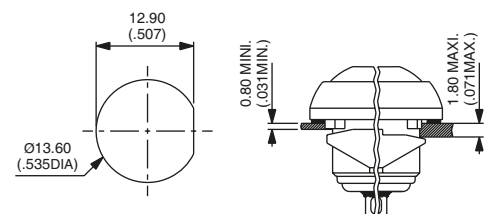
- Panel thickness : 0,8 mm (.031) min. - 1,8 mm (.071) max.
- Total travel : 1,7 mm (.066) +/- 0,3 mm
- Typical operating force : 4 N +/- 3 N
- Low level or mechanical life : 1.000.000 cycles
- Soldering : 300°C max. for 3 seconds

The company reserves the right to change specifications without notice.

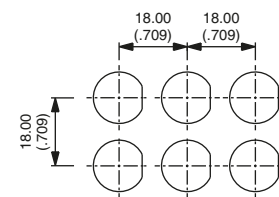


MOUNTING

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 R P Round, curved Round, flat Actuator marking available on round flat models (symbol 10 mm max.). On request.	 ELECTRICAL FUNCTION 3 Normally open (NO)	 TERMINALS S P Z1 Solder lugs Straight PC Quick-connect 2,8 x 0,5 mm	 CONTACTS AD Silver, gold plated
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OPTIONS

..... ACTUATOR COLORS <table border="1" style="width: 100%; border-collapse: collapse; text-align: left;"> <tr><td style="width: 30px;">1</td><td>Blue</td></tr> <tr><td>B</td><td>Dark blue</td></tr> <tr><td>2</td><td>Black</td></tr> <tr><td>3</td><td>Green</td></tr> <tr><td>4</td><td>Grey</td></tr> <tr><td>5</td><td>Yellow</td></tr> <tr><td>6</td><td>Red</td></tr> <tr><td>7/1</td><td>White</td></tr> <tr><td>8</td><td>Bright chrome</td></tr> <tr><td>9</td><td>Orange</td></tr> <tr><td>A</td><td>Satin chrome</td></tr> </table>	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	 BEZEL FINISH <table border="1" style="width: 100%; border-collapse: collapse; text-align: left;"> <tr><td style="width: 30px;">00</td><td>Black (std)</td></tr> <tr><td>10</td><td>White</td></tr> </table>	00	Black (std)	10	White	 OPTION 104 High actuator	 APPROVAL UL Consult factory for detail of approved models.
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																												

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

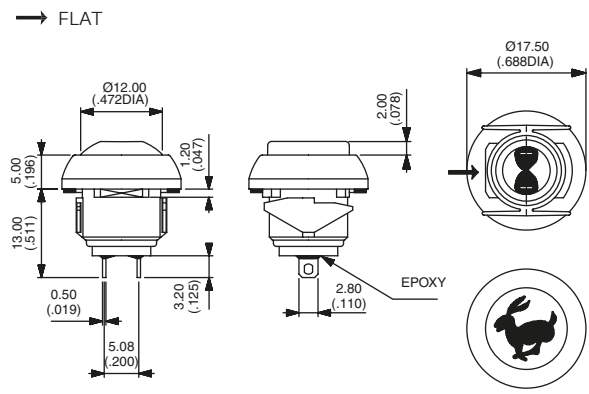
IBR3SAD


 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

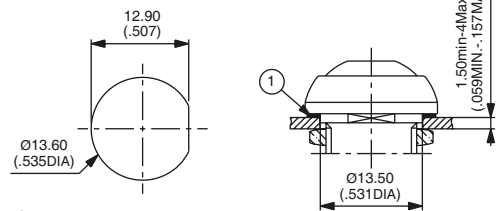
- Panel thickness : 1,5 mm (.059) min. - 4 mm (.157) max.
- Total travel : 1,7 mm (.066) +/- 0,3 mm
- Typical operating force : 4 N +/- 3 N
- Low level or mechanical life : 1.000.000 cycles
- Torque (applied to nut) : 1 Nm max. with metal nut U166
1,5 Nm max. with plastic nut U4248
- Soldering : 300°C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

The company reserves the right to change specifications without notice.



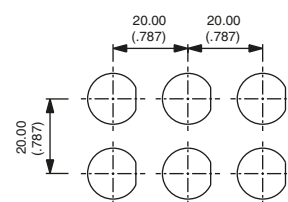
MOUNTING

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

SERIES	ACTUATOR SHAPES	ELECTRICAL FUNCTION	TERMINALS	CONTACTS
IS	R Round, curved P Round, flat Actuator marking available on round flat models (symbol 10 mm max.). On request.	3 Normally open (NO)	S Solder lugs P Straight PC Z1 Quick-connect 2,8 x 0,5 mm	AD Silver, gold plated

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) 08 Bright chrome 10 White 20 Satin chrome	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

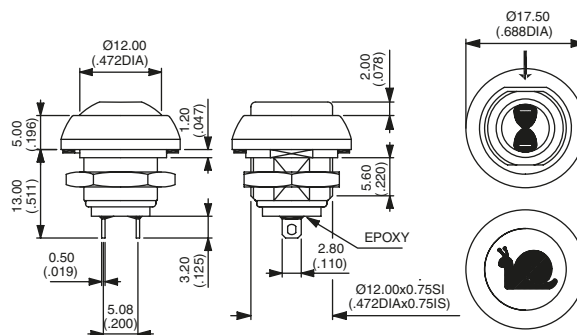


Curved actuator
ISR3SAD Normally Open

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



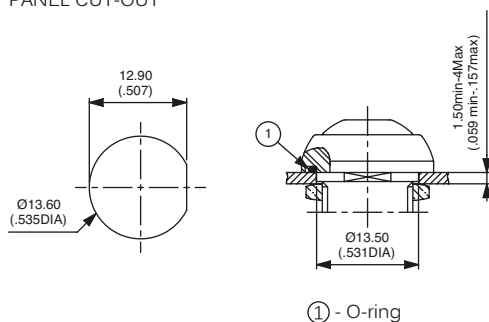
ELECTRICAL SPECIFICATIONS

- 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

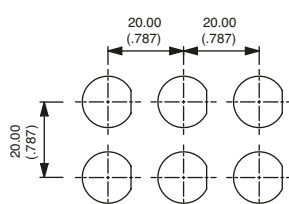


MOUNTING

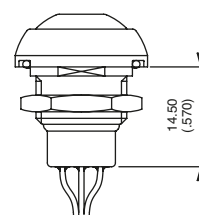
PANEL CUT-OUT



MATRIX MOUNTING



BACK OF PANEL SPACE REQUIREMENT



The company reserves the right to change specifications without notice.

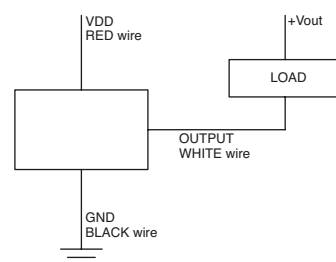


MATERIALS

- Case : PBT, UL94-V0
- Actuator : polyamide 6/6
- Bushing/bezel : zinc die-cast (zamac), black painted
- Multi-wire leads : AWG26, 150 mm



WIRING DIAGRAM



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										
	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%; text-align: center;">R</td> <td>Round</td> </tr> <tr> <td style="text-align: center;">H</td> <td>Round, high</td> </tr> </table>	R	Round	H	Round, high	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%; text-align: center;">3</td> <td>Normally open (NO)</td> </tr> </table>	3	Normally open (NO)	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%; text-align: center;">6</td> <td>6N</td> </tr> </table>	6	6N	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%; text-align: center;">F</td> <td>Flying leads</td> </tr> </table>	F	Flying leads
R	Round													
H	Round, high													
3	Normally open (NO)													
6	6N													
F	Flying leads													

OPTIONS

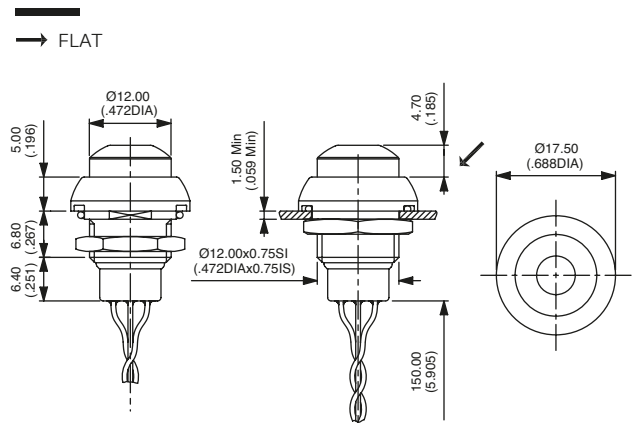
..... ACTUATOR COLORS <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">1 Blue</td> <td style="width: 50%;">6 Red</td> </tr> <tr> <td>2 Black</td> <td>7 White</td> </tr> <tr> <td>3 Green</td> <td>9 Orange</td> </tr> <tr> <td>4 Grey</td> <td>B Dark blue</td> </tr> <tr> <td>5 Yellow</td> <td></td> </tr> </table>	1 Blue	6 Red	2 Black	7 White	3 Green	9 Orange	4 Grey	B Dark blue	5 Yellow		 OPTIONS <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%; text-align: center;">Blank</td> <td>None</td> </tr> <tr> <td style="text-align: center;">100</td> <td>Satin chrome bezel</td> </tr> <tr> <td style="text-align: center;">101</td> <td>Bright chrome bezel</td> </tr> </table>	Blank	None	100	Satin chrome bezel	101	Bright chrome bezel
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

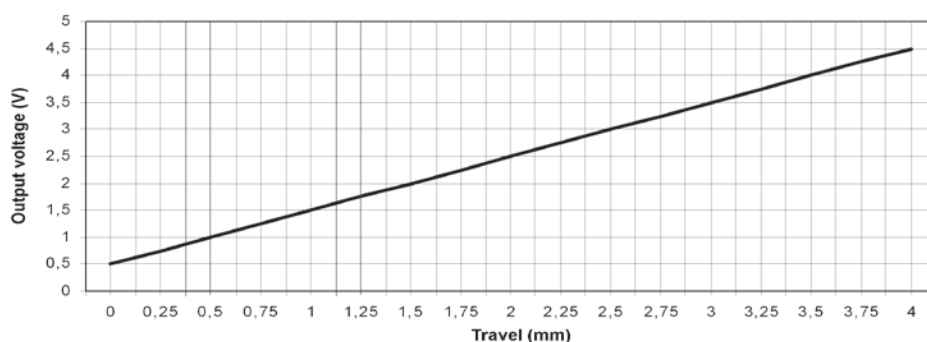


ENVIRONMENTAL SPECIFICATIONS

- 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

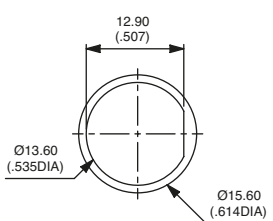


LINEAR OUTPUT GRAPH (VDC = 5V@20°C)

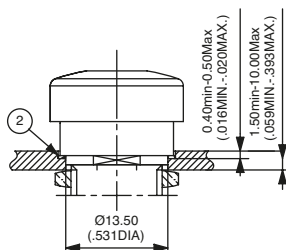


MOUNTING

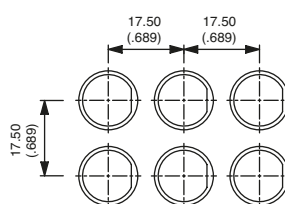
PANEL CUT-OUT



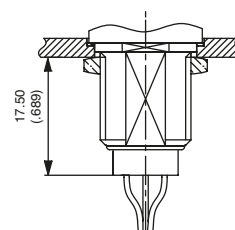
② - O-ring



MATRIX MOUNTING



BACK OF PANEL SPACE REQUIREMENT

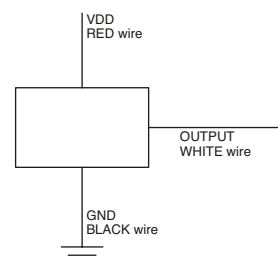


ELECTRICAL SPECIFICATIONS

- Supply voltage :
4,5VDC to 5,5VDC without regulator
6,5VDC to 24VDC with 5V regulator
- Supply current : 9mA max.
- Max. output current : 1,25mA
- Max. output voltage with or without regulator : see graph below.



WIRING DIAGRAM



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

SERIES	ACTUATOR SHAPE	OUTPUT VOLTAGE	OPERATING FORCE	REGULATOR	TERMINALS
IHL	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	

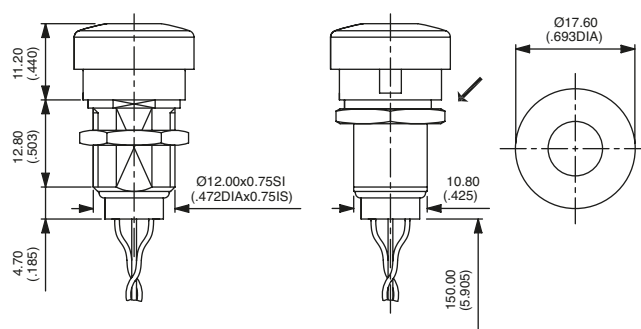
NOTICE : please note that not all combinations of above numbers are available. Refer to www.apem.com for further information.

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 V_{rm}



LED COMPONENT SPECIFICATIONS

LED color	Forward current	Typ. forward voltage	Max. forward voltage	A resistor must be series-connected by the user. Resistor value = $\frac{\text{supply voltage} - \text{LED forward voltage}}{\text{LED forward current}}$ On flying lead versions, the LED resistor can be integrated by APEM on request.
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	

The company reserves the right to change specifications without notice.

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.



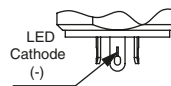
MATERIALS

- 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

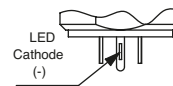


TERMINALS

ILLUMINATED MODELS

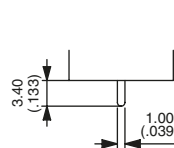


Solder lug S

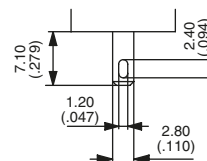


Straight P

NON-ILLUMINATED MODELS



Straight P

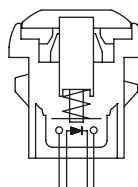


Quick-connect Z



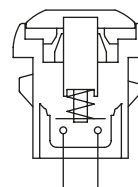
ELECTRICAL FUNCTIONS

ILLUMINATED MODELS



Function 3 (NO)

NON-ILLUMINATED MODELS

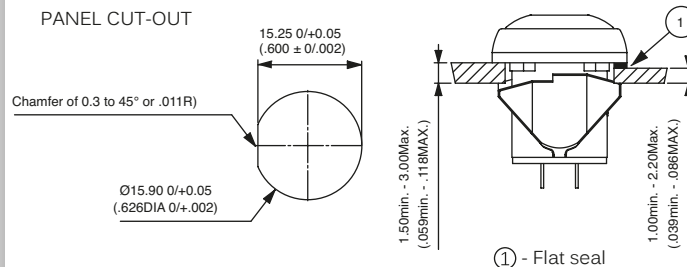


Function 3 (NO)



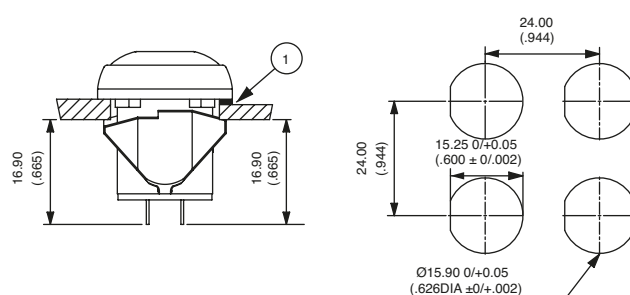
MOUNTING

PANEL CUT-OUT



① - Flat seal

BACK OF PANEL SPACE REQUIREMENT - MATRIX MOUNTING



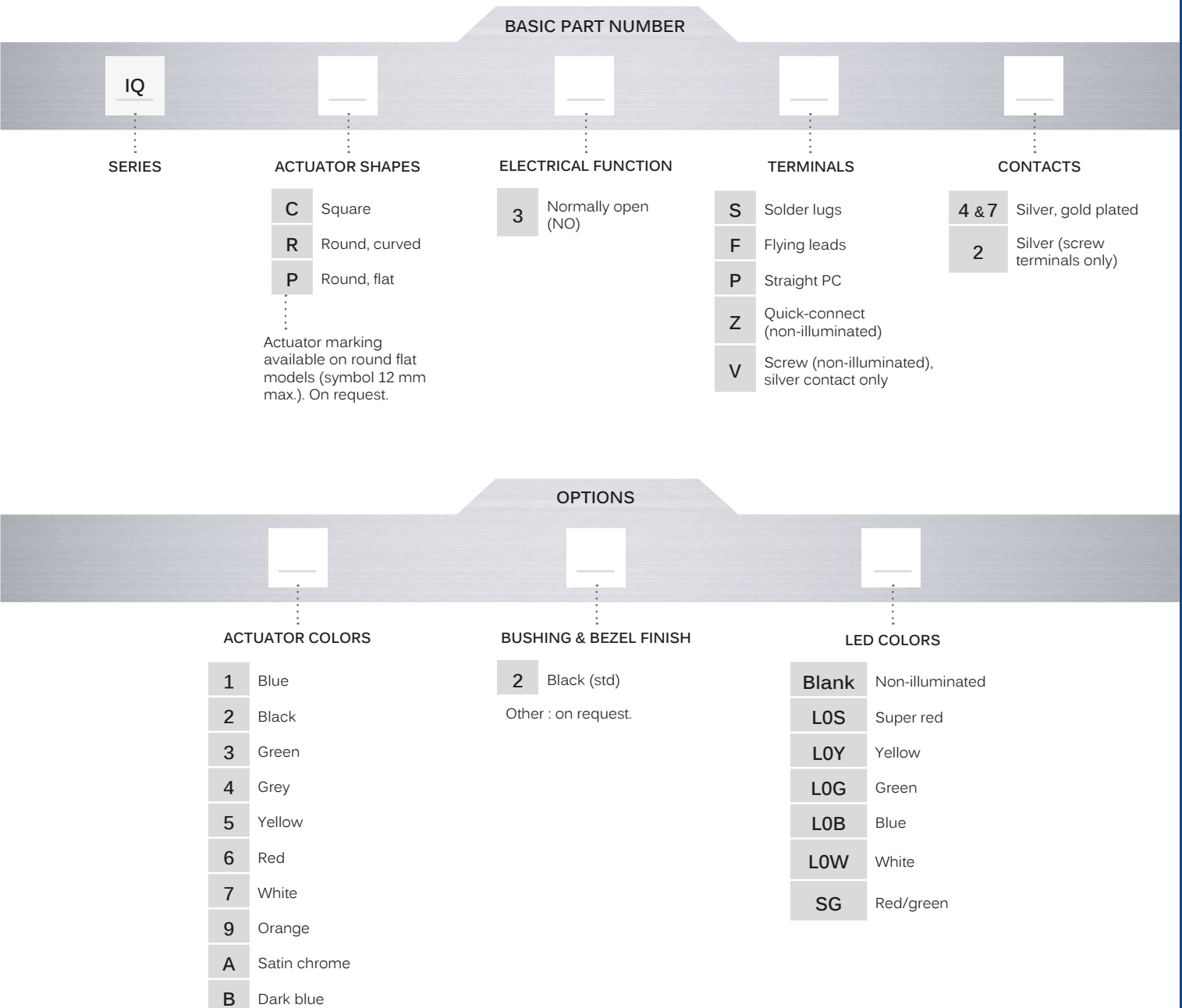
IQ series

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.

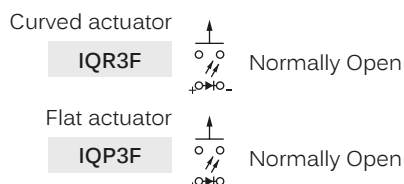


Mounting accessories : Standard hardware supplied : 1 flat seal

IQ series

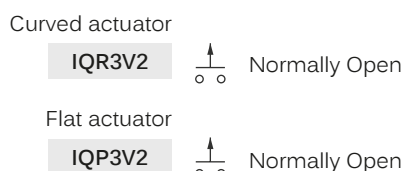
Sealed pushbutton switches • bushing Ø 16 mm •
snap-in mounting • momentary

ROUND - ILLUMINATED FLYING LEAD TERMINALS

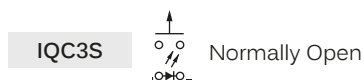


Wire colors : black : NO contact, red : LED anode (+), blue : LED cathode (-)

ROUND - NON-ILLUMINATED SCREW TERMINALS

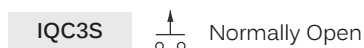


SQUARE - ILLUMINATED SOLDER LUG TERMINALS

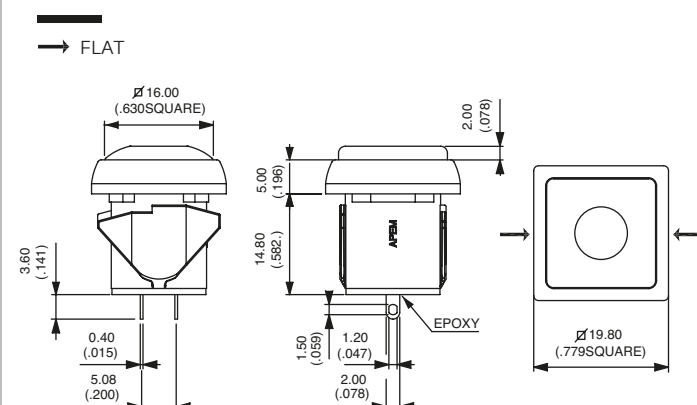
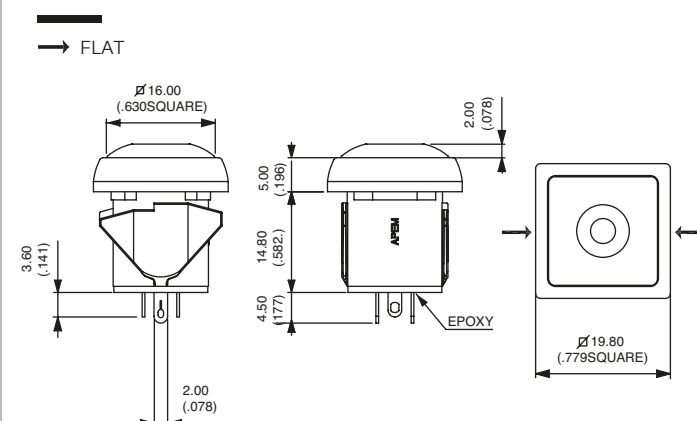
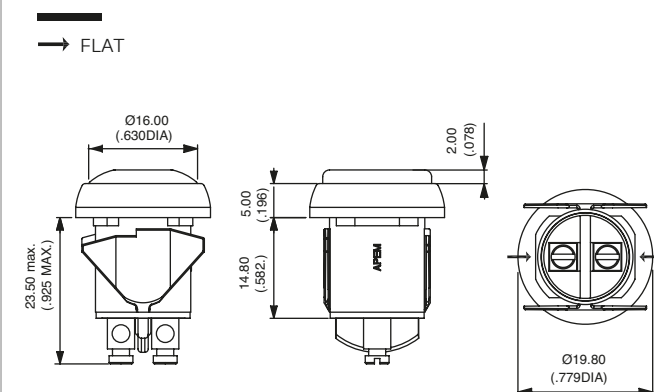
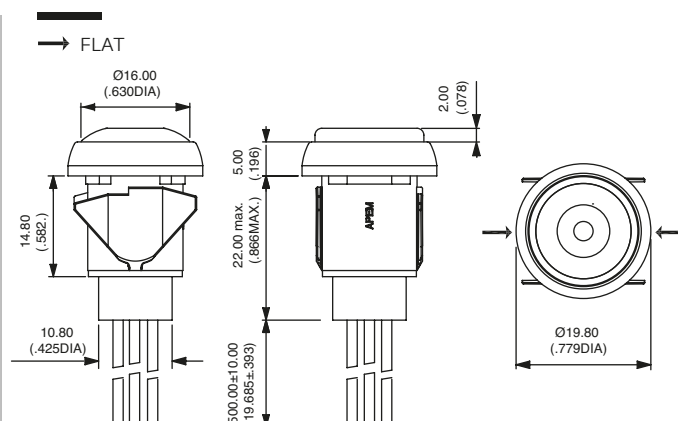


Also available with straight PC terminals : **IQC3P4**.
LED color is indicated by the bottom of the switch.

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 = $\frac{\text{supply voltage} - \text{LED forward voltage}}{\text{LED forward current}}$

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

The company reserves the right to change specifications without notice.

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.



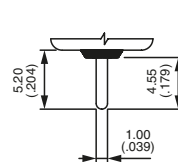
MATERIALS

- Case : thermoplastic UL94-V0
- Plunger : polyamide
- Bushing/bezel : brass, nickel plated
- 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)

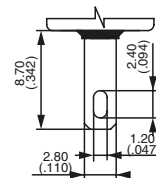


TERMINALS

MODELS FOR VARIABLE PANEL THICKNESS (IZM)

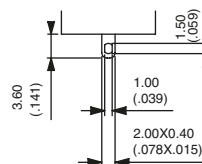


Straight P

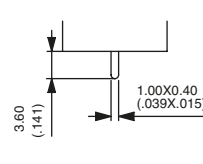


Quick-connect Z

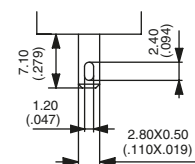
MODELS FOR FIXED PANEL THICKNESS (IZN)



Solder lug S



Straight P

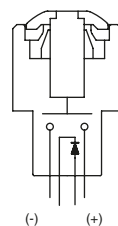


Quick-connect Z



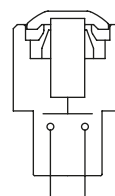
ELECTRICAL FUNCTIONS

ILLUMINATED MODELS



Function 3 (NO)

NON-ILLUMINATED MODELS

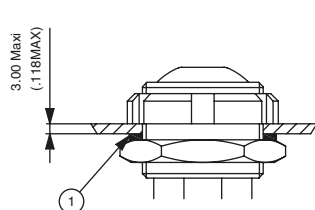


Function 3 (NO)

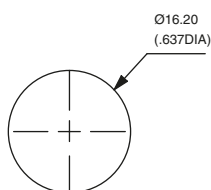


MOUNTING

PANEL CUT-OUT - MATRIX MOUNTING



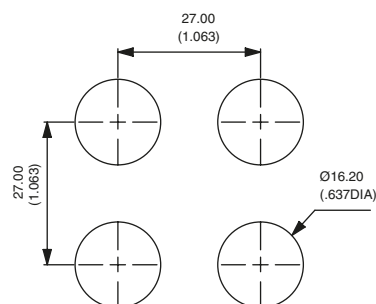
IZM (adjustable hex nut)



IZN (fixed hex nut)

① - Flat seal

② - O-ring

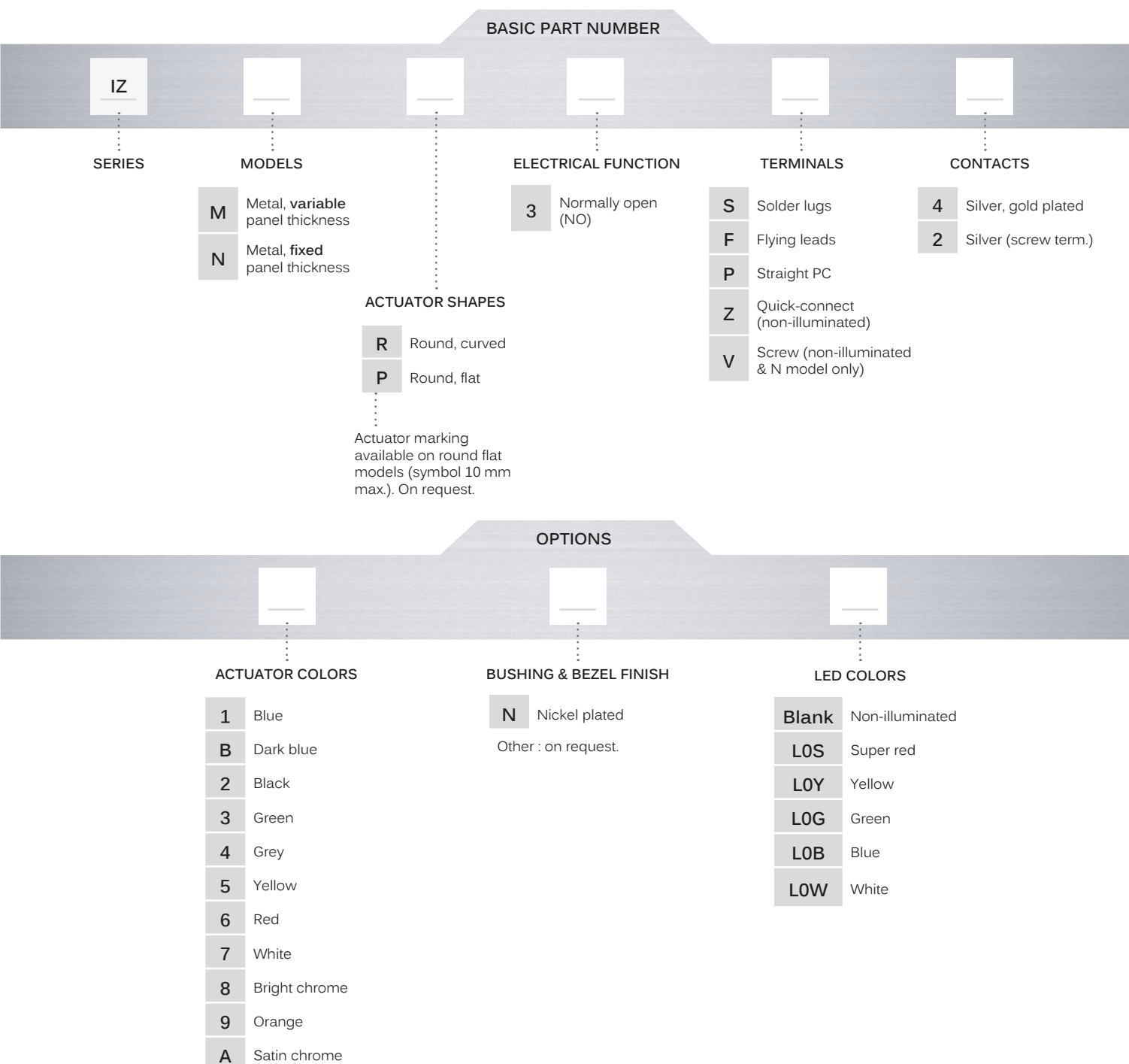


Rear mounted sealed pushbutton switches •
bushing Ø 16 mm • metal • momentary



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.



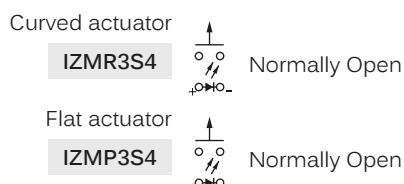
Mounting accessories : Standard hardware supplied :

- 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

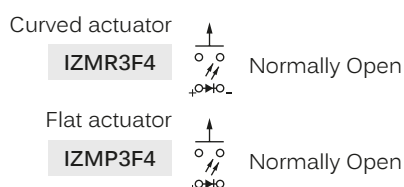
Rear mounted sealed pushbutton switches •
bushing Ø 16 mm • metal • momentary

VARIABLE PANEL THICKNESS ILLUMINATED - SOLDER LUG TERMINALS



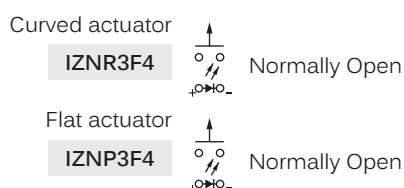
Also available with straight PC terminals : **IZM•3P4**.
LED color is indicated by the bottom of the switch.

VARIABLE PANEL THICKNESS ILLUMINATED - FLYING LEAD TERMINALS



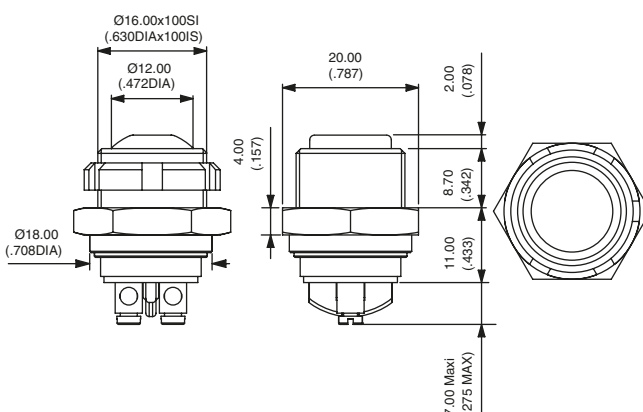
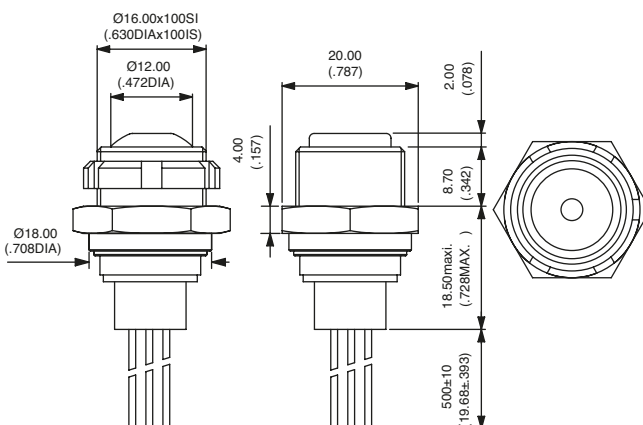
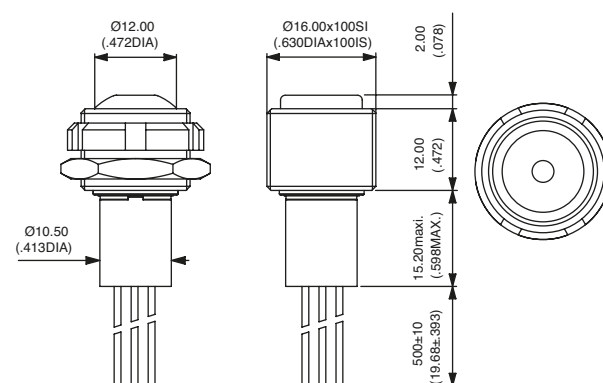
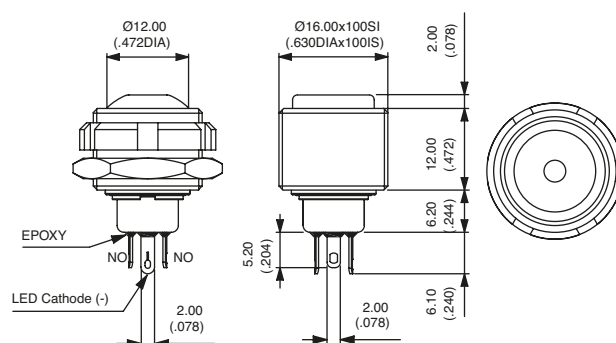
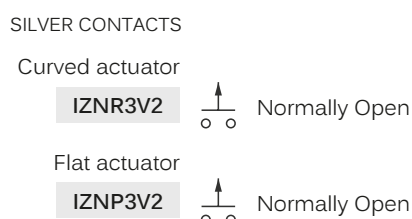
Wire colors : black : NO contact, red : LED anode (+), blue : LED cathode (-)

FIXED PANEL THICKNESS ILLUMINATED - FLYING LEAD TERMINALS



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

FIXED PANEL THICKNESS NON-ILLUMINATED - SCREW TERMINALS



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 = $\frac{\text{supply voltage} - \text{LED forward voltage}}{\text{LED forward current}}$

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

The company reserves the right to change specifications without notice.

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.



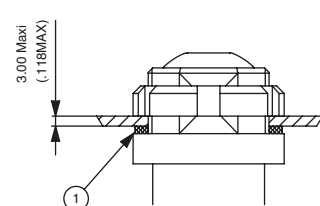
MATERIALS

- 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)

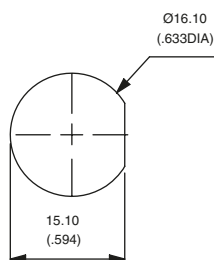


MOUNTING

PANEL CUT-OUT - MATRIX MOUNTING

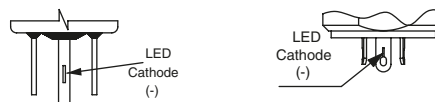


① - Flat seal

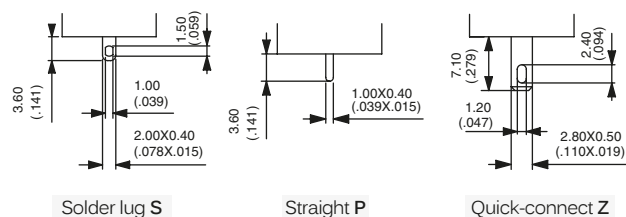


TERMINALS

ILLUMINATED



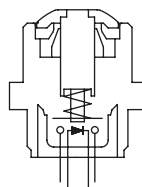
NON-ILLUMINATED



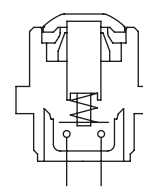
ELECTRICAL FUNCTIONS

ILLUMINATED MODELS

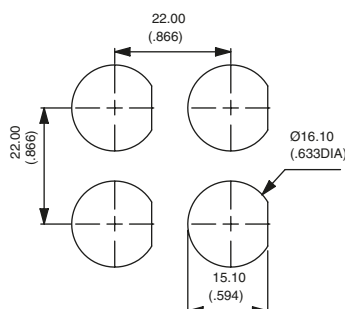
NON-ILLUMINATED MODELS



Function 3 (NO)



Function 3 (NO)



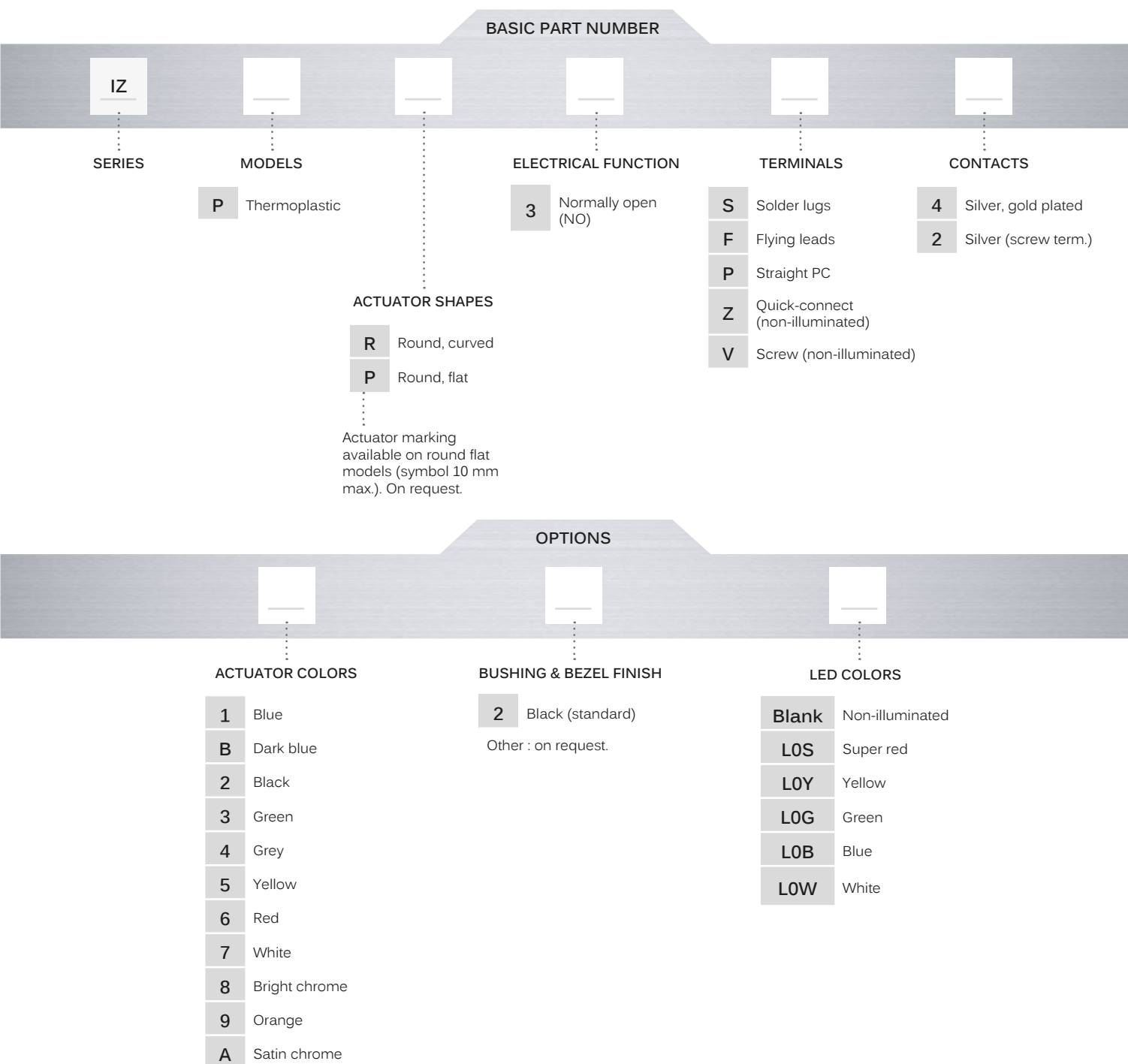
IZ series

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.

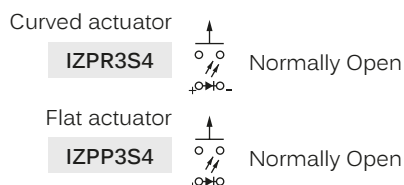


Mounting accessories : Standard hardware supplied : 1 castellated black plastic nut U4249 and 1 silicone flat seal.

IZ series

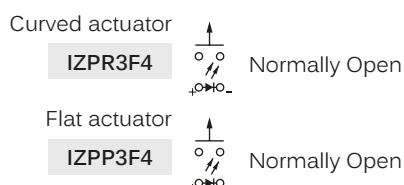
Rear mounted sealed pushbutton switches •
bushing Ø 16 mm • momentary

ILLUMINATED SOLDER LUG TERMINALS



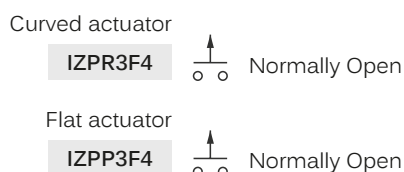
Also available with straight PC terminals : **IZP•3P4**.
LED color is indicated by the bottom of the switch.

ILLUMINATED FLYING LEAD TERMINALS

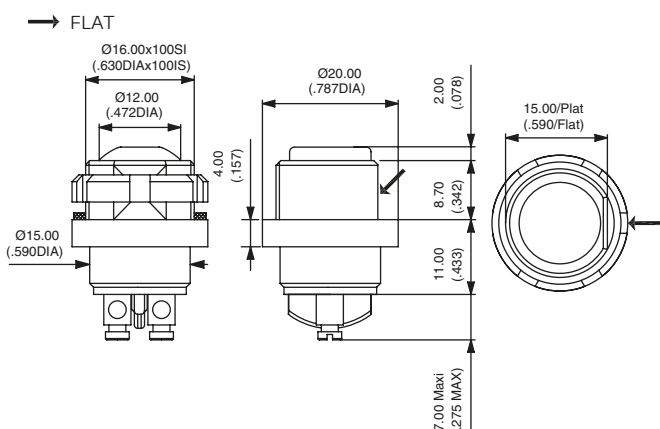
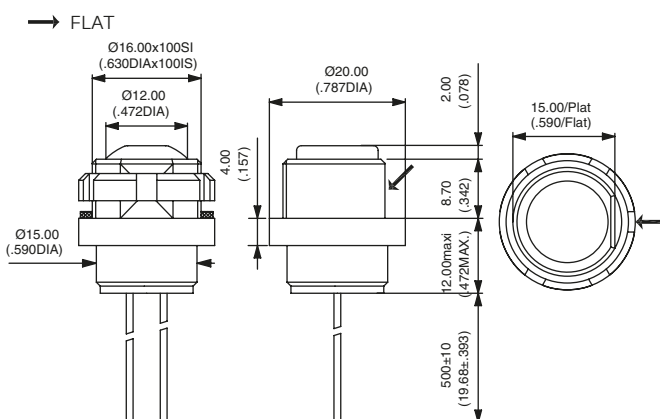
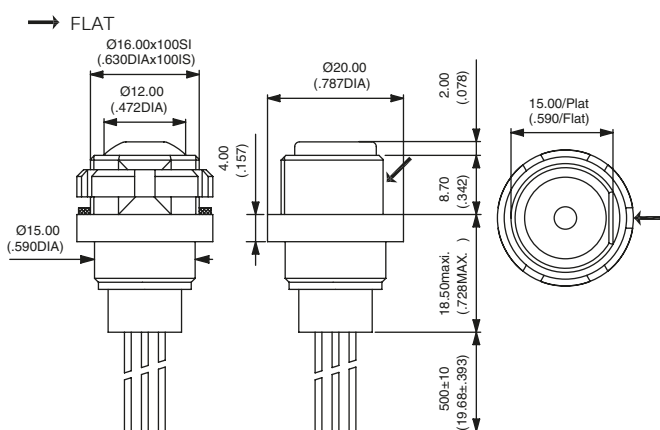
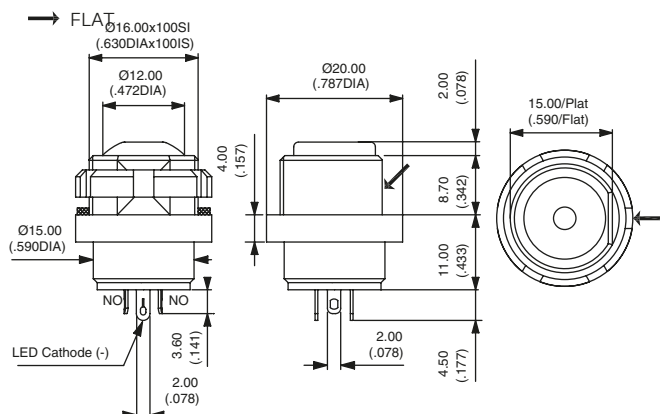
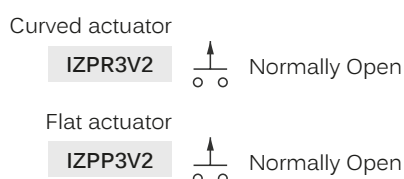


Wire colors : black : NO contact, red : LED anode(+), blue : LED cathode (-)

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



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



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.



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

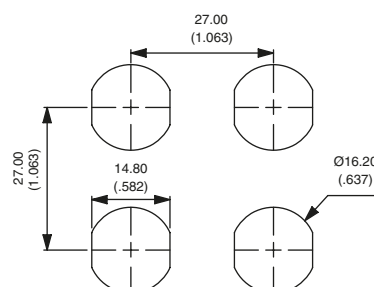
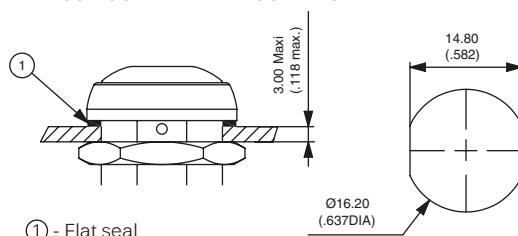
A resistor must be series-connected by the user.
Resistor value = $\frac{\text{supply voltage} - \text{LED forward voltage}}{\text{LED forward current}}$

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 <table style="margin: 5px auto; width: 100%;"> <tr><td style="background-color: #cccccc; padding: 2px 5px;">C</td><td>Square</td></tr> <tr><td style="background-color: #cccccc; padding: 2px 5px;">R</td><td>Round, curved</td></tr> <tr><td style="background-color: #cccccc; padding: 2px 5px;">P</td><td>Round, flat</td></tr> </table> Actuator marking available on round flat models (symbol 12 mm max.). On request.	C	Square	R	Round, curved	P	Round, flat	 ELECTRICAL FUNCTIONS <table style="margin: 5px auto; width: 100%;"> <tr><td style="background-color: #cccccc; padding: 2px 5px;">7</td><td>NC + NO (3 terminals)</td></tr> <tr><td style="background-color: #cccccc; padding: 2px 5px;">8</td><td>NC/NO combined (4 terminals)</td></tr> </table>	7	NC + NO (3 terminals)	8	NC/NO combined (4 terminals)	 TERMINALS <table style="margin: 5px auto; width: 100%;"> <tr><td style="background-color: #cccccc; padding: 2px 5px;">Z</td><td>Solder lug or quick-connect</td></tr> </table>	Z	Solder lug or quick-connect	 CONTACTS <table style="margin: 5px auto; width: 100%;"> <tr><td style="background-color: #cccccc; padding: 2px 5px;">2</td><td>Silver</td></tr> </table>	2	Silver
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																	

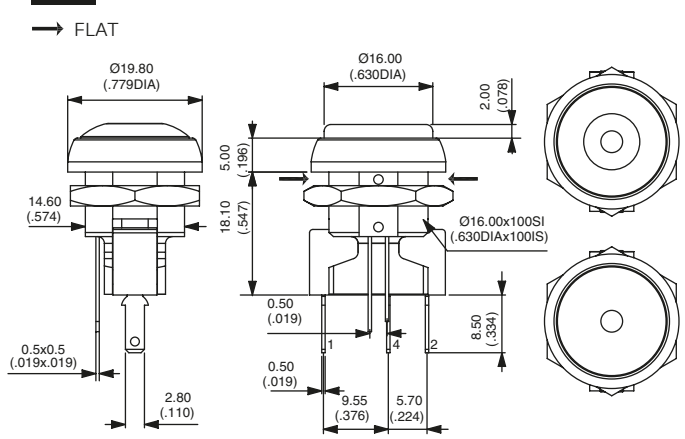
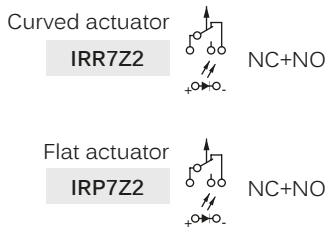
OPTIONS

..... ACTUATOR COLORS <table style="margin: 5px auto; width: 100%;"> <tr><td style="background-color: #cccccc; padding: 2px 5px;">1</td><td>Blue</td></tr> <tr><td style="background-color: #cccccc; padding: 2px 5px;">B</td><td>Dark blue</td></tr> <tr><td style="background-color: #cccccc; padding: 2px 5px;">2</td><td>Black</td></tr> <tr><td style="background-color: #cccccc; padding: 2px 5px;">3</td><td>Green</td></tr> <tr><td style="background-color: #cccccc; padding: 2px 5px;">4</td><td>Grey</td></tr> <tr><td style="background-color: #cccccc; padding: 2px 5px;">5</td><td>Yellow</td></tr> <tr><td style="background-color: #cccccc; padding: 2px 5px;">6</td><td>Red</td></tr> <tr><td style="background-color: #cccccc; padding: 2px 5px;">7</td><td>White</td></tr> <tr><td style="background-color: #cccccc; padding: 2px 5px;">8</td><td>Bright chrome</td></tr> <tr><td style="background-color: #cccccc; padding: 2px 5px;">9</td><td>Orange</td></tr> <tr><td style="background-color: #cccccc; padding: 2px 5px;">A</td><td>Satin chrome</td></tr> </table>	1	Blue	B	Dark blue	2	Black	3	Green	4	Grey	5	Yellow	6	Red	7	White	8	Bright chrome	9	Orange	A	Satin chrome	 BUSHING & BEZEL <table style="margin: 5px auto; width: 100%;"> <tr><td style="background-color: #cccccc; padding: 2px 5px;">0</td><td>Transparent (round bezel only)</td></tr> <tr><td style="background-color: #cccccc; padding: 2px 5px;">2</td><td>Black (std)</td></tr> <tr><td style="background-color: #cccccc; padding: 2px 5px;">1</td><td>White</td></tr> </table> Other : on request.	0	Transparent (round bezel only)	2	Black (std)	1	White	 ILLUMINATION <table style="margin: 5px auto; width: 100%;"> <tr><td style="background-color: #cccccc; padding: 2px 5px;">Blank</td><td>Non-illuminated</td></tr> <tr><td style="background-color: #cccccc; padding: 2px 5px;">L</td><td>Central lens</td></tr> <tr><td style="background-color: #cccccc; padding: 2px 5px;">B</td><td>Bezel (round only)</td></tr> </table>	Blank	Non-illuminated	L	Central lens	B	Bezel (round only)	 LED COLORS <table style="margin: 5px auto; width: 100%;"> <tr><td style="background-color: #cccccc; padding: 2px 5px;">Blank</td><td>Non-illuminated</td></tr> <tr><td style="background-color: #cccccc; padding: 2px 5px;">0S</td><td>Super red</td></tr> <tr><td style="background-color: #cccccc; padding: 2px 5px;">0Y</td><td>Yellow</td></tr> <tr><td style="background-color: #cccccc; padding: 2px 5px;">0G</td><td>Green</td></tr> <tr><td style="background-color: #cccccc; padding: 2px 5px;">0B</td><td>Blue</td></tr> </table>	Blank	Non-illuminated	0S	Super red	0Y	Yellow	0G	Green	0B	Blue
1	Blue																																														
B	Dark blue																																														
2	Black																																														
3	Green																																														
4	Grey																																														
5	Yellow																																														
6	Red																																														
7	White																																														
8	Bright chrome																																														
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0S	Super red																																														
0Y	Yellow																																														
0G	Green																																														
0B	Blue																																														

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



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 = $\frac{\text{supply voltage} - \text{LED forward voltage}}{\text{LED forward current}}$

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

The company reserves the right to change specifications without notice.

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

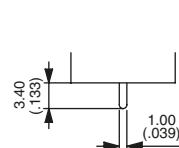


TERMINALS

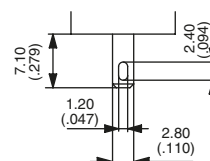
ILLUMINATED MODELS



NON-ILLUMINATED MODELS



Straight P

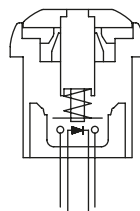


Quick-connect Z



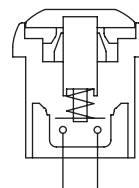
ELECTRICAL FUNCTIONS

ILLUMINATED MODELS



Function 3 (NO)

NON-ILLUMINATED MODELS

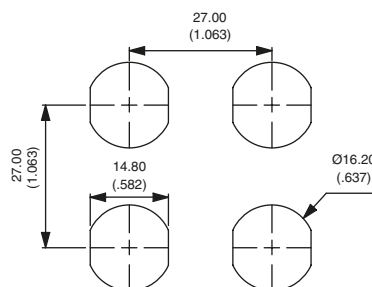
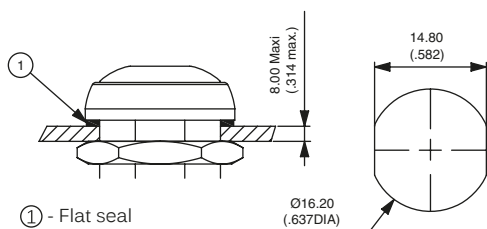


Function 3 (NO)



MOUNTING

PANEL CUT-OUT - MATRIX MOUNTING

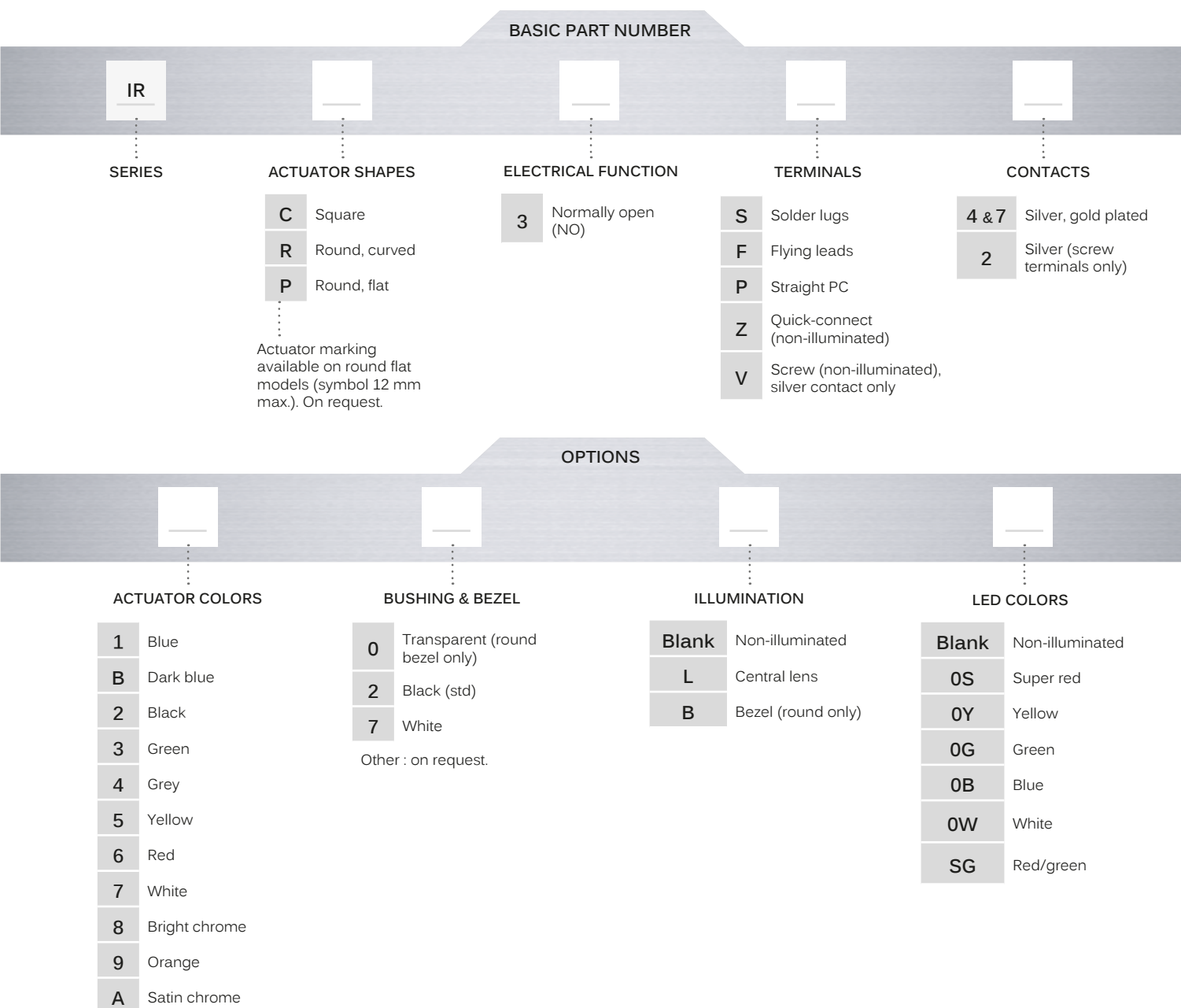


IR series

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.

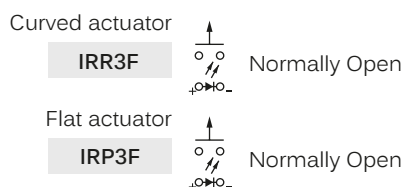


Mounting accessories : Standard hardware supplied : 1 hex nut 19 mm (.748) across flats and 1 flat seal Hex nut P/N U6715.

IR series

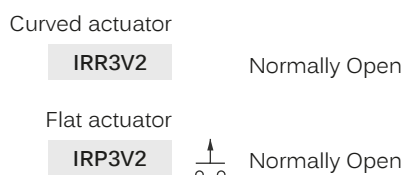
Sealed pushbutton switches • bushing Ø 16 mm • momentary • standard version

ROUND - ILLUMINATED FLYING LEAD TERMINALS

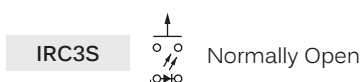


Wire colors : black : NO contact, red : LED anode (+), blue : LED cathode (-)

ROUND - NON-ILLUMINATED SCREW TERMINALS

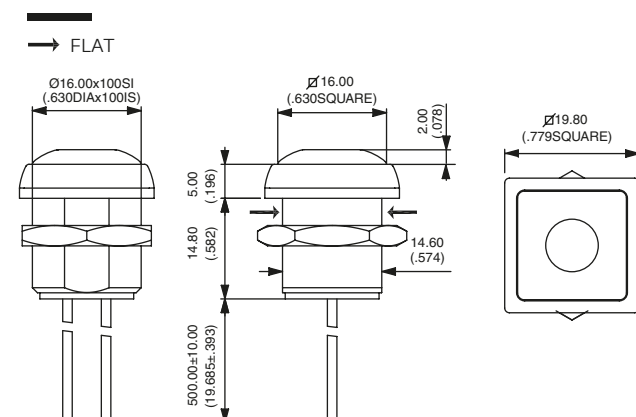
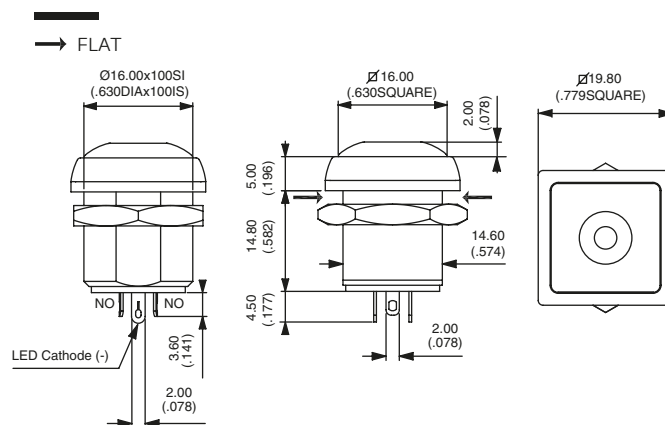
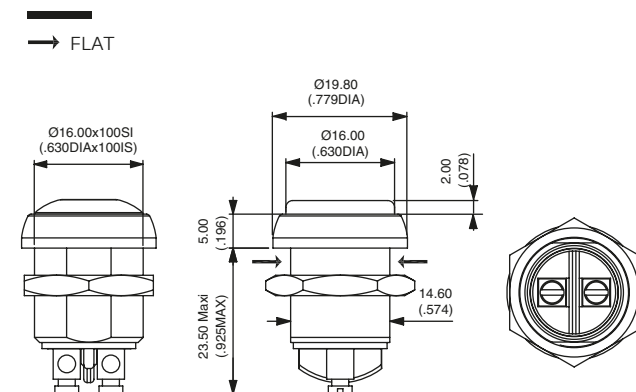
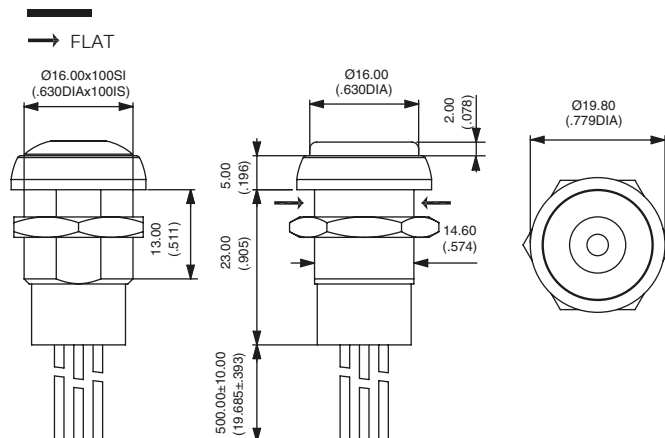
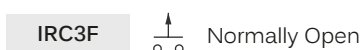


SQUARE - ILLUMINATED SOLDER LUG TERMINALS



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 = $\frac{\text{supply voltage} - \text{LED forward voltage}}{\text{LED forward current}}$
On flying lead versions, the LED resistor can be integrated by APEM on request.

The company reserves the right to change specifications without notice.

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.



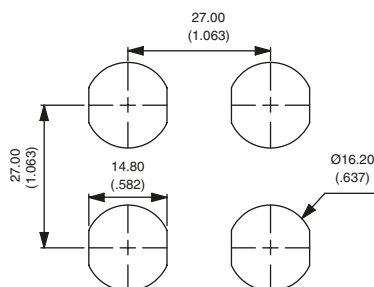
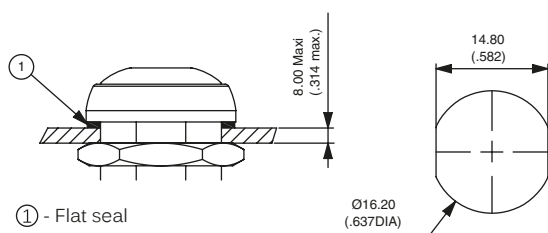
MATERIALS

- 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

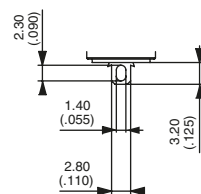


MOUNTING

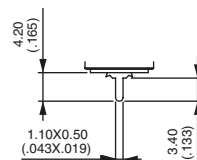
PANEL CUT-OUT - MATRIX MOUNTING



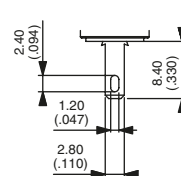
TERMINALS



Solder lug S



Straight P

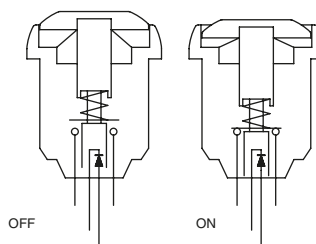


Quick-connect Z

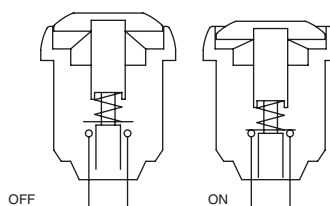


ELECTRICAL FUNCTIONS

ILLUMINATED MODELS



NON-ILLUMINATED MODELS

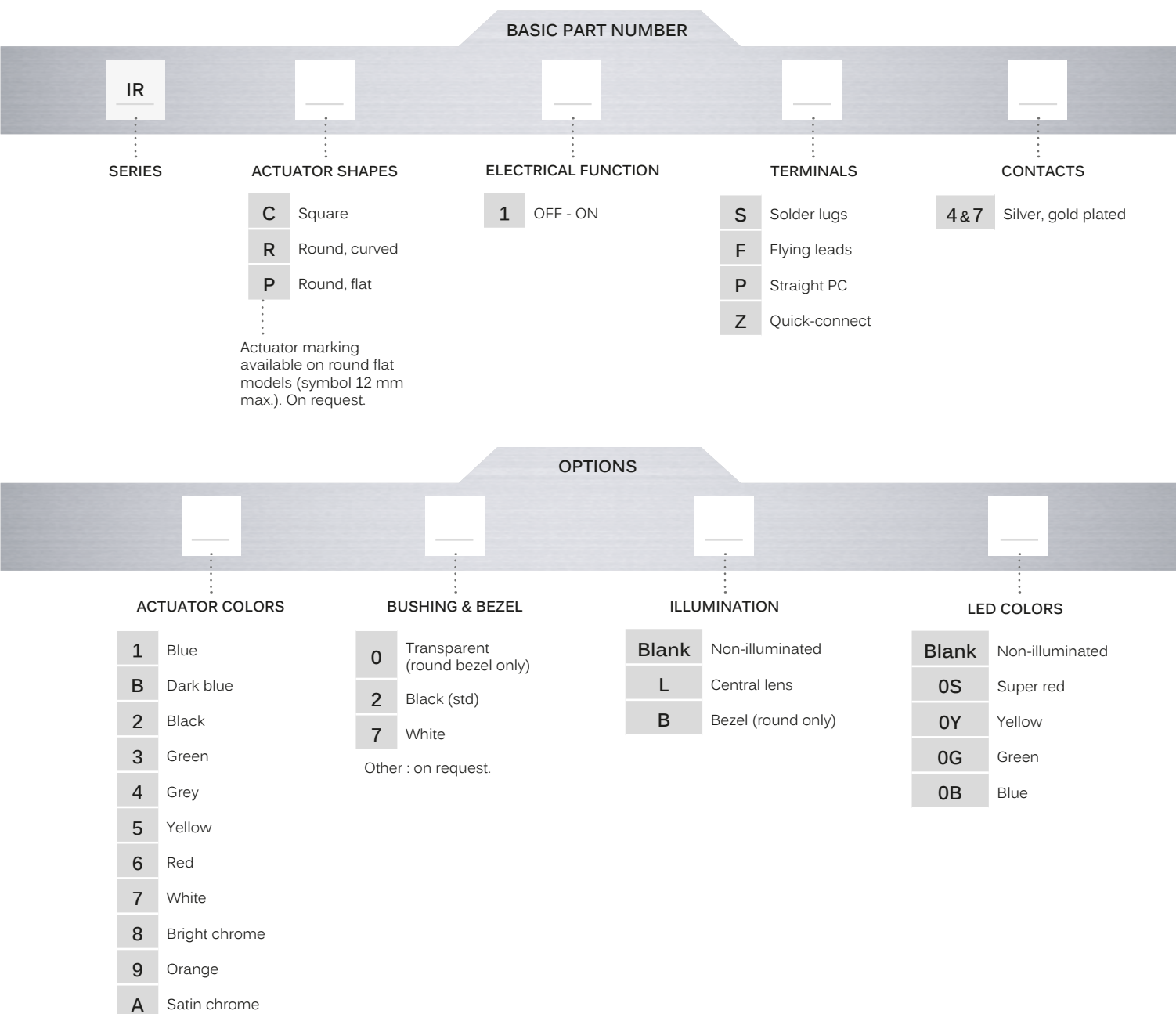


IR series

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



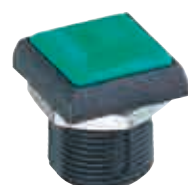
Curved actuator

IRC1F

OFF - ON

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

SQUARE - NON-ILLUMINATED SOLDER LUG TERMINALS



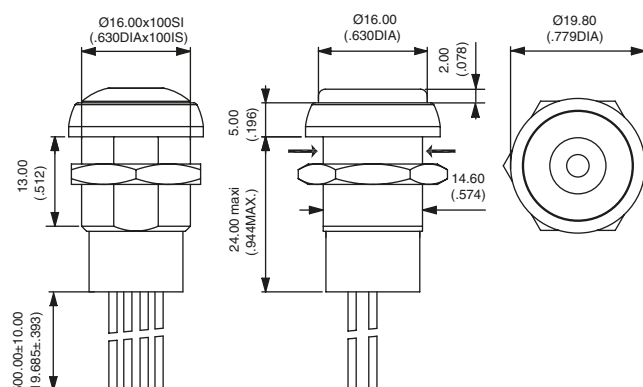
Curved actuator

IRC1S

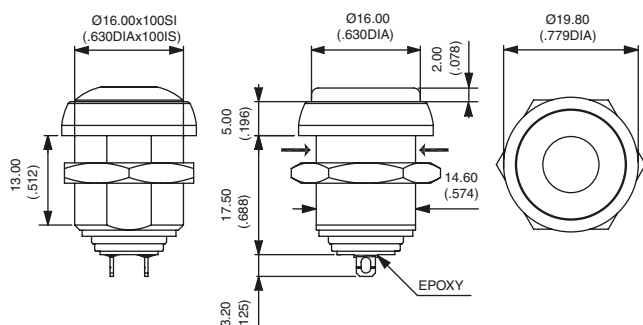
OFF - ON

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

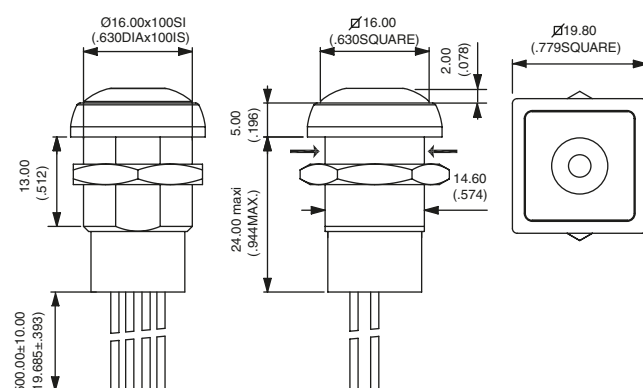
→ FLAT



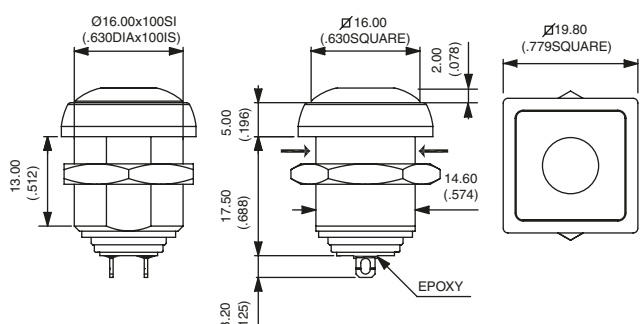
→ FLAT



→ FLAT



→ FLAT



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)

The company reserves the right to change specifications without notice.



MATERIALS

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

IA series

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

BUILD YOUR PART NUMBER

BASIC PART NUMBER

SERIES	ACTUATOR SHAPES	ELECTRICAL FUNCTIONS	TERMINALS
IA	R Round, curved	3 Normally open (NO) 5 NC/NO combined	F Flying leads

OPTIONS

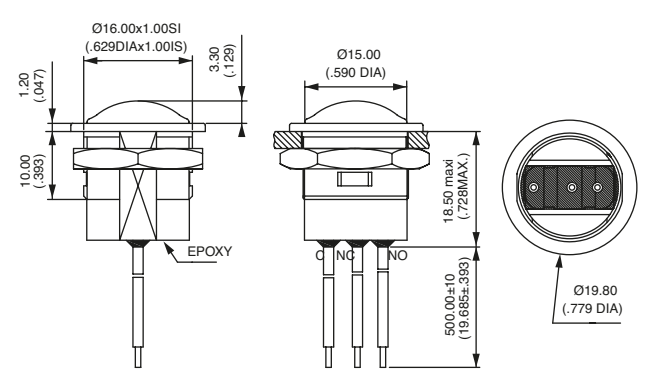
CONTACTS	ACTUATOR COLORS	CASE COLOR
1 Silver, gold plated	1 Blue 2 Black 3 Green 4 Grey 5 Yellow 6 Red 7/1 White 9 Orange	00 Black

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

The company reserves the right to change specifications without notice.



MATERIALS

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

IF series

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



BUILD YOUR PART NUMBER

BASIC PART NUMBER

SERIES	MOUNTING	ELECTRICAL FUNCTION	TERMINALS
IF			
	B Snap-in S Threaded bushing	3 Normally open (NO)	Z1 Quick-connect or solder 2,8 x 0,5 mm

OPTIONS

CONTACTS	ACTUATOR COLORS	CASE COLORS
AD Solid silver, gold plated	1 Blue 1/4 Dark blue 2 Black 3 Green 5 Yellow 6 Red 7/1 White 9 Orange	00 Black 20 Red

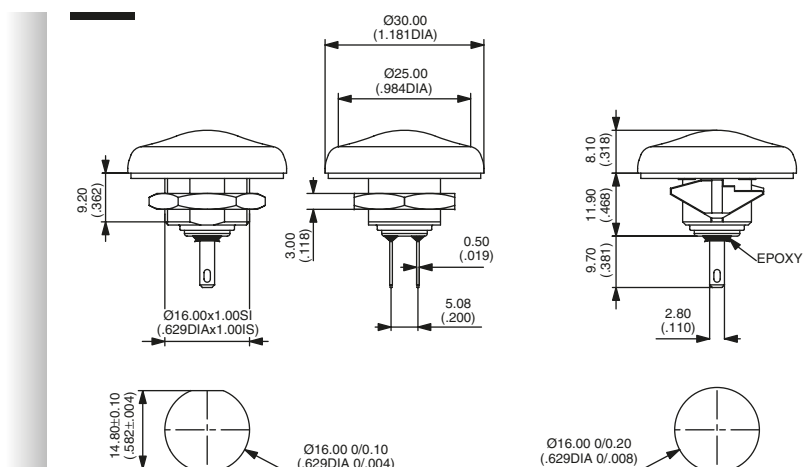
Grey RAL7040 : on request

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

MODELS



Snap-in	
IFB3Z1AD	NO
Threaded bushing	
IFS3Z1AD	NO



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.

The company reserves the right to change specifications without notice.

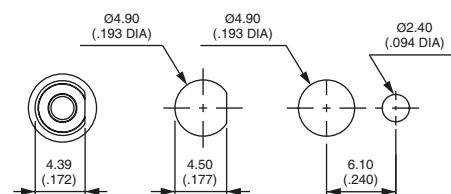


MATERIALS

- 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

BASIC PART NUMBER

SERIES	NUMBER OF POLES	ELECTRICAL FUNCTIONS	TERMINALS
ZP	3 Single pole	2 ON - MOM 3 OFF - MOM	S0 Solder lug P0 Straight PC

OPTIONS

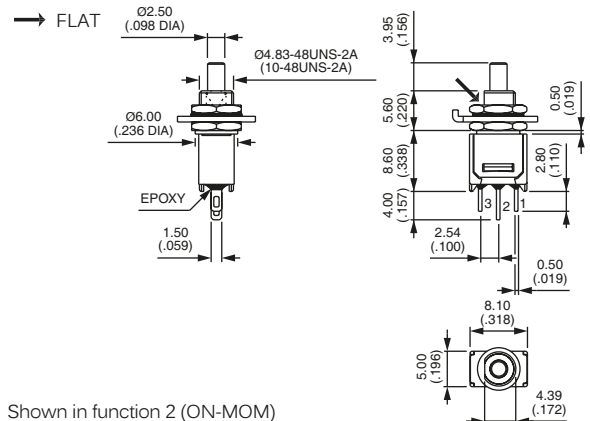
CONTACT AND TERMINAL MATERIALS	BUSHING	MODELS
0 Brass, gold plated 1 Brass, silver plated 3 Brass, gold plated (1,27 micron gold)	01 Threaded, with flat	00 Standard model

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

SOLDER LUG TERMINALS : ZP..S0



ZP32S0	ON	MOM
ZP33S0	OFF	MOM



Shown in function 2 (ON-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

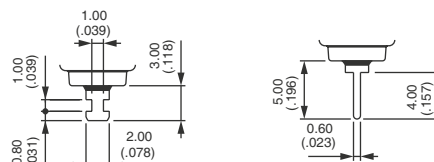


MATERIALS

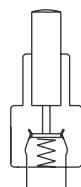
- Case : Pa6T
- Actuator : polyamide, glass filled
- Bushing : brass, nickel plated
- Contacts :
CD : brass, gold plated
- Terminal seal : epoxy



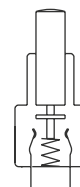
TERMINALS



ELECTRICAL FUNCTIONS



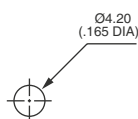
Function 2 (NC)



Function 3 (NO)



PANEL CUT-OUT

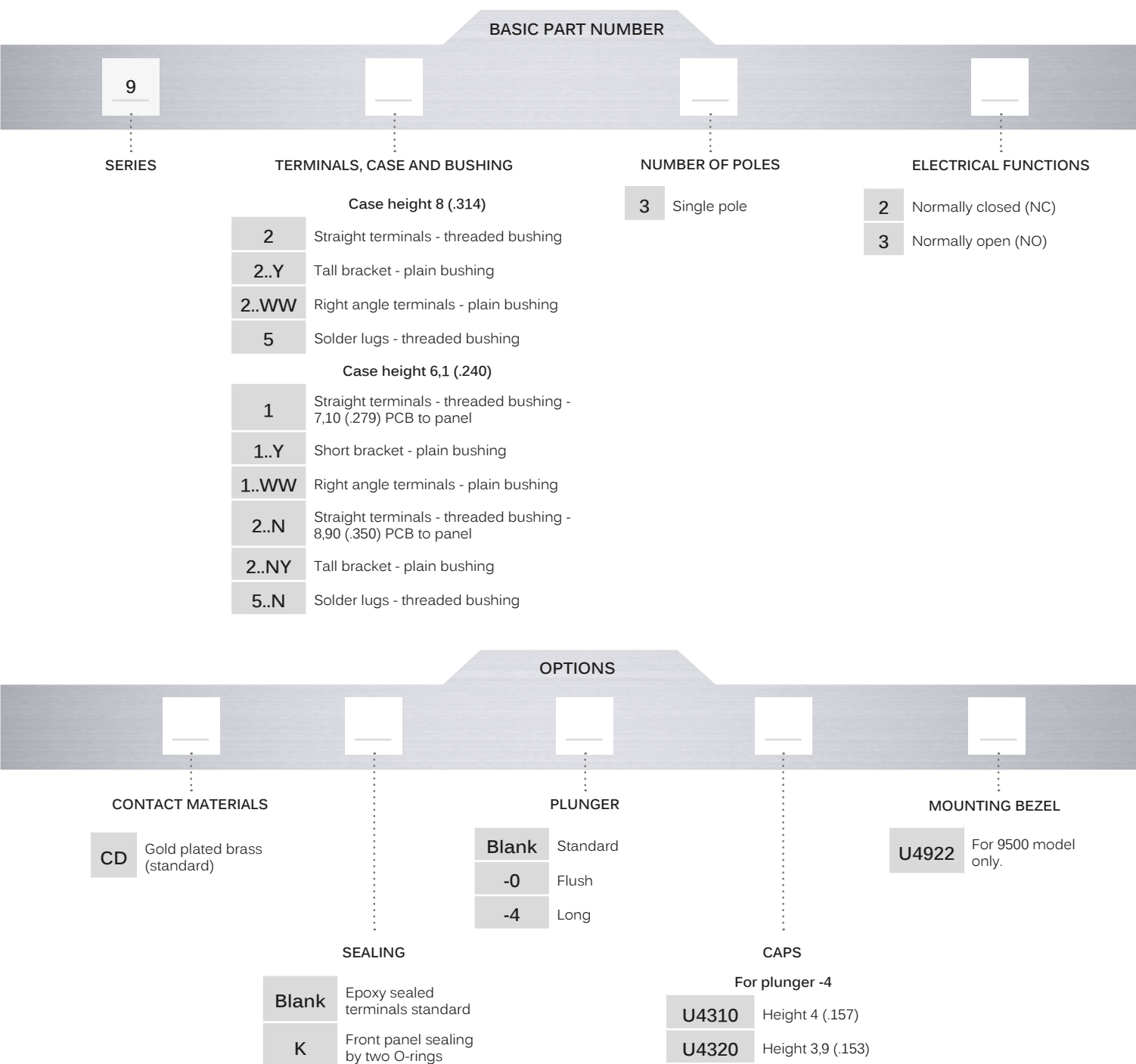


9100-9200-9500 series

Subminiature momentary pushbutton switches



BUILD YOUR PART NUMBER



ABOUT THIS SERIES



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. See Sealing Boot section.



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

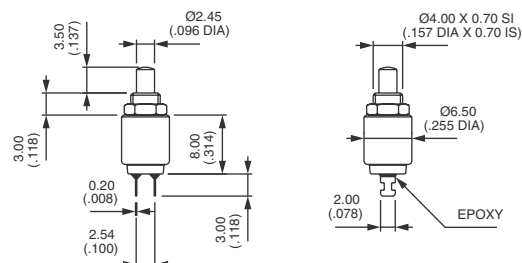


Normally Closed

9533



Normally Open



LONG CASE - STRAIGHT PC TERMINALS : 9200



9232

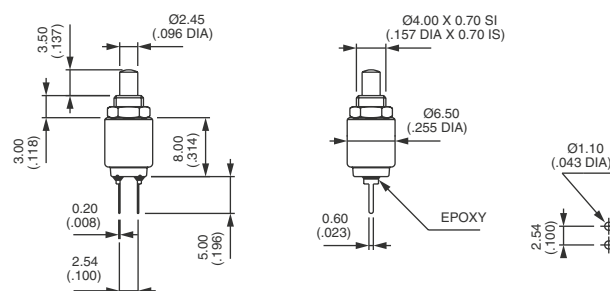


Normally Closed

9233



Normally Open



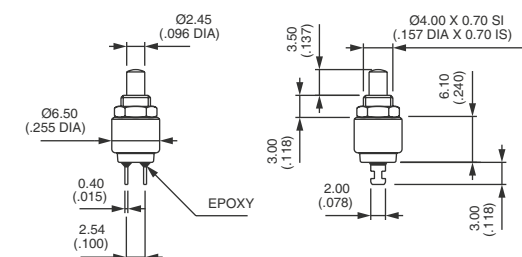
SHORT CASE - SOLDER LUGS : 9500N



9533N



Normally Open



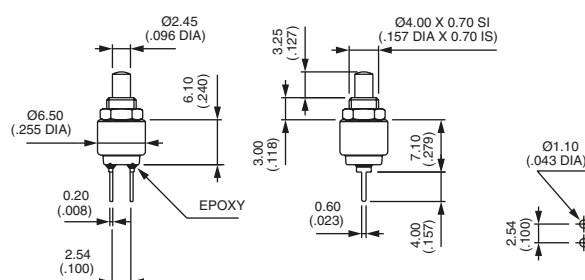
SHORT CASE - STRAIGHT PC TERMINALS 7,10 (.279) PCB TO PANEL



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



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.



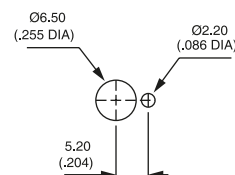
GENERAL SPECIFICATIONS

- 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.

The company reserves the right to change specifications without notice.



PANEL CUT-OUT



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

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

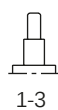
BASIC PART NUMBER			
SP			
SERIES	NUMBER OF POLES	ELECTRICAL FUNCTION	TERMINALS
	3 Single pole 4 Double pole	5 ON - MOM	P0 Straight PC Y0 Straight PC and bracket mounting W0 Right angle, horizontal mounting WW Right angle, vertical mounting S0 Solder lug terminals, (threaded bushing)
OPTIONS			
CONTACT AND TERMINAL MATERIALS	PLUNGERS	OPTIONS/APPROVAL	CAPS (MOUNTED)
0 Brass, gold plated 1 Silver 2 Silver, gold plated	00 Standard 02 Short	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	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... 00
Double pole
SP45WW... 00



1-3

ON

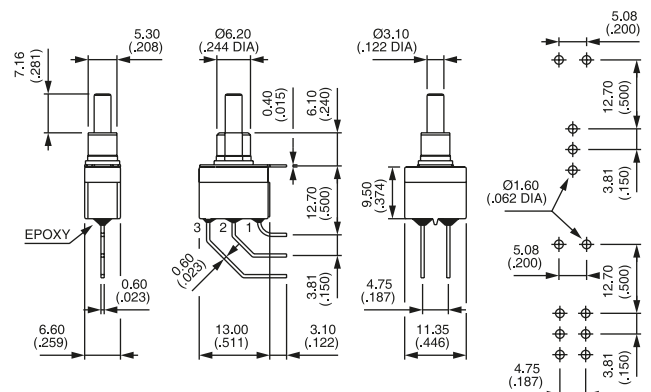


1-2

MOM

MOM

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



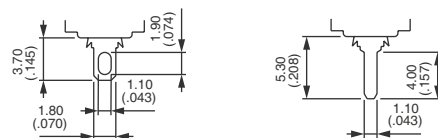
3A 250VAC,
6A 125VAC

Availability : consult factory for details of approved models.

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

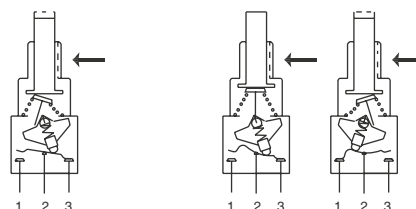


TERMINALS



ELECTRICAL FUNCTIONS

→ KEYWAY

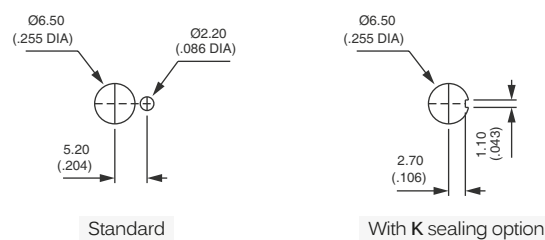


Funct. 6 (ON-ON)

Funct. 2 (ON-MOM)



PANEL CUT-OUT



Standard

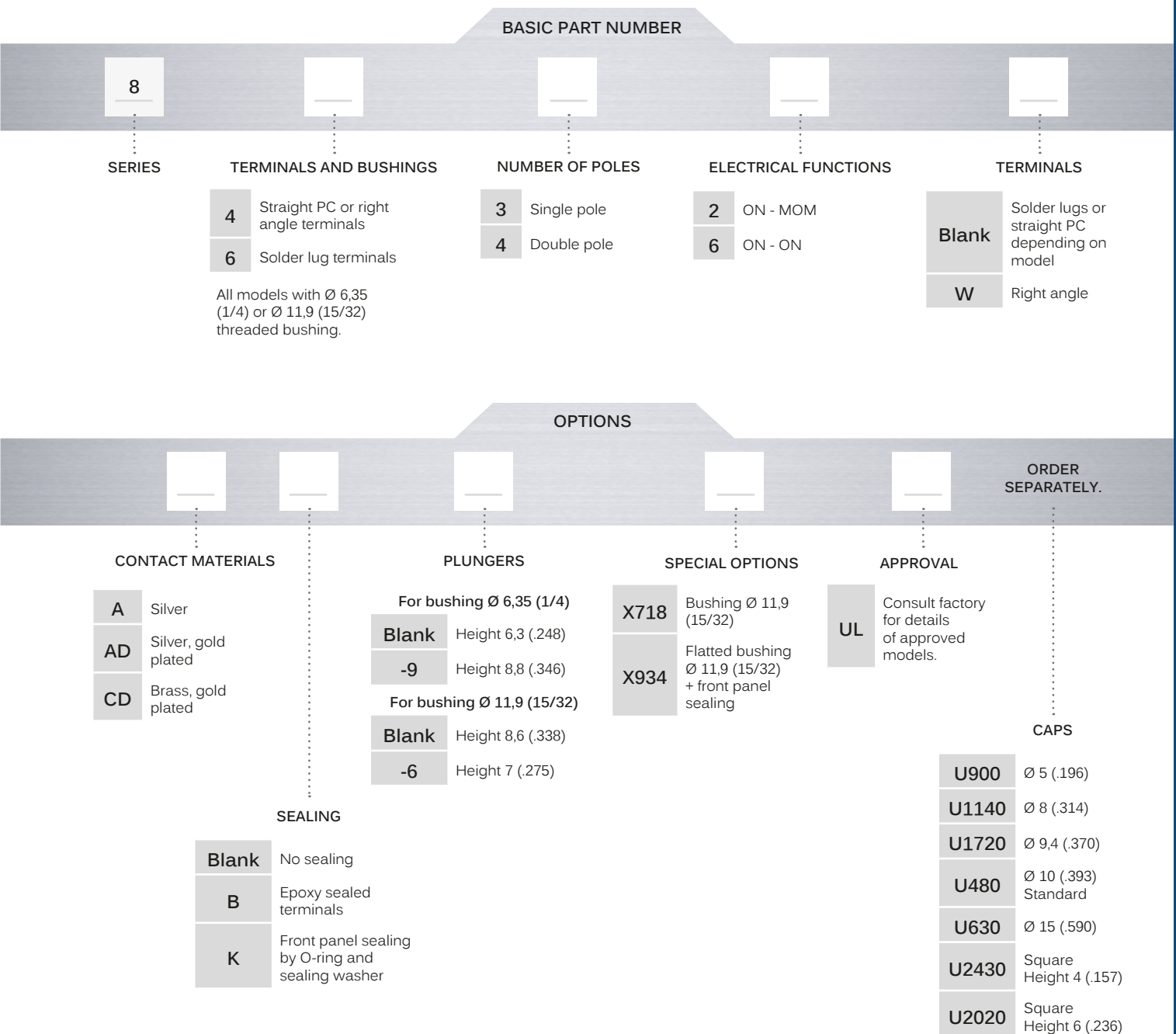
With K sealing option

8000 series

Momentary or alternate action
pushbutton switches



BUILD YOUR PART NUMBER



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 with all models : 2 hex nuts 8 mm (.314) across flats, 1 locking ring and 1 lockwasher.

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



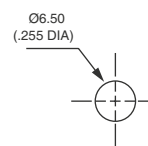
MATERIALS

- 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

Case length 11,2 (.440)

- 4 Straight PC terminals
- 6 Solder lug terminals
- 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.

NUMBER OF POLES

- 3 Single pole

ELECTRICAL FUNCTIONS

- 2 Normally closed (NC)
- 3 Normally open (NO)
- 5 Combined (NC/NO)

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)

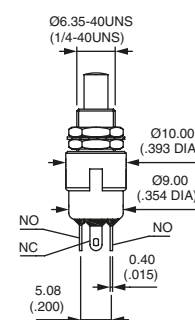
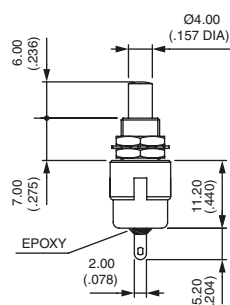
NOTICE : please note that not all combinations of above numbers are available. Refer to www.apem.com for further information.

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)



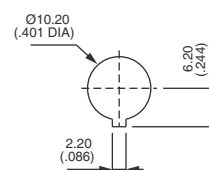
MATERIALS

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

The company reserves the right to change specifications without notice.



PANEL CUT-OUT



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



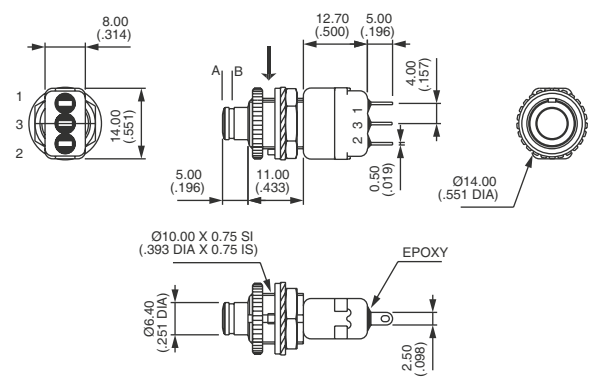
	A	B
	1-2	1-3
Silver contacts		
104350003	ON	MOM
Gold plated silver contacts		
104350108	ON	MOM

DOUBLE POLE

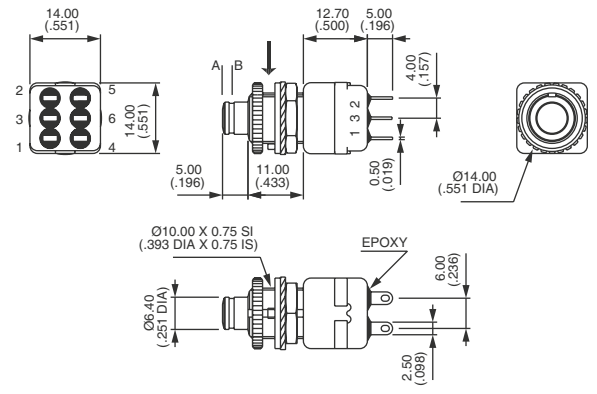


	A	B
	1-2	1-3
	5-4	5-6
Silver contacts		
104450003	ON	MOM
Gold plated silver contacts		
104450108	ON	MOM

→ KEYWAY



→ KEYWAY



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.



RELIABILITY - RUN-IN TEST

Upon request, each individual switch can be submitted to a low level run-in test of 50 or 250 cycles to ensure suitability for special applications requiring a very high level of reliability (military, space, etc.).

AGENCY APPROVALS



2A 125VAC/250VAC



CECC 96401-001

Designed to **MIL** specifications

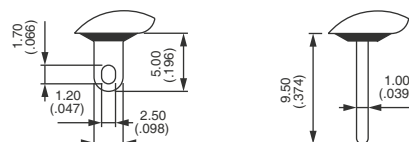
Availability :

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.

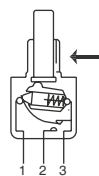


TERMINALS



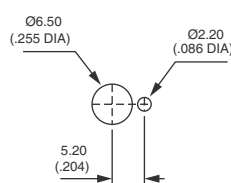
ELECTRICAL FUNCTION

→ KEYWAY

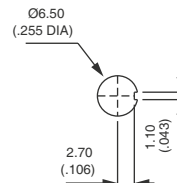


PANEL CUT-OUT

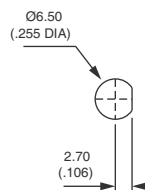
FOR Ø 6,35 (1/4) BUSHING



Standard



With K sealing option



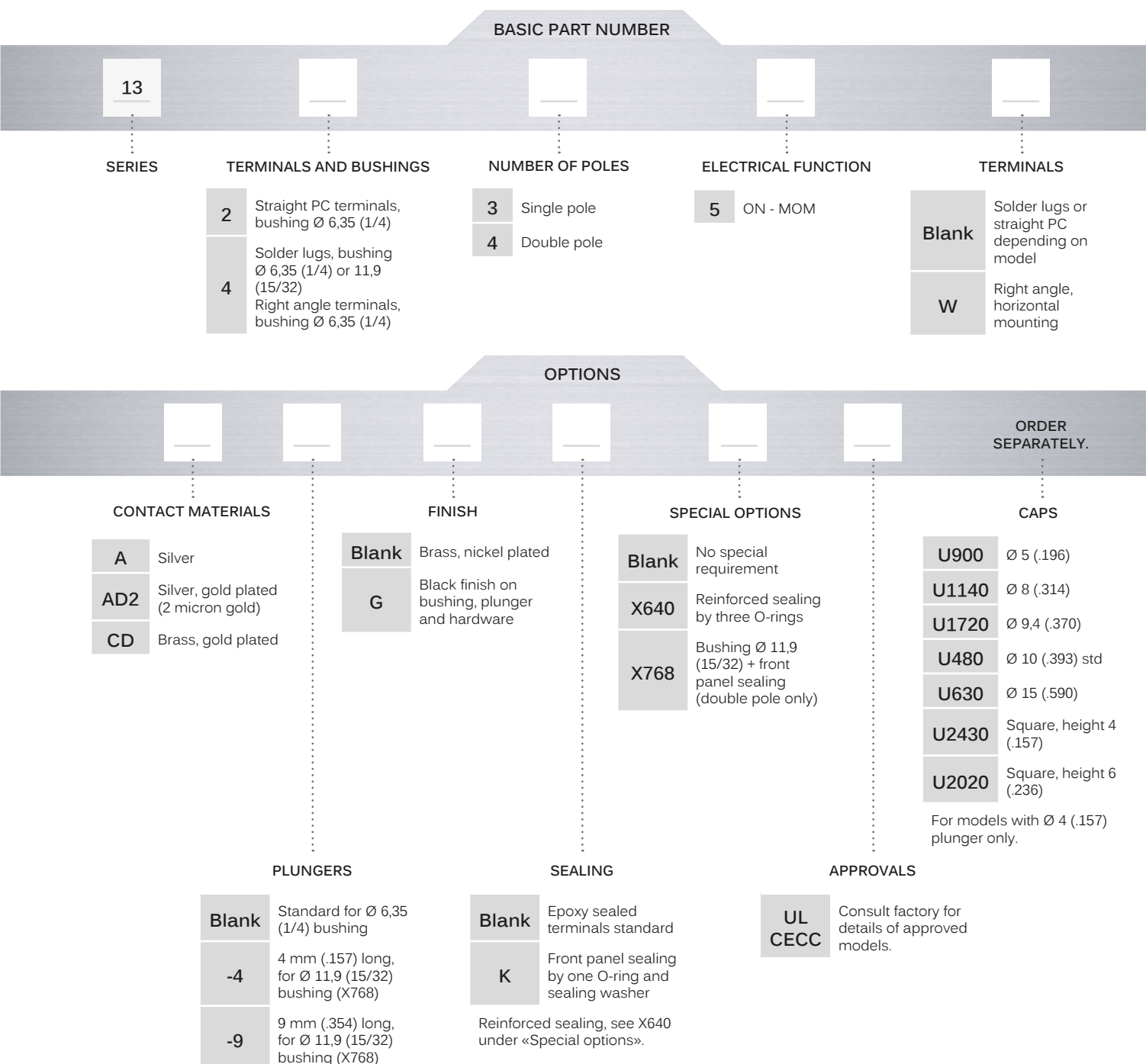
With X640 sealing option

13000 series

Professional quick-break
momentary pushbutton switches



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 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



	1-3	1-2
Single pole	ON	MOM
Double pole	ON	MOM

Ø 6,35 BUSHING

STRAIGHT PC TERMINALS : 13200



	1-3	1-2
Single pole	ON	MOM
Double pole	ON	MOM

Ø 6,35 BUSHING

RIGHT ANGLE TERMINALS - SINGLE POLE



1-3

1-2

13435W ON MOM

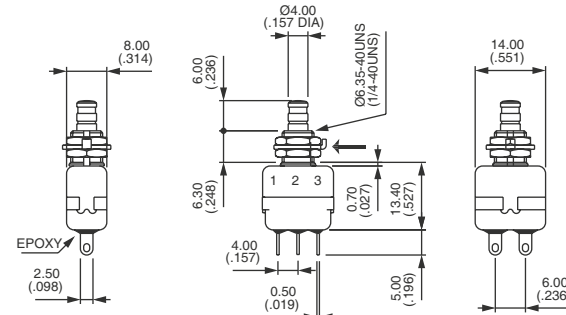
SEALED SWITCH WITH Ø 11,9 FLATTED
BUSHING : X768



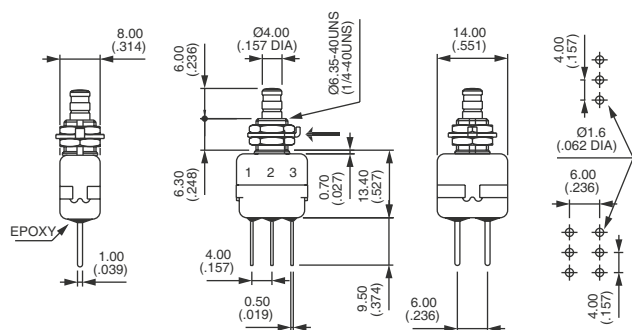
		
With short plunger	ON	MOM
With long plunger	ON	MOM

Chrome plated actuator

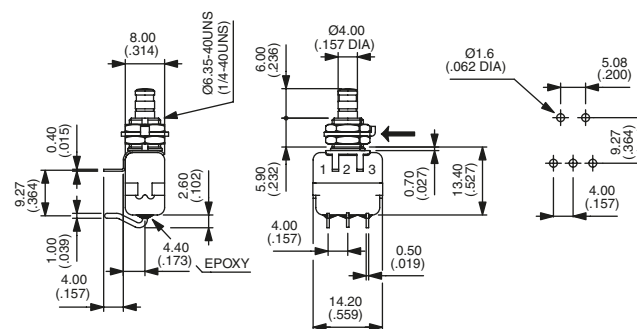
→ KEYWAY



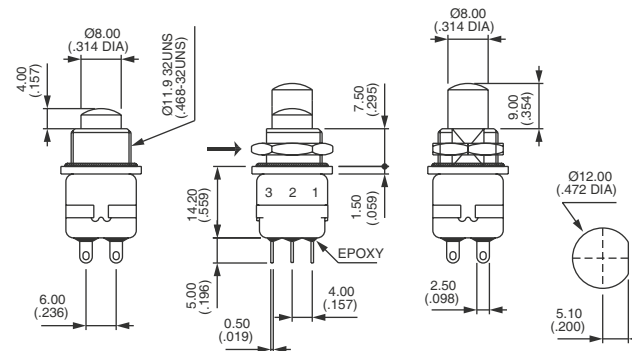
→ KEYWAY



→ KEYWAY



→ FLAT



Short (-4)

Long (-9)

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)

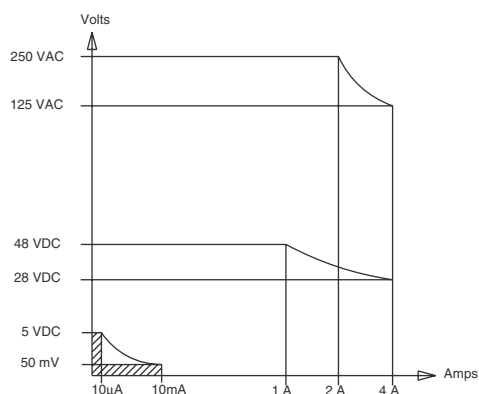
Highly reliable contacts

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



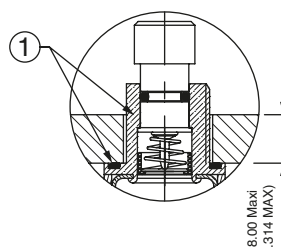
CECC 96401-001

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

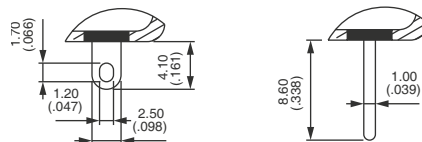
- Front panel sealing by two O-rings
- Panel seal withstands 1 bar pressure and remains sealed even when the switch is operated.
- Epoxy sealed terminals
- Splash-proof case



① - O-ring

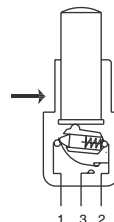


TERMINALS

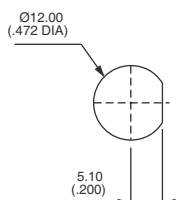


ELECTRICAL FUNCTION

→ FLAT



PANEL CUT-OUT

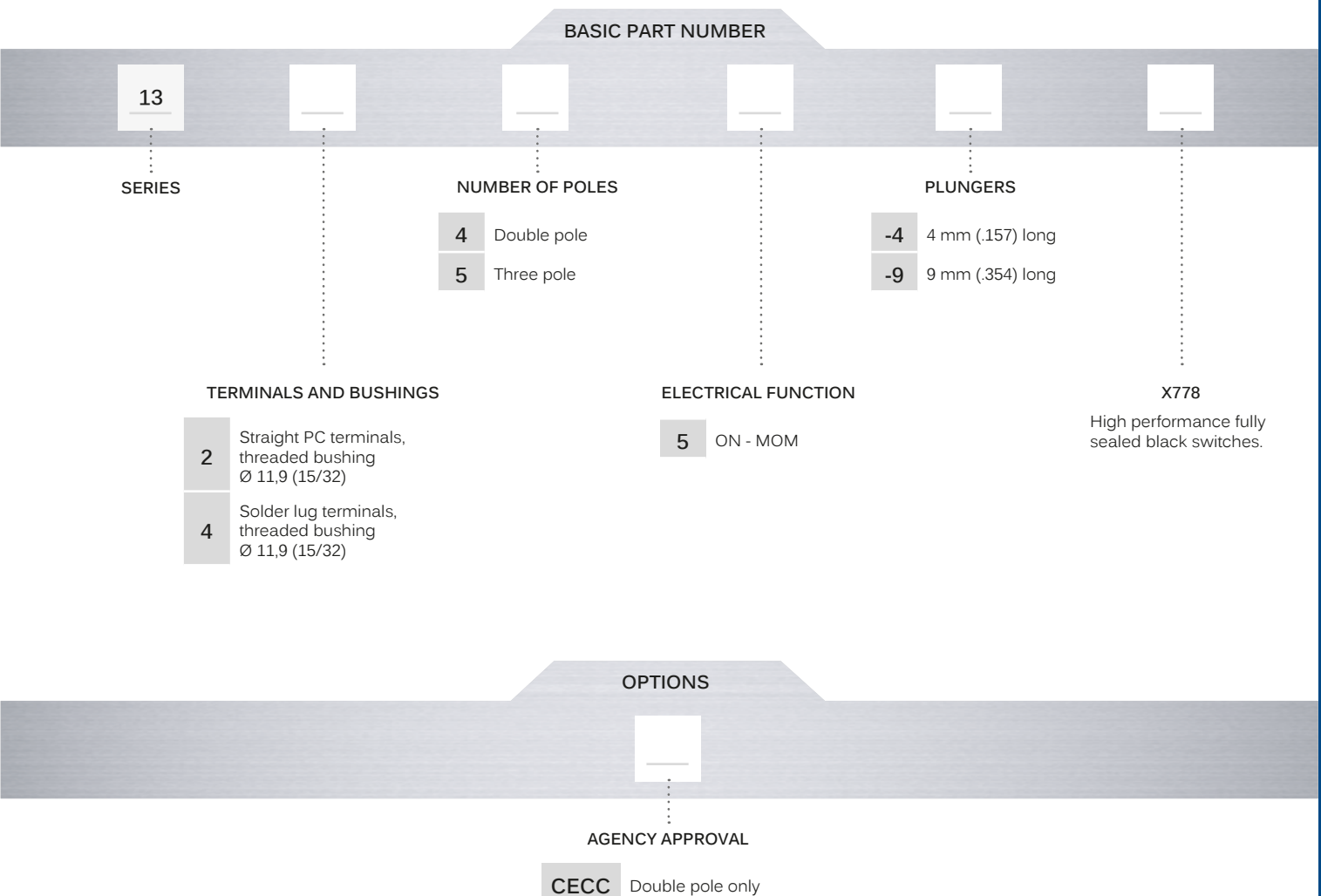


13000X778 series

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

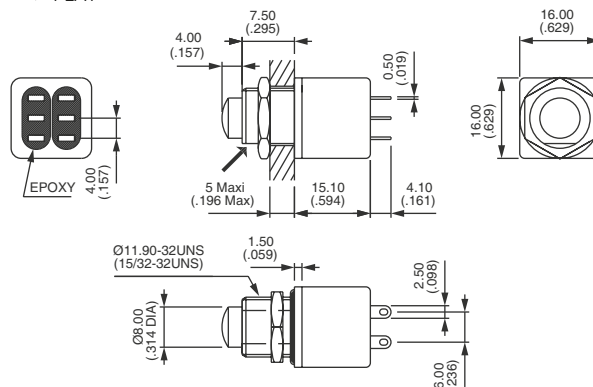


ON

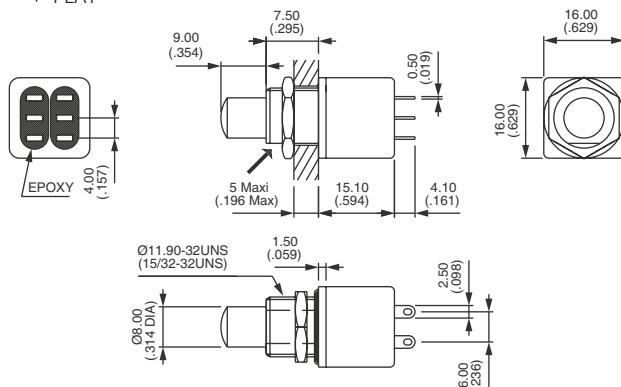


MOM

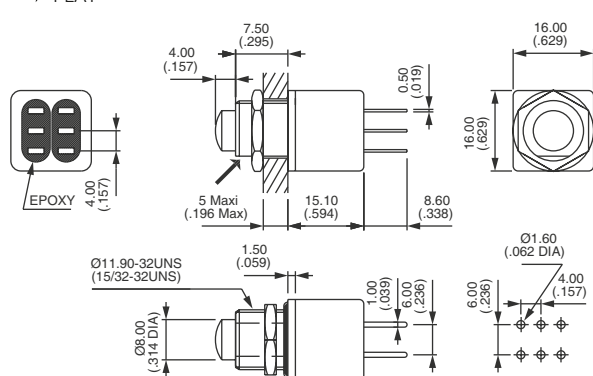
→ FLAT



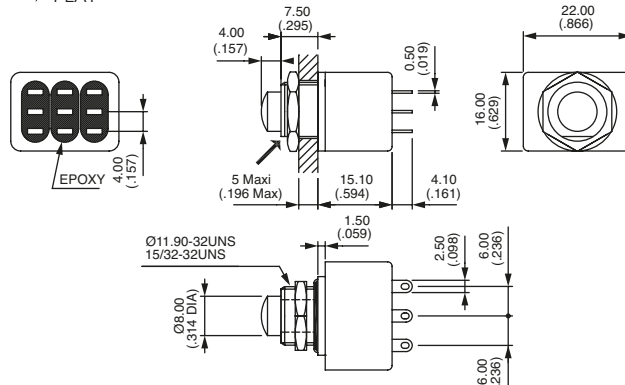
→ FLAT



→ FLAT



→ FLAT



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

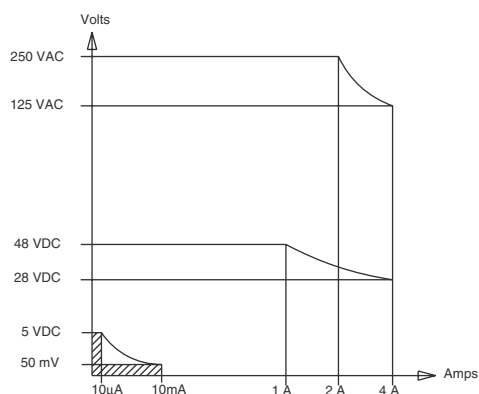
Highly reliable contacts

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

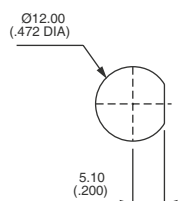


ENVIRONMENTAL SPECIFICATIONS

- 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)

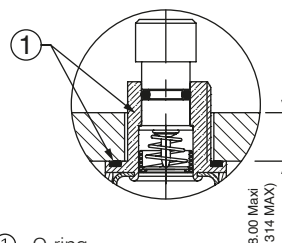


PANEL CUT-OUT



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

Solder lug 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.

SOLDER LUG TERMINALS - DOUBLE POLE

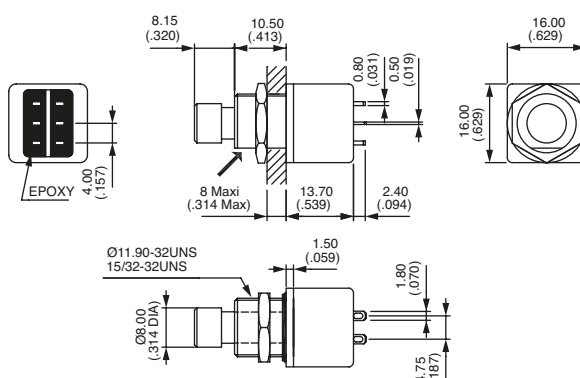


13446-3X778

ON

ON

→ FLAT



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.

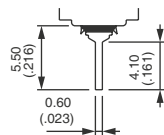
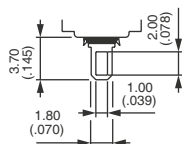


18000 series

Snap-action momentary pushbutton switches

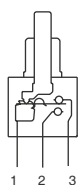


TERMINALS

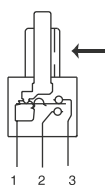


ELECTRICAL FUNCTION

→ KEYWAY



Plain bushing

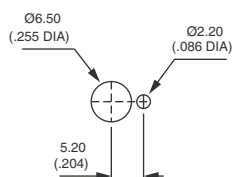


Threaded bushing

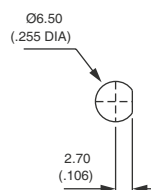


PANEL CUT-OUT

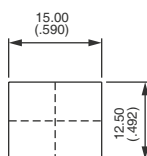
18500 - 18200



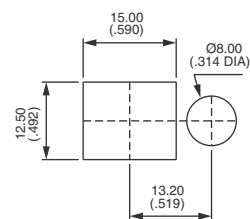
18700 - 18900



18800



With bezel U1200



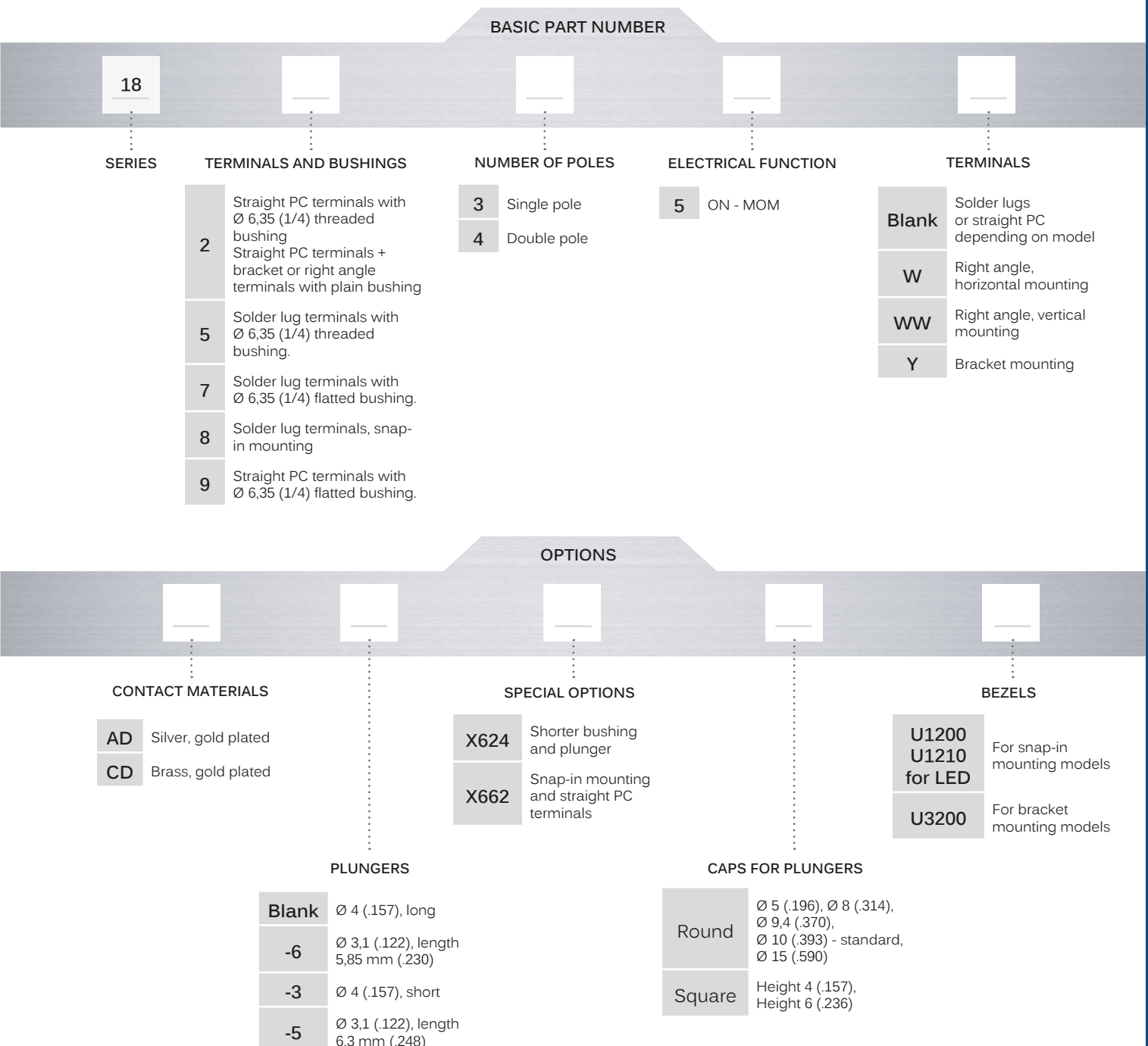
With bezel U1210 for LED

18000 series

Snap-action momentary pushbutton switches



BUILD YOUR PART NUMBER



ABOUT THIS SERIES



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 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



1-3

ON



1-2

MOM

Double pole

18545

ON

MOM

THREADED BUSHING

STRAIGHT PC TERMINALS : 18200



Single pole

18235



1-3

ON



1-2

MOM

Double pole

18245

ON

MOM

SNAP-IN MOUNTING

SOLDER LUG TERMINALS : 18800



Single pole

18835



1-3

ON



1-2

MOM

Double pole

18845

ON

MOM

Available with straight PC terminals : see X662 under «Special options».

PLAIN BUSHING - RIGHT ANGLE TERMINALS VERTICAL : 18200WW



Single pole

18235WW



1-3

ON



1-2

MOM

Double pole

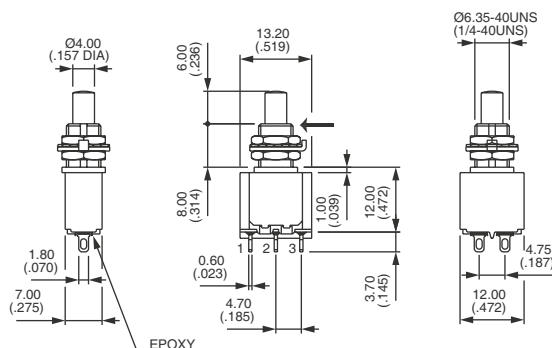
18245WW

ON

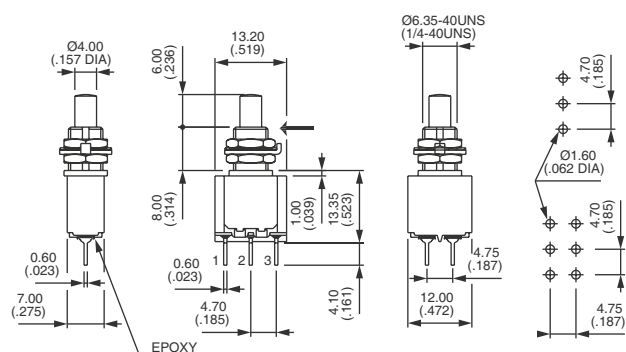
MOM

→ KEYWAY

Shown with standard plunger

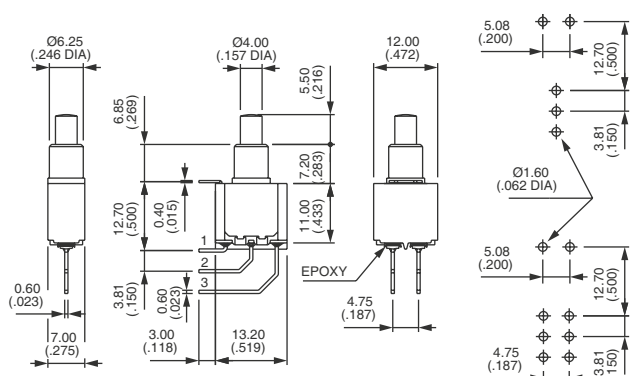
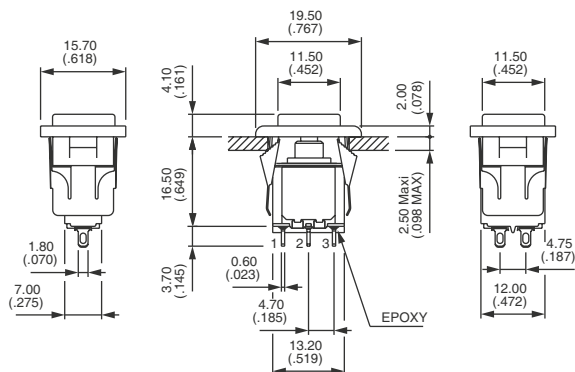


→ KEYWAY



→ KEYWAY

Shown with cap U910 + U1200



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



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

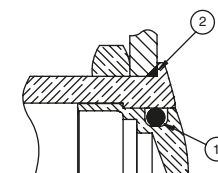
- Case : PBT
- Contacts : silver (A) or brass, silver plated (C)
- Bushing : stainless steel
- Actuator : stainless steel

The company reserves the right to change specifications without notice.



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)



① - internal gasket

② - external gasket

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

BASIC PART NUMBER					
SERIES	BUSHING/ACTUATOR CONFIGURATIONS	CASES	FUNCTION	CONTACTS	TERMINALS
AV	Models Ø 19 (.748) 09 Flat actuator 19 Curved actuator 9D Flush actuator Models Ø 22 (.866) 03 Flat actuator 02 Curved actuator M3 Flat actuator + flatted bushing M2 Curved actuator + flatted bushing	000 Long 100 Short	3 NO	A Silver C Brass, silver plated	9 Screw 2 Quick-connect
OPTIONS					
BUSHING/ACTUATOR MATERIALS		SEALING		AGENCY APPROVAL	
40 Stainless steel		N No sealing T Sealed to IP65		UU UL Availability : models with long case only.	

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

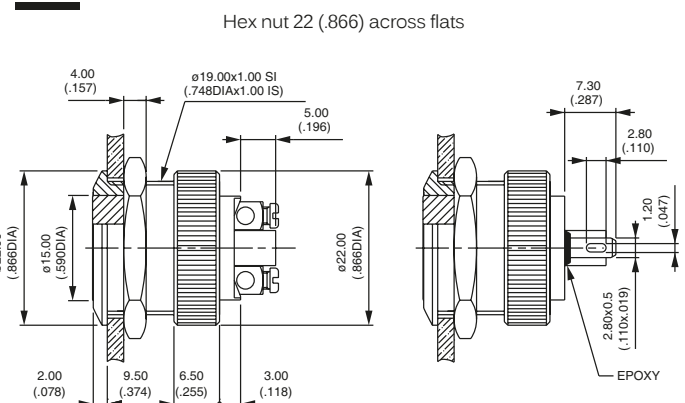
AV091003-940•

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

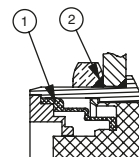
- Case : PA4-6, UL94-V0
- Contacts : silver (A)
- Bushing & actuator : see next page

The company reserves the right to change specifications without notice.



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					
SERIES	BUSHINGS/ACTUATORS	MODEL	FUNCTION	CONTACTS	TERMINALS
AV	06 09 03 16 19 02	100	1 OFF-ON	A Silver	2 4 8
	Ø 16 (.629), flat Ø 19 (.748), flat Ø 22 (.866), flat Ø 16 (.629), curved Ø 19 (.748), curved Ø 22 (.866), curved				Solder PC Quick-connect

OPTIONS	
BUSHING/ACTUATOR MATERIALS 00 (std) 10 40	Nickel plated brass / Nickel plated brass Nickel plated brass / Stainless steel Stainless steel / Stainless steel
SEALING Blank K	No sealing Sealed to IP65

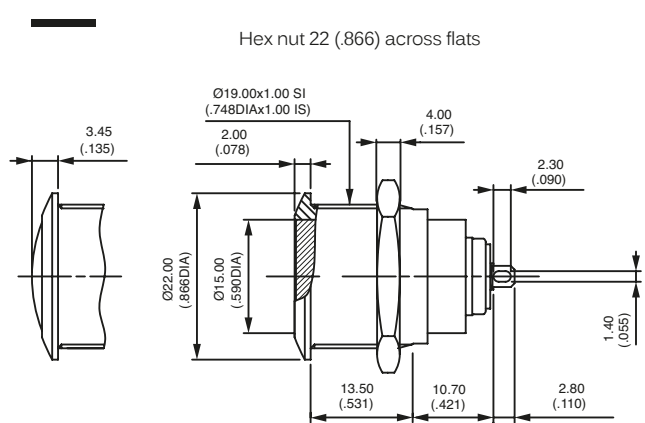
NOTICE : please note that not all combinations of above numbers are available. Refer to www.apem.com for further information.

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

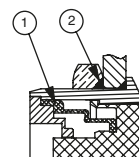
- Case : PBT
- Contacts : brass, silver plated (C)
- Bushing and actuator : see next page

The company reserves the right to change specifications without notice.



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

SERIES	BUSHING/ACTUATOR CONFIGURATIONS	FUNCTION	CASE	CONTACTS	TERMINALS
AV					
	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				

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



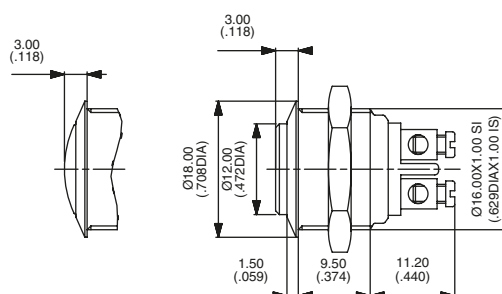
Curved actuator

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



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



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.



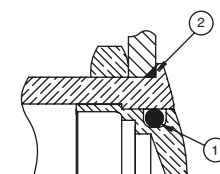
MATERIALS

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



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)



- ① - internal gasket
- ② - external gasket

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 • 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 = $\frac{\text{supply voltage} - \text{LED forward voltage}}{\text{LED forward current}}$



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.



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)



- ① - internal membrane
- ② - external gasket

AV series

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



BUILD YOUR PART NUMBER

BASIC PART NUMBER

SERIES	BUSHING	LED COLORS	LED RESISTORS	CONTACTS	TERMINALS
AV					
	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	RING COLORS	SEALING
0 No protection and/or no flying leads	1 Blue	Blank No sealing
1 Heat-shrink sleeves	2 Black*	K Sealed to IP67
2 Tube + epoxy	3 Green	
	4 Grey*	
	5 Yellow	
	6 Red	
	7 Opal white	
	8 Translucent	
	9 Orange	

*non-illuminated only

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



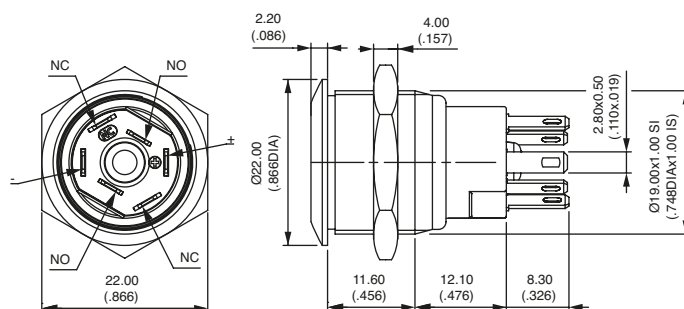
Illuminated (select LED color above)*

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 = $\frac{\text{supply voltage} - \text{LED forward voltage}}{\text{LED forward current}}$



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.



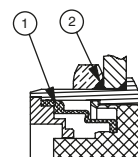
MATERIALS

- 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

AV series

Security pushbutton switches
 Ø 19 mm or 22 mm • latching



BUILD YOUR PART NUMBER

BASIC PART NUMBER

SERIES	ACTUATOR TYPES	ILLUMINATION	LED COLORS	FUNCTION	TERMINALS
AV	Models Ø 19 (.748)				
09	Flat	0 No	0 No LED	E ON - ON	2 Solder
19	Curved	L Illuminated	1 Blue		4 PC
	Models Ø 22 (.866)		3 Green		8 Quick-connect
03	Flat		5 Yellow		
02	Curved		6 Red		
	BUSHING/ACTUATOR CONFIGURATIONS			CONTACTS	
				A Silver	

OPTIONS

BUSHING/ACTUATOR MATERIALS	SEALING
00 (std) Nickel plated brass / Nickel plated brass	Blank No sealing
10 Nickel plated brass / Stainless steel	K Sealed to IP65
40 Stainless steel / Stainless steel	
50 Stainless steel / Nickel plated brass	

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

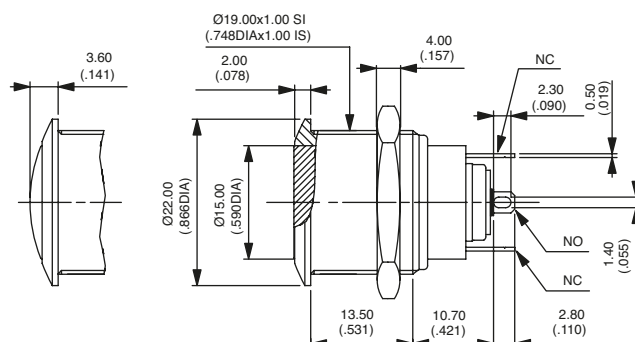
BUSHING Ø 19 (.748) - NON-ILLUMINATED SOLDER LUG TERMINALS



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.

Hex nut 22 (.866) across flats



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 = $\frac{\text{supply voltage} - \text{LED forward voltage}}{\text{LED forward current}}$



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.



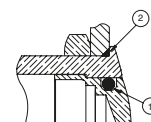
MATERIALS

- 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)



① - internal gasket

② - external gasket

AV series

Tactile security pushbutton switches Ø 19 mm



BUILD YOUR PART NUMBER

BASIC PART NUMBER

SERIES	ACTUATOR TYPES	CASE	ILLUMINATION	FUNCTION	CONTACTS	TERMINALS
AV		C7				
	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

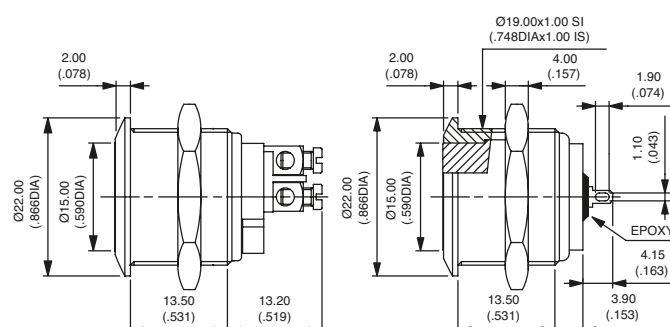


Screw terminals

AV09C703D9



Hex nut 22 (.866) across flats



Also available with curved actuator : AV19C703D2 or AV19C703D9

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 = $\frac{\text{supply voltage} - \text{LED forward voltage}}{\text{LED forward current}}$



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.



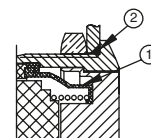
MATERIALS

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



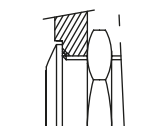
MOUNTING

- 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

OVERMOLDING COLORS

LED COLORS

SEALING

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

1 Blue

2 Black*

3 Green

4 Grey*

5 Yellow

6 Red

7 White

8 Translucent

9 Orange

1 Blue

2 Red/green

3** Green

V** Green, high intensity

5 Yellow

6 Red

7 White

9 Amber

Blank No sealing

K Sealed to IP67 or IP69K

** 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.

ACTUATOR STYLES

002 Illuminated ring

006 Validation

009 Standby

010 Cancel

011 Power

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

Other styles : see website.

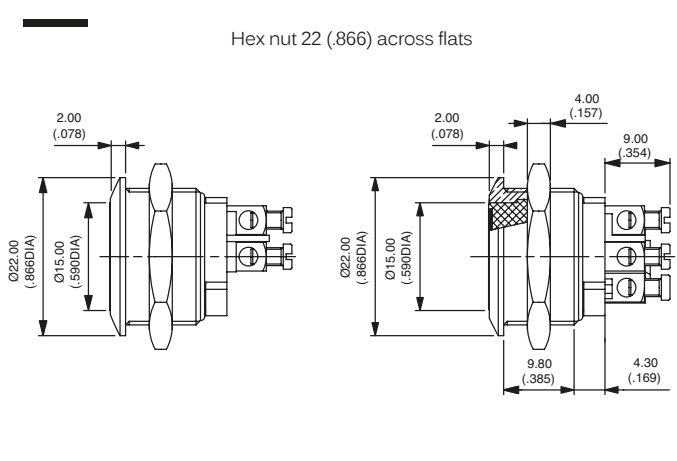
BUSHING Ø 19 (.748) - FLAT ACTUATOR SCREW TERMINALS



- 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

SERIES	BUSHING DIAMETERS	BUSHING/ACTUATOR CONFIGURATION	ACTUATOR STYLES	TERMINALS
AV	22 22 mm (.866) 24 24 mm (.944)	L	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 20 Chrome plated brass / Chrome plated brass Models with anodized actuator 1• Black chrome plated brass 2• Chrome plated brass 4• Stainless steel	1 Blue 2 Black 3 Pale green 3F Dark green 4 Natural 5 Gold yellow 6 Red 6B Maroon	Blank IP65

• 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



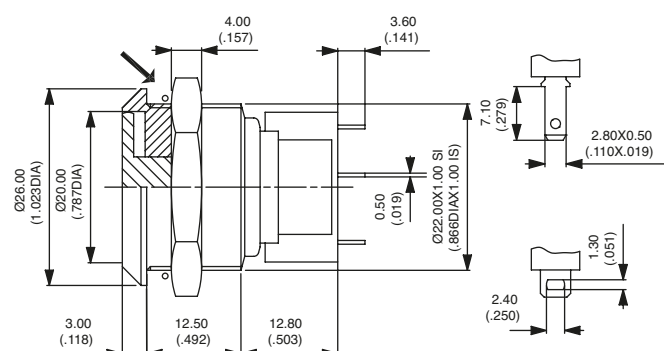
Solder lug terminals

AV22LP••2



→ O-RING

Hex nut 25 (.984) across flats



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 = $\frac{\text{supply voltage} - \text{LED forward voltage}}{\text{LED forward current}}$



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.



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) :



- ① - internal membrane
- ② - external gasket

AV series

Security pushbutton switches Ø 30 mm • momentary NC/NO

BUILD YOUR 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

FLYING LEAD PROTECTION

RING COLORS

SEALING

0

No protection and/or no flying leads

1

Heat-shrink sleeves

2

Tube + epoxy

1

Blue

2

Black*

3

Green

4

Grey*

5

Yellow

6

Red

7

Opal white

8

Translucent

9

Orange

Blank

No sealing

K

Sealed to IP67

FLYING LEAD/CABLE LENGTH

BUSHING/ACTUATOR MATERIALS

000

No flying leads / no cable

020

Length 20 cm (std)

XXX

Length in centimeters

00

Nickel plated brass / Nickel plated brass

4B

Stainless steel 316 / Stainless steel 316

Other : on request.

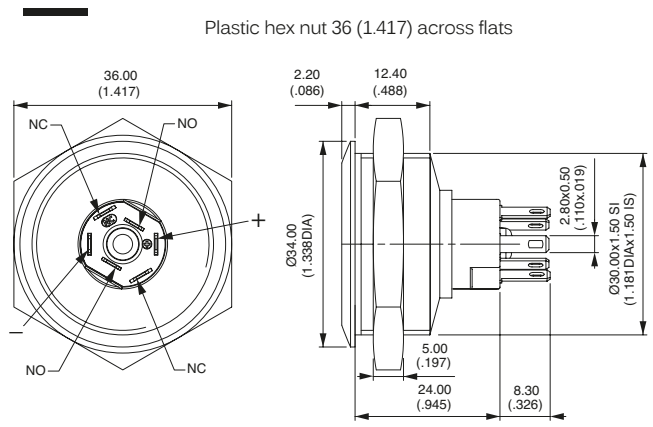
NOTICE : please note that not all combinations of above numbers are available. Refer to www.apem.com for further information.

FLAT ACTUATOR - SOLDER LUG TERMINALS



Illuminated (select LED color above)*			
AV5•022	ON	MOM	
Non-illuminated			
AV50022	ON	MOM	

*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

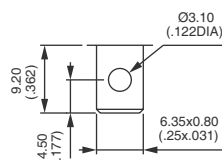


4A 250VAC - 8A 125VAC
All models function 3 (NO)

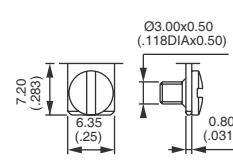
Models 1233X209 and 1233X209L are standard marked NF. To order switches marked NF, UL or CSA, complete appropriate box of ordering format.



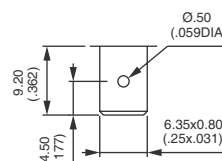
TERMINALS



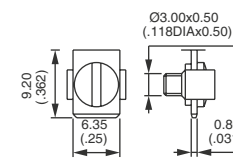
121.



122.



123.

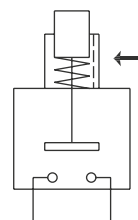


120.

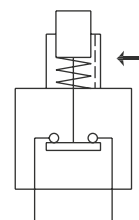


ELECTRICAL FUNCTIONS

→ KEYWAY



NO (function 3)



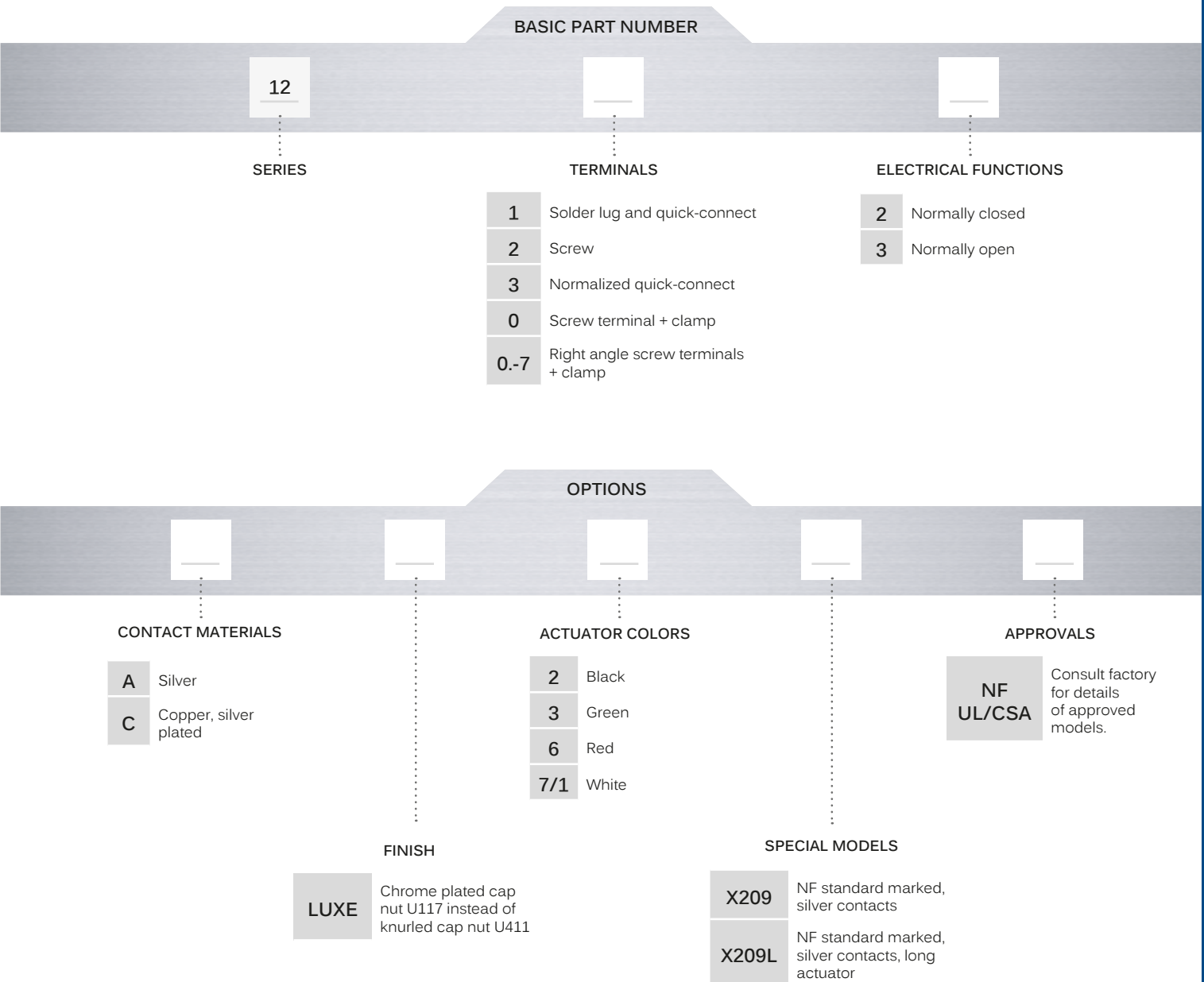
NC (function 2)

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

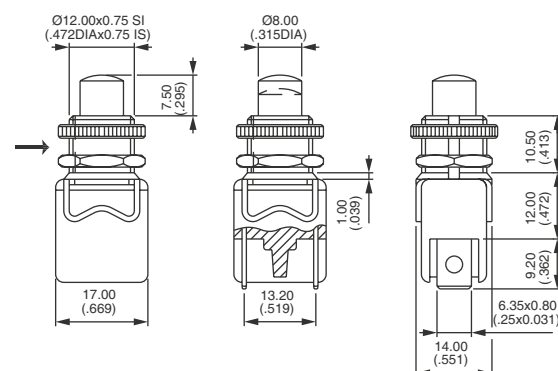


1202  Normally Closed

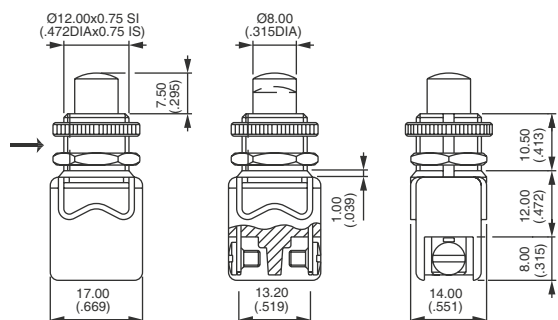
1203  Normally Open

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

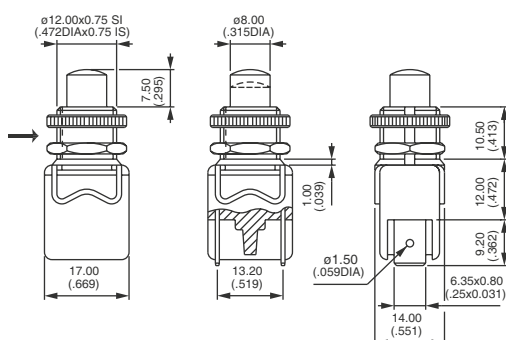
→ KEYWAY



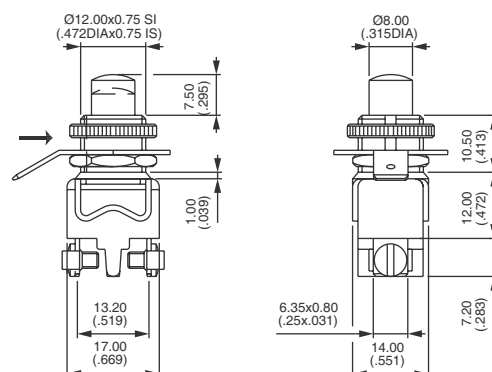
→ KEYWAY



→ KEYWAY



→ KEYWAY



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)



MATERIALS

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

The company reserves the right to change specifications without notice.



MOUNTING

- Panel cut-out : Ø 12,2 (.480)

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

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

...

NUMBER OF POLES

3	Single pole
4	Double pole

...

ELECTRICAL FUNCTIONS

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.
----	--

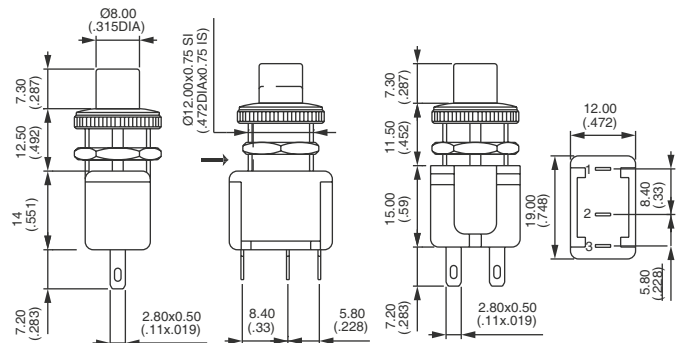
NOTICE : please note that not all combinations of above numbers are available. Refer to www.apem.com for further information.

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

	Non-illuminated	Illuminated 1 LED	
		Output indicator	Independent
OFF-ON OFF - MOM			

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.

SENSITIVITY

1	Medium (6 mm glass or 4 mm polycarbonate)
---	---

Other on request.

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

LED COLORS

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

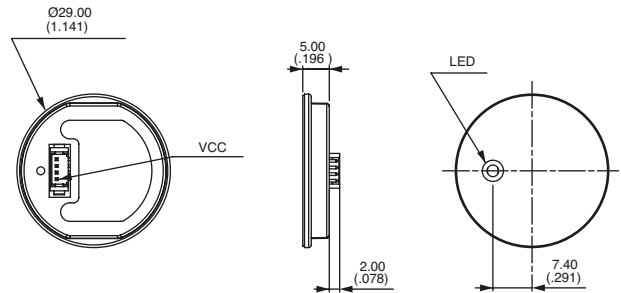
Other on request.

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) ± 8 KV (20 contacts) and ± 15 KV (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.

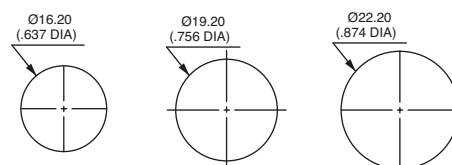


ADJUSTABLE SENSITIVITY

- 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

1	Flying leads
2	Cable
3	Connector

TYPES OF ILLUMINATION/VOLTAGE

0	Non-illuminated - 5VDC	N	Standard ring - 12VDC	E	Thin ring - 24VDC
1	Non-illuminated - 12VDC	K	Standard ring - 24VDC	F	Large ring - 5VDC
2	Non-illuminated - 24VDC	C	Thin ring - 5VDC	G	Large ring - 12VDC
A	Standard ring - 5VDC	D	Thin ring - 12VDC	H	Large ring - 24VDC

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

LED FUNCTIONS

S	Independent
C	Output indicator

COLORS / MATERIALS

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

Bold = standard

LED COLORS

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

*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



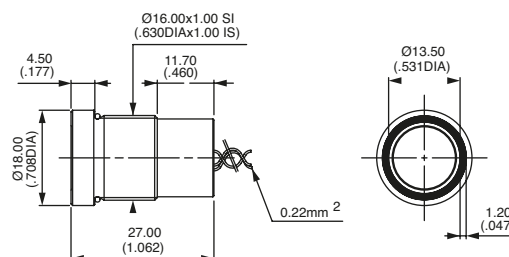
Momentary

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

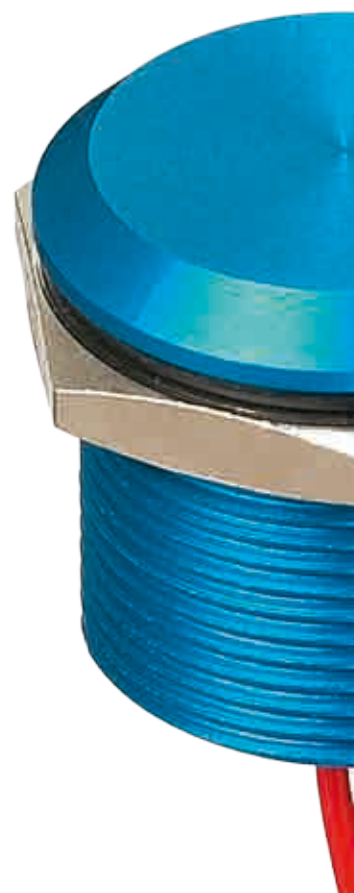
- Max. current/voltage rating with resistive load :
 - Function A : standard 200mA 24VAC/DC - option 1A 24VAC/DC
 - Function B : standard 100mA 24VAC/DC
- Switch resistance ON : 10 Ω max.
- Switch resistance OFF : 5 M Ω min.
- Life expectancy : 50 million cycles
- LED consumption : Illuminated dot 10mA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



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.



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.

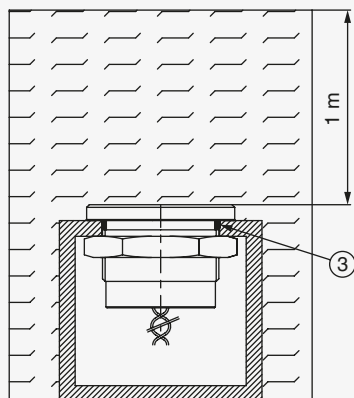
PBA series

Piezo switches



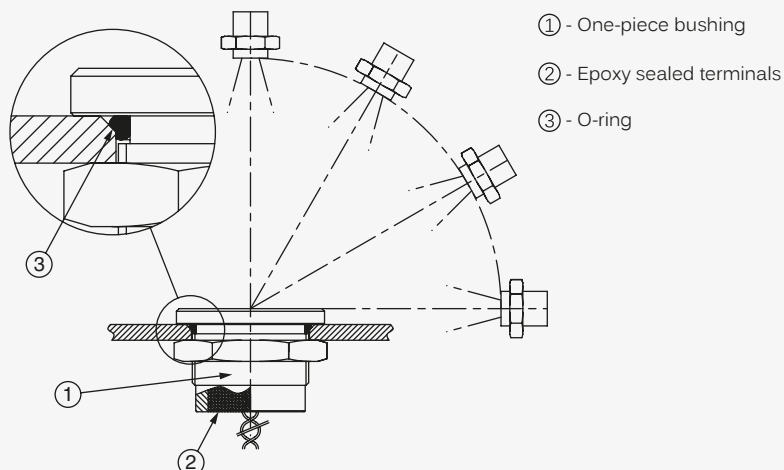
SEALING

SEALING IP68



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

SEALING IP69K

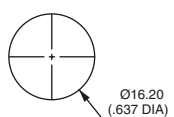


High pressure, high temperature wash down
IP69K test conditions
 . Pressure : 80 - 120 bars
 . Distance : 15 cm
 . Temperature : 80°C ± 5°C
 . Flow : 14 - 16 l/mn
 . Duration : 30 seconds per position

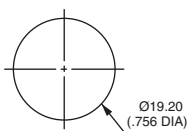


PANEL CUT-OUT

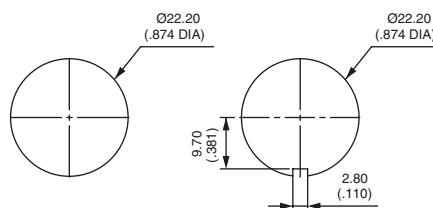
MODELS Ø16 (.630)



MODELS Ø19 (.748)



MODELS Ø22 (.866)

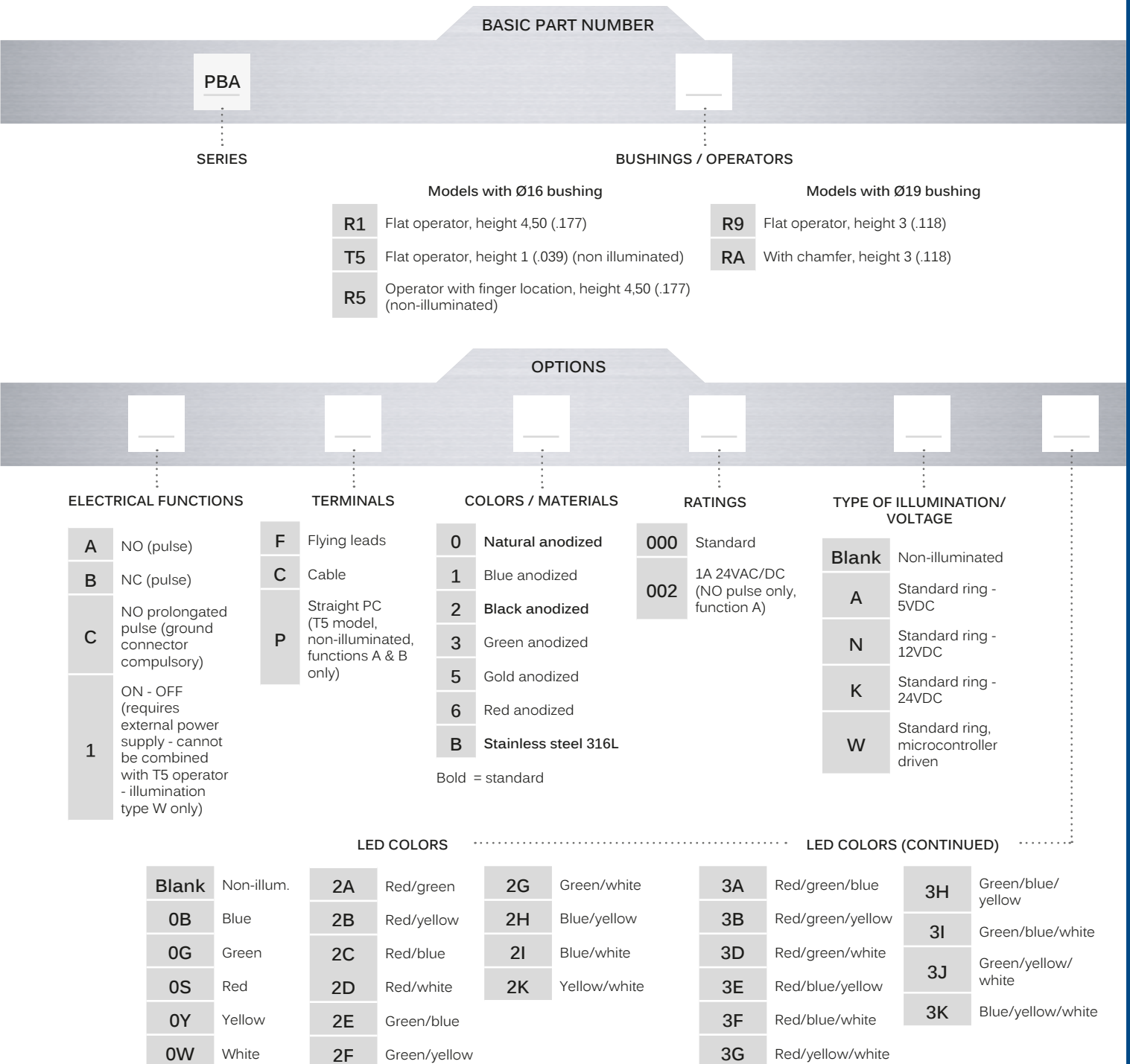


PBA series

Piezo switches Ø 16 or Ø 19 mm



BUILD YOUR PART NUMBER



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



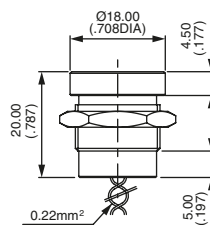
Flat

PBAR9

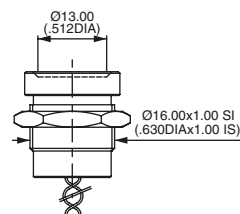
With chamfer

PBARA

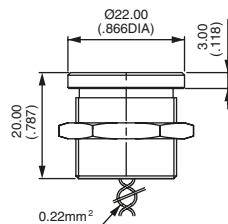
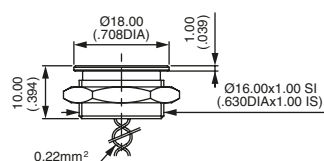
Wire colors : see "Electrical functions" page on website.



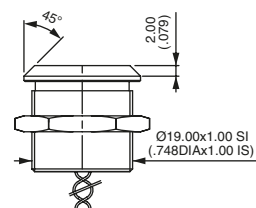
R1



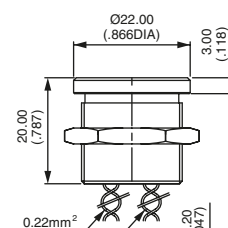
R5



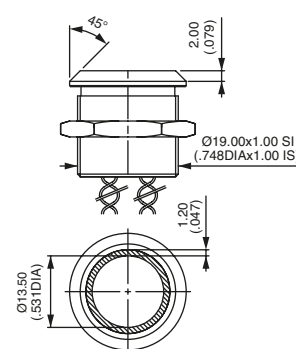
R9



RA



R9



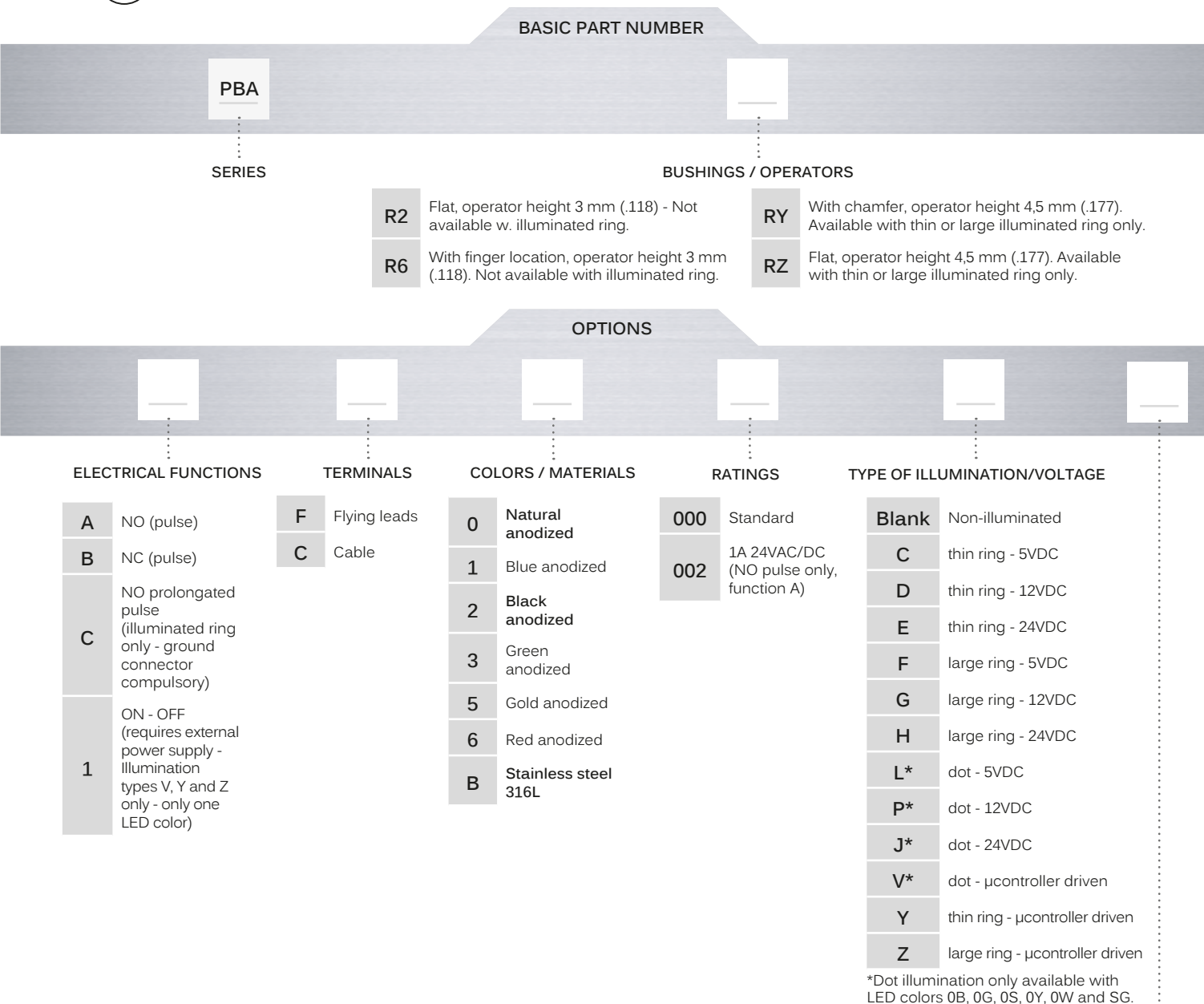
RA

PBA series

Piezo switches Ø 22 mm



BUILD YOUR PART NUMBER



LED COLORS

Blank	Non-illum.	SG	Red/green (dot only)
0B	Blue	2A	Red/green
0G	Green	2B	Red/yellow
0S	Red	2C	Red/blue
0Y	Yellow	2D	Red/white
0W	White		

2E	Green/blue
2F	Green/yellow
2G	Green/white
2H	Blue/yellow
2I	Blue/white
2K	Yellow/white

LED COLORS (CONTINUED)

3A	Red/green/blue	3H	Green/blue/yellow
3B	Red/green/yellow	3I	Green/blue/white
3D	Red/green/white	3J	Green/yellow/white
3E	Red/blue/yellow	3K	Blue/yellow/white
3F	Red/blue/white		
3G	Red/yellow/white		



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

WITH ILLUMINATED DOT OPERATOR HEIGHT 3 MM



Flat

PBAR2

With finger location

PBAR6

WITH THIN ILLUMINATED RING OPERATOR HEIGHT 4,50



Flat

PBARZ

With chamfer

PBARY

WITH LARGE ILLUMINATED RING OPERATOR HEIGHT 4,50

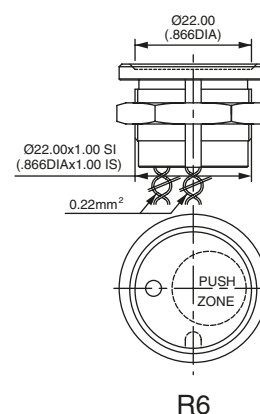
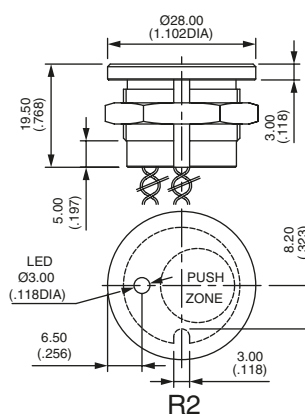
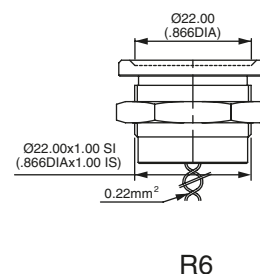
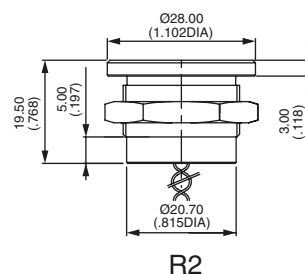


Flat

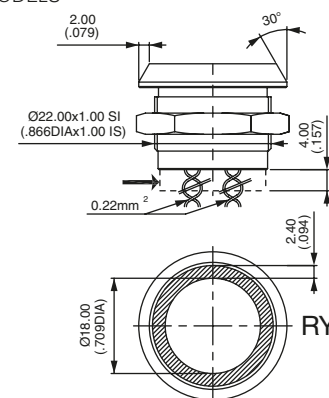
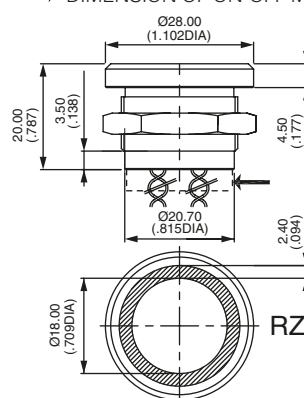
PBARZ

With chamfer

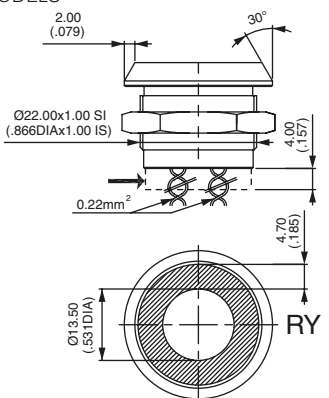
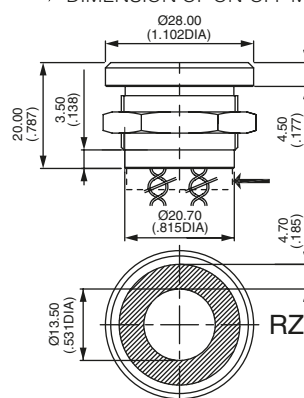
PBARY



→ DIMENSION OF ON-OFF MODELS



→ DIMENSION OF ON-OFF MODELS



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 M Ω 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.



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.



MATERIALS

- Case : 316L stainless steel
- Terminals : multi-wire leads
0,22 mm², length 300 mm (11.81)

PBA series

ATEX approved piezo switches



BUILD YOUR PART NUMBER

BASIC PART NUMBER

PBA

SERIES

MODELS

R1	Bushing Ø 16 (.630), flat	R5	Bushing Ø 16 (.630), with finger location (non-illuminated only)
R2	Bushing Ø 22 (.866), flat	R6	Bushing Ø 22 (.866), with finger location
R9	Bushing Ø 19 (.748), flat		

R2 and R6 not available with illuminated ring.

OPTIONS

A

F

B

000

X

TERMINALS

RATINGS

LED COLORS

F Flying leads

000

200mA max. at 6VAC/DC - 50mA max. at 24VAC/DC

0B	Blue
0G	Green
0S	Red
0Y	Yellow

ELECTRICAL FUNCTION

COLORS/MATERIALS

TYPE

APPROVAL

A NO (pulse)

B 316L stainless steel

M	One-piece bushing (non-illuminated)
A	Illuminated ring (Ø 16 and 19 mm)
L	Illuminated dot (Ø 22 mm)

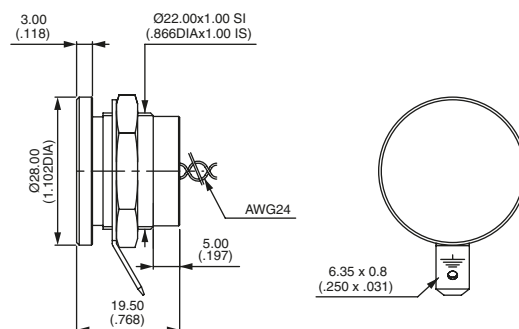
X ATEX

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



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(.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.

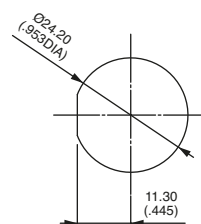


MATERIALS

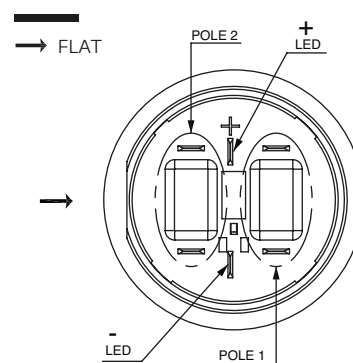
- Case : PA46
- Actuator : PA12
- Bushing/ bezel : PA66
- Contacts : silver (code 2)
or silver, gold plated (code 4)
- Cable : length 300 mm, section
depending on switch model
- Terminal seal : epoxy or overmolding



PANEL CUT-OUT



WIRING DIAGRAM



FP series

Fully illuminated pushbutton switches •
bushing Ø 24 mm • momentary or latching

BUILD YOUR PART NUMBER

FP

SERIES

MODEL

ACTUATORS

ELECTRICAL FUNCTIONS

TERMINALS

A

Threaded
bushing,
dia. 24 (.944)

P

Round, flat

R

Round, curved

F

Round, curved,
flush

1

OFF - ON

3

Normally
open (NO)

1

Solder lugs

2

Straight cable

3

Right angle cable,
length 300 mm

A

Non-illuminated, 1 pole

B

Non-illuminated, 2 poles

C

Independent, 1 pole

D

Independent, 2 poles

E

Independent, 1 pole, dimming LED

OPTIONS

CONTACT MAT.

ACTUATOR COLORS

BEZEL COLORS

LED COLORS

LED RESISTORS

SYMBOLS

MARKING

2

Silver

4

Silver, gold
plated

1

Blue

2

Black

3

Green

4

Grey

5

Yellow

6

Red

7

White/natural

9

Orange

1

Blue

2

Black

3

Green

4

Grey

5

Yellow

6

Red

7

White/natural

X

Non-illum.

A

Blue

B

Green

C

Red

D

Yellow

E

White

F

Red/green

G

Red/blue

0

No resistor
supplied

1

12V resistor

2

24V resistor

X

No marking

1

Pad printing

2

Laser

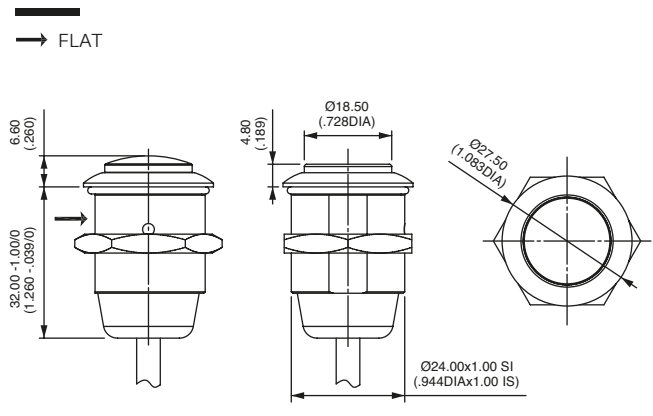
See website.

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	FPAR1•1	OFF	ON	
Flat actuator	FPAP1•1	OFF	ON	
	MOMENTARY (NO)			
Curved actuator	FPAR3•1			
Flat actuator	FPAP3•1			



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.

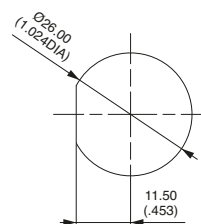


MATERIALS

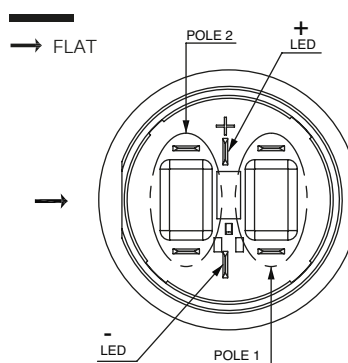
- Case : PA46
- Actuator : PA12
- Bushing/ bezel : ABS
- Contacts : silver (code 2)
or silver, gold plated (code 4)



PANEL CUT-OUT



WIRING DIAGRAM



FP series

Fully illuminated pushbutton switches •
bushing Ø 26 mm • momentary or latching

BUILD YOUR PART NUMBER

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

A

Non-illuminated, 1 pole

B

Non-illuminated, 2 poles

C

Independent, 1 pole

D

Independent, 2 poles

E

Independent, 1 pole, dimming LED

OPTIONS

CONTACT MAT.

ACTUATOR COLORS

BEZEL COLORS

LED COLORS

LED RESISTORS

SYMBOLS

2

Silver

4

Silver, gold plated

1

Blue

2

Black

3

Green

4

Grey

5

Yellow

6

Red

7

White/natural

9

Orange

1

Blue

2

Black

3

Green

4

Grey

5

Yellow

6

Red

7

White/natural

X

Non-illum.

A

Blue

B

Green

C

Red

D

Yellow

E

White

F

Red/green

G

Red/blue

0

No resistor supplied

1

12V resistor

2

24V resistor

X

No marking

1

Pad printing

2

Laser

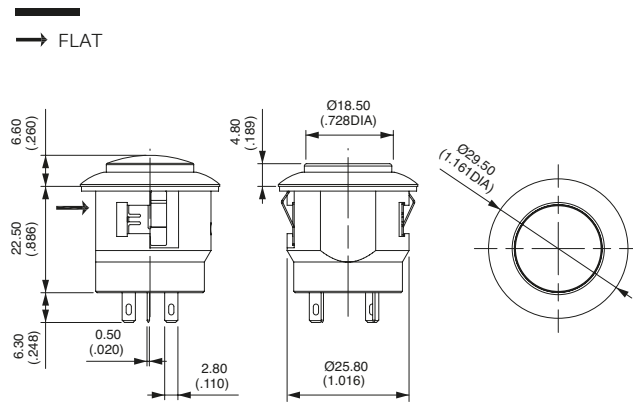
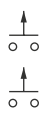
See website.

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.

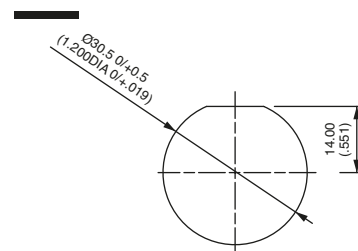


MATERIALS

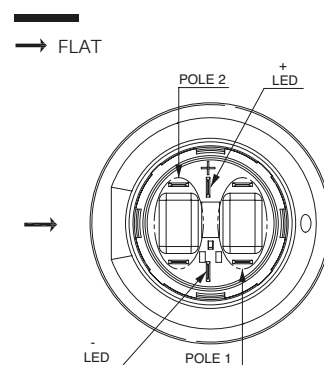
- Case : PA46
- Actuator : PA12, gloss finish
- Bushing/ bezel : ABS, gloss finish
- Contacts :
 - Silver (code 2)
 - or silver, gold plated (code 4)



PANEL CUT-OUT



WIRING DIAGRAM



FP series

Fully illuminated pushbutton switches •
bushing Ø 30 mm • momentary or latching

BUILD YOUR PART NUMBER

FP

SERIES

MODELS

ACTUATOR

ELECTRICAL FUNCTIONS

TERMINALS

C

Snap-in,
dia. 30 mm

D

Threaded
bushing,
dia. 30 mm

R

Round, curved

1

OFF - ON

3

Normally
open (NO)

1

Solder lugs

A

Non-illuminated, 1 pole

B

Non-illuminated, 2 poles

C

Independent, 1 pole

D

Independent, 2 poles

E

Independent, 1 pole, dimming LED

OPTIONS

CONTACT MAT.

ACTUATOR COLORS

BEZEL COLORS

LED COLORS

LED RESISTORS

SYMBOLS

2

Silver

4

Silver, gold
plated

1

Blue

2

Black

3

Green

4

Grey

5

Yellow

6

Red

7

White/natural

9

Orange

1

Blue

2

Black

3

Green

4

Grey

5

Yellow

6

Red

7

White/natural

8

Bright chrome

X

Non-illum.

A

Blue

B

Green

C

Red

D

Yellow

E

White

F

Red/green

G

Red/blue

0

No resistor
supplied

1

12V resistor

2

24V resistor

MARKING

X

No marking

1

Pad printing

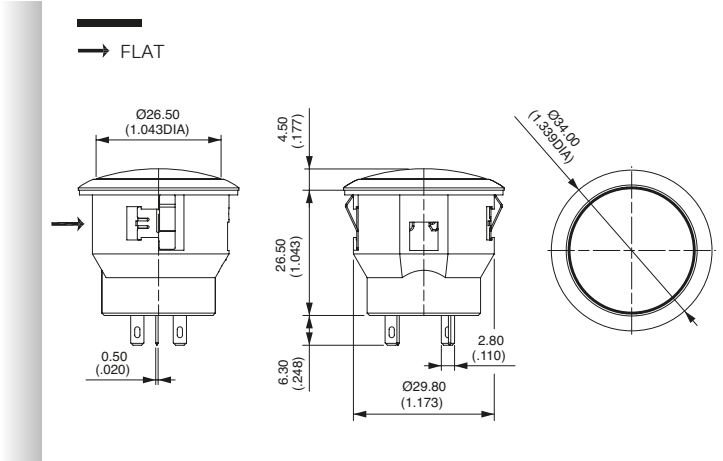
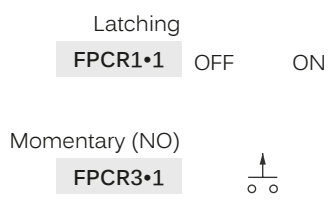
2

Laser

See website.

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.

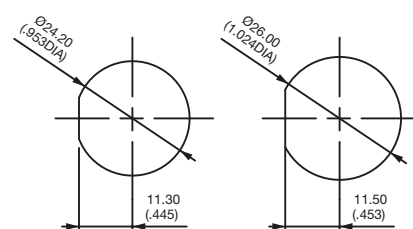


MATERIALS

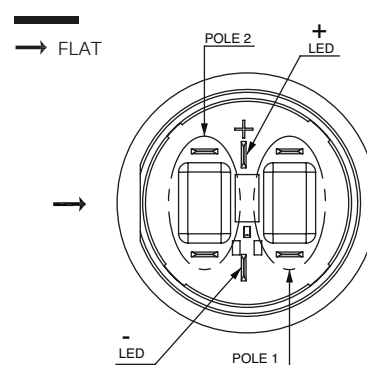
- Case : PA46
- Actuator : PA12
- Bushing/ bezel : PA66
- Contacts : silver (code 2)
or silver, gold plated (code 4)



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

SERIES	MODELS	ACTUATOR	ELECTRICAL FUNCTIONS	TERMINALS
FD				
	A Threaded bushing, dia. 24 (.944) B 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.

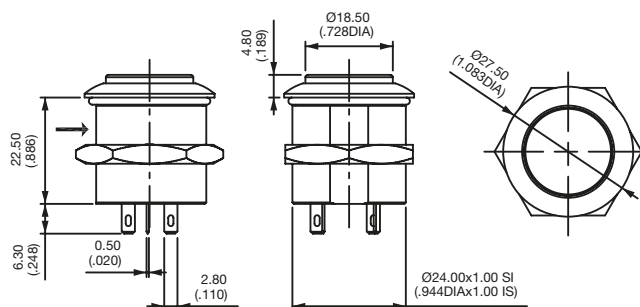
MOUNTING BY THREADED BUSHING Ø 24 (.944)



Latching
FDAP1•1 OFF ON

Momentary (NO)
FDAP3•1

→ FLAT



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

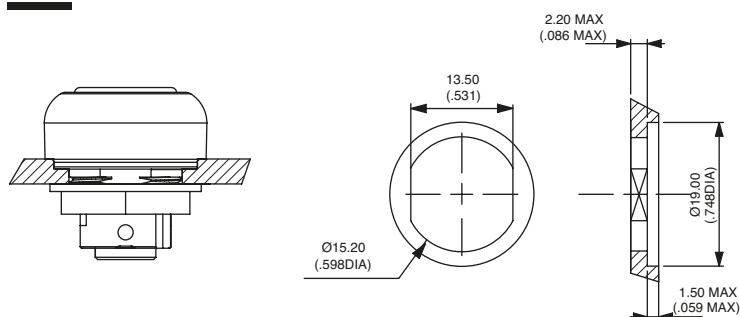


ELECTRICAL AND GENERAL SPECIFICATIONS

- 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 $\pm$ 1,5 N
 - step 2 : 14,5 N $\pm$ 1,5 N
- Travel :
 - 1 step : 4 mm $\pm$ 0,4 mm
 - 2 steps : 6,65 mm $\pm$ 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) T Cap only L Base only	Blank Cap only 1 1 step 2 2 steps

OPTIONS

PCB	MARKING	ACTUATOR COLORS	CONNECTOR																				
Blank Cap only	Blank Base only	Blank Base only	Blank Base only																				
<table border="1"> <thead> <tr> <th></th> <th>No of barriers</th> <th>No of steps</th> <th>Contact Redundancy</th> </tr> </thead> <tbody> <tr> <td>01</td> <td>4</td> <td>2</td> <td>yes</td> </tr> <tr> <td>02</td> <td>2</td> <td>1</td> <td>yes</td> </tr> <tr> <td>03</td> <td>2</td> <td>2</td> <td>no</td> </tr> <tr> <td>04</td> <td>1</td> <td>1</td> <td>no</td> </tr> </tbody> </table>		No of barriers	No of steps	Contact Redundancy	01	4	2	yes	02	2	1	yes	03	2	2	no	04	1	1	no	0 Without marking	1 Blue B Dark blue 2 Black 3 Green 5 Yellow 6 Red 7 White 9 Orange	0 JST SM09B-SRSS-TB
	No of barriers	No of steps	Contact Redundancy																				
01	4	2	yes																				
02	2	1	yes																				
03	2	2	no																				
04	1	1	no																				

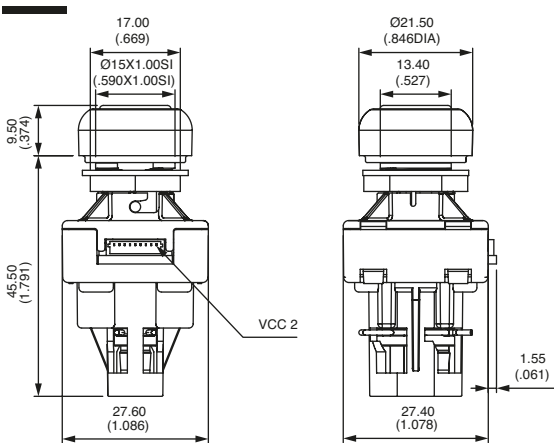
NOTICE : please note that not all combinations of above numbers are available. Refer to www.apem.com for further information.

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



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.



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)



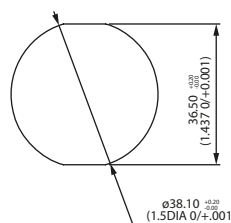
MATERIALS

- 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

LPI

SERIES

ELECTRICAL FUNCTIONS

3

50mA NO

5

5A NO/NC

ILLUMINATION

0

No illumination

1

Dot

4

Ring

LED VOLTAGE

XX

None

06

6V

12

12V

24

24V

LED COLORS

X

None

R

Red

G

Green

B

Blue

A

Amber

W

White

OPERATOR

MOUNTING

1

Front mounting

2

Rear mounting

SEALING

X

Unsealed

K

Sealed

BEZEL COLORS

X

No bezel

1

Blue

2

Black

3

Green

4

Grey

5

Yellow

6

Red

7

White

9

Amber

N

Satin grey
Consult APEM.

ACTUATOR TYPES

1

Raised crimped

2

Raised moulded

3

Raised screen printed

4

Without symbol

5

Screen printed

ACTUATOR COLOR

7

White

ACTUATOR MARKING

14

Open

15

Close

16

Up

17

Down

18

Left

19

Right

Other symbols :

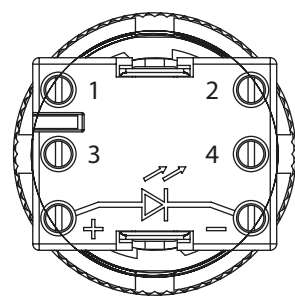
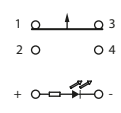
see website.

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)



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.



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

PR and V series

Stainless steel keys

BUILD YOUR PART NUMBER

BASIC PART NUMBER



MODELS

PR0	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



VOLTAGE

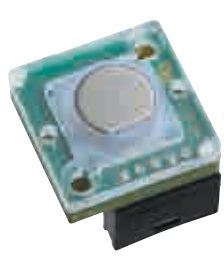
05	5V
12	12V (std)
24	24V

Options available on request :
Custom marking - Keypads (4, 12, 16 keys)

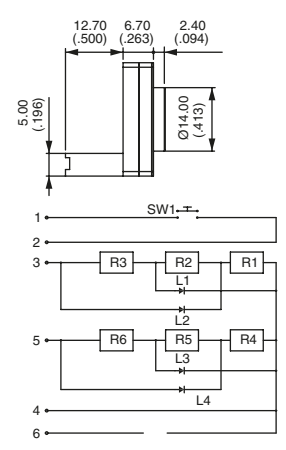
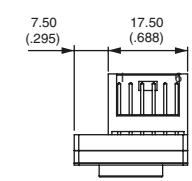
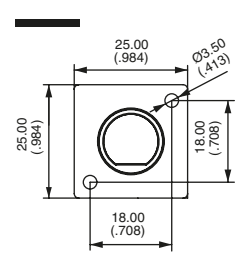
Other on request.
*Except for VH0

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.



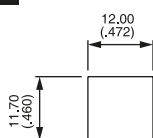
ELECTRICAL SPECIFICATIONS

- 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 :

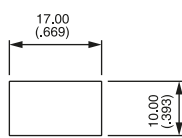
Contacts	Number of cycles	
	2 positions	3 positions
A	40.000	40.000
CD	100.000	50.000
AD	40.000	40.000



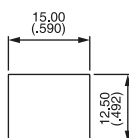
PANEL CUT-OUT



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	2	3	6
WW	Right angle, vertical mounting	0	4	9
Y	Bracket mounting			7
				8
				2
				4TH

OPTIONS

CONTACT MATERIALS	LEVER	APPROVALS	ACTUATORS	BEZELS
A Silver	-6 For rocker and paddle.	UL Availability : Consult factory for details of approved models.	Rockers	For SK models
AD Silver, gold plated			U620 Large	U1200
CD Brass, gold plated			U730 Small	U1210 For LED
			Paddles	For SW, SWW and SY models
			U610 Narrow	U4602
			U700 Broad	

SPECIAL OPTIONS / INSULATED MODELS

Blank	No special requirement
X653	Vertical right angle with stand-off plate
X1159	Insulated models

See website.

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

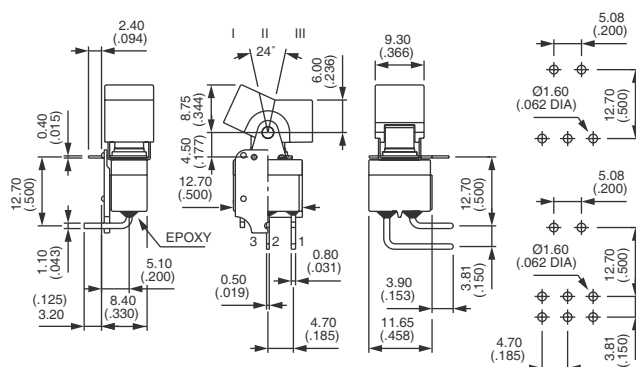
RIGHT ANGLE TERMINALS - HORIZONTAL SPACING 4,7 (.185)



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.

Shown with rocker U620



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



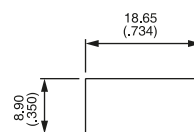
MATERIALS

- 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.



PANEL CUT-OUT



AGENCY APPROVALS



2A 250VAC
4A 125VAC

Availability : consult factory for details or 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	<table style="width: 100%; border-collapse: collapse;"> <tr><td style="border: 1px solid black; padding: 2px;">6</td><td>ON</td><td>-</td><td>ON</td></tr> <tr><td style="border: 1px solid black; padding: 2px;">9</td><td>ON</td><td>OFF</td><td>ON</td></tr> <tr><td style="border: 1px solid black; padding: 2px;">7</td><td>MOM</td><td>OFF</td><td>MOM</td></tr> <tr><td style="border: 1px solid black; padding: 2px;">8</td><td>ON</td><td>OFF</td><td>MOM</td></tr> <tr><td style="border: 1px solid black; padding: 2px;">2</td><td>ON</td><td>-</td><td>MOM</td></tr> </table>	6	ON	-	ON	9	ON	OFF	ON	7	MOM	OFF	MOM	8	ON	OFF	MOM	2	ON	-	MOM	<table style="width: 100%; border-collapse: collapse;"> <tr><td style="border: 1px solid black; padding: 2px;">S0</td><td>Solder lug</td></tr> <tr><td style="border: 1px solid black; padding: 2px;">P0</td><td>Straight PC</td></tr> </table>	S0	Solder lug	P0	Straight PC
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

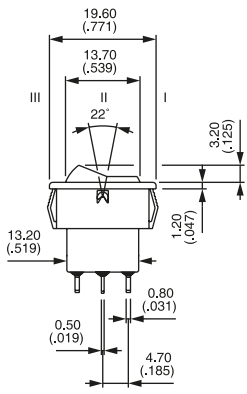
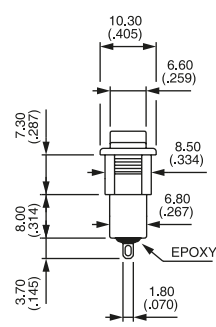
..... CONTACT MATERIALS	 ACTUATORS	 OTHER OPTIONS																										
<table style="width: 100%; border-collapse: collapse;"> <tr><td style="border: 1px solid black; padding: 2px;">0</td><td>Brass, gold plated</td></tr> <tr><td style="border: 1px solid black; padding: 2px;">1</td><td>Silver</td></tr> <tr><td style="border: 1px solid black; padding: 2px;">2</td><td>Silver, gold plated</td></tr> <tr><td style="border: 1px solid black; padding: 2px;">5</td><td>Special contact, lower rating. On request.</td></tr> </table>	0	Brass, gold plated	1	Silver	2	Silver, gold plated	5	Special contact, lower rating. On request.	<table style="width: 100%; border-collapse: collapse;"> <tr><td style="border: 1px solid black; padding: 2px;">00</td><td>Black</td></tr> <tr><td style="border: 1px solid black; padding: 2px;">01</td><td>Red</td></tr> <tr><td style="border: 1px solid black; padding: 2px;">02</td><td>Grey</td></tr> <tr><td style="border: 1px solid black; padding: 2px;">03</td><td>Blue</td></tr> <tr><td style="border: 1px solid black; padding: 2px;">04</td><td>Ivory</td></tr> <tr><td style="border: 1px solid black; padding: 2px;">07</td><td>White</td></tr> <tr><td style="border: 1px solid black; padding: 2px;">09</td><td>Dark blue</td></tr> </table> Actuator marking on request.	00	Black	01	Red	02	Grey	03	Blue	04	Ivory	07	White	09	Dark blue	<table style="width: 100%; border-collapse: collapse;"> <tr><td style="border: 1px solid black; padding: 2px;">10</td><td>With UL-CSA marking</td></tr> <tr><td style="border: 1px solid black; padding: 2px;">20</td><td>10 mm long straight PC terminals</td></tr> </table>	10	With UL-CSA marking	20	10 mm long straight PC terminals
0	Brass, gold plated																											
1	Silver																											
2	Silver, gold plated																											
5	Special contact, lower rating. On request.																											
00	Black																											
01	Red																											
02	Grey																											
03	Blue																											
04	Ivory																											
07	White																											
09	Dark blue																											
10	With UL-CSA marking																											
20	10 mm long straight PC terminals																											

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
AS36S0	ON	-	ON
AS39S0	ON	OFF	ON
AS37S0	MOM	OFF	MOM
AS38S0	ON	OFF	MOM
AS32S0	ON	-	MOM



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



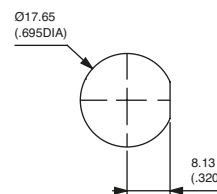
MATERIALS

- 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

SERIES	BUSHING FINISH	ELECTRICAL FUNCTIONS	TERMINALS
MT	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

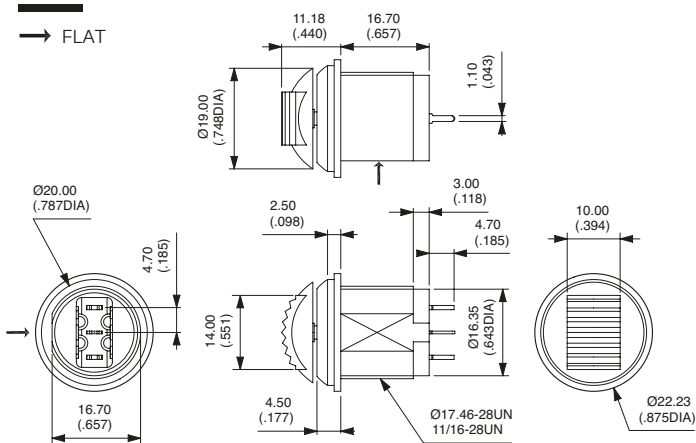
CONTACT MATERIALS	ACTUATORS
A Silver	2 Rocker, black
AD Gold plated silver	3 Winged, black
CD Gold plated brass	4 Paddle, black
	5 Winged, soft touch, black
	6 Paddle, soft touch, black

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

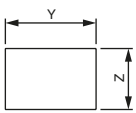


ELECTRICAL AND GENERAL SPECIFICATIONS

- 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		
SERIES	ROCKER	ELECTRICAL FUNCTIONS	TERMINALS
	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	2 Solder lug 8 Quick-connect 9 Straight PC (funct. 1 & 6)

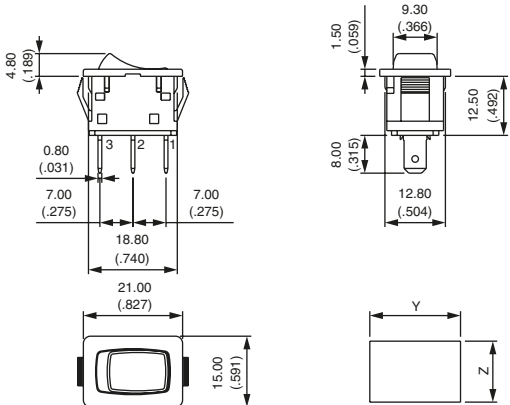
OPTIONS

A			0	0	
CONTACTS	FRAME COLOR	ROCKER COLORS	LENS COLOR	LAMP	MARKING
A Silver	2 Black Others : on request.	1 Blue 2 Black (std) 3 Green 4 Grey 5 Yellow 6 Red (std) 7 Ivory 7/1 White 9 Orange	0 No lens	0 None	000 None Symbols 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

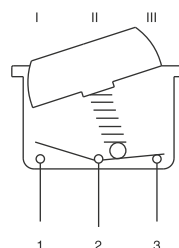


MATERIALS

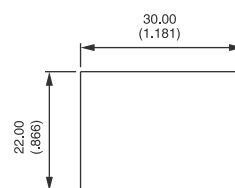
- Case : melamine/polyester
- Frame : polyamide
- Actuator : polyamide
- Contacts :
A : silver
C : copper, silver plated



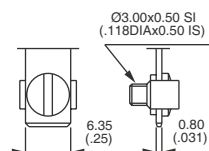
ELECTRICAL FUNCTIONS



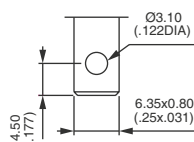
PANEL CUT-OUT



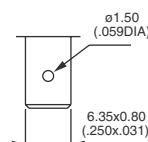
TERMINALS



Screw



Solder lug / quick-connect



Normalized quick-connect

Power rocker switches



OPTIONS

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



Screw term. + clamp	Solder lug/ quick-connect	III A2-A1	II	I A2-A3
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

2600LH - DOUBLE POLE



Screw term. + clamp	Solder lug/ quick-connect	III A2-A1 B5-B4	II	I A2-A3 B5-B6
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

2600LP - WITH PROTECTION GUARD SINGLE POLE



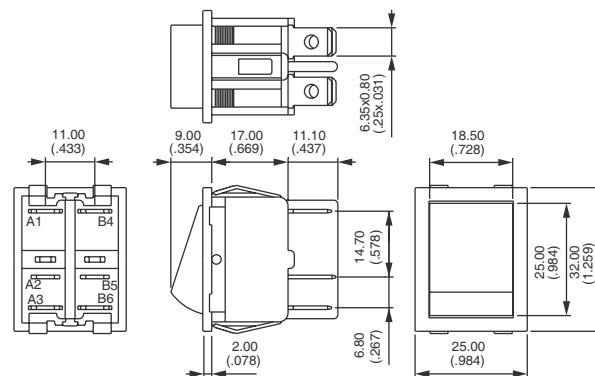
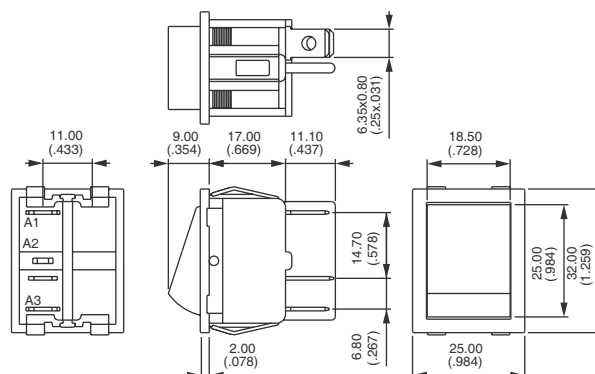
Screw term. + clamp	Solder lug/ quick-connect	III A2-A1	II	I A2-A3
2631LP	2631LP/2	ON	-	OFF
2635LP	2635LP/2	MOM	-	ON
2636LP	2636LP/2	ON	-	ON
2637LP	2637LP/2	MOM	OFF	MOM
2638LP	2638LP/2	ON	OFF	MOM
2639LP	2639LP/2	ON	OFF	ON

2600LP - WITH PROTECTION GUARD DOUBLE POLE

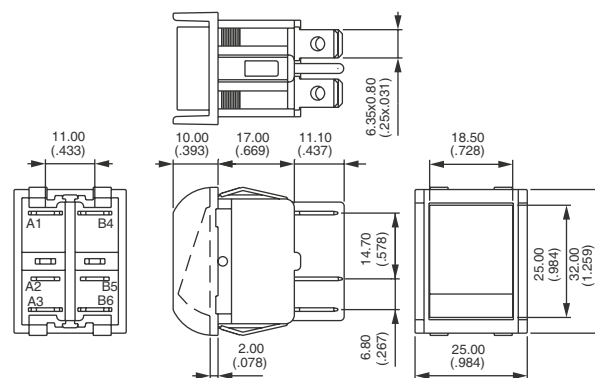
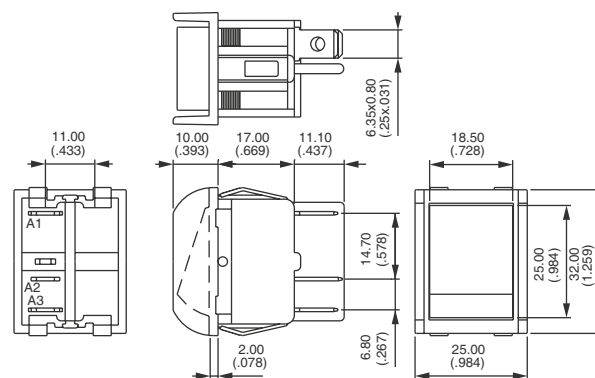


Screw term. + clamp	Solder lug/ quick-connect	III A2-A1 B5-B4	II	I A2-A3 B5-B6
2641LP	2641LP/2	ON	-	OFF
2644LP*	2644LP/2*	ON	ON	ON
2645LP	2645LP/2	MOM	-	ON
2646LP	2646LP/2	ON	-	ON
2647LP	2647LP/2	MOM	OFF	MOM
2648LP	2648LP/2	ON	OFF	MOM
2649LP	2649LP/2	ON	OFF	ON

Shown with plain rocker



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



*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



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



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.



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

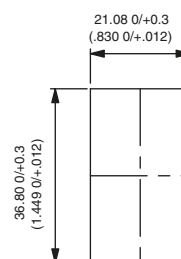


SEALING

- Sealing is optional.
To order a sealed product, complete the appropriate box of ordering format on the following pages.



PANEL CUT-OUT

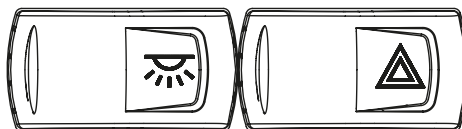
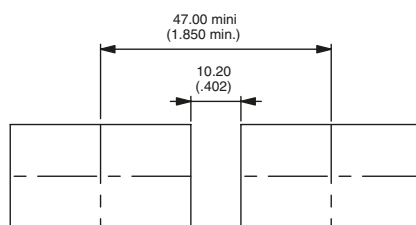
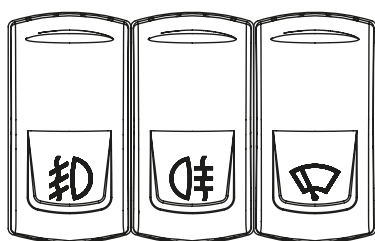
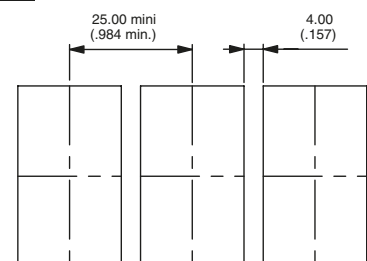


KR series

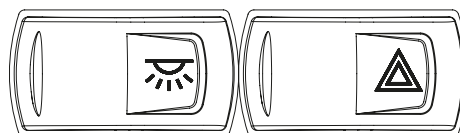
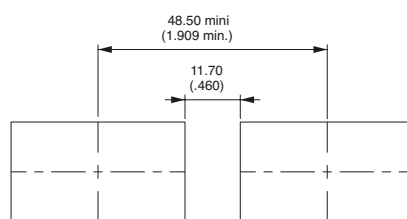
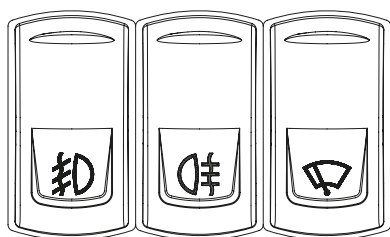
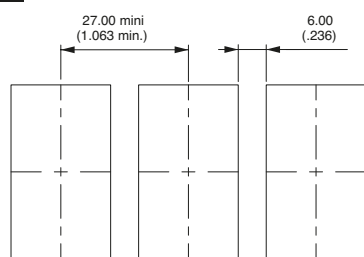
Power rocker switches



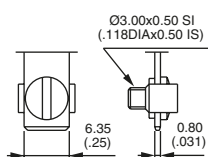
MATRIX MOUNTING



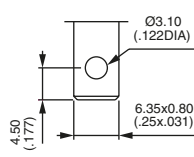
SPECIFIC MATRIX MOUNTING FOR Z VERSION



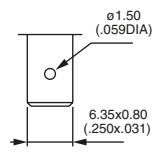
TERMINALS



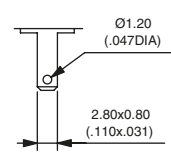
Screw



Solder lug / quick-connect



Normalized quick-connect 6,35x0,8



Normalized quick-connect 2,8x0,8



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 SERIES	POLES 3 Single pole 4 Double pole	ELECTRICAL FUNCTIONS <table border="1"> <tr><td>1</td><td>ON</td><td>-</td><td>OFF</td></tr> <tr><td>4</td><td>ON</td><td>ON</td><td>ON</td></tr> <tr><td>4-1R</td><td>ON</td><td>ON</td><td>MOM</td></tr> <tr><td>5</td><td>MOM</td><td>-</td><td>ON</td></tr> <tr><td>6</td><td>ON</td><td>-</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>9</td><td>ON</td><td>OFF</td><td>ON</td></tr> </table> Function 1 only for 6-terminal versions. Functions 5 and 6 cannot be combined with "H" wiring.	1	ON	-	OFF	4	ON	ON	ON	4-1R	ON	ON	MOM	5	MOM	-	ON	6	ON	-	ON	7	MOM	OFF	MOM	8	ON	OFF	MOM	9	ON	OFF	ON	CONTACTS <table border="1"> <tr><td>A</td><td>Silver</td></tr> <tr><td>D</td><td>Gold plated</td></tr> <tr><td>S</td><td>Silver 20A***</td></tr> </table>	A	Silver	D	Gold plated	S	Silver 20A***	SEALING <table border="1"> <tr><td>X</td><td>No</td></tr> <tr><td>K</td><td>IP68</td></tr> <tr><td>Z</td><td>IP69K</td></tr> </table>	X	No	K	IP68	Z	IP69K	LEDS <table border="1"> <tr><td>X</td><td>None</td></tr> <tr><td>A</td><td>LED 6V red</td></tr> <tr><td>B</td><td>LED 6V green</td></tr> <tr><td>C</td><td>LED 6V yellow</td></tr> <tr><td>M</td><td>LED 6V blue</td></tr> <tr><td>R</td><td>LED 6V white</td></tr> <tr><td>D</td><td>LED 12V red</td></tr> <tr><td>E</td><td>LED 12V green</td></tr> </table>	X	None	A	LED 6V red	B	LED 6V green	C	LED 6V yellow	M	LED 6V blue	R	LED 6V white	D	LED 12V red	E	LED 12V green	WIRING See website.	TERMINALS <table border="1"> <tr> <td> 0 Screw 6 terminals with barrier </td> <td> 3 Normalized quick-connect 6,35x0,8 6 terminals with barrier </td> <td> G Normalized quick-connect 2,8x0,8 10 term. with barrier </td> </tr> <tr> <td> 2 Solder lug/quick-connect 6 terminals with barrier </td> <td> 5 6 terminals w/o barrier </td> <td> H 10 term. w/o barrier </td> </tr> <tr> <td> 4 6 terminals w/o barrier </td> <td> D 10 term. with barrier </td> <td> J 10 terminals for use with connector U2282 </td> </tr> <tr> <td> A 10 term. with barrier </td> <td> E 10 term. w/o barrier </td> <td></td> </tr> <tr> <td> B 10 term. w/o barrier </td> <td> F 10 term. for use with connector U2292 </td> <td></td> </tr> <tr> <td> C 10 terminals for use with connector U2292 </td> <td></td> <td></td> </tr> </table> ***S contacts for all functions except 5 and 4-1R - for normalized quick-connect terminals 6,35x0,8 only.	0 Screw 6 terminals with barrier	3 Normalized quick-connect 6,35x0,8 6 terminals with barrier	G Normalized quick-connect 2,8x0,8 10 term. with barrier	2 Solder lug/quick-connect 6 terminals with barrier	5 6 terminals w/o barrier	H 10 term. w/o barrier	4 6 terminals w/o barrier	D 10 term. with barrier	J 10 terminals for use with connector U2282	A 10 term. with barrier	E 10 term. w/o barrier		B 10 term. w/o barrier	F 10 term. for use with connector U2292		C 10 terminals for use with connector U2292		
1	ON	-	OFF																																																																																		
4	ON	ON	ON																																																																																		
4-1R	ON	ON	MOM																																																																																		
5	MOM	-	ON																																																																																		
6	ON	-	ON																																																																																		
7	MOM	OFF	MOM																																																																																		
8	ON	OFF	MOM																																																																																		
9	ON	OFF	ON																																																																																		
A	Silver																																																																																				
D	Gold plated																																																																																				
S	Silver 20A***																																																																																				
X	No																																																																																				
K	IP68																																																																																				
Z	IP69K																																																																																				
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M	LED 6V blue																																																																																				
R	LED 6V white																																																																																				
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4 6 terminals w/o barrier	D 10 term. with barrier	J 10 terminals for use with connector U2282																																																																																			
A 10 term. with barrier	E 10 term. w/o barrier																																																																																				
B 10 term. w/o barrier	F 10 term. for use with connector U2292																																																																																				
C 10 terminals for use with connector U2292																																																																																					
ACTUATOR																																																																																					
TYPE <table border="1"> <tr><td>1</td><td>For non-illuminated application</td></tr> <tr><td>2</td><td>For illuminated application</td></tr> </table>	1	For non-illuminated application	2	For illuminated application	COLOR <table border="1"> <tr><td>1</td><td>Blue</td></tr> <tr><td>1/4</td><td>Dark blue</td></tr> <tr><td>2</td><td>Black</td></tr> <tr><td>3</td><td>Green</td></tr> <tr><td>4</td><td>Grey</td></tr> <tr><td>5</td><td>Yellow</td></tr> <tr><td>6</td><td>Red</td></tr> <tr><td>7</td><td>Ivory</td></tr> <tr><td>9</td><td>Orange</td></tr> <tr><td>A</td><td>Aluminum bright</td></tr> </table>	1	Blue	1/4	Dark blue	2	Black	3	Green	4	Grey	5	Yellow	6	Red	7	Ivory	9	Orange	A	Aluminum bright	MARKING ORIENTATION <table border="1"> <tr><td>N</td><td>North</td></tr> <tr><td>O</td><td>West</td></tr> <tr><td>S</td><td>South</td></tr> <tr><td>E</td><td>East</td></tr> </table> Drawings on website.	N	North	O	West	S	South	E	East	SYMBOLS Area A Area M Area B Symbols & Accessories : see website.																																																		
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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

10 TERMINAL VERSION

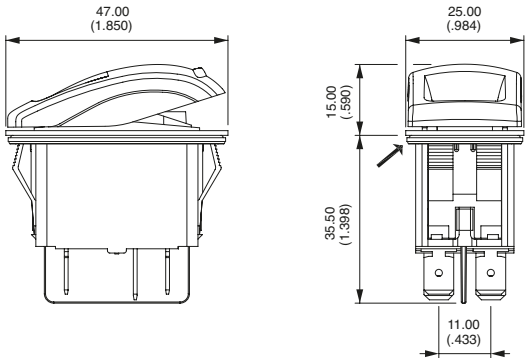


Single pole	Double pole	2-3 5-6		1-2 4-5	
KR31	KR41	ON	-	OFF	
	KR44*	ON	ON	ON	
	KR44-1R*	ON	ON	MOM	
KR35	KR45	MOM	-	ON	
KR36	KR46	ON	-	ON	
KR37	KR47	MOM	OFF	MOM	
KR38	KR48	ON	OFF	MOM	
KR39	KR49	ON	OFF	ON	

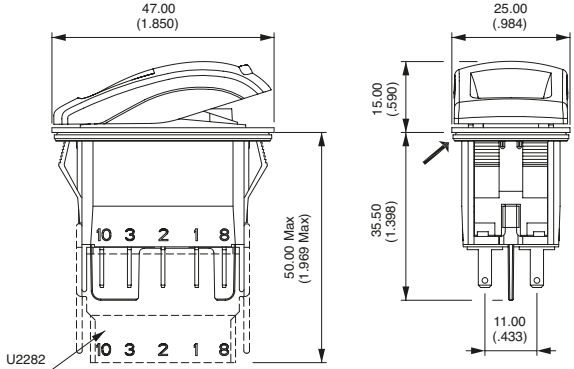
*Function 4 : single pole in double pole case

To order, please refer to «Build your part number» on previous page.

→ FLAT SEAL



→ FLAT SEAL



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



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.



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.



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

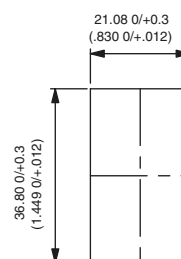


SEALING

- Sealing is optional.
To order a sealed product, complete the appropriate box of ordering format on the following pages.



PANEL CUT-OUT

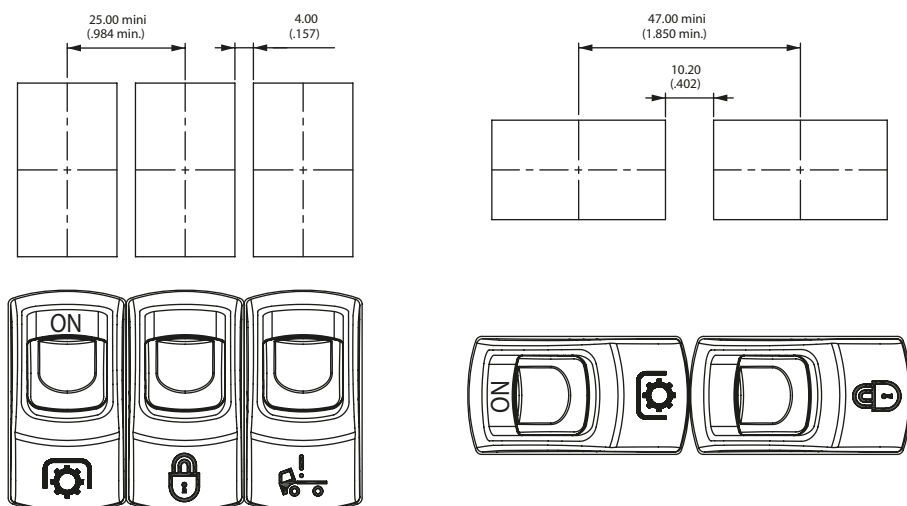


KL series

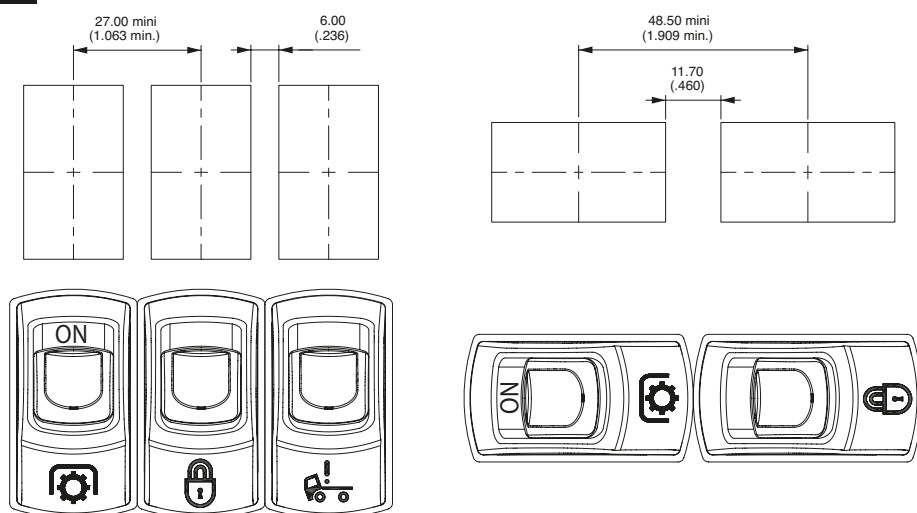
Locking power rocker switches



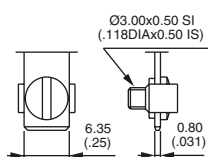
MATRIX MOUNTING



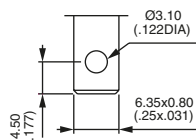
SPECIFIC MATRIX MOUNTING FOR Z VERSION



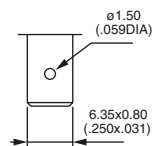
TERMINALS



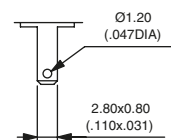
Screw



Solder lug / quick-connect



Normalized quick-connect 6,35x0,8



Normalized quick-connect 2,8x0,8



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

POLES

3	Single pole
4	Double pole

ELECTRICAL FUNCTIONS

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

Function 1 only for 6-terminal versions.
Functions 5 and 6 cannot be combined with "H" wiring.

CONTACTS

A	Silver
D	Gold plated
S	Silver 20A***

SEALING

X	No
K	IP68
Z	IP69K

LEDS

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

See website.

TERMINALS

Screw

0	6 terminals with barrier
---	--------------------------

Solder lug/quick-connect

2	6 terminals with barrier
4	6 terminals w/o barrier
A	10 term. with barrier
B	10 term. w/o barrier
C	10 terminals for use with connector U2292

Normalized quick-connect 6,35x0,8

3	6 terminals with barrier
5	6 terminals w/o barrier
D	10 term. with barrier
E	10 term. w/o barrier
F	10 term. for use with connector U2292

Normalized quick-connect 2,8x0,8

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

TYPE

1	For non-illuminated application
2	For illuminated application

UNLOCKING ACTUATOR COLOR

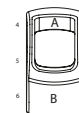
Hard plastic (ABS)

1	Blue	5	Yellow
1/4	Dark blue	6	Red
2	Black	7	Ivory
3	Green	9	Orange
4	Grey		

Elastomer

Y	Yellow
R	Red
G	Green

SYMBOLS



MARKING COLOR

Illuminated models

Blank White

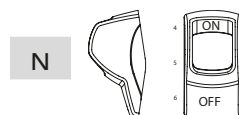
Non-illuminated

1	Blue
2	Black
3	Green
4	Grey
5	Yellow
6	Red
7	White
9	Orange

ROCKER COLOR

1	Blue	3	Green	6	Red
1/4	Dark blue	4	Grey	7	Ivory
2	Black	5	Yellow	9	Orange

MARKING ORIENTATION



Symbols & Accessories : see website.

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

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

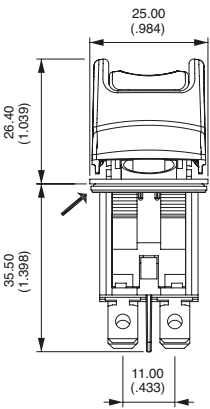
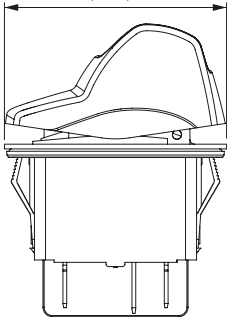


Single pole	Double pole	2-3 5-6	1-2 4-5	
KL31	KL41	ON	-	OFF
	KL44*	ON	ON	ON
	KL44-1R*	ON	ON	MOM
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KL36	KL46	ON	-	ON
KL37	KL47	MOM	OFF	MOM
KL38	KL48	ON	OFF	MOM
KL39	KL49	ON	OFF	ON

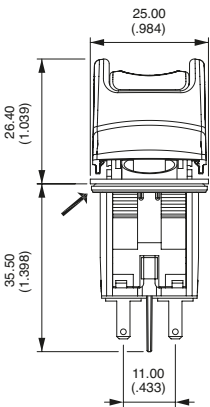
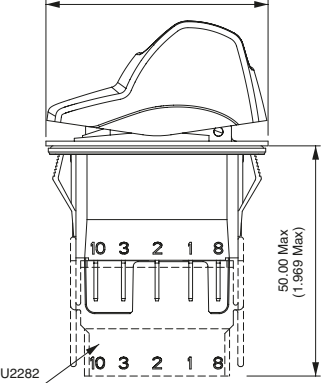
*Function 4 : single pole in double pole case

To order, please refer to «Build your part number» on previous page.

→ FLAT SEAL
47.00
(1.850)



→ FLAT SEAL
47.00
(1.850)



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

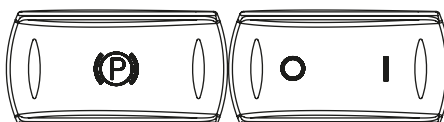
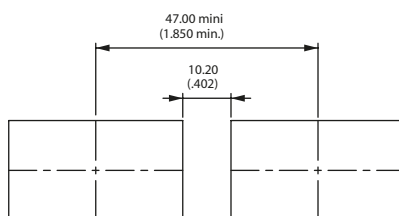
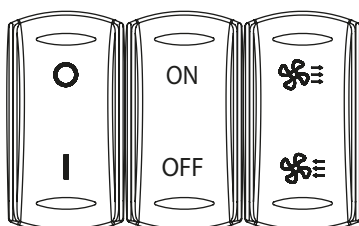
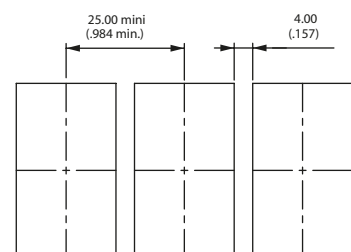


ELECTRICAL AND GENERAL SPECIFICATIONS

- 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



MATRIX MOUNTING



The company reserves the right to change specifications without notice.



MATERIALS

- Case : ABS
- Bezel : ABS
- Terminals : brass, silver plated

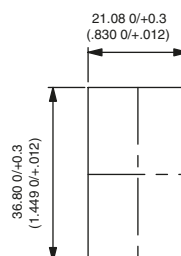


SEALING

- Sealing is optional.
- To order a sealed product, complete the appropriate box of ordering format on the following pages.



PANEL CUT-OUT



KI series

LED indicators



BUILD YOUR PART NUMBER

CASE + LEDS

SERIES	COLORS	LEDS	TYPE OF ILLUMINATION	SYMBOLS	SEALING	TERMINALS WITH BARRIER
KI	1 Blue	X None	X Standard		X No	C Solder lug / quick-connect
	1/4 Dark blue	A LED 6V red	S Super bright		K Yes	F Quick-connect 6,35 mm
	2 Black	B LED 6V green				J Quick-connect 2,8 mm
	3 Green	C LED 6V yellow				
	4 Grey	M LED 6V blue				
	5 Yellow	R LED 6V white				
	6 Red	D LED 12V red				
	9 Orange	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				

DC voltage standard

MARKING ORIENTATION

N	North
O	West
S	South
E	East

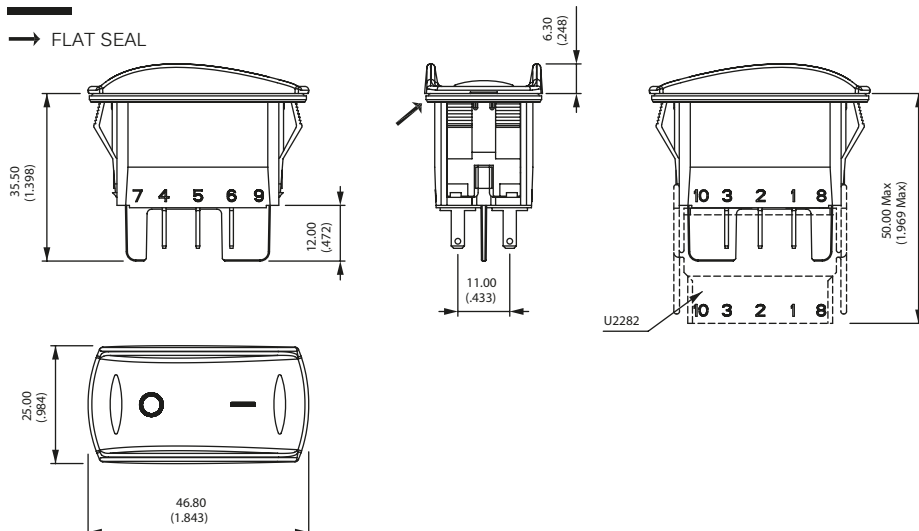
Drawings on website.

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



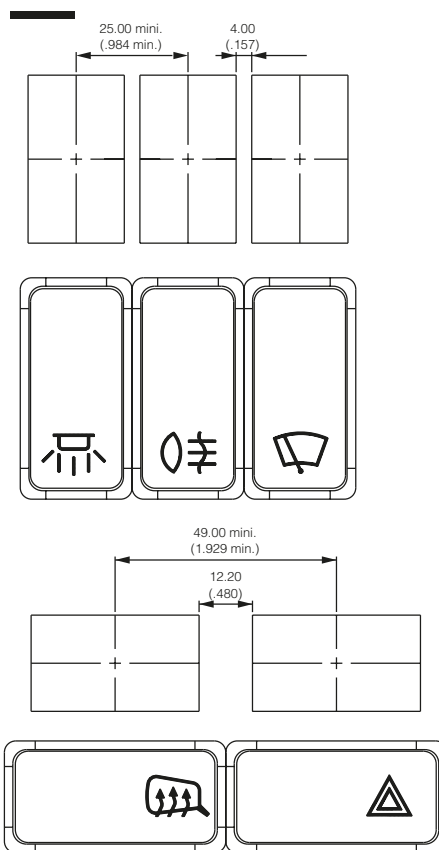
MATERIALS

- 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

CASE + LAMPS

KR SERIES	 POLES 3 Single pole 4 Double pole	ELECTRICAL FUNCTIONS <table border="1" style="border-collapse: collapse; width: 100%;"> <tr><td>1</td><td>ON</td><td>-</td><td>OFF</td></tr> <tr><td>4</td><td>ON</td><td>ON</td><td>ON</td></tr> <tr><td>4-1R</td><td>ON</td><td>ON</td><td>MOM</td></tr> <tr><td>5</td><td>MOM</td><td>-</td><td>ON</td></tr> <tr><td>6</td><td>ON</td><td>-</td><td>MOM</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>9</td><td>ON</td><td>OFF</td><td>ON</td></tr> </table>	1	ON	-	OFF	4	ON	ON	ON	4-1R	ON	ON	MOM	5	MOM	-	ON	6	ON	-	MOM	7	MOM	OFF	MOM	8	ON	OFF	MOM	9	ON	OFF	ON	 TERMINALS 0 Screw 2 Solder lug / quick-connect 3 Normalized quick-connect	 LAMPS LED 6V, 12V, 18V Neon 125V or 250V Filament 6V, 12V, 24V Fluorescent 220V or 110V Codes, see website.	Side A BEZEL 2 Black, sealed to IP65	Side B LAMP WIRING See website.
1	ON	-	OFF																																			
4	ON	ON	ON																																			
4-1R	ON	ON	MOM																																			
5	MOM	-	ON																																			
6	ON	-	MOM																																			
7	MOM	OFF	MOM																																			
8	ON	OFF	MOM																																			
9	ON	OFF	ON																																			

CONTACTS

A

 Silver grain

ACTUATOR

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

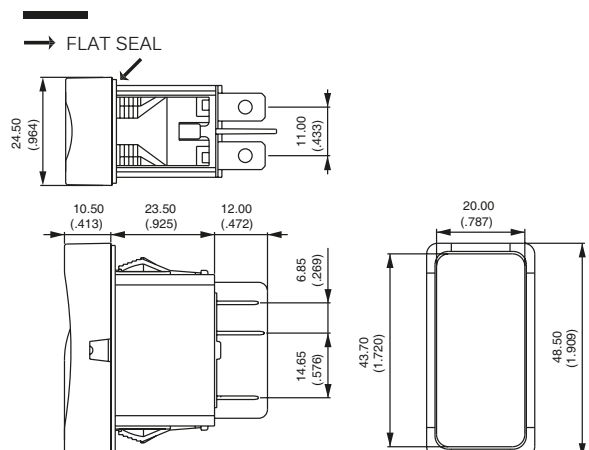
Actuator marking and symbols : see website.

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



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)

AGENCY APPROVALS

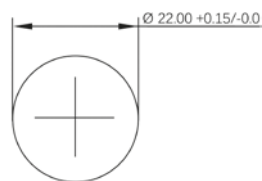


EN 61058-1

The company reserves the right to change specifications without notice.



PANEL CUT-OUT



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

A1 series

Industrial controls • Ø22mm panel mounting
pushbutton switches and indicators

BUILD YOUR PART NUMBER

A1

SERIES

C Round

BEZEL

0 Unsealed
1 Sealed IP65

SEALING

0 Indicator
1 Single pole
2 Double pole
5 Three pole
3 Four pole

SWITCH BLOCK

03 Flushmount

ACCESSORIES

P Pushbutton
I Indicator

SWITCH TYPE

A Illuminated
B Non-Illuminated

ILLUMINATION

A Indicator
X Latching
Y Momentary

FUNCTION

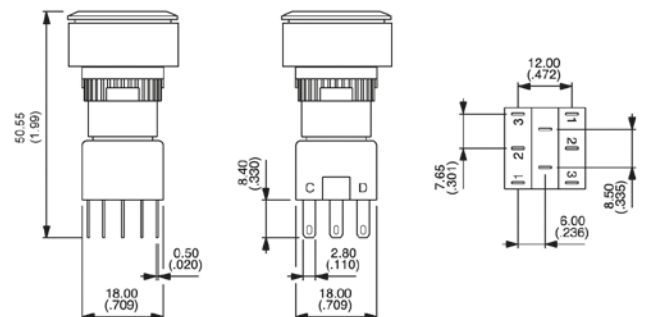
ENGRAVED SCREEN OPTIONS

01	Front Fog Lights
02	Rear Fog Lights
03	'Start'
04	Interior Light
05	Boot Release
06	Hazard Warning
07	Lights
08	Heating & Ventilation
09	Map Lights
10	Side Lights
11	'Lock'
12	'Unlock'
13	Rear Window Heating
14	Cooling
15	Wipers
16	Washers
17	Fan
18	Horn
19	Air recirculation
20	Blank

BULB

A1	Filament 6.3V
B1	Filament 14V
C1	Filament 28V
D1	Filament 36V
E1	Filament 48V
F1	Filament 60V
G1	Neon 110V
H1	Neon 220V
I1	Led 6V red
I2	Led 6V green
I3	Led 6V amber
J1	Led 12V red
J2	Led 12V green
J3	Led 12V amber
J4	Led 12V blue
J5	Led 12V white
K1	Led 24V red
K2	Led 24V green
K3	Led 24V amber
K4	Led 24V blue
K5	Led 24V white
L1	Led 48V red
L2	Led 48V green
J1	Led 48V amber

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



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)

AGENCY APPROVALS

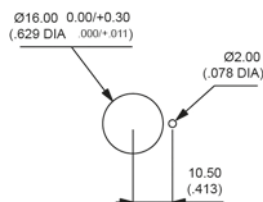
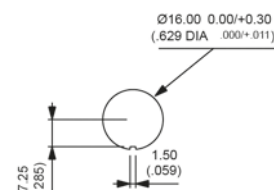


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PANEL CUT-OUT



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

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.

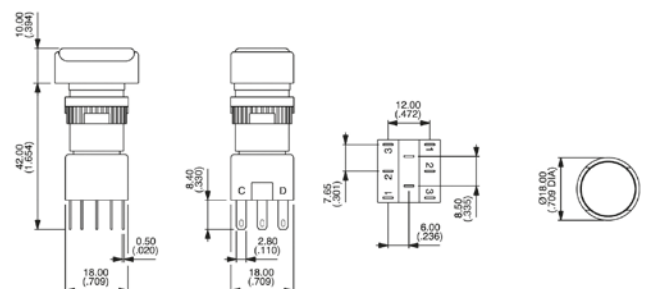
SCREEN			LAMP (IF REQUIRED)			OPERATOR			
BEZEL	COLOR	PART NO	LAMP	VOLTAGE	PART NO	POLE	BEZEL	DESCRIPTION	PART NO
	black	A0161A	Filament	6.3V	A0141A	1 or 2		Illum, momentary	A0101Y
	red	A0161B	Filament	14V	A0141B	1 or 2		Illum, maintained	A0101X
	amber	A0161C	Filament	28V	A0141C	1 or 2		Non-illum, momentary	A0102Y
	yellow	A0161D	Filament	36V	A0141D	1 or 2		Non-illum, 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-illum, momentary	A0104Y
	white	A0161J	Neon	220V	A0143H	3 or 4		Non-illum, 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-illum, momentary	A0106Y
	yellow	A0162D	LED	12V red	A0142M1	1 or 2		Non-illum, 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-illum, momentary	A0108Y
	white	A0162J	LED	12V white	A0142M5	3 or 4		Non-illum, 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-illum, momentary	A0110Y
	yellow	A0163D	LED	24V blue	A0142N4	1 or 2		Non-illum, 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-illum, momentary	A0112Y
	white	A0163J	LED	48V amber	A0142P3	3 or 4		Non-illum, 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)

AGENCY APPROVALS

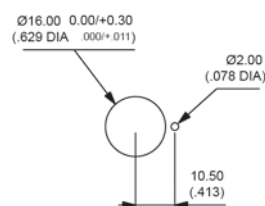
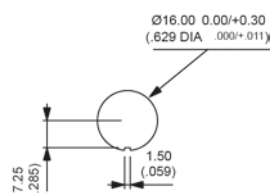


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PANEL CUT-OUT



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

A01 series

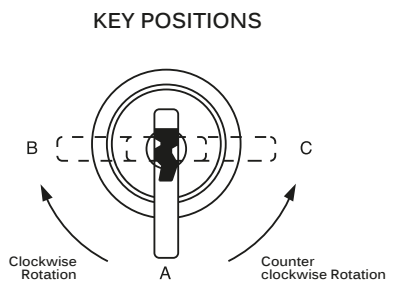
Industrial controls • Ø16mm panel mounting
keylock switches

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	at the end of the model number.
24 with 02	
27 with 03	
28 with 04	

Unsealed switches (IP40) suffix 01 to the end of the part number.

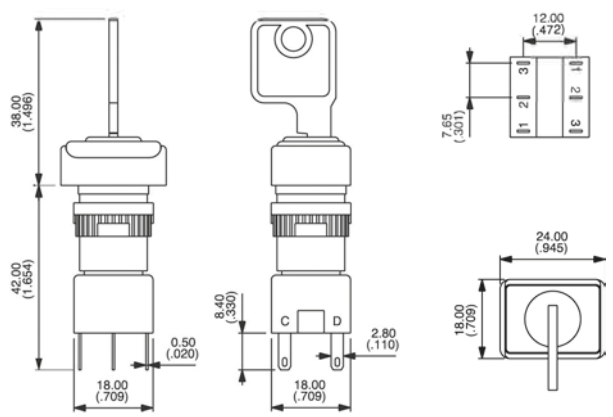
Bezel:  rectangular,  square,  round. 'pos'-position, 'mainL'-maintained left, 'momR'-momentary right, etc

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)

AGENCY APPROVALS

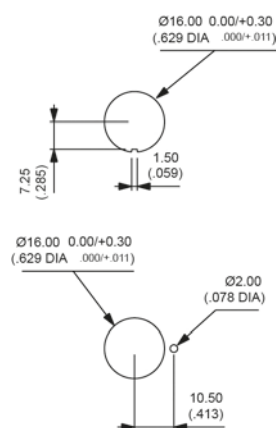


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PANEL CUT-OUT



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

A01 series

Industrial controls • Ø16mm panel mounting selector switches



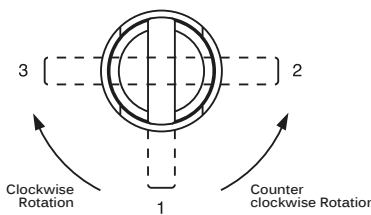
BUILD YOUR PART NUMBER

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	at the end of the
	11 with 03	model number.
	12 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

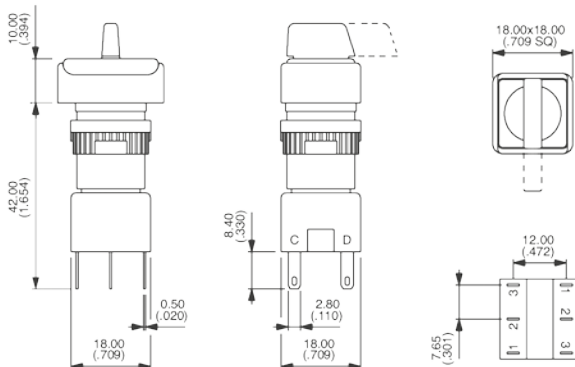
SWITCH BLOCK

NO OF POLES PART NO

Single pole	A0151B
Double pole	A0152B
Three pole	A0155B
Four pole	A0153B

• 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



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

AGENCY APPROVALS

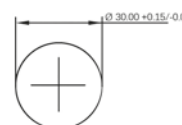
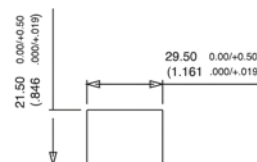
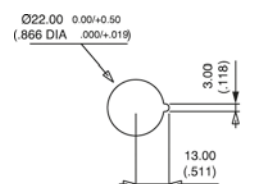


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PANEL CUT-OUT



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

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		(WITH STANDARD BEZEL)			
☐	black	A0261A	Filament	6.3V	A0141A	☐	illum, momentary	Lamp/LED bulb	A0201Y	
☐	red	A0261B	Filament	14V	A0141B	☐	illum, maintained	Lamp/LED bulb	A0201X	
☐	amber	A0261C	Filament	28V	A0141C	☐	Non-illum, momentary		A0203Y	
☐	yellow	A0261D	Filament	36V	A0141D	☐	Non-illum, maintained		A0203X	
☐	green	A0261E	Filament	48V	A0141E	☐	illum, momentary	Lamp/LED bulb	A0204Y	
☐	blue	A0261F	Filament	60V	A0141F	☐	illum, maintained	Lamp/LED bulb	A0204X	
☐	clear	A0261G	Neon	110V	A0143G	☐	Non-illum, momentary		A0206Y	
☐	white	A0261J	Neon	220V	A0143H	☐	Non-illum, maintained		A0206X	
☐	black	A0262A	LED	6V red	A0142L1	☐	illum, momentary	Lamp/LED bulb	A0207Y	
☐	red	A0262B	LED	6V green	A0142L2	☐	illum, maintained	Lamp/LED bulb	A0207X	
☐	amber	A0262C	LED	6V amber	A0142L3	☐	Non-illum, momentary		A0209Y	
☐	yellow	A0262D	LED	12V red	A0142M1	☐	Non-illum, maintained		A0209X	
☐	green	A0262E	LED	12V green	A0142M2					
☐	blue	A0262F	LED	12V amber	A0142M3					
☐	clear	A0262G	LED	12V blue	A0142M4					
☐	white	A0262J	LED	12V white	A0142M5					
☐	black	A0263A	LED	24V red	A0142N1					
☐	red	A0263B	LED	24V green	A0142N2					
☐	amber	A0263C	LED	24V amber	A0142N3					
☐	yellow	A0263D	LED	24V blue	A0142N4					
☐	green	A0263E	LED	24V white	A0142N5					
☐	blue	A0263F	LED	48V red	A0142P1					
☐	clear	A0263G	LED	48V green	A0142P2					
☐	white	A0263J	LED	48V amber	A0142P3					

Bezel: ☐ rectangular, ☐ square, ☐ round. 'illum'-illuminated, 'Non-illum'-non illuminated

SWITCH BLOCK

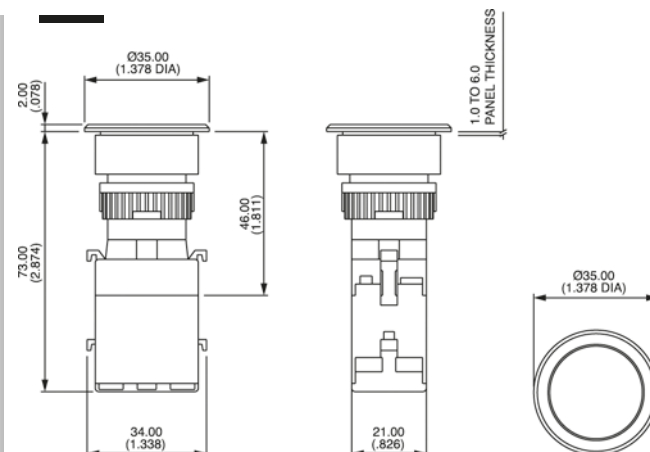
CONTACTS	PART NO
1 N.O.	A02501
1 N.C.	A02502
2 N.O.	A02503
2 N.C.	A02504
1 N.O./1 N.C.	A02505

SECOND SWITCH BLOCK

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.

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

AGENCY APPROVALS

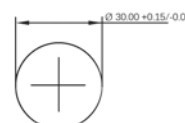
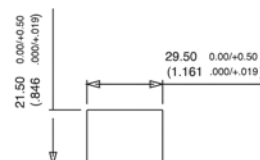
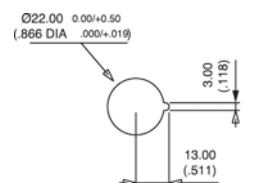


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PANEL CUT-OUT



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

A02 series

Industrial controls • Ø22mm panel mounting
keylock switches

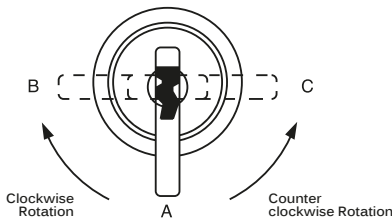
BUILD YOUR PART NUMBER

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
	2 pos. maintained	A028120	A-B
	2 pos. momentary	A028119	A
	3 pos. maintained	A028105	A-B-C
	3 pos. momentary	A028106	A
	3 pos. mainL, momR	A028107	A-B
	3 pos. momL, mainR	A028108	A-C
	2 pos. maintained	A028220	A-B
	2 pos. momentary	A028219	A
	3 pos. maintained	A028205	A-B-C
	3 pos. momentary	A028206	A
	3 pos. mainL, momR	A028207	A-B
	3 pos. momL, mainR	A028208	A-C
	2 pos. maintained	A028320	A-B
	2 pos. momentary	A028319	A
	3 pos. maintained	A028305	A-B-C
	3 pos. momentary	A028306	A
	3 pos. mainL, momR	A028307	A-B
	3 pos. momL, mainR	A028308	A-C

KEY ROTATION



KEY ROTATION - 2 POSITION SWITCHES

The model numbers shown are for switches with counter clockwise lever rotation.

For clockwise rotation, replace : **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

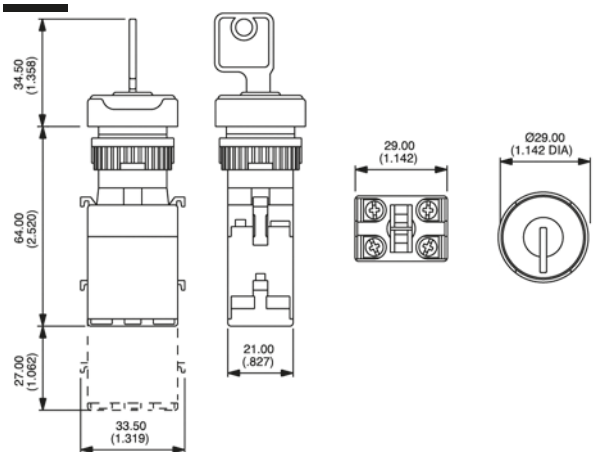
CONTACTS	PART NO
1 N.O.	A02501
1 N.C.	A02502
2 N.O.	A02503
2 N.C.	A02504
1 N.O./1 N.C.	A02505

SECOND SWITCH BLOCK

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



GENERAL SPECIFICATIONS

- Contact Gap : >1mm (0.039)
- Mechanical Life : 100.000 lifecycles (momentary and maintained)
- Terminals : M3 captive screw and push on tab terminals

AGENCY APPROVALS

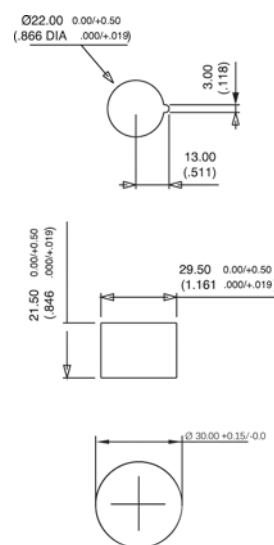


EN 61058-1

The company reserves the right to change specifications without notice.



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 : Silver

A02 series

Industrial controls • Ø22mm panel mounting selector switches



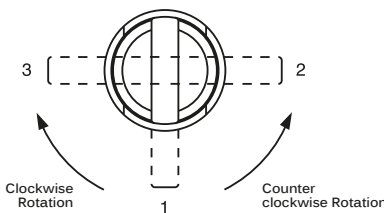
BUILD YOUR PART NUMBER

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
□	2 pos. maintained	A029207	A029107
□	2 pos. momentary	A029208	A029108
□	3 pos. maintained	A029203	A029103
□	3 pos. momentary	A029204	A029104
□	3 pos. mainL, momR	A029205	A029105
□	3 pos. momL, mainR	A029206	A029106
○	2 pos. maintained	A029407	A019307
○	2 pos. momentary	A029408	A019308
○	3 pos. maintained	A029403	A029303
○	3 pos. momentary	A029404	A029304
○	3 pos. mainL, momR	A029405	A029305
○	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

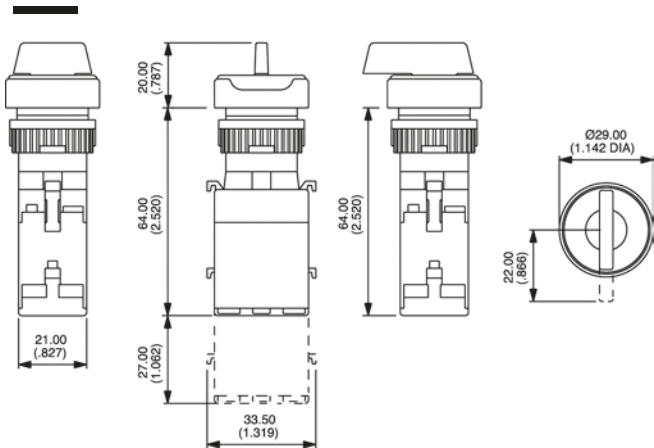
CONTACTS	PART NO
1 N.O.	A02501
1 N.C.	A02502
2 N.O.	A02503
2 N.C.	A02504
1 N.O./1 N.C.	A02505

SECOND SWITCH BLOCK

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



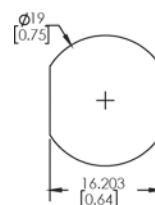
MATERIALS

- 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 5 Momentary		N Nickel plated G Black	(Nickel finish only) S Supplied B None	126 Standard

LOCK CONFIGURATION

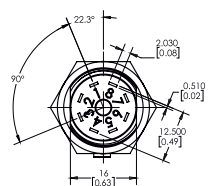
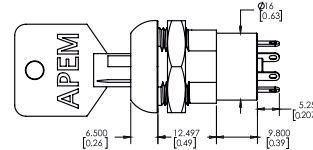
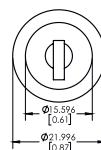
B	Double pole ON - OFF - ON
S	Double pole ON - ON

For detail and other functions see www.apem.com

OPTIONS

-		
KEY OPTIONS		HARDWARE
N Nickel Key (standard) M Overmolded		3 Nut (standard) 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

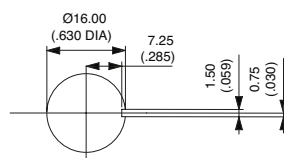
AGENCY APPROVAL

Switch block approved to
UL 1054 / VDE (EN 61058-1) and DEMKO (60947-5-5)

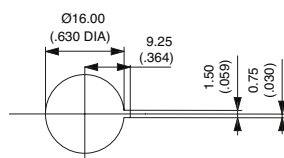


PANEL CUT-OUT

A01ES-DM - A01ES-DSP3



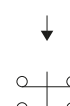
A01ES-D - A01ES-DF1- A01ES-DF2



ELECTRICAL FUNCTIONS



Single pole
Normally Closed



Double pole
Normally Closed

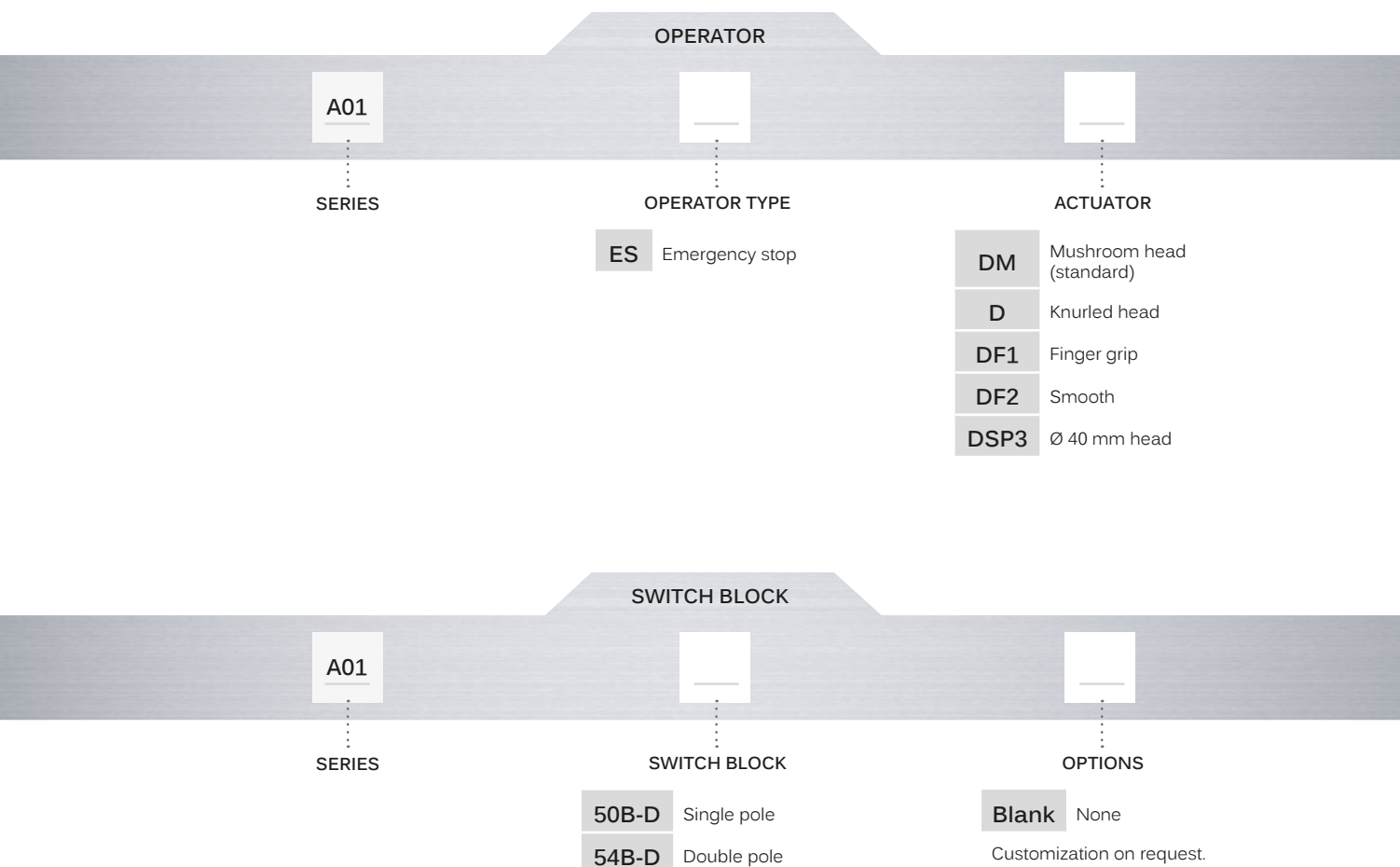
A01ES-D series

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

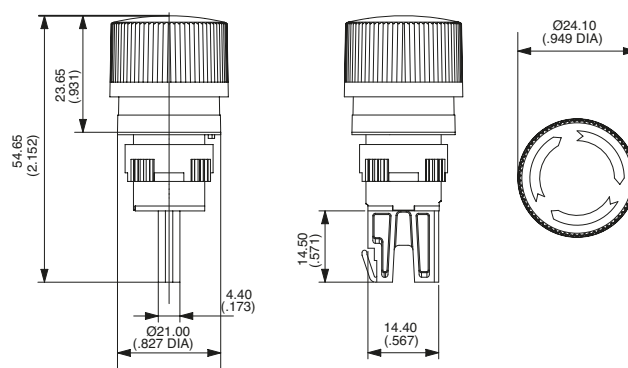
A01ES-D series

Emergency stop switches •
panel cut-out Ø 16 mm

KNURLED HEAD ACTUATOR



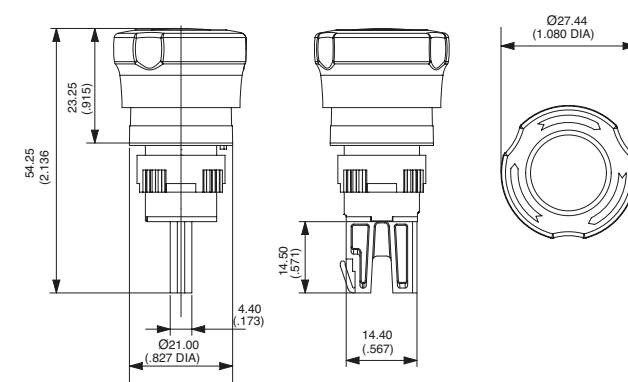
A01ES-D



FINGER GRIP ACTUATOR



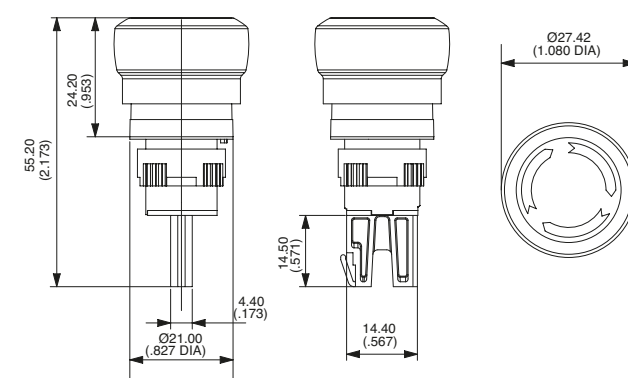
A01ES-DF1



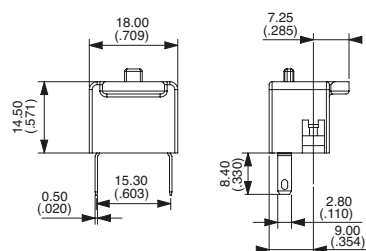
SMOOTH ACTUATOR



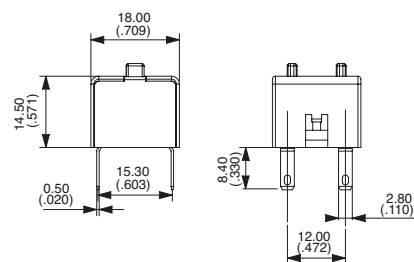
A01ES-DF2



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

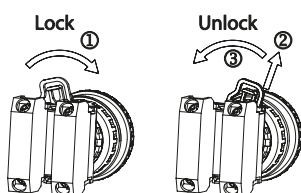


GENERAL SPECIFICATIONS

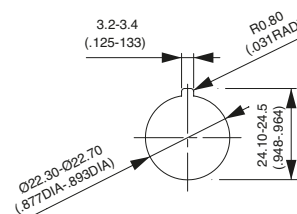
- Front panel sealing : IP65
- Panel thickness : 6 mm (.236) max.
- Low level or mechanical life : 250.000 cycles w. one contact block
- Operating temperature : -20°C to +55°C
- Switch terminals : M3.5 screws



MOUNTING LOCKING SYSTEM



PANEL CUT-OUT



AGENCY APPROVALS



UL 508
CSA C22.2 No 14-10



EN 60947-5-5

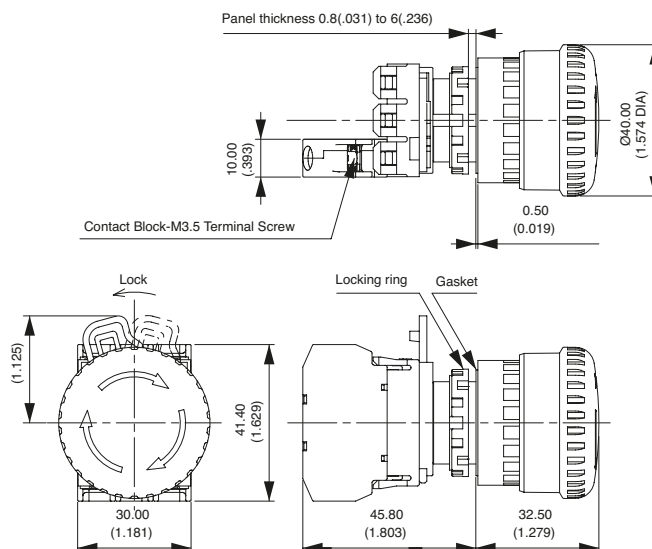
A02ES-I series

Emergency stop switches •
panel cut-out Ø 22 mm

SINGLE POLE - NORMALLY CLOSED



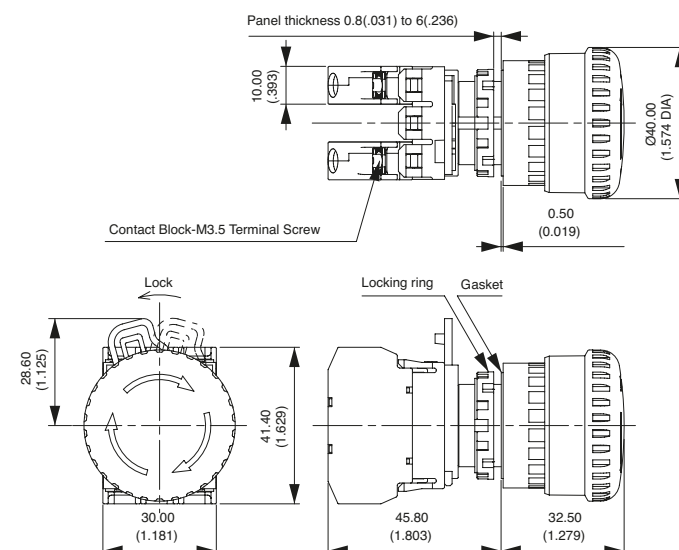
A02ESI3B101IX0



DOUBLE POLE - NORMALLY CLOSED



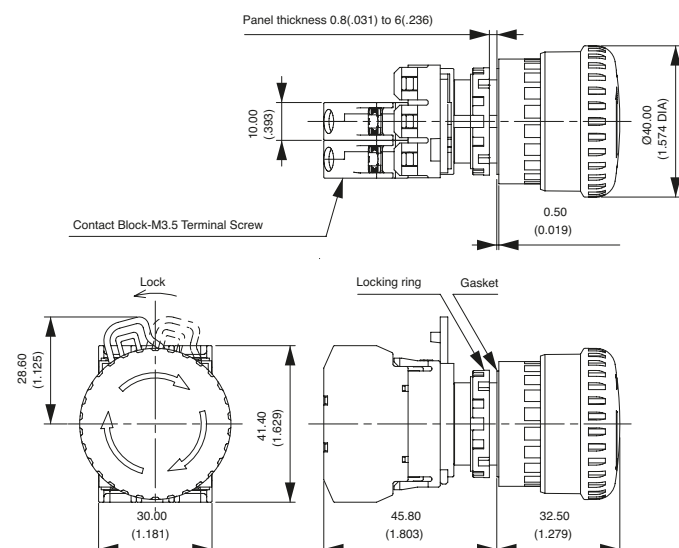
A02ESI3B102IX0



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



ENVIRONMENTAL SPECIFICATIONS

- Front panel sealing : IP65
- Terminals IP20 (finger safe)
- Operating temperature : -25°C to +60°C
- Storage temperature : -45°C to +80°C



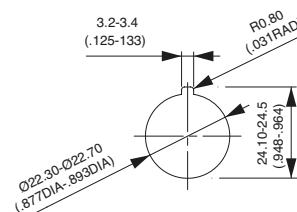
GENERAL SPECIFICATIONS

- 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.



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

AGENCY APPROVALS



UL 508
CSA 22.2 No 14-10



EN 60947-5-5

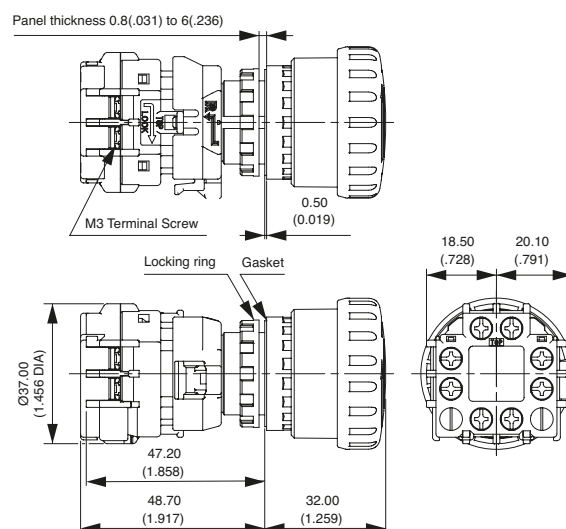
A02ES-H series

High-security emergency stop switches •
panel cut-out Ø 22 mm

DOUBLE POLE, NORMALLY CLOSED



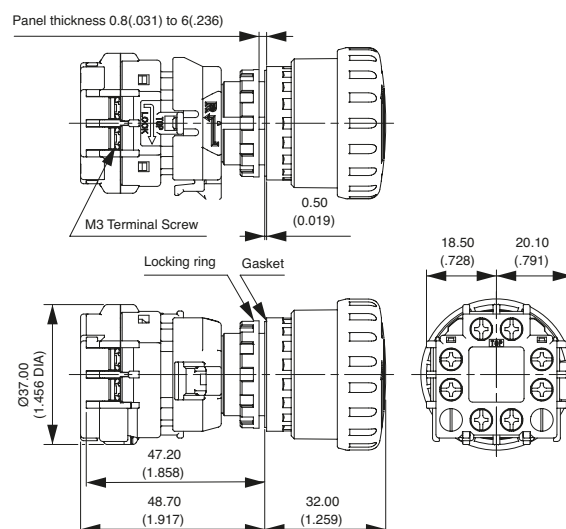
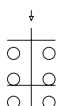
A02ESH3B102IX0



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

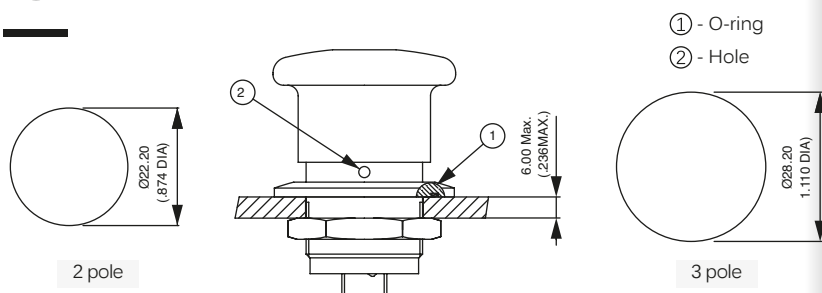


ENVIRONMENTAL SPECIFICATIONS

- 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

SERIES	ELECTRICAL FUNCTIONS	NUMBER OF POLES	ACTUATOR COLOR	STATUS INDICATOR	TERMINALS	ACTUATOR DIAMETER	BUSHING COLOR	OPTIONS
ES	1 2 NC (double pole only) 2 1 NO + 1NC (double pole only) 3 1 NO + 2NC (three pole only)	4 Double pole 5 Three pole	6 Red anodized Other : on request	3 Green Other : on request	P Straight PC S Solder lug	1 34,5 mm (1.358)	5 Yellow anodized	Blank None 001 PUSH PULL marking Other markings : on request

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

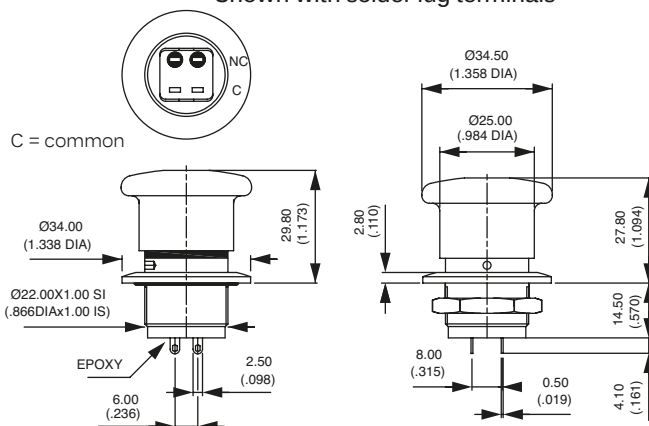


Straight PC terminals

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



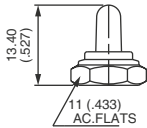
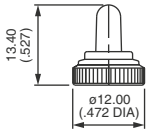
Sealing boots

For toggle or pushbutton switches

FOR BUSHING Ø 6,35-40NS (1/4-40UNS)
5000 AND 11000 SERIES



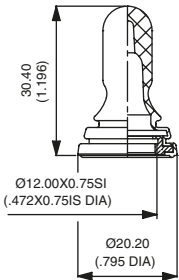
NUT	FULL-TOGGLE SILICONE BOOTS			
	Black	Red	Green	White
Knurled Nickel plated	N33161005 (U1331)	N33162005 (U1331-6)	N3316V005 (U1331-3)	N3316B005 (U1331-7)
Knurled Black	N33161002 (U1333)	N33162002 (U1333-6)	N3316V002 (U1333-3)	N3316B002 (U1333-7)
Hex Nickel plated	N33121005 (U1229)	N33122005 (U1229-6)	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



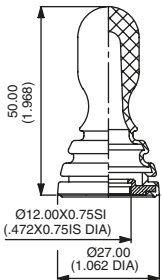
FULL-TOGGLE BLACK NEOPRENE BOOT
N36346009 (U2252)



FOR BUSHING Ø12 X 0.75 SI (.472X.075 IS)
600 SERIES WITH -5 LONG LEVER



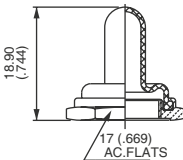
FULL-TOGGLE BLACK NEOPRENE BOOT
N36346209 (U2197)



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)



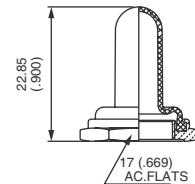
Sealing boots

For toggle or pushbutton switches

FOR BUSHING Ø 12 X 0.75 SI (.472X.075 IS)
600H, 660, 1000, 1500 AND 3600



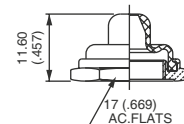
HEX NUT	FULL-TOGGLE SILICONE BOOTS			
	Black	Red	Green	White
Nickel plated	N36111005 (U1565)	N36112005 (U1565-6)	N3611V005 (U1565-3)	N3611B005 (U1565-7)
Black	N36111002 (U1567)	N36112002 (U1567-6)	N3611V002 (U1567-3)	-
FULL-TOGGLE BLACK NEOPRENE BOOTS				
Nickel plated	N36116005 (U851)			
Black	N36116002 (U853)			



FOR BUSHING Ø 12 X 0.75 SI (.472X.075 IS)
600H, 660, 1000 AND 3600 SERIES



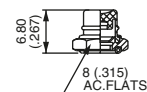
HEX NUT	HALF-TOGGLE SILICONE BOOTS			
	Black	Red	Green	White
Nickel plated	N36111015 (U1151)	N36112015 (U1151-6)	N3611V015 (U1151-3)	N3611B015 (U1151-7)
Black	N36111012 (U1153)	N36112012 (U1153-6)	N3611V012 (U1153-3)	-
HALF-TOGGLE BLACK NEOPRENE BOOTS				
Nickel plated	N36116015 (U598)			
Black	N36116012 (U600)			



FOR BUSHING Ø 4 X 0.70 (.157 X 0.70)
9500 SERIES



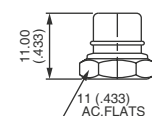
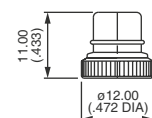
HEX NUT	PUSHBUTTON SILICONE BOOTS			
	Black	Red	Green	White
Nickel plated	N31221005 (U1829)	N31222005 (U1829-6)	N3122V005 (U1829-3)	N3122B005 (U1829-7)
Black	N31221002 (U1831)	N31222002 (U1831-6)	N3122V002 (U1831-3)	N3122B002 (U1831-7)



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)



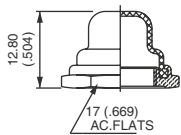
Sealing boots

For toggle or pushbutton switches

FOR BUSHING Ø 12 X 0.75 SI (.472X.075 IS)
1200, 4700 AND 4800 SERIES



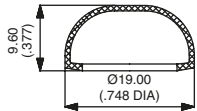
HEX NUT	PUSHBUTTON SILICONE BOOTS			
	Black	Red	Green	White
Nickel plated	N36211005 (U1654)	N36212005 (U1654-6)	N3621V005 (U1654-3)	N3621B005 (U1654-7)
Black	N36211002 (U1656)	N36212002 (U1656-6)	N3621V002 (U1656-3)	-
PUSHBUTTON BLACK NEOPRENE BOOTS				
Nickel plated	N36216005 (U31)			
Black	N36216002 (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

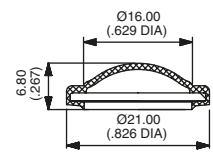


Operating temperature : -40°C to +85°C
The flat seal or O-Ring supplied with the switch should not be used with this boot.

FOR DOUBLE SEALING ON IA SERIES



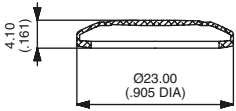
SILICONE BOOT	
Black	U6602
Green	U6603
Yellow	U6605
Red	U6606



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

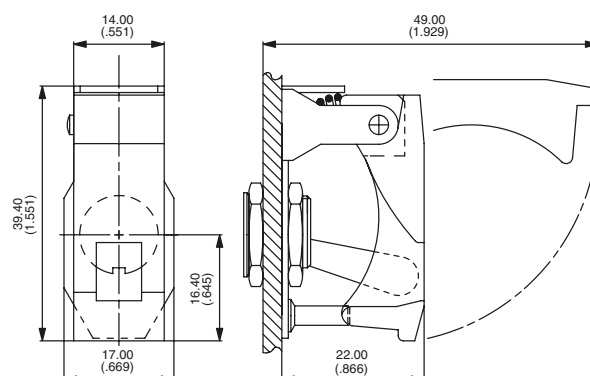
For switch series 12000 - 3500 - 600H - 6000

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

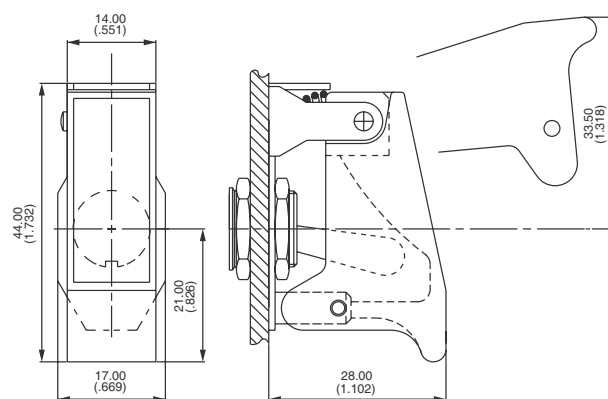


SERIES 20PN - WITH STANDARD BUSHING FOR 2-POSITION SWITCHES

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.

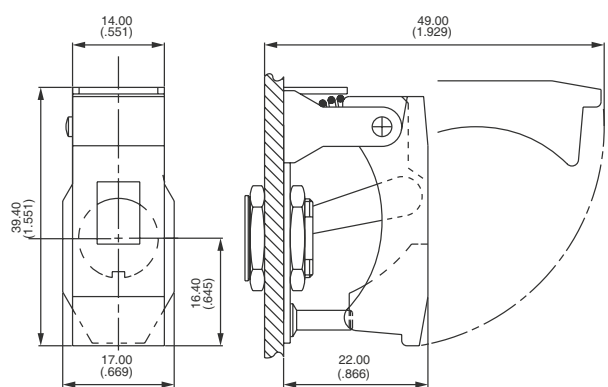
SERIES 40 - WITH STANDARD BUSHING FOR 2-POSITION SWITCHES

Lever returned then locked in upper position



Model No	Color
42	Grey
43	White
44	Orange
45	Black
46	Red
47	Green
48	Yellow
49	Blue
45/48	Black/yellow striped

Model 140 (with smaller aperture) recommended for the 12000 series.

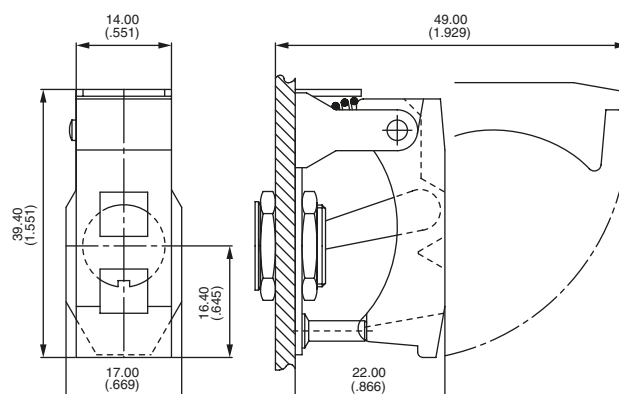


SERIES 200 - WITH STANDARD BUSHING FOR 2-POSITION SWITCHES

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

For standard products

A

 Flatted, left side

B

 Flatted, right side

C

 Keyway, left

D

 Keyway, right

For other products

E

 Flatted, up

F

 Flatted, down

G

 Keyway, up

H

 Keyway, down

SWITCH GUARD SHAPES

1

 Locks in center position

2

 Prevents down position

3

 Prevents up position

4

 Locks in down position

5

 Locks in up position

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

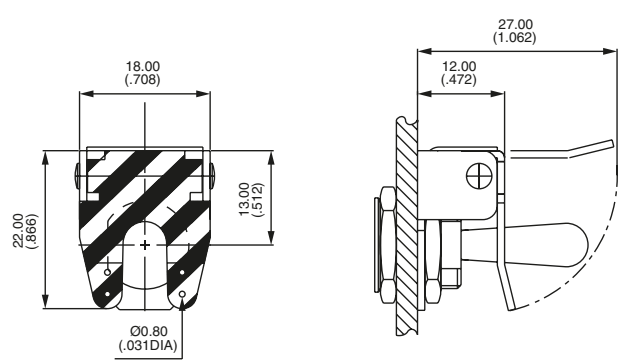


Plate features holes for wiring a seal.

MSG series

Rugged switch guards for switch series 12000 - 3500 - 600H - 6000



DISTINCTIVE FEATURES

Robust
For harsh environments
Modern, patented design



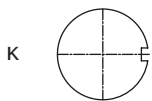
GENERAL SPECIFICATIONS

- 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

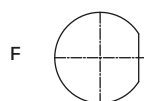


PANEL CUT-OUT

FOR BUSHING WITH KEYWAY



FOR FLATTED BUSHING



MOUNTING



Standard



With K sealing option



With X408 sealing option

The company reserves the right to change specifications without notice.



MATERIALS

- Support plate : black stainless steel
- Cap : thermoset

MSG series

Rugged switch guards for switch series 12000 - 3500 - 600H - 6000

BUILD YOUR PART NUMBER

MSG

SERIES

NUMBER OF POSITIONS

2

2 positions

3

3 positions

CUT-OUT TYPE

K

For bushing with keyway

F

For flatted bushing

MARKING

XX

No marking
Markings on request.

SWITCH GUARD TYPE

1

Locked in upper position

2

Locked in down position

3

Locked in center position (3 positions only)

4

Locked in upper and down positions

5

Locked in either position

CUT-OUT ORIENTATION

N

North

S

South

COLORS

1

Blue

2

Black

3

Green

4

Grey

5

Yellow

6

Red

7

White

9

Orange

MARKING COLOR

X

No marking

1

Blue

2

Black

3

Green

4

Grey

5

Yellow

6

Red

7

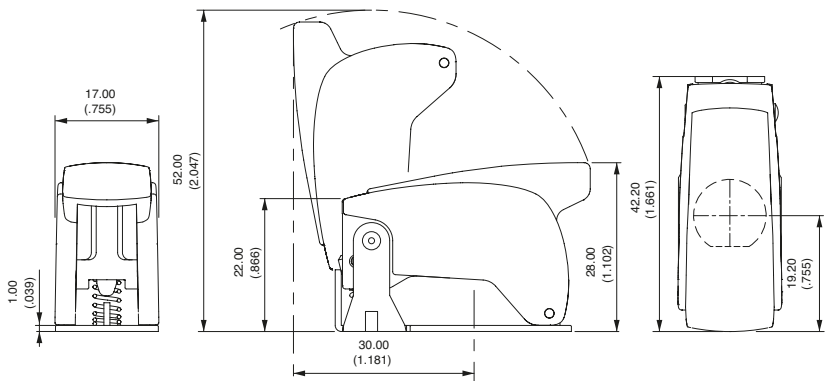
White

9

Orange

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

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

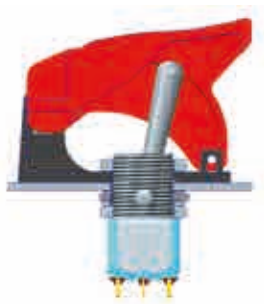
- Support plate : thermoplastic
- Cap : thermoplastic



MOUNTING



Standard



With K sealing option

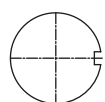
The company reserves the right to change specifications without notice.



PANEL CUT-OUT

FOR BUSHING WITH KEYWAY

K



CSG series

Switch guards for switch series 5000M - 600H

BUILD YOUR PART NUMBER

CSG

SERIES

NUMBER OF POSITIONS

CUT-OUT TYPE

CUT-OUT ORIENTATION

COLORS

2 2 positions

K For bushing with keyway

2 Locked in down position
5 Locked in either position

N North
S South

1 Blue

2 Black

3 Green

4 Grey

5 Yellow

6 Red

7 White

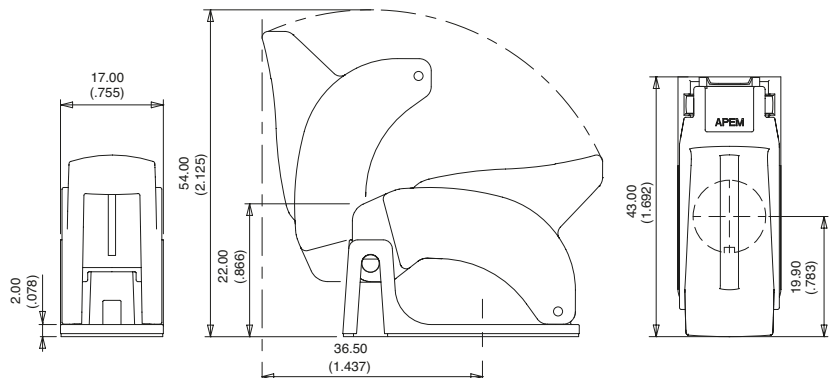
9 Orange

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

DIMENSIONS



Note : Ø 1,60 mm holes for wiring a seal are standard on all models.



Hardware

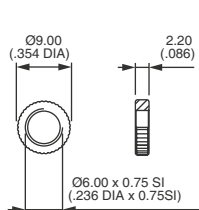
For miniature and industrial switches

Standard hardware is automatically supplied with the switches
Non-standard hardware is presented below



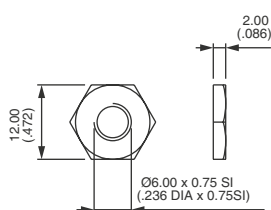
NON-STANDARD HARDWARE FOR SWITCHES Ø 6 (.236) - 5000 SERIES

KNURLED NUT



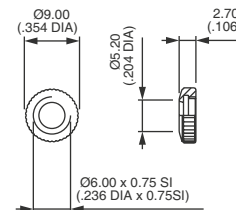
Chrome plated **U826**

SPECIAL NUT 12 (.472) ACROSS FLATS

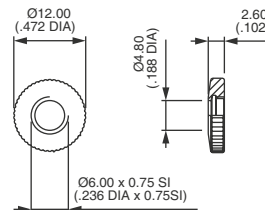


Chrome plated **U1916**

KNURLED CAP NUTS



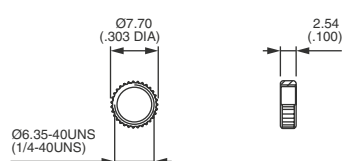
Chrome plated **U461**
Black **U502**



Chrome plated **U232**

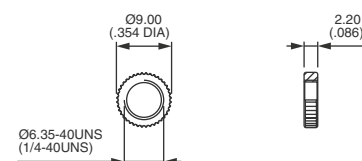
NON-STANDARD HARDWARE FOR SWITCHES Ø 6,35 (1/4) - ALL SERIES

KNURLED NUT



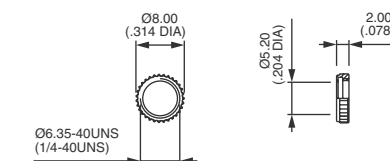
Nickel plated **U369**

KNURLED NUT



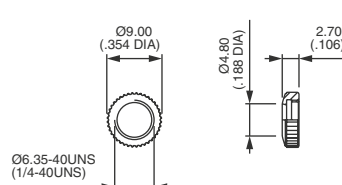
Nickel plated **U229**
Black **U230**

KNURLED NUT



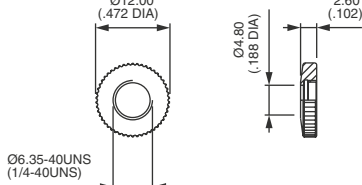
Chrome plated **U501**

KNURLED CAP NUT



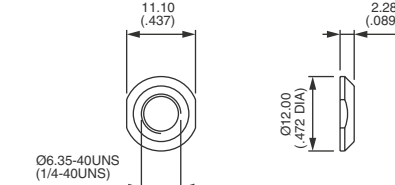
Chrome plated **U216**
Black **U218**

KNURLED CAP NUT



Chrome plated **U268**
Black **U725**

DRESS NUT



Nickel plated **U443**
Black **U848**

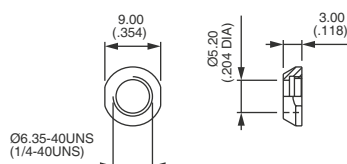
The company reserves the right to change specifications without notice.

Hardware

For miniature and industrial switches

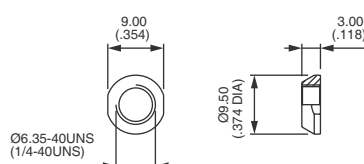
OTHER HARDWARE FOR SWITCHES Ø 6,35 (1/4) - ALL SERIES

CONIC CAP NUT



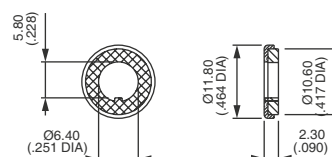
Nickel plated U500

CONIC NUT



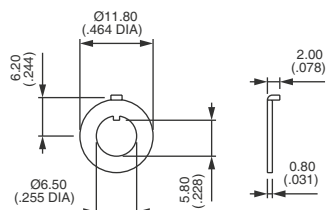
Chrome plated U542
Nickel plated U561

SEALING WASHER
for keyway bushing



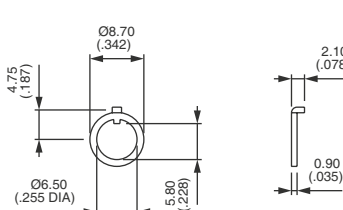
U360

SPECIAL LOCKING RING
Spacing 6,2 mm (.244)



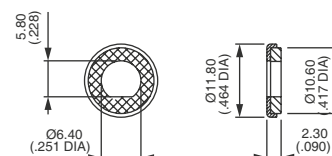
Nickel plated U368

SPECIAL LOCKING RING
Spacing 4,75 mm (.187)



Nickel plated U409

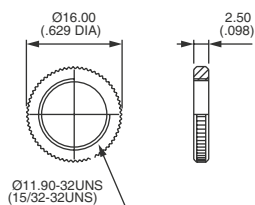
SEALING WASHER
for flatted bushing



U5141

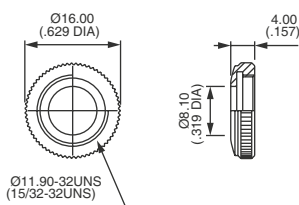
NON-STANDARD HARDWARE FOR SWITCHES Ø 11,9 (15/32) 12000, 13000X768 AND 5600M SERIES

KNURLED NUT

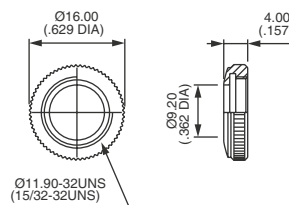


Nickel plated U53
Black U1634

KNURLED CAP NUTS

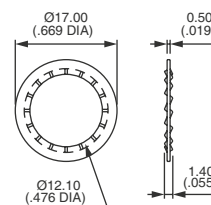


Chrome plated U124



Chrome plated U123

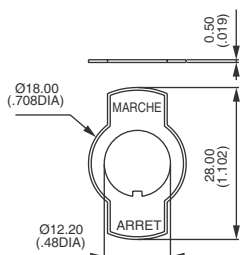
LOCKWASHER



Zinc plated steel U13

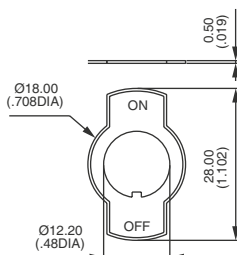
PLATES FOR SWITCHES Ø 12 (.472) AND 11,9 (15/32)

MARCHE - ARRÊT



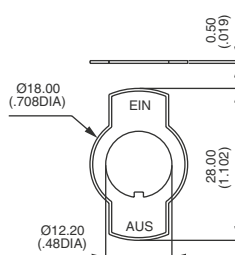
U17

ON - OFF



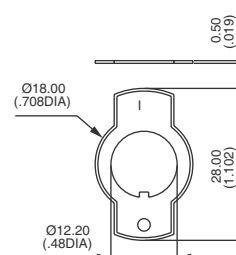
U19

EIN - AUS



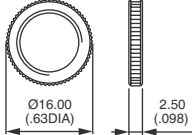
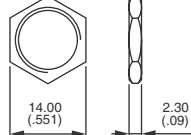
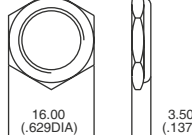
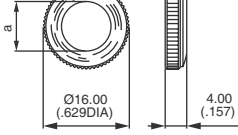
U99

I - O



U1050

NUTS FOR BUSHING Ø 11,9 (15/32) AND Ø 12 (.472)

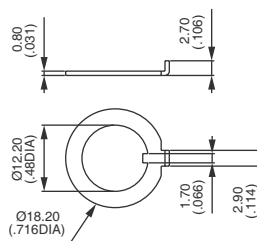
NUTS				
BUSHING Ø 11,9 (15/32) THREAD 0,794-32UNS SERIES 3500 - 6000				
Chrome plated brass		U92		U123
Nickel plated brass	U53	U162		
Black brass	U1634	U41		U2226
BUSHING Ø 12 (.472) THREAD 0,75 SERIES 1B/IS - IC - IH - IL - IM - IP - 660 - 600H - 600NH - 1000 - 1200 - 1500 - 1600 - 1700 - 3600 - 4000				
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

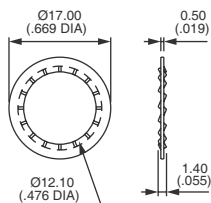
HARDWARE FOR SWITCHES Ø 12 (.472) AND 11,9 (15/32)

LOCKING RING



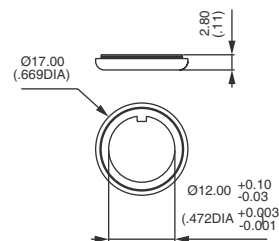
Nickel plated **U121**
Black **U12**

LOCKWASHER



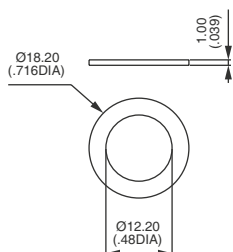
Zinc plated steel **U13**

SEALING WASHER



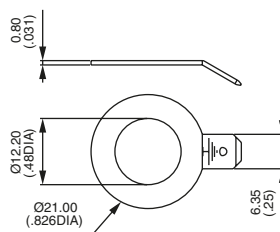
Stainless steel and neoprene **U60**

SEALING WASHER FOR BOOTS



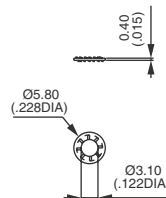
Nylon **U21**

GROUND CONNECTOR



Nickel plated **U187**

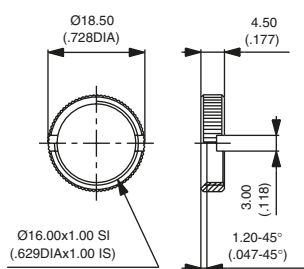
LOCKWASHER



Zinc plated steel **U14**

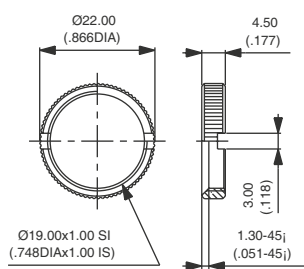
HARDWARE FOR AV SERIES (ANTI-VANDAL AND SECURITY PUSHBUTTON SWITCHES)

KNURLED NUT FOR MODELS Ø 16 (.629)



10-960-5

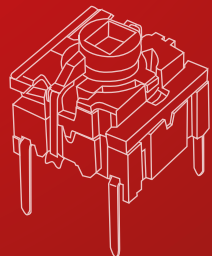
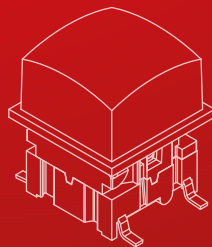
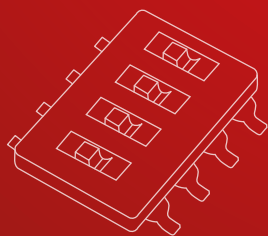
KNURLED NUT FOR MODELS Ø 19 (.748)

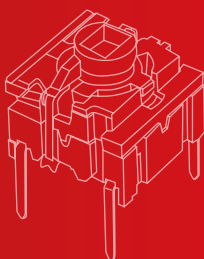
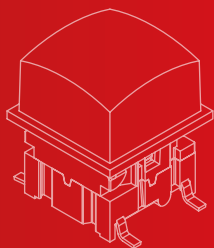
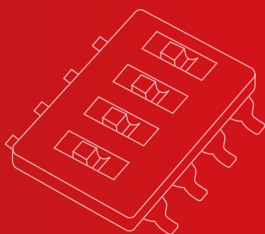


U1977-5



PCB SWITCHES





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MEC TACTILE SWITCHES

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SUBMINIATURE AND SLIDE SWITCHES



APEM
BEST SELLER

TG SERIES
TOTALLY SEALED

APEM
EXCLUSIVE

WASHABLE.
A totally sealed boot
protects the switch
during the PCB
cleaning process.



DESIGNED FOR
SURFACE MOUNT



RESISTANT 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	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

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.

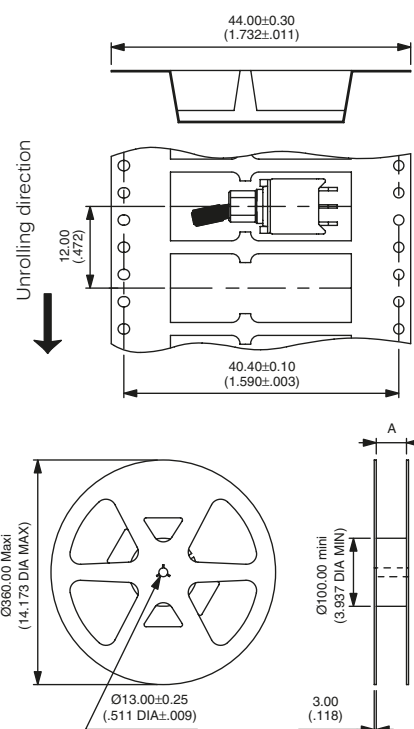


SOLDERING AND CLEANING

- 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)

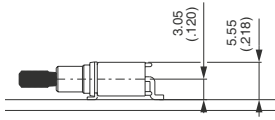
Standard packaging unit : 700 pieces
Tape meeting international standard IEC - Publication 286-3 (EIA481A)
Start leader : 400 mm min.

SMT TL series

Surface mount subminiature
washable toggle switches



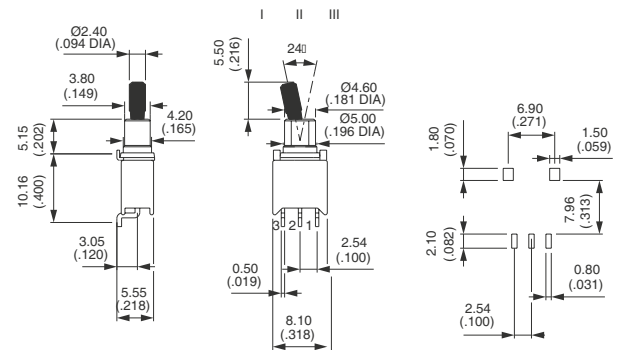
MOUNTING



WITHOUT POSITIONING PINS



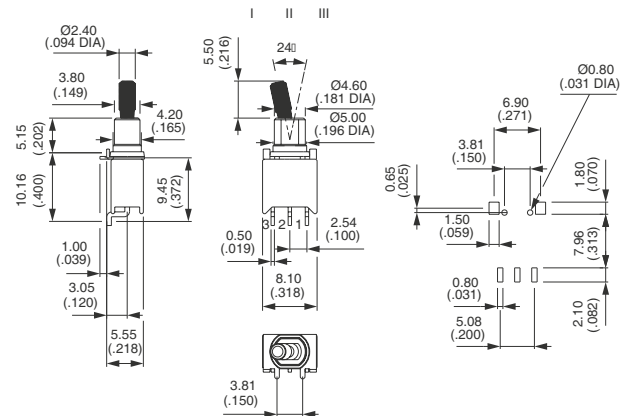
	III	II	I
TL36WS84000	ON	-	ON
TL39WS84000	ON	OFF	ON
TL37WS84000	MOM	OFF	MOM
TL38WS84000	ON	OFF	MOM
TL32WS84000	ON	-	ON



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

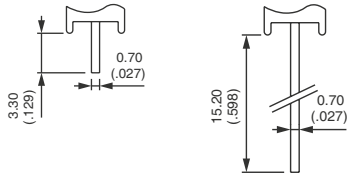
- Case : PBT
- Actuator : brass, nickel plated
- Contacts and terminals :
 - 0 : brass, gold plated
 - 1 : brass, silver plated
 - 3 : brass, gold plated (1,27 micron gold)
 - 8 : contact brass, gold plated + tin plated terminals
 - 9 : contact brass, gold plated (1,27 micron gold) + tin plated terminals
- Terminal seal : epoxy

TL series

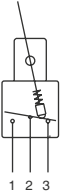
Subminiature washable toggle switches



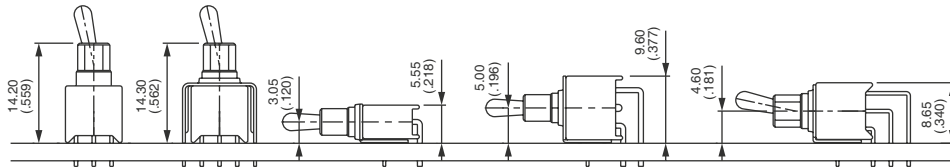
TERMINALS



ELECTRICAL FUNCTIONS



PCB MOUNTING





BUILD YOUR PART NUMBER

BASIC PART NUMBER																																																																				
TL																																																																				
SERIES	NUMBER OF POLES	ELECTRICAL FUNCTIONS	TERMINALS																																																																	
	<table border="1"> <tr> <td>3</td> <td>Single pole</td> </tr> <tr> <td>4</td> <td>Double pole</td> </tr> </table>	3	Single pole	4	Double 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>2</td> <td>ON</td> <td>-</td> <td>MOM</td> </tr> </table>	6	ON	-	ON	9	ON	OFF	ON	7	MOM	OFF	MOM	8	ON	OFF	MOM	2	ON	-	MOM	<table border="1"> <tr> <td>P0</td> <td>Straight PC</td> </tr> <tr> <td>Y0</td> <td>Bracket mounting</td> </tr> <tr> <td>W0</td> <td>Right angle, horizontal mounting</td> </tr> <tr> <td>WW</td> <td>Right angle, vertical mounting</td> </tr> <tr> <td>MW</td> <td>Wire-wrap</td> </tr> </table>	P0	Straight PC	Y0	Bracket mounting	W0	Right angle, horizontal mounting	WW	Right angle, vertical mounting	MW	Wire-wrap																															
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CONTACT AND TERMINAL MATERIALS	LEVER STYLES / CASE COLORS		SPECIAL OPTIONS																																																																	
<table border="1"> <tr> <td>0</td> <td>Brass, gold plated</td> </tr> <tr> <td>1</td> <td>Brass, silver plated</td> </tr> <tr> <td>3</td> <td>Brass, gold plated (1,27 micron gold)</td> </tr> <tr> <td>8</td> <td>Contact brass, gold plated + tin plated terminals</td> </tr> <tr> <td>9</td> <td>Contact brass, gold plated (1,27 micron gold) + tin plated terminals (SP only)</td> </tr> </table>	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)	<table border="1"> <thead> <tr> <th colspan="2">With blue case</th> <th colspan="2">With black case</th> </tr> </thead> <tbody> <tr> <td>00</td> <td>Short lever, nickel plated</td> <td>50</td> <td>Short lever, nickel plated</td> </tr> <tr> <td>01</td> <td>Short lever, black</td> <td>51</td> <td>Short lever, black</td> </tr> <tr> <td>02</td> <td>Long lever, nickel plated</td> <td>52</td> <td>Long lever, nickel plated</td> </tr> <tr> <td>03</td> <td>Long lever, black</td> <td>53</td> <td>Long lever, black</td> </tr> <tr> <td>04</td> <td>Medium lever, nickel plated</td> <td>54</td> <td>Medium lever, nickel plated</td> </tr> <tr> <td>05</td> <td>Medium lever, black</td> <td>55</td> <td>Medium lever, black</td> </tr> <tr> <td>40</td> <td>Short insulated lever</td> <td>56</td> <td>Cylindrical lever, nickel plated</td> </tr> <tr> <td>30</td> <td>Long insulated lever</td> <td>94</td> <td>Short insulated lever</td> </tr> <tr> <td></td> <td></td> <td>90</td> <td>Long insulated lever</td> </tr> </tbody> </table>	With blue case		With black case		00	Short lever, nickel plated	50	Short lever, nickel plated	01	Short lever, black	51	Short lever, black	02	Long lever, nickel plated	52	Long lever, nickel plated	03	Long lever, black	53	Long lever, black	04	Medium lever, nickel plated	54	Medium lever, nickel plated	05	Medium lever, black	55	Medium lever, black	40	Short insulated lever	56	Cylindrical lever, nickel plated	30	Long insulated lever	94	Short insulated lever			90	Long insulated lever	<table border="1"> <tr> <td>00</td> <td>No special requirement</td> </tr> <tr> <td>07</td> <td>Trimmed terminals - length 3,2 (.125)</td> </tr> <tr> <td>08</td> <td>Extended terminals</td> </tr> <tr> <td>18</td> <td>Switch without ground plate</td> </tr> <tr> <td>20</td> <td>Ground plate with 2 pins</td> </tr> <tr> <td>25</td> <td>Trimmed terminals - length 5 (.196)</td> </tr> <tr> <td>30</td> <td>Wire-wrap on bracket mounting models</td> </tr> <tr> <td>50</td> <td>Crimped ground plate pins</td> </tr> </table>	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
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01	Short lever, black	51	Short lever, black																																																																	
02	Long lever, nickel plated	52	Long lever, nickel plated																																																																	
03	Long lever, black	53	Long lever, black																																																																	
04	Medium lever, nickel plated	54	Medium lever, nickel plated																																																																	
05	Medium lever, black	55	Medium lever, black																																																																	
40	Short insulated lever	56	Cylindrical lever, nickel plated																																																																	
30	Long insulated lever	94	Short insulated lever																																																																	
		90	Long insulated lever																																																																	
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																																																																			

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	III	II	I
TL36P0	TL46P0	ON	-	ON
TL39P0	TL49P0	ON	OFF	ON
TL37P0	TL47P0	MOM	OFF	MOM
TL38P0	TL48P0	ON	OFF	MOM
TL32P0	TL42P0	ON	-	MOM

STRAIGHT PC TERMINALS BRACKET MOUNTING : TL..Y0



Single pole	Double pole	III	II	I
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	III	II	I
TL36W0	TL46W0	ON	-	ON
TL39W0	TL49W0	ON	OFF	ON
TL37W0	TL47W0	MOM	OFF	MOM
TL38W0	TL48W0	ON	OFF	MOM
TL32W0	TL42W0	ON	-	MOM

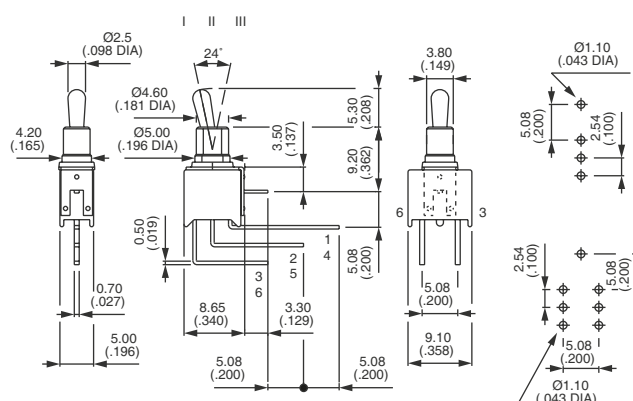
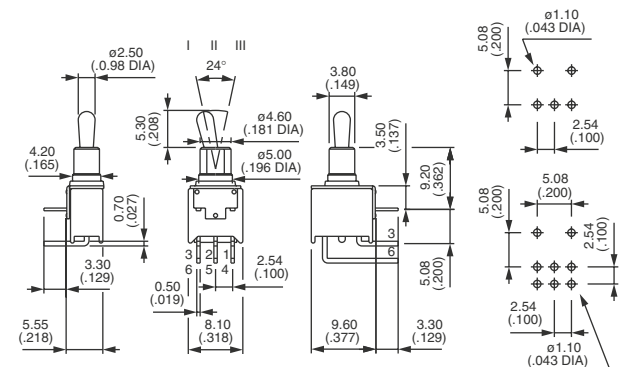
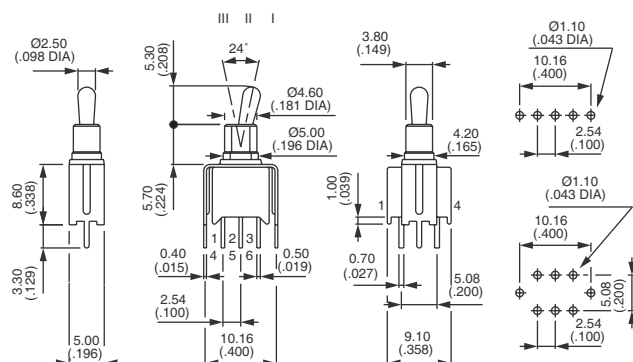
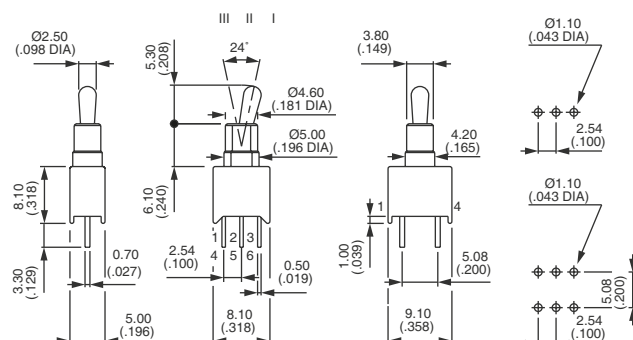
RIGHT ANGLE TERMINALS VERTICAL MOUNTING : TL..WW



Single pole	Double pole	III	II	I
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.

Shown with standard lever



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



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)



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.

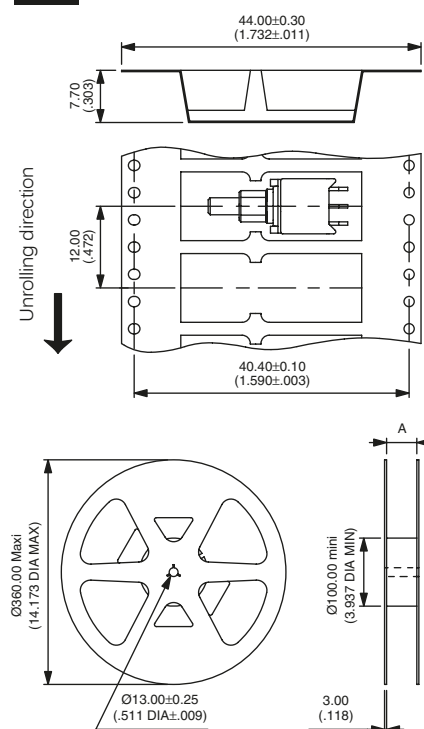


SOLDERING AND CLEANING

- 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 TP series

Surface mount subminiature washable pushbutton switches

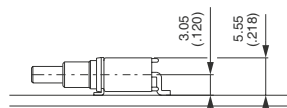


MATERIALS

- 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



MOUNTING



WITHOUT POSITIONING PINS



TP32WS83500



ON

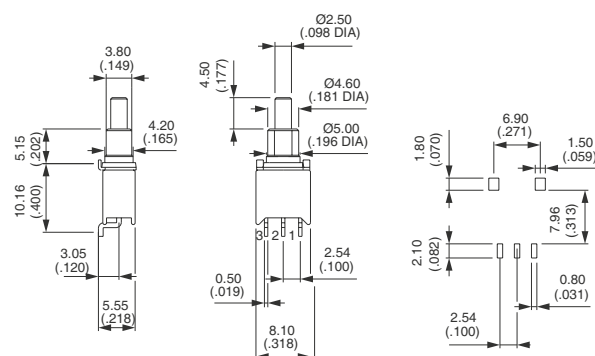


MOM

TP33WS83500

OFF

MOM



Shown in function 2

WITH POSITIONING PINS



TP32WS83565



ON

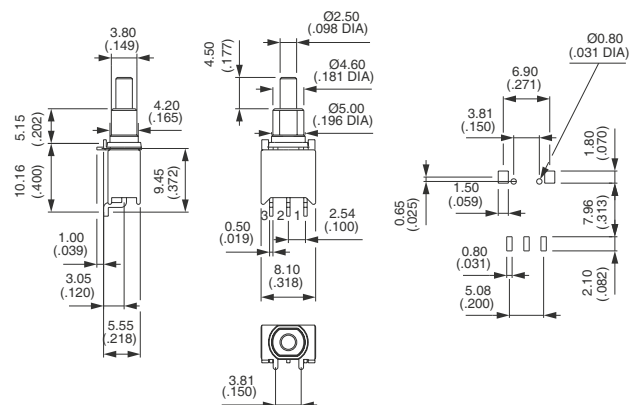


MOM

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 - 10 μ A 5VDC
- Contact resistance : 50 m Ω max.
- Insulation resistance : 1.000 M Ω 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

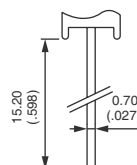
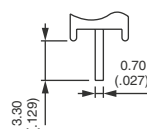


MATERIALS

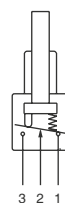
- Case : PBT
- Actuator : polyamide, glass filled
- Contacts and terminals :
 - 0 : brass, gold plated
 - 1 : brass, silver plated
 - 3 : brass, gold plated (1,27 micron gold)
 - 8 : contact brass, gold plated + tin plated terminals
 - 9 : contact brass, gold plated (1,27 micron gold) + tin plated terminals
- Terminal seal : epoxy



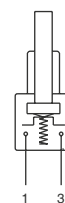
TERMINALS



ELECTRICAL FUNCTIONS



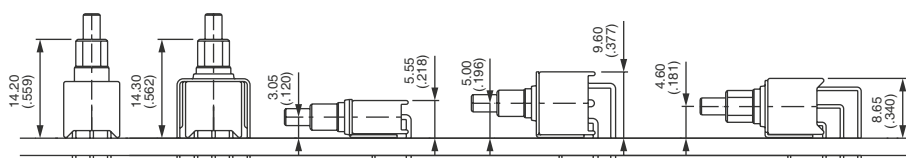
Function 2
(ON - MOM)



Function 3 (NO)
(OFF - MOM)



PCB MOUNTING

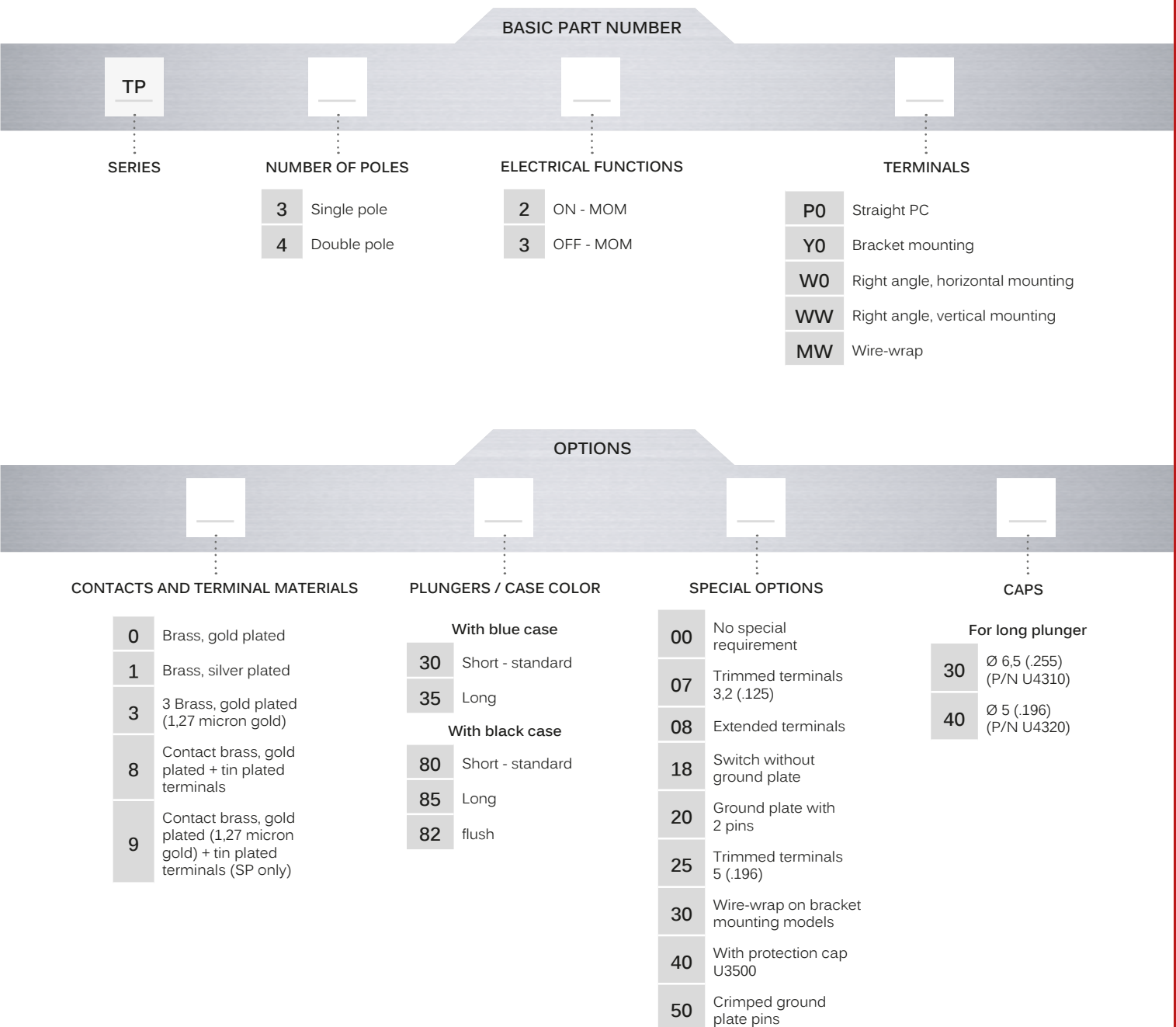


TP series

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.

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



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



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.

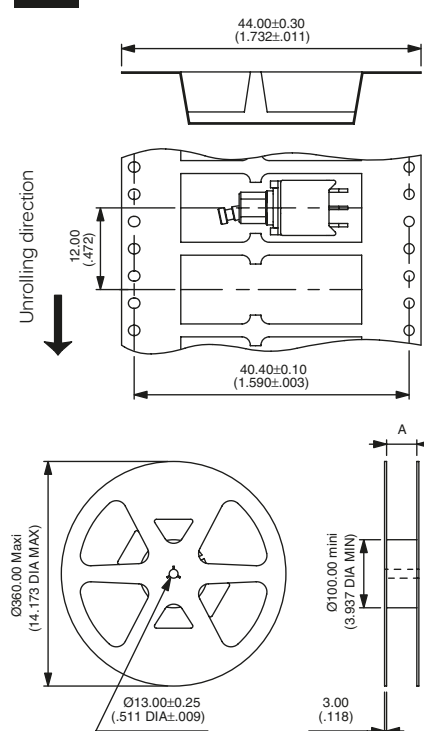


SOLDERING AND CLEANING

- 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)

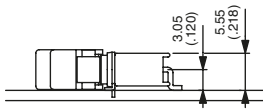
Standard packaging unit : 700 pieces
Tape meeting international standard IEC - Publication 286-3 (EIA481A)
Start leader : 400 mm min.

SMT TR series

Surface mount subminiature washable rocker switches



MOUNTING



WITHOUT POSITIONING PINS



TR36WS80000
TR39WS80000
TR37WS80000
TR38WS80000
TR32WS80000

III	II	I
ON	-	ON
ON	OFF	ON
MOM	OFF	MOM
ON	OFF	MOM
ON	-	MOM

Rocker U4700 to order separately. See website.

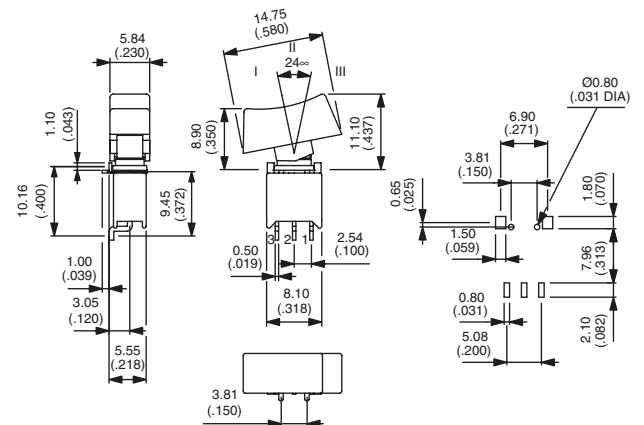
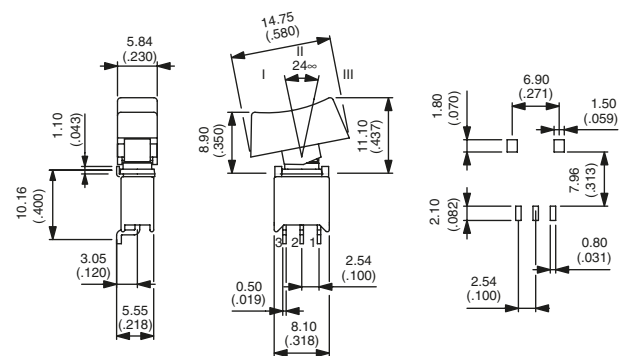
WITH POSITIONING PINS



TR36WS80065
TR39WS80065
TR37WS80065
TR38WS80065
TR32WS80065

III	II	I
ON	-	ON
ON	OFF	ON
MOM	OFF	MOM
ON	OFF	MOM
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



ENVIRONMENTAL SPECIFICATIONS

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



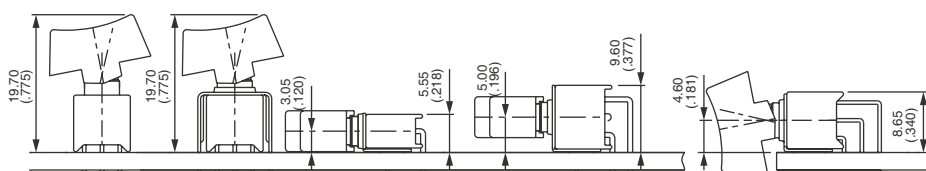
ELECTRICAL SPECIFICATIONS

- 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



PCB MOUNTING



The company reserves the right to change specifications without notice.



GENERAL SPECIFICATIONS

- Strength of terminals :
 - pull-out force - 10 N max
- Cleaning : solvents or water + detergent
- Wave soldering : 260°C - 5 sec.

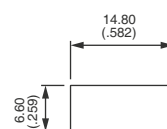


MATERIALS

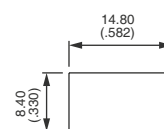
- Case : PBT
- Actuator : polyamide
- Contacts and terminals :
 - 0 : brass, gold plated
 - 1 : brass, silver plated
 - 3 : brass, gold plated (1,27 micron gold)
 - 8 : contact brass, gold plated + tin plated terminals
 - 9 : contact brass, gold plated (1,27 micron gold) + tin plated terminals
- Terminal seal : epoxy



PANEL CUT-OUT



With small rocker



With large rocker

TR series

Subminiature washable rocker switches



BUILD YOUR PART NUMBER

BASIC PART NUMBER

SERIES	NUMBER OF POLES	ELECTRICAL FUNCTIONS	TERMINALS
TR			
	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

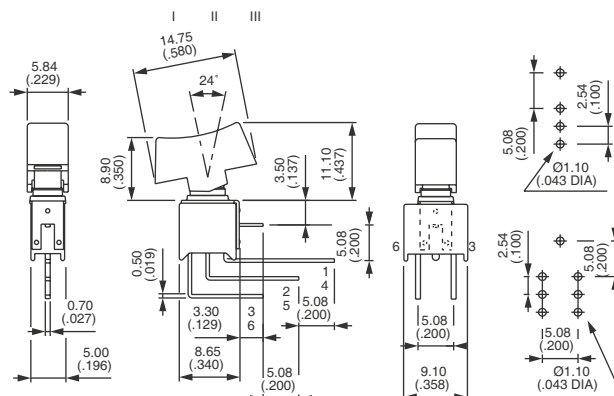
10	Small
20	Large
Colors, see website.	

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



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.

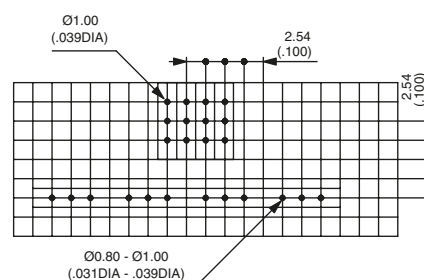


MATERIALS

- Case : PA6/6, glass filled, UL94-V0
- Actuator : PA6/6, glass filled, UL94-V0
- Contacts : gold over nickel



EXAMPLES OF LAYOUT



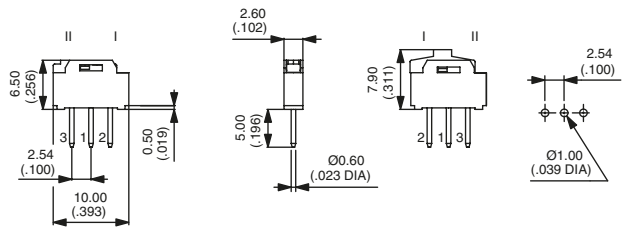
NK series

Subminiature slide switches

STRAIGHT PC TERMINALS



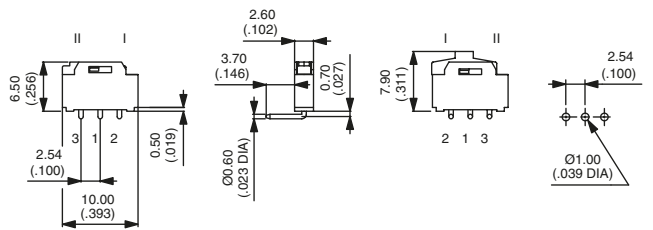
	I 1-3		II 1-2
Flush actuator			
NK236	ON	-	ON
Raised actuator			
NK236H	ON	-	ON



RIGHT ANGLE TERMINALS



	I 1-3		II 1-2
Flush actuator			
NK236W	ON	-	ON
Flush actuator			
NK236WH	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

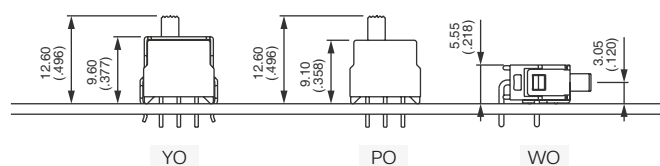


GENERAL SPECIFICATIONS

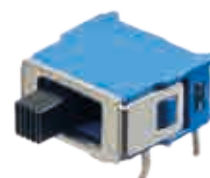
- Travel : 2,60 mm (.102)
- Wave soldering : 260°C - 5 sec. max.
- Operating temperature : -30°C to +85°C
- Cleaning : solvents or water + detergent



PCB MOUNTING



The company reserves the right to change specifications without notice.



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

TG series

Subminiature slide switches



BUILD YOUR PART NUMBER

BASIC PART NUMBER

SERIES	NUMBER OF POLES	ELECTRICAL FUNCTIONS	TERMINALS
TG	3 Single pole	6 ON - ON 9 ON OFF ON	P0 Straight PC Y0 Straight PC, bracket mounting W0 Right angle, horizontal mounting MW Wire-wrap

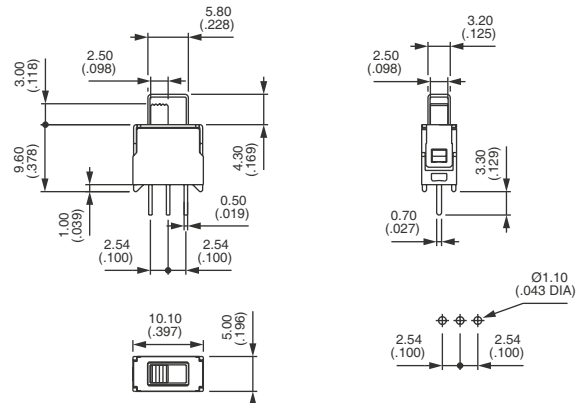
OPTIONS

CONTACT AND TERMINAL MATERIALS	ACTUATORS	MODEL
0 Brass, gold plated (std)	00 High (standard)	00 Standard
1 Brass, silver plated	10 Flush	50 Washable
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.		

STRAIGHT PC TERMINALS WASHABLE MODEL



TG36P0-0050	ON	-	ON
TG39P0-0050	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.)

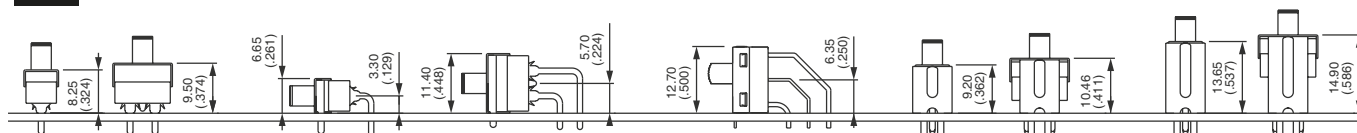


GENERAL SPECIFICATIONS

- 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.



PCB MOUNTING



The company reserves the right to change specifications without notice.



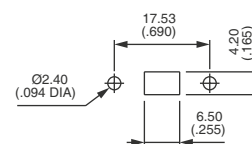
MATERIALS

- 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



PANEL CUT-OUT

SOLDER LUG MODEL



G series

Slide switches • telecom grade



BUILD YOUR PART NUMBER

BASIC PART NUMBER

SERIES	ACTUATORS	NUMBER OF POLES	ELECTRICAL FUNCTIONS	TERMINALS
G				
	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

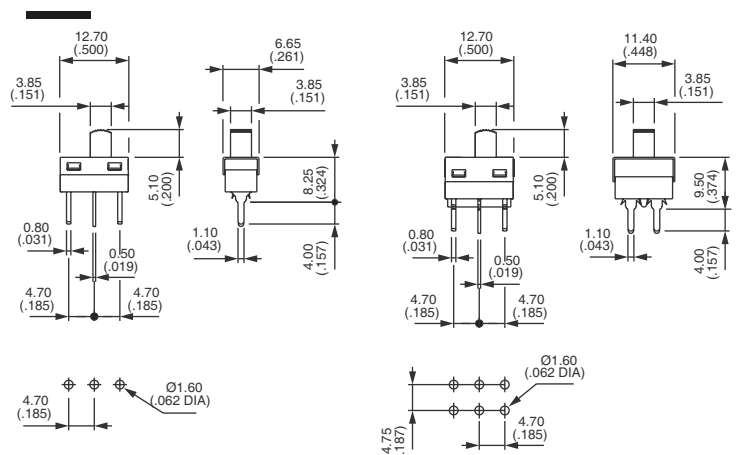
NOTICE : please note that not all combinations of above numbers are available.
Refer to www.apem.com for further information.

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)

The company reserves the right to change specifications without notice.



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

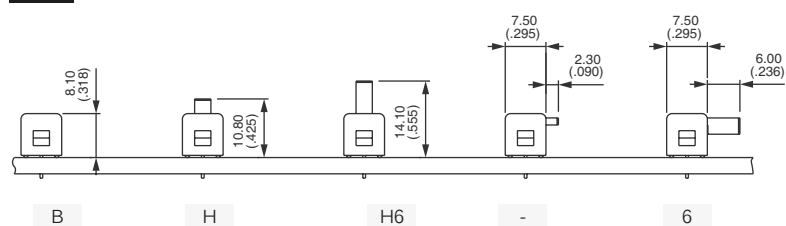
- Case : PBT
- Actuator : polyamide, glass filled
- Cover : polyamide, glass filled
- Contacts
 - A : silver
 - LD : brass, gold plated
- Terminal seal : epoxy



ELECTRICAL FUNCTIONS



PCB MOUNTING



25000N series

Professional slide switches



BUILD YOUR PART NUMBER

25

SERIES

ACTUATOR AND TERMINALS

NUMBER OF POLES

ELECTRICAL FUNCTIONS

N

VERSION

1

Flush or high actuator, terminal spacing 2,54 (.100)

4

Flush or high actuator, terminal spacing 5,08 (.200)

3

Side actuator, terminal spacing 2,54 (.100)

5

Side actuator, terminal spacing 5,08 (.200)

3

Single pole

4

Double pole

6

ON - ON

9

ON OFF ON

N

For all models

CONTACT MATERIALS

ACTUATOR

OPTIONS AND APPROVALS

A

Silver

LD

Gold plated brass

B

Flush

H

High

H6

Extra high

Blank

Side

-6

Long side

X601

Special contact : lower rating

X693

Flame retardant plastic material

X693UL

Switches approved and marked UL (Silver contact only)

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

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

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

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

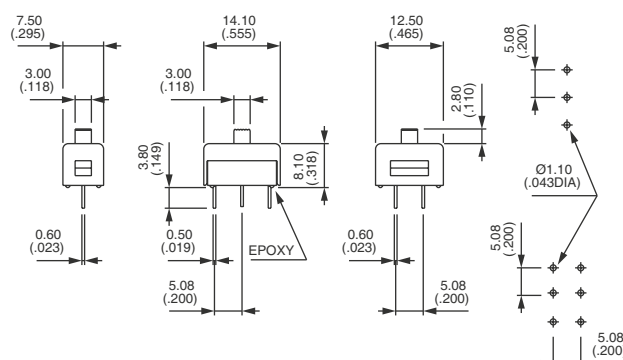
25539N -6

Double pole

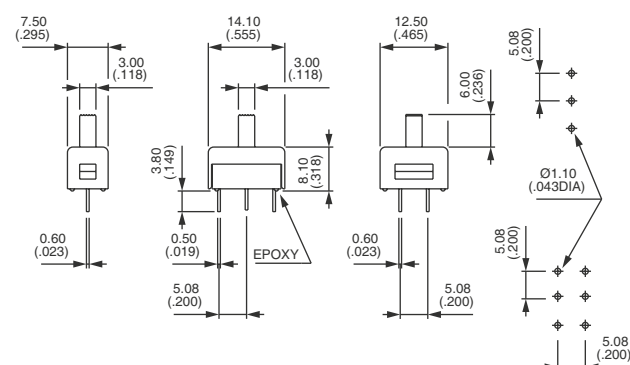
25546N -6

25549N -6

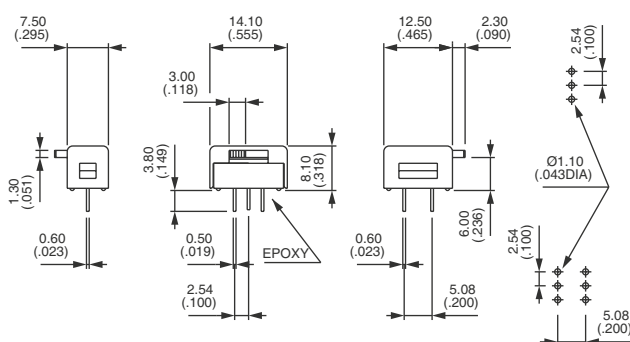
Shown with 5,08 mm terminal spacing



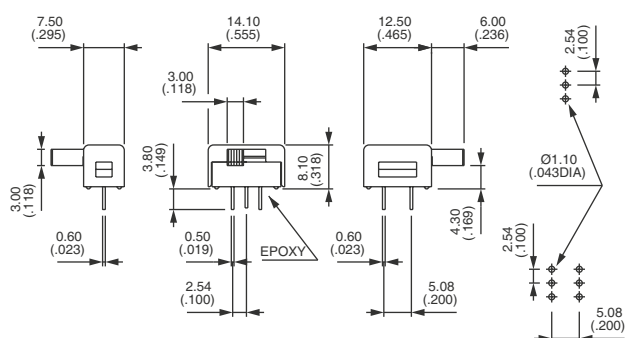
Shown with 5,08 mm terminal spacing



Shown with 2,54 mm terminal spacing



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

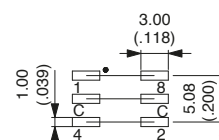
- Base : UL94-V0, high temperature thermoplastic
- Cover : stainless steel
- Actuator : PA 4.6 nylon
- Contacts : gold over nickel plated phosphor bronze
- Terminals : tin plated

The company reserves the right to change specifications without notice.

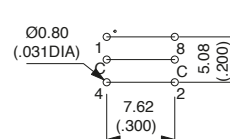


PCB MOUNTING

SURFACE MOUNT



THROUGH-HOLE



P36 series

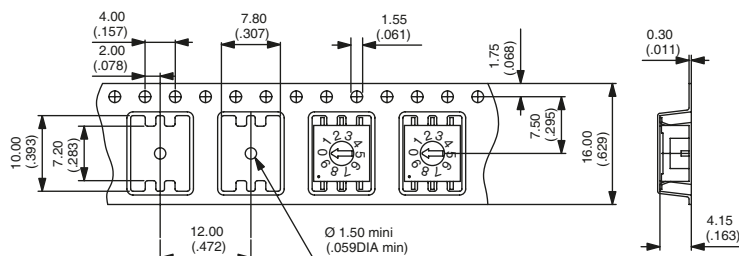
Low profile rotary code switches



PACKAGING

P36S1..

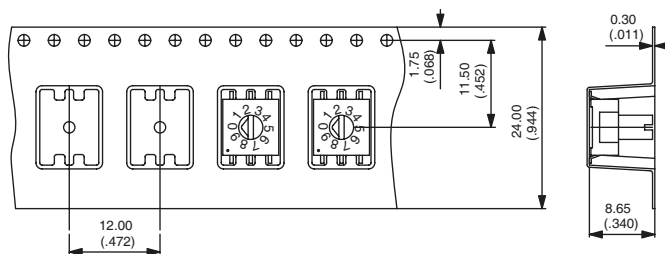
1300 pieces per reel
dim.A = 22,4 mm
dim.B = 16,4 mm



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.

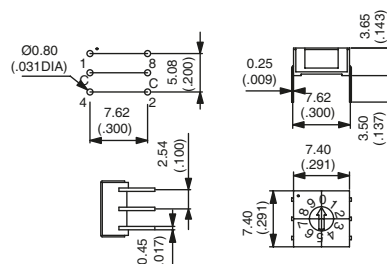
Tubes : 50 pieces (through-hole or SMT) per tube.



BUILD YOUR PART NUMBER

SERIES		MOUNTING		ACTUATORS		CODES		TERMINALS	
P36		(none)	Through-hole	1	Screwdriver	01	BCD	(none)	Straight or SMT
		S	Surface mount	3	Spindle	02	BCD complement	V	Crimped
				8	Slotted spindle	03	Hexadecimal	L254	Right angle, spacing 2,54 (.100)
						06	Hexadecimal complement		

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.



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

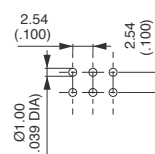
- Switches for screwdriver slot or accessory actuation (PT651 and PT657) : tubes of 50 pieces
- Switches with spindle (PT653) or segment wheel (PT655) : trays of 50 pieces
- Accessories : bags of 50 pieces

The company reserves the right to change specifications without notice.

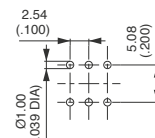


PCB MOUNTING

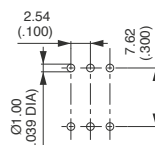
PCB RIGHT ANGLE 2.54



PCB RIGHT ANGLE 5.08



PCB STRAIGHT



PT65 series

Rotary code switches



BUILD YOUR PART NUMBER

PT65

SERIES

ACTUATORS

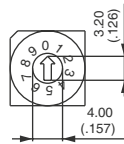
- 1 Screwdriver
- 3 Spindle
- 5 Segment wheel
- 7 Accessories

CODES

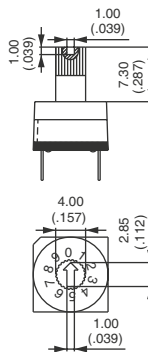
- 01 BCD
- 02 BCD complement
- 03 Hexadecimal
- 06 Hexadecimal complement

TERMINALS

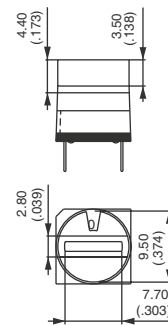
- (none) Straight
- L254 Right angle, spacing 2,54 (.100)
- L508 Right angle, spacing 5,08 (.200)



1 > Screwdriver

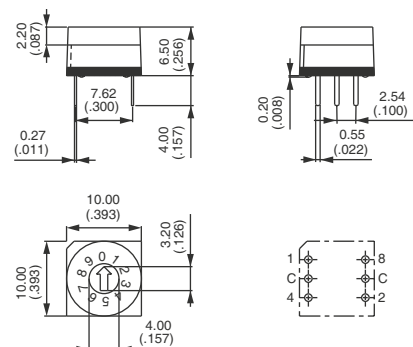


3 > Spindle



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

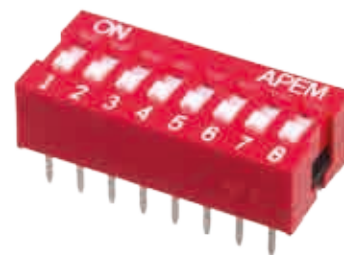
- Operating force: 1.000gf (9.8N) max



MATERIALS

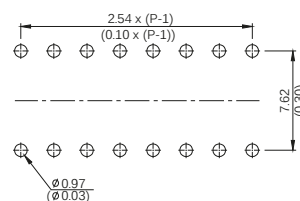
- Case & Actuator: PBT
- Base: PA66
- Contact: Gold plated
- Terminal: Gold plated brass
- Protection tape: Polyimide

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

NDS

-

-

V

SERIES

ACTUATOR

NUMBER OF WAYS

TAPE SEAL

COMPLIANCE

Blank

R

Raised

Recessed

01

02

03

04

05

06

One way

Two way

Three way

Four way

Five way

Six way

07

08

09

10

12

Seven way

Eight way

Nine way

Ten way

Twelve way

Blank

T

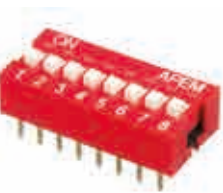
No tape seal

Tape seal

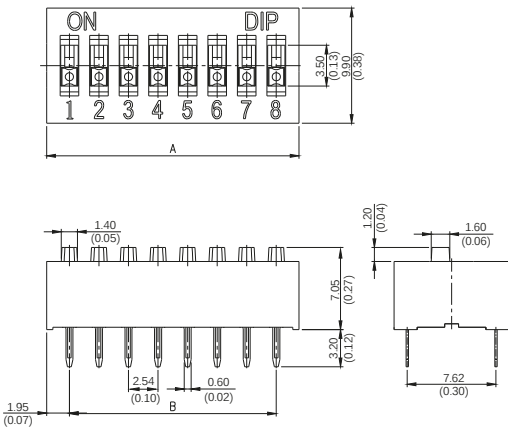
V

RoHS

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

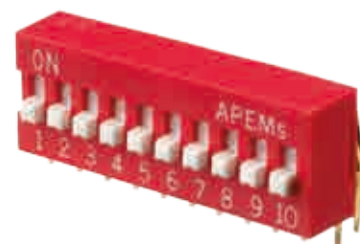
- Operating force: 1.000gf (9.8N) max



MATERIALS

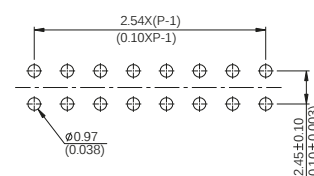
- Case & Actuator: PBT
- PA66
- Moving Contact: Gold plated
- Terminal: Gold plated
- Protection tape: Polyimide

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

NDA

-

-

V

SERIES

NUMBER OF WAYS

TAPE SEAL

COMPLIANCE

02

Two way

03

Three way

04

Four way

05

Five way

06

Six way

07

Seven way

08

Eight way

09

Nine way

10

Ten way

12

Twelve way

Blank

No tape seal

T

Tape seal

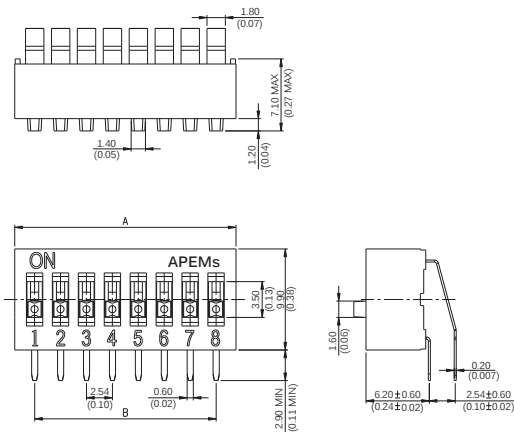
V

RoHS

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

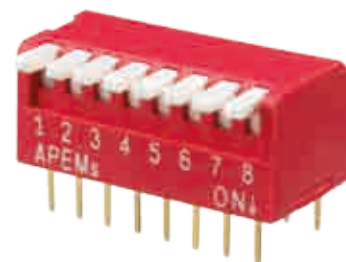
- Operating force: 400gf (3.92N) max



MATERIALS

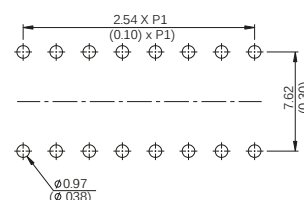
- Case & Actuator: PBT
- Base: PA66
- Contact: Gold plated
- Terminal: Gold plated brass
- Protection tape: Polyimide

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		27 pcs
7		24 pcs
8		21 pcs
9		19 pcs
10		17 pcs
12		14 pcs

BUILD YOUR PART NUMBER

NDP

-

-

V

SERIES

ACTUATOR

NUMBER OF WAYS

TAPE SEAL

COMPLIANCE

Blank

 Short

L

 Long

02

 Two way

03

 Three way

04

 Four way

05

 Five way

06

 Six way

07

 Seven way

08

 Eight way

09

 Nine way

10

 Ten way

12

 Twelve way

Blank

 No tape seal

T

 Tape seal

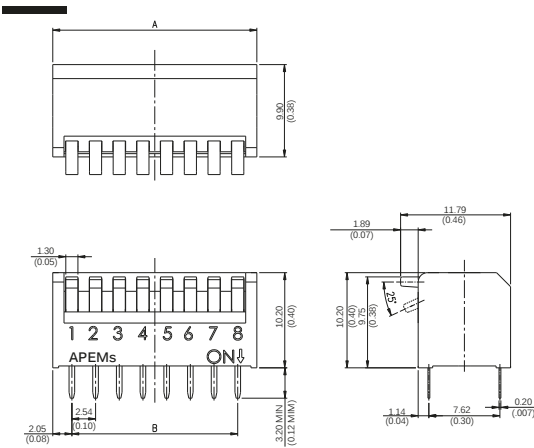
V

 RoHS

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)



MATERIALS

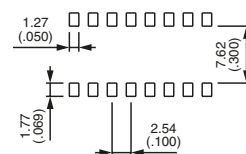
- Case and actuator : UL 94-V0 thermoplastic
- Stationary contact : bronze, gold plated over nickel barrier
- Moving contact : beryllium copper, gold plated
- Terminals : tin plated over nickel barrier
- Protection tape : polyimide

The company reserves the right to change specifications without notice.

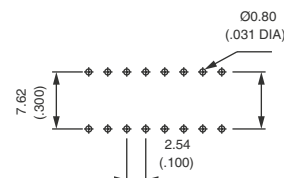


PCB LAYOUT

SURFACE MOUNT



THROUGH-HOLE



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

IKN

SERIES

NUMBER OF WAYS

02	Two way
04	Four way
06	Six way
08	Eight way

MODEL TYPE

000	Through-hole
030	SMT IC tubes
040	SMT tape and reel

TAPE SEAL

00	Top tape seal
----	---------------

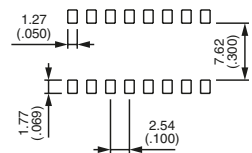
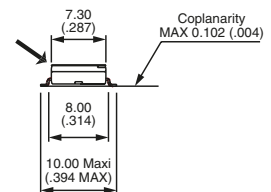
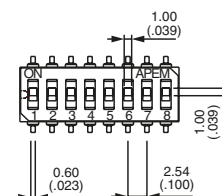
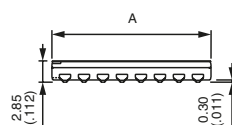
DIMENSIONS



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

→ TAPE



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)



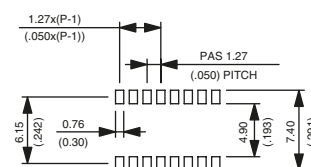
MATERIALS

- 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

IKH

SERIES

NUMBER OF WAYS

02	Two way
04	Four way
06	Six way
08	Eight way
10	Ten way

MODEL TYPE

030	SMT IC tubes
040	SMT tape and reel

TAPE SEAL

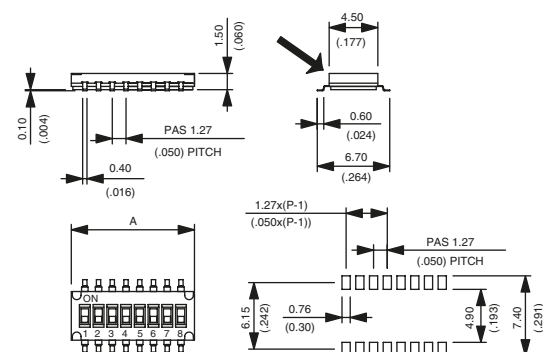
00	Top tape seal
----	---------------

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)

→ TAPE



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



GENERAL SPECIFICATIONS

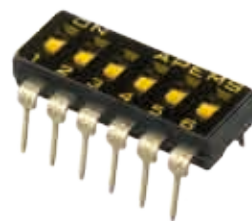
- Max Reverse Voltage: 5V
- Life Expectancy: 100.000 hours



MATERIALS

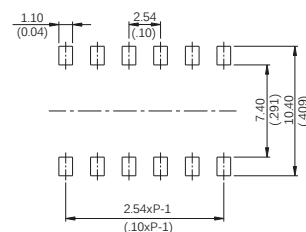
- Case & Actuator: UL94-V0
- Moving Contact: Phosphor bronze, gold plated, over nickel barrier
- Terminal: Gold plated
- Protection Tape: Polyimide

The company reserves the right to change specifications without notice.

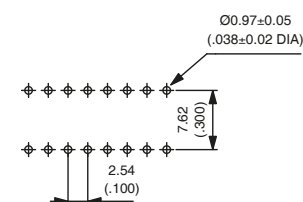


PCB LAYOUT

SURFACE MOUNT



THROUGH-HOLE



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	130 pcs
2	700 pcs	900 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
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
02 Two way	08 Eight way
03 Three way	09 Nine way
04 Four way	10 Ten way
05 Five way	11 Eleven way
06 Six way	12 Twelve way

001 Through-hole raised actuators
000 Through-hole recessed actuators
031 SMT gull wing raised actuators IC tubes
030 SMT gull wing recessed actuators IC tubes
041 SMT gull wing raised actuators T/R
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

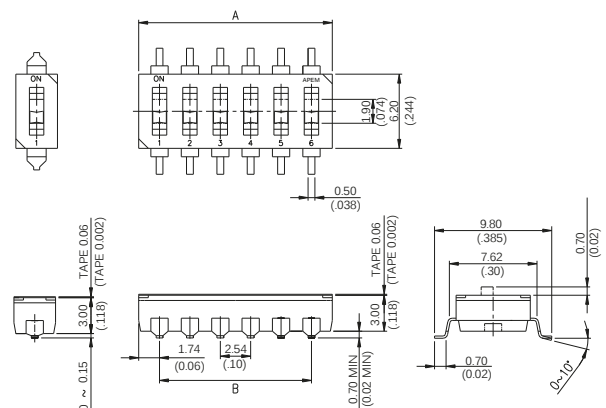
00 Top tape seal*
01 No tape seal

*Recessed actuators only

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

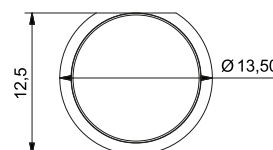
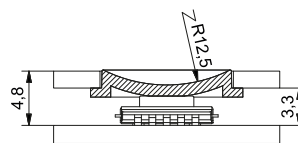
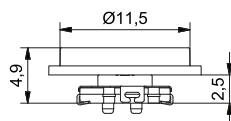
Floating mounting - easy alignment of PCB and front panel

Anti-rotation for printed caps



SWITCH SPECIFICATIONS : see Ultramec™ series

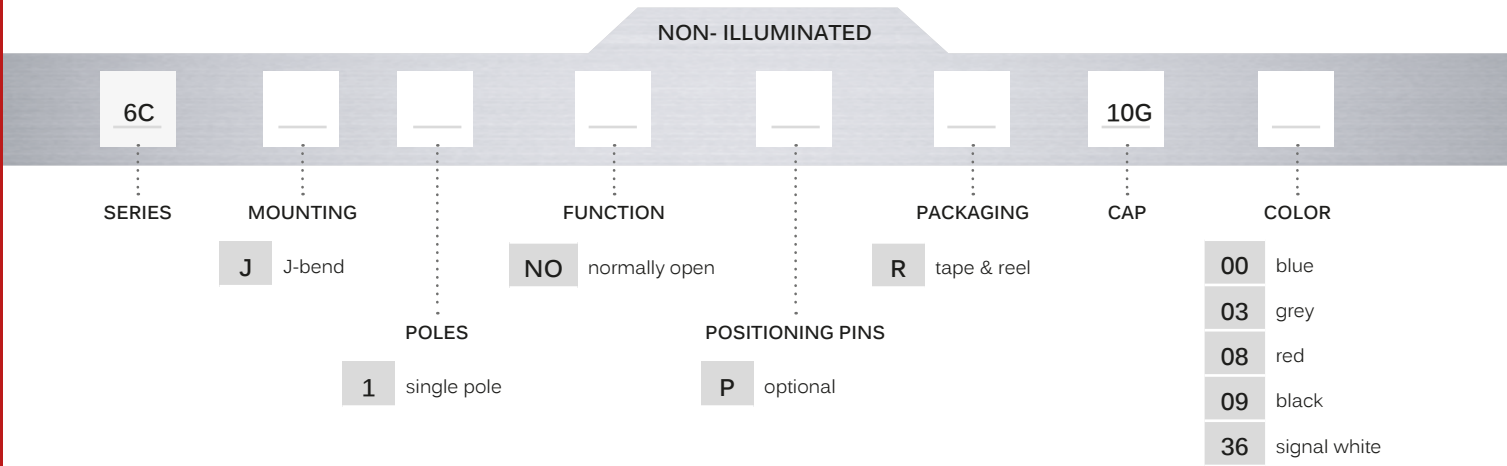
6C+10G - J-BEND



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 : $-40^{\circ}\text{C}/+85^{\circ}\text{C}$
- Soldering : JEDEC J-STD-020C



ELECTRICAL SPECIFICATIONS

- Recommended load : 0.5-50mA 24VDC
- Contact resistance : $<50\text{m}\Omega$
- Insulation resistance : $>10\text{M}\Omega$
- Contact bounce : $<2\text{mS}$
- Dielectric strength: 250V



MECHANICAL SPECIFICATIONS

- Standard actuation force :
before soldering $4.2\text{N} \pm 1.0\text{N}$
after soldering : $3.7\text{N} \pm 0.7\text{N}$
- Max. actuation force : 100N for 10 sec
- Travel : $0.3\text{ mm} \pm 0.15\text{ mm}$
- Lifetime : 3,000,000 cycles

The company reserves the right to change specifications without notice.



MATERIALS

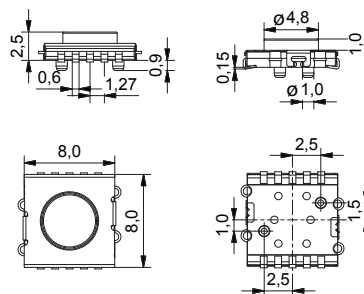
- Housing : PPS UL94V0
- Actuator : silicone
- Contact dome : stainless steel
- Fixed contacts :
Silver : $\text{CuZn} + 1\mu\text{Ni} + 4\mu\text{Ag}$
- Terminals : $\text{CuZn} + 1\mu\text{Ni}$

All tolerance if not otherwise specified $\pm 0.2\text{mm}$.

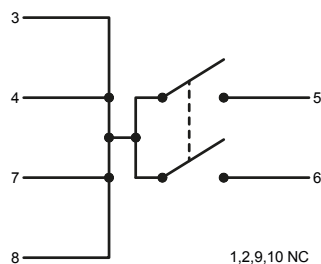
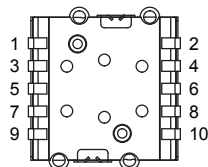
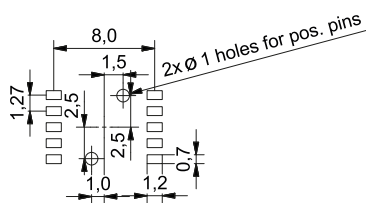
High performance tactile switches •
low profile • IP67



- All tolerances unless otherwise noted : ± 0.2 mm



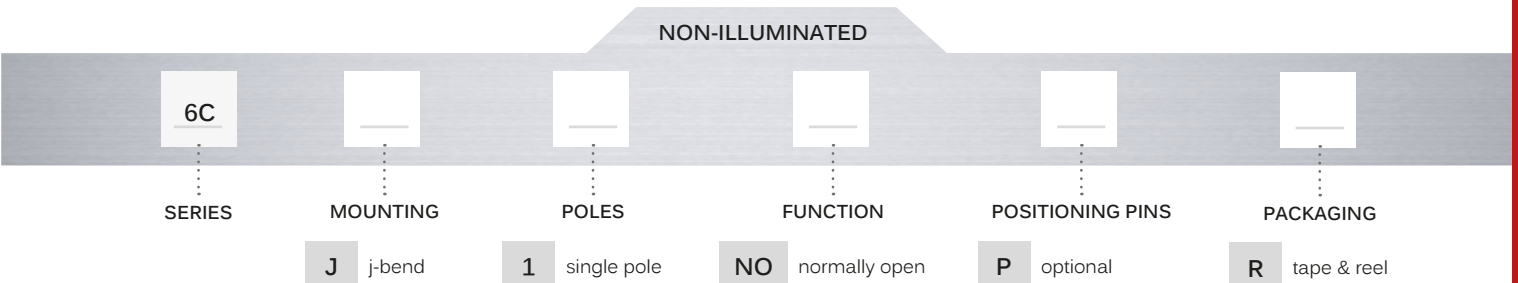
PCB LAYOUT & CIRCUIT DIAGRAM



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

Ulramec™ 6C

High performance tactile switches •
low profile • IP67

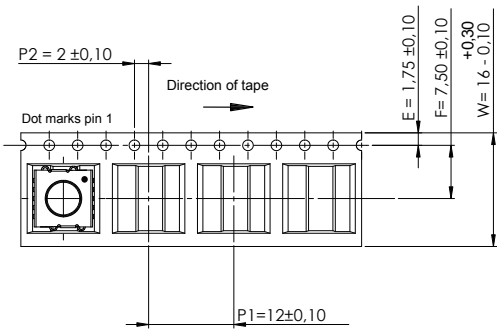


TAPE & REEL

Tape and reel is available for the parts listed and has the following specifications

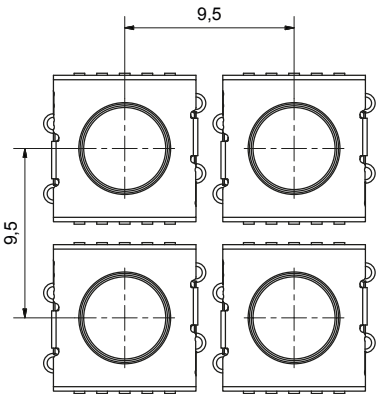
- Reel diameter: Ø330 mm
- Tape width: 16 mm
- Pitch: see list
- Tape and reel material : antistatic or better
- Quantity per reel : see list

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

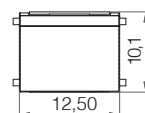
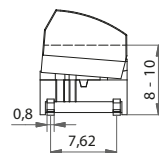
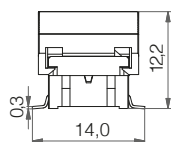
Long travel - 2 mm

The cap series can be combined into a custom keyboard

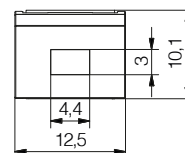
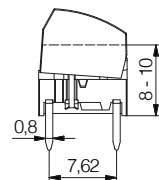
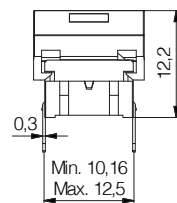


SWITCH SPECIFICATIONS : see Multimec® 5 series.

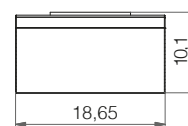
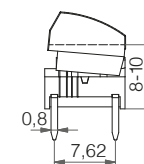
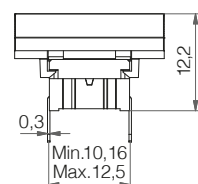
5G+1A - SMD



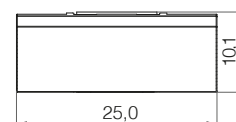
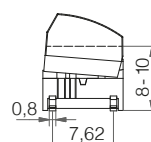
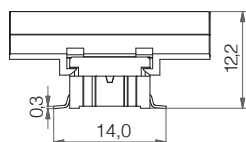
5G+1H - TH W/LED



5G+1ZA - TH



5G+1M - SMD



The company reserves the right to change specifications without notice. All tolerance if not otherwise specified ± 0.2 mm.

1A/1H/1M/1ZA

Rectangular caps • rocker-action • long travel



BUILD YOUR PART NUMBER

ILLUMINATED

SERIES	MOUNTING	ACTUATION FORCE	LED	CAP	COLOR	LENS
5G	TH9 through-hole SH9 surface mount	20 2.0N 35 3.5N 65 6.5N	01 blue 22 green 29 high intensity green 42 yellow 61 white 82 red 2242 green/yellow 8222 red/green 8242 red/yellow	1A 1H	1H 03 grey 09 black 1A 16 frosted white	1 transparent 2 green 4 yellow 6 frosted white 8 red

NON-ILLUMINATED

SERIES	MOUNTING	ACTUATION FORCE	CAP	COLOR
5G	TH9 through-hole SH9 surface mount	20 2.0N 35 3.5N 65 6.5N	1A 1M 1ZA	1A/1M 00 blue 02 green 03 grey 04 yellow 06 white 08 red 09 black 1ZA 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

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

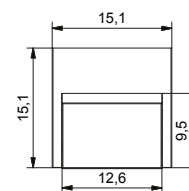
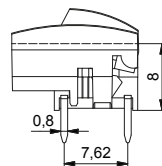
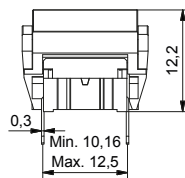
Full or lens illumination option with the cap

Illumination option in bezel with an LED on the PCB

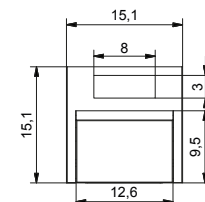
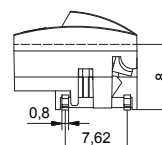
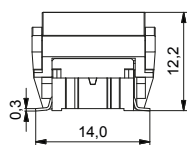


SWITCH SPECIFICATIONS : see Multimec® 5 series.

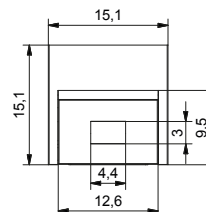
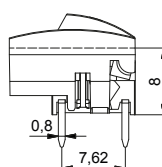
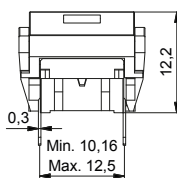
5G+1B+2C - TH



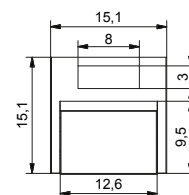
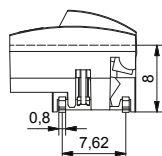
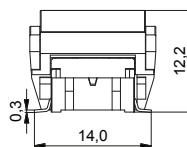
5G+1B+2D - SMD



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 ± 0.2 mm.

1B/1C+2C/2D

Square solutions • rocker-action • long travel



BUILD YOUR PART NUMBER

ILLUMINATED CAP							
SERIES	ACTUATION FORCE	LED	CAP	COLOR	LENS 1C	BEZEL COLOR	LENS 2D
5G	20 2.0N 35 3.5N 65 6.5N	01 blue 22 green 29 high intensity green 42 yellow 61 white 82 red 2242 green/yellow 8222 red/green 8242 red/yellow	1B 1C	1C 03 grey 08 red 09 black 1B 16 frosted white	1 transparent 2 green 4 yellow 6 frosted white 8 red	00 blue 03 grey 06 white 08 red 09 black	1 transparent 2 green 4 yellow 6 frosted white 8 red
MOUNTING						BEZEL	
TH9 through-hole SH9 surface mount						2C non-illuminated 2D illuminated	

NON-ILLUMINATED CAP							
SERIES	MOUNTING	ACTUATION FORCE	CAP	CAP COLOR	BEZEL	BEZEL COLOR	LENS 2D
5G	TH9 through-hole SH9 surface mount	20 2.0N 35 3.5N 65 6.5N	1B	00 blue 02 green 03 grey 04 yellow 06 white 08 red 09 black	2C non-illuminated 2D illuminated	00 blue 03 grey 06 white 08 red 09 black	1 transparent 2 green 4 yellow 6 frosted white 8 red

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

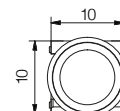
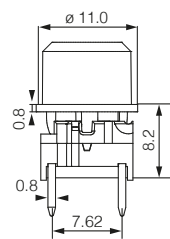
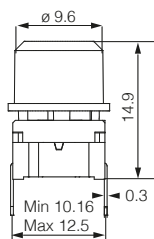
Full, lens or legend illumination option

20 color options

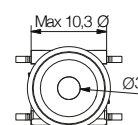
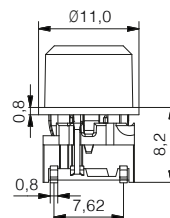
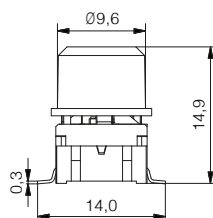


SWITCH SPECIFICATIONS : see Multimec® 5 series.

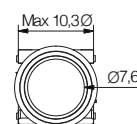
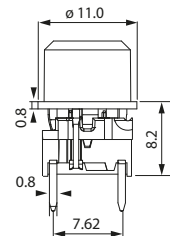
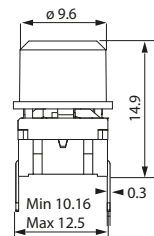
5G+1DS - TH



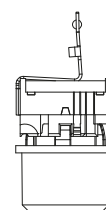
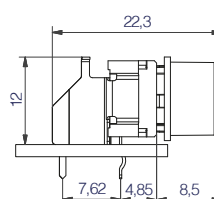
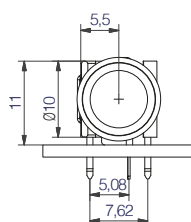
5G+1ES - SMD W/LED



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 ±0.2mm.

1DS/1ES/1FS

Round caps • many color options •
many illumination options



BUILD YOUR PART NUMBER

ILLUMINATED

5G

SERIES

MOUNTING

ACTUATION FORCE

LED

CAP

COLOR
1ES/1FS

LENS 1ES/1FS

TH9 through-hole

SH9 surface mount

20 2.0N

35 3.5N

65 6.5N

01 blue

22 green

29 high intensity
green

42 yellow

61 white

82 red

2242 green/yellow

8222 red/green

8242 red/yellow

1ES

1FS

1DS

00 blue

02 green

03 grey

04 yellow

06 white

08 red

09 black

1DS

11 transparent

16 frosted white

1 transparent

2 green

4 yellow

6 frosted white

8 red

NON-ILLUMINATED

5G

SERIES

MOUNTING

ACTUATION FORCE

CAP

COLOR

TH9 through-hole

SH9 surface mount

20 2.0N

35 3.5N

65 6.5N

1DS

00 blue

02 green

03 grey

04 yellow

06 white

08 red

09 black

30 ultra blue

40 dusty blue

42 aqua blue

32 mint green

33 tele grey

34 melon

38 noble red

50 metal dark
blue53 metal light
grey57 metal dark
grey58 metal
bordeaux

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

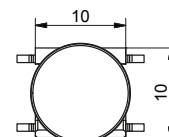
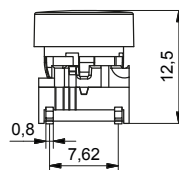
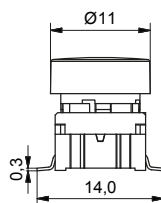
Rounded edges for better use under overlay

Illumination available

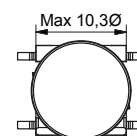
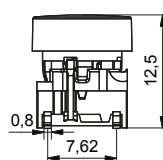
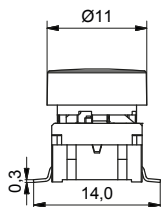


SWITCH SPECIFICATIONS : see Multimec® 5 series.

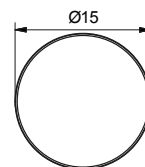
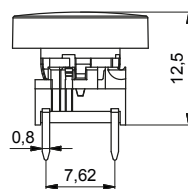
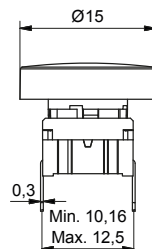
5G+1GAS - SMD



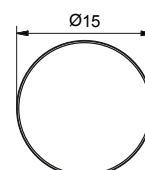
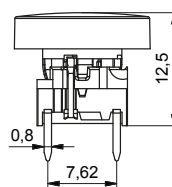
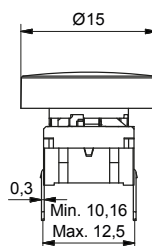
5G+1GAS - SMD W/LED



5G+1GCS - TH



5G+1GCS - TH W/LED



The company reserves the right to change specifications without notice. All tolerance if not otherwise specified ±0.2mm.

1GAS/1GCS

Ø11 mm & 15 mm round caps •
for under overlay



BUILD YOUR PART NUMBER

ILLUMINATED

SERIES	MOUNTING	ACTUATION FORCE	LED	CAP	COLOR
5G	TH9 through-hole SH9 surface mount	20 2.0N 35 3.5N 65 6.5N	01 blue 22 green 29 high intensity green 42 yellow 61 white 82 red 2242 green/yellow 8222 red/green 8242 red/yellow	1GAS 1GCS	11 transparent 16 frosted white

NON-ILLUMINATED

SERIES	MOUNTING	ACTUATION FORCE	CAP	COLOR
5G	TH9 through-hole SH9 surface mount	20 2.0N 35 3.5N 65 6.5N	1GAS 1GCS	00 blue 02 green 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

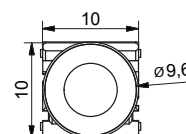
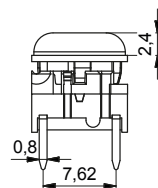
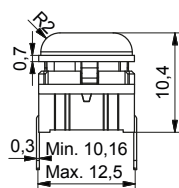
Low total height

Illumination available

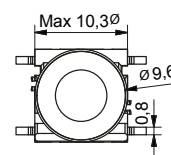
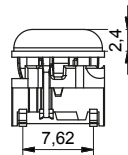
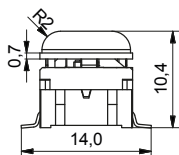


SWITCH SPECIFICATIONS : see Multimec® 5 series.

5G+1JS - TH



5G+1JS - SMD - W/LED



1JS

Ø9.6 mm round caps •
for under overlay



BUILD YOUR PART NUMBER

ILLUMINATED

SERIES	MOUNTING	ACTUATION FORCE	LED	CAP	COLOR
5G				1JS	
	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

SERIES	MOUNTING	ACTUATION FORCE	CAP	COLOR
5G			1JS	
	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

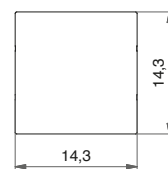
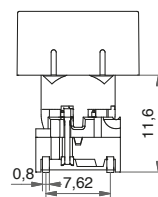
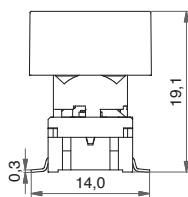
A layer with legend can be inserted between cap and diffuser

Bezel option

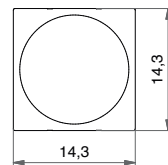
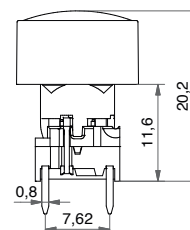
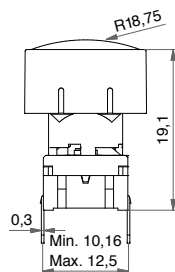


SWITCH SPECIFICATIONS : see Multimec® 5 series.

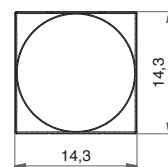
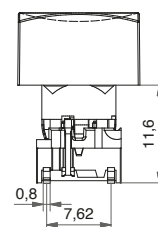
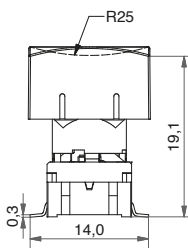
5G+1KS - SMD - W/LED



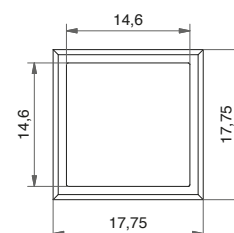
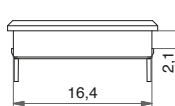
5G+1KBS - TH - W/LED



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
	MOUNTING		42 yellow				09 black
	TH9 through-hole		61 white				
	SH9 surface mount		82 red		COLOR		
			2242 green/yellow		1116 frosted white lens with transparent lid		
			8222 red/green				
			8242 red/yellow				

NON-ILLUMINATED

5G			1KS			
SERIES	MOUNTING	ACTUATION FORCE	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
		65 6.5N		0216 green		08 red
				0316 grey		09 black
				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

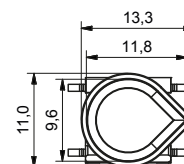
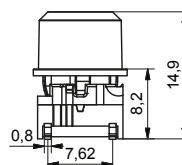
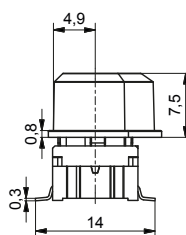
Excellent for creative layouts for navigation or indicating

Illumination available

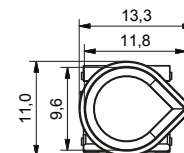
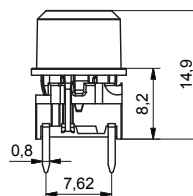
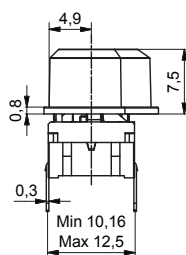


SWITCH SPECIFICATIONS : see Multimec® 5 series.

5G+1NS - SMD



5G+1NS - TH - W/LED



1NS

Teardrop-shaped cap • for navigation or indicating • illumination option

BUILD YOUR PART NUMBER

ILLUMINATED

5G

1NS

SERIES

MOUNTING

ACTUATION FORCE

LED

CAP

COLOR

TH9

 through-hole

SH9

 surface mount

20

 2.0N

35

 3.5N

65

01

 blue

22

29

42

61

82

2242

8222

8242

16

 frosted white

NON-ILLUMINATED

5G

1NS

SERIES

MOUNTING

ACTUATION FORCE

CAP

COLOR

TH9

 through-hole

SH9

 surface mount

20

 2.0N

35

65

03

 grey

09

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 Ax B : 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

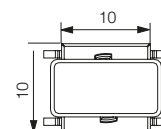
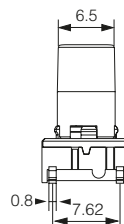
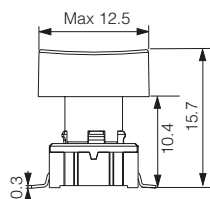
Full or lens illumination option

5E/5G + 1PS; 5G + 1QS/1RS

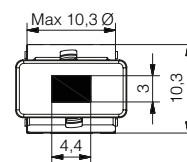
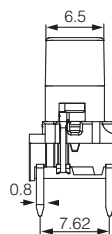
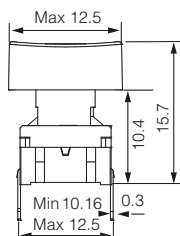


SWITCH SPECIFICATIONS : see Multimec® 5 series.

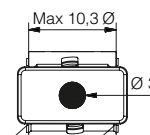
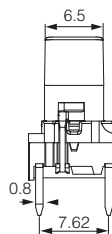
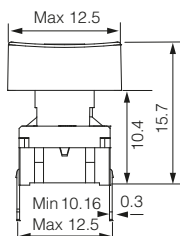
5E+1PS - SMD



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						
SERIES	MOUNTING	ACTUATION FORCE		LED	CAP	LENS
5G	TH9 through-hole SH9 surface mount	20 2.0N 35 3.5N 65 6.5N		01 blue 22 green 29 high intensity green 42 yellow 61 white 82 red 2242 green/yellow 8222 red/green 8242 red/yellow	1PS 1QS 1RS	1QS/1RS 00 blue 03 grey 09 black 1PS 11 transparent 16 frosted white
						1 transparent 6 frosted white
NON-ILLUMINATED						
SERIES	MOUNTING	ACTUATION FORCE			CAP	COLOR
5E	TH9 through-hole SH9 surface mount	20 2.0N 35 3.5N 65 6.5N			1PS	00 blue 02 green 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 Ax B : 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

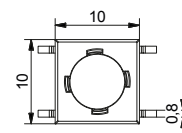
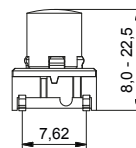
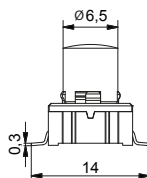
Full or lens illumination option

7 solid, 2 transparent and 5 lens colors

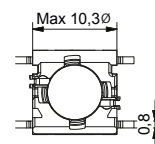
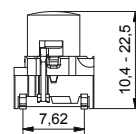
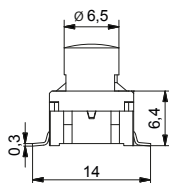


SWITCH SPECIFICATIONS : see Multimec® 5 series.

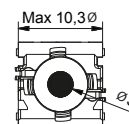
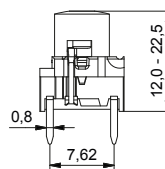
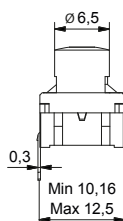
5E+1SS - SMD



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		ACTUATION FORCE		CAP	COLOR	LENS	HEIGHT
		20 2.0N		1IS	1LS	1 transparent	10.4 10.4
		35 3.5N		1LS	00 blue	2 green	11.0 11.0
		65 6.5N			02 green	4 yellow	12.0 12.0
MOUNTING			LED		03 grey	6 frosted white	15.0 15.0
TH9 through-hole		01 blue	82 red		04 yellow	8 red	16.0 16.0
SH9 surface mount		22 green	2242 green/ yellow		06 white		19.0 19.0
		29 high intensity green	8222 red/green		08 red		22.5 22.5
		42 yellow	8242 red/ yellow		09 black		
		61 white			1IS		
					11 transparent		
					16 frosted white		

NON-ILLUMINATED

5E			1SS			
SERIES		ACTUATION FORCE	CAP	COLOR		HEIGHT
		20 2.0N		00 blue	06 white	08.0 08.0
		35 3.5N		02 green	08 red	09.5 09.5
MOUNTING		65 6.5N		03 grey	09 black	10.4 10.4
TH9 through-hole				04 yellow		11.0 11.0
SH9 surface mount						12.0 12.0
						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

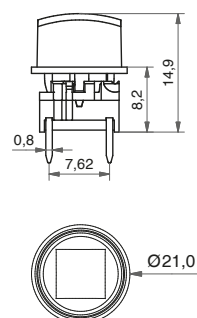
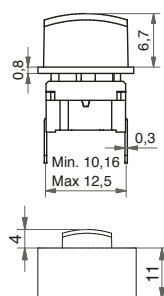
Front panel seal options to IP67 - 1TS&1US or IP65 - 1VS

Can be combined for a navigation unit

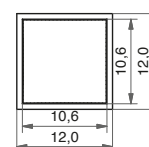


SWITCH SPECIFICATIONS : see Multimec® 5 series.

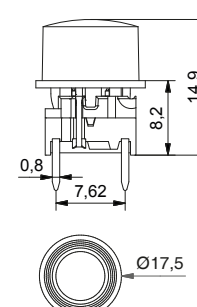
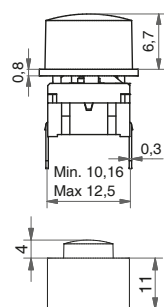
5G+1TS - TH



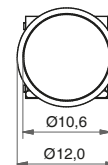
with sealing 1TW



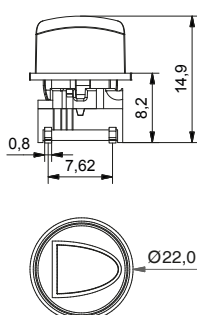
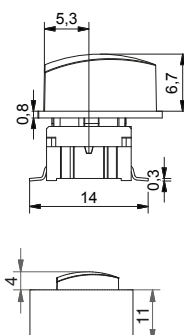
5G+1US - TH - W/LED



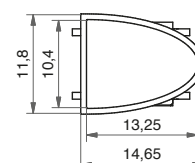
with sealing 1UW



5G+1VS - SMD



with sealing 1VW



The company reserves the right to change specifications without notice. All tolerance if not otherwise specified ±0.2mm.

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	

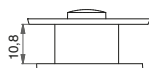
NOTICE : Other versions : Please refer to www.apem.com for information on the 3F & 4F series versions - 1T/1U/1V



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

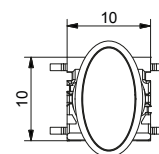
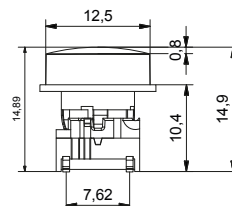
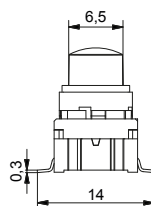
1WAS/1WDS : h=15 mm; convex top surface

1WPS : h=15.7 mm; concave top surface

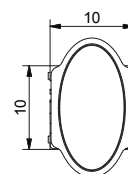
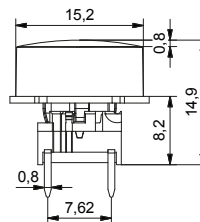
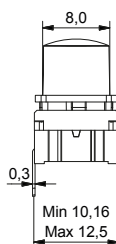


SWITCH SPECIFICATIONS : see Multimec® 5 series.

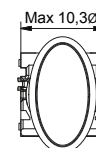
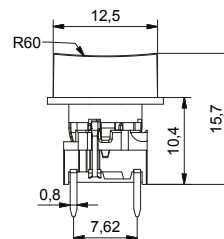
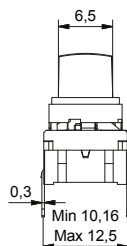
5G+1WAS - SMD



5G+1WDS - TH



5G+1WPS - TH W/LED



1WAS/1WDS/1WPS

Ellipse-shaped caps • different top surfaces • two sizes

BUILD YOUR PART NUMBER

ILLUMINATED

SERIES	MOUNTING	ACTUATION FORCE	LED	CAP	COLOR
5G	TH9 through-hole SH9 surface mount	20 2.0N 35 3.5N 65 6.5N	01 blue 22 green 29 high intensity green 42 yellow 61 white 82 red 2242 green/yellow 8222 red/green 8242 red/yellow	1WAS 1WDS 1WPS	16 frosted white

NON-ILLUMINATED

SERIES	MOUNTING	ACTUATION FORCE	CAP	COLOR
5G	TH9 through-hole SH9 surface mount	20 2.0N 35 3.5N 65 6.5N	1WAS 1WDS 1WPS	00 blue 03 grey 08 red 09 black 30 ultra blue 40 dusty blue 42 aqua blue 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

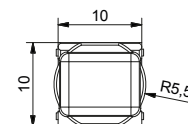
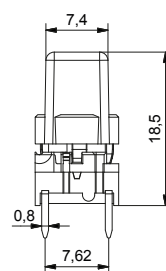
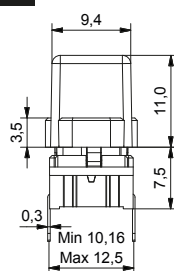
Soft edges

Illumination option

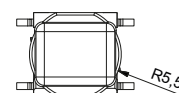
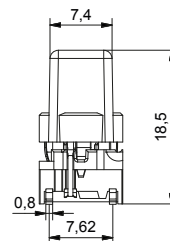
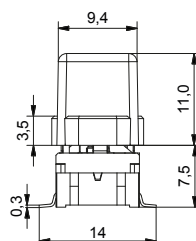


SWITCH SPECIFICATIONS : see Multimec® 5 series.

5G+1XS - TH



5G+1XS - SMD W/LED



1XS

Rectangular caps • soft edges



BUILD YOUR PART NUMBER

ILLUMINATED

5G

SERIES

MOUNTING

TH9

through-hole

SH9

surface mount

ACTUATION FORCE

20

2.0N

35

3.5N

65

6.5N

LED

01

blue

22

green

29

high intensity green

42

yellow

61

white

82

red

2242

green/yellow

8222

red/green

8242

red/yellow

1XS

CAP

COLOR

11

transparent

16

frosted white

NON-ILLUMINATED

5E

SERIES

MOUNTING

TH9

through-hole

SH9

surface mount

ACTUATION FORCE

20

2.0N

35

3.5N

65

6.5N

1XS

CAP

COLOR

00

blue

02

green

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 Ax B : 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

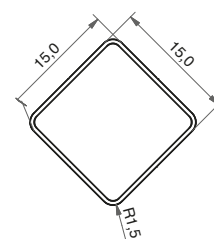
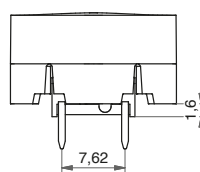
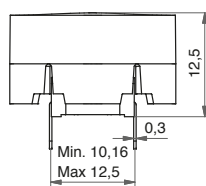
Flat surface

Illumination with LEDs on PCB

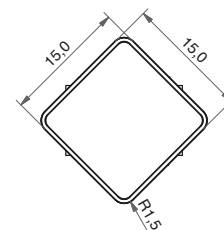
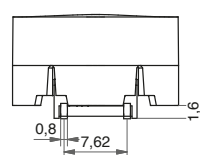
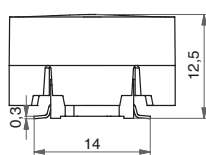


SWITCH SPECIFICATIONS : see Multimec® 5 series.

5E+1YS - TH



5E+1YS - SMD



Foilmec™ 1YS

Square cap • for under overlay • illumination option



BUILD YOUR PART NUMBER

5E

SERIES

MOUNTING

TH9

through-hole

SH9

surface mount

ILLUMINATED

ACTUATION FORCE

20

2.0N

35

3.5N

65

6.5N

1YS

CAP

COLOR

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

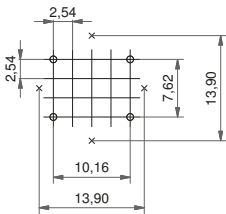
- Panel cut-out : min. 16.0 x 16.0 mm
- Switch spacing Ax B : min. 17.0 x 17.0 mm



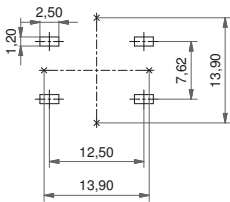
MATERIALS

- Cap : ABS UL94HB
- Lens : polycarbonate UL94HB

PCB LAYOUT WITH LED PLACEMENT



5E+1YS - TH



5E+1YS - SMD

1ZCS

Round caps • rounded top •
many legend options



DISTINCTIVE FEATURES

Round Ø14.3 mm

h=11.7 mm

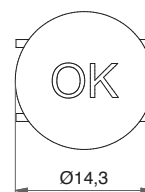
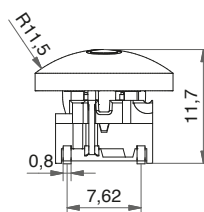
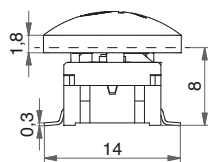
Rounded top surface

Legends in pad print, reverse print or hard paint laser marked

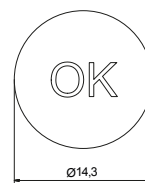
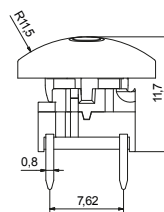
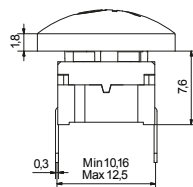


SWITCH SPECIFICATIONS : see Multimec® 5 series.

5G+1ZCS - SMD - W/LED



5G+1ZCS - TH



1ZCS

Round caps • rounded top •
many legend options



BUILD YOUR PART NUMBER

ILLUMINATED									
SERIES	ACTUATION FORCE	LED	CAP	COLOR	LEGEND TYPE*	LEGEND*			
5G	20 2.0N	01 blue		16 frosted white	Blank pad printed	1ZB			
	35 3.5N	22 green			LMH hard paint laser marked	136 ▲			
	65 6.5N	29 high intensity green			R revers printed	1ZCS			
		42 yellow				038 RESET			
		61 white				051 ESC			
		82 red				105 ENTER			
		2242 green/yellow				118 OK			
		8222 red/green				119 SET			
		8242 red/yellow				120 MENU			
						121 FUNC			
						122 HOME			
						123 ⏻			

NON-ILLUMINATED					
SERIES	MOUNTING	ACTUATION FORCE	CAP	COLOR	LEGEND* (PAD PRINT)
5G	TH9 through-hole SH9 surface mount	20 2.0N 35 3.5N 65 6.5N	1ZCS	03 grey 06 white 08 red 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
					12B 136 ▲ 1ZCS 038 RESET 051 ESC 105 ENTER 118 OK

*optional

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



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



BUILD YOUR PART NUMBER

SINGLE PARTS

SWITCH	MOUNTING	ACTUATION FORCE	LED*	CAP	COLOR	LEGEND TYPE*	LEGEND*
5G	TH9 through-hole SH9 surface mount	20 2.0N 35 3.5N 65 6.5N	01 blue 22 green 29 high intensity green 42 yellow 61 white 82 red 2242 green/yellow 8222 red/green 8242 red/yellow	1ZB edge cap (4x) 1ZCS center cap	16 illuminated frosted white 03 non illuminated 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 pad printed LMH hard paint laser marked R revers printed	1ZB 136 ▲ 1ZCS 038 RESET 051 ESC 105 ENTER 118 OK 119 SET 120 MENU 121 FUNC 122 HOME 123 ⏻

MODULE

MODULE	CAP	ACTUATION FORCE	LED*	LEGEND TYPE*	LEGEND*
95	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 pad printed LMH hard paint laser marked	1ZB 135 ▲ 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

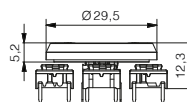
One piece navigational cap

Single components or a complete module

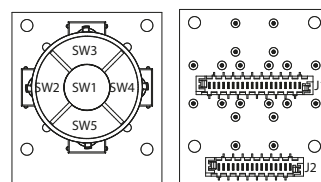
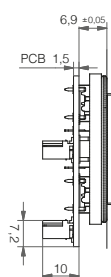
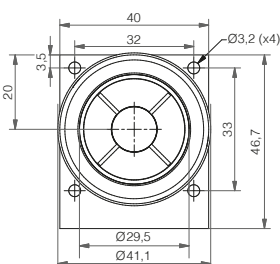


SWITCH SPECIFICATIONS : see Multimec® 5 series.

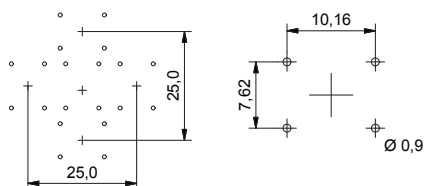
4X5E+5G TH +1ZW



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:

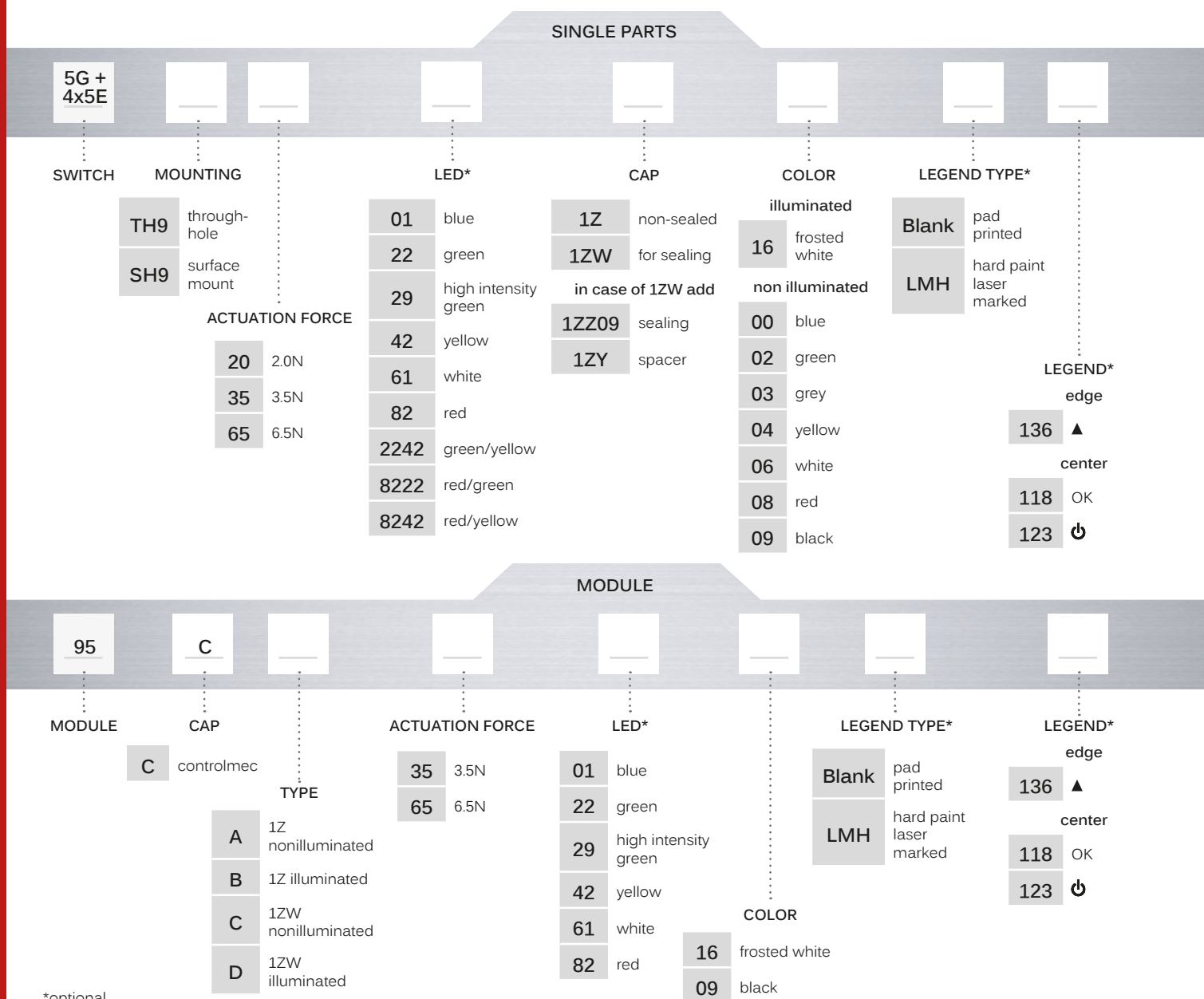
Cable socket: 90327-0320 for switches and 90327-0316 for additional LEDs.

Controlmec™

Round front panel sealed solutions •
for navigation unit • illumination option



BUILD YOUR PART NUMBER



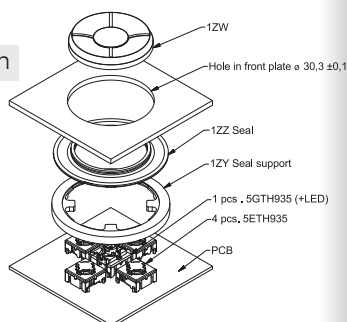
*optional

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

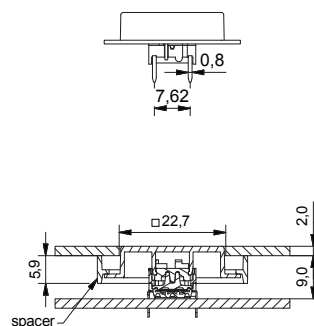
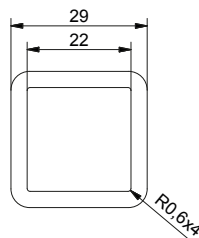
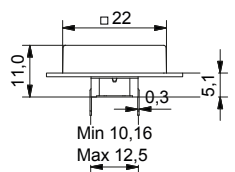
Optional IP67 sealing -10QW and spacer - 10QY

LEDs on PCB for excellent illumination

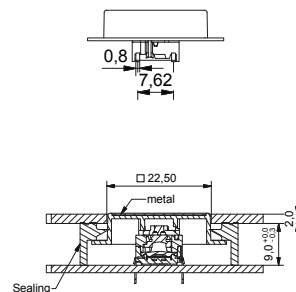
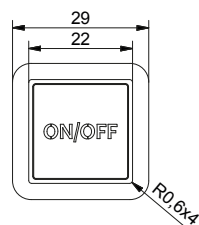
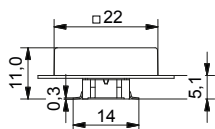


SWITCH SPECIFICATIONS : see Multimec® 5 series.

5G+10Q - TH



5G+10QM - SMD - W/LED



10Q/10QM

Large square cap • optional metal plate • many legend options



BUILD YOUR PART NUMBER

ILLUMINATED

SERIES	MOUNTING	ACTUATION FORCE	LED	CAP	COLOR	SPACER*	SEALING*
5G							
	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

SERIES	MOUNTING	ACTUATION FORCE	CAP	COLOR	SPACER*	SEALING*
5G			10Q			
	TH9 through-hole	20 2.0N		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

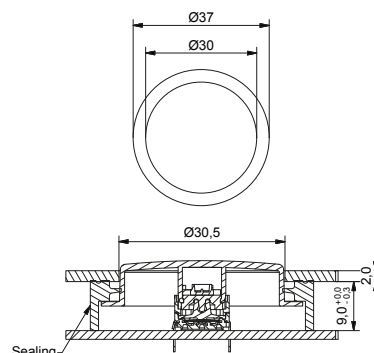
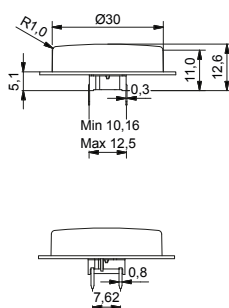
Optional IP67 sealing - 10RW and spacer - 10RY

LEDs on PCB for excellent illumination

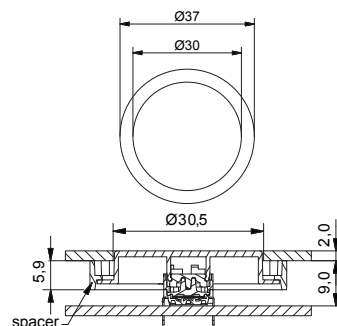
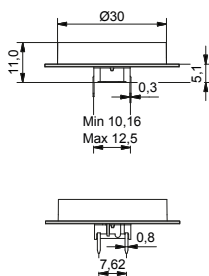


SWITCH SPECIFICATIONS : see Multimec® 5 series.

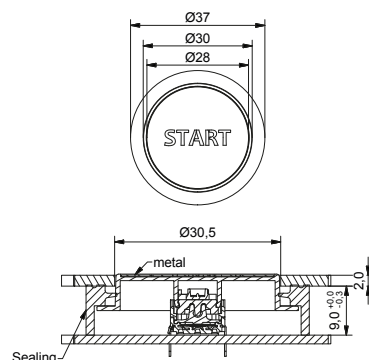
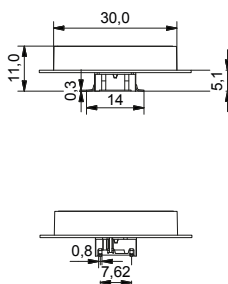
5G+10R - TH



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

SERIES	MOUNTING	ACTUATION FORCE	LED	CAP	COLOR	SPACER	SEALING
5G	TH9 through-hole SH9 surface mount	20 2.0N 35 3.5N 65 6.5N	01 blue 22 green 29 high intensity green 42 yellow 61 white 82 red 2242 green/yellow 8222 red/green 8242 red/yellow	10R 10RF 10RM	16 frosted white	10RY	10RW

NON-ILLUMINATED

SERIES	MOUNTING	ACTUATION FORCE	CAP	COLOR	SPACER	SEALING
5G	TH9 through-hole SH9 surface mount	20 2.0N 35 3.5N 65 6.5N	10R 10RF	00 blue 02 green 03 grey 04 yellow 06 white 08 red 09 black	10RY	10RW

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

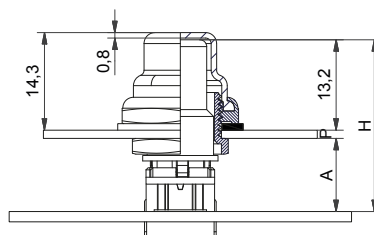
Front panel sealed to IP67

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	BUSHING	CAP transparent	SEALING BOOT transparent incl. sealing
	TH9 through-hole	20 2.0N	01 blue	AQN-0.5		
	SH9 surface mount	35 3.5N	22 green	AQN-2.5		
		65 6.5N	29 high intensity green		OVERALL HEIGHT (H)	24.2
			42 yellow			25.2
			61 white			26.2
			82 red			27.2
			2242 green/yellow			
			8222 red/green			
			8242 red/yellow			

NON-ILLUMINATED						
5G				AQCS09		AQB0109
SERIES	MOUNTING	ACTUATION FORCE	BUSHING	CAP black	OVERALL HEIGHT (H)	SEALING BOOT black incl. sealing
	TH9 through-hole	20 2.0N	AQN-0.5		24.2	
	SH9 surface mount	35 3.5N	AQN-2.5		25.2	
		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

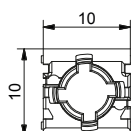
- Housing : PPS UL94V0
- Actuator : PPS UL94V0
- Sealing : Silicone rubber
- Contacts spring : Stainless steel
 - Silver : +3µAg
 - Gold : +1µAu
- Fixed contacts :
 - Silver : SnCu + 2µNI + 3µAg
 - Gold : SnCu + 2µNI + 1µAu
- Terminals : SnCu + 2µNI + 3µSn100

All tolerance if not otherwise specified ±0.2mm.

Multimec® 5

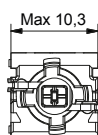
High performance tactile switches •
MIL-PRF-28855H • excellent illumination

5G NON-ILLUMINATED



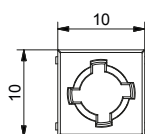
- SMD, TH or right angle TH
- NO or NC/NO

5G ILLUMINATED



- SMD or TH
- NO
- single or bi-color LEDs

5E NON-ILLUMINATED



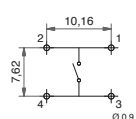
- SMD, TH or right angle TH
- NO or NC/NO

All tolerances unless otherwise noted : ± 0.2 mm

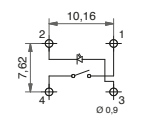


PCB LAYOUT & CIRCUIT DIAGRAM

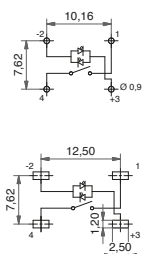
Non-illuminated



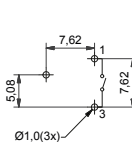
Single LED



Bicolor - 2 LEDs

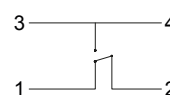


RAS

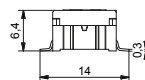


NC/NO function

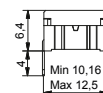
*not for sale in Japan



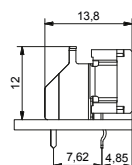
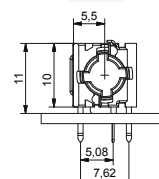
SMD



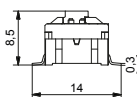
TH



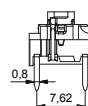
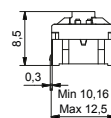
RAS



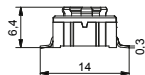
SMD



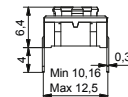
TH



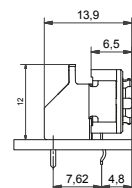
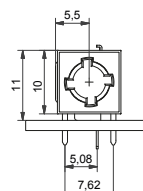
SMD



TH



RAS



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	TH9 through-hole	20 2.0N	Q quiet contact	
5G	SH9 surface mount	35 3.5N	RAS right angle (with TH only)	
		65 6.5N	NCNO normally closed/ normally open function (with 3.5N only)	
			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

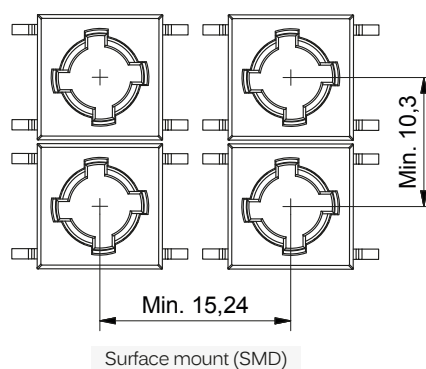
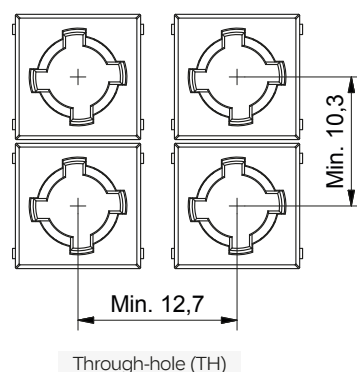
- Reel diameter: Ø330 mm
- Tape width: 24 mm
- Pitch: See list
- Tape and reel material: antistatic or better
- Quantity per reel: see list

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 lmm

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



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.



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.

Illumec™ 4F

Illuminated switches • slip-on cap retention system • integrated chip-LEDs

4FSH9XX

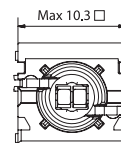
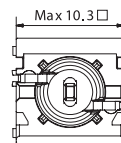
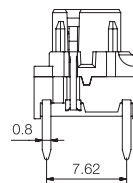
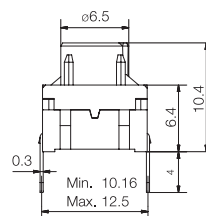
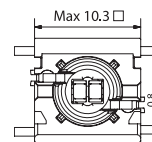
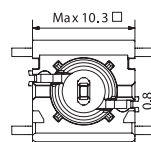
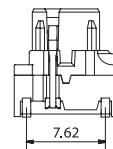
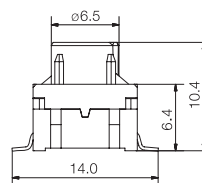


- SMD
- NO
- Single or bi-color LEDs

4FTH9XX



- TH
- NO
- Single or bi-color LEDs

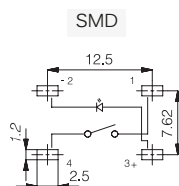
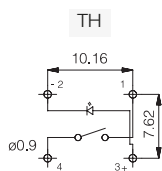


All tolerances unless otherwise noted : ± 0.2 mm

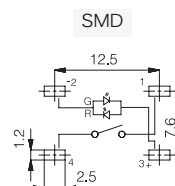
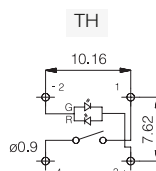


PCB LAYOUT & CIRCUIT DIAGRAM

SINGLE LED



BI-COLOR - 2 LEDs



Illuminated switches • slip-on cap retention system • integrated chip-LEDs



BUILD YOUR PART NUMBER

ILLUMINATED

4F

SERIES

MOUNTING

LED

TH9	through-hole	01	blue
SH9	surface mount	22	green
		29	high intensity green
		42	yellow
		61	white
		82	red
		2242	green/yellow
		8222	red/green
		8242	red/yellow



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

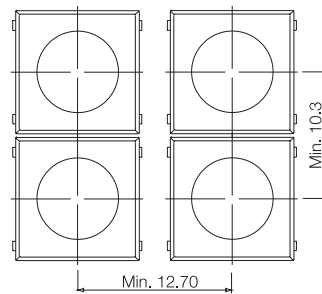
- Reel diameter: Ø330 mm
- Tape width: 24 mm
- Pitch: see list
- Tape and reel material : antistatic or better
- Quantity per reel : see list

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

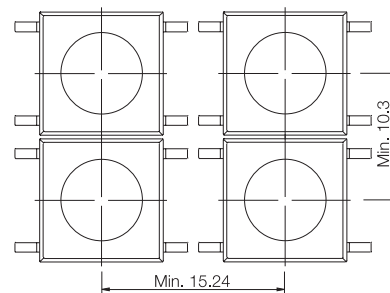


MOUNTING

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 lm/m

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

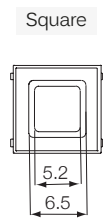
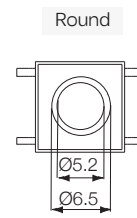
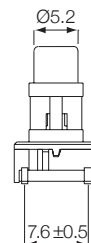
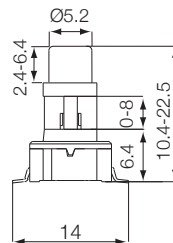
10 total height options 10.4 - 22.5 mm

8 above recess height options 2.4 - 6.4 mm

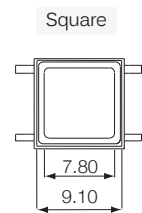
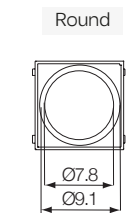
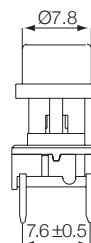
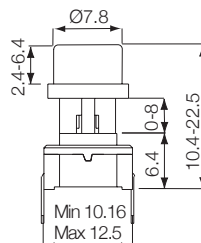


SWITCH SPECIFICATIONS : see Multimec® 3 series.

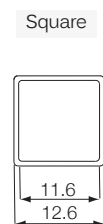
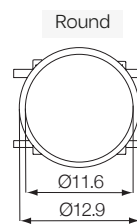
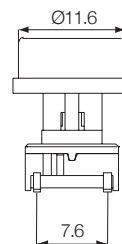
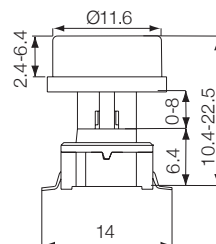
3E+5.2



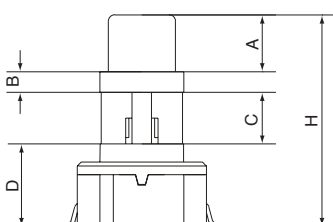
3E+7.8



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 ±0.2mm.

Varimec™

Round or square caps •
variable total and above recess heights



BUILD YOUR PART NUMBER

ROUND

SERIES	MOUNTING	SHAPE AND SIZE	COLOR	OVERALL HEIGHT H	HEIGHT ABOVE RECESS A	TAPE
3E						
	TH9 through-hole	A Ø5.2 mm	60 blue	A 10.4	A 2.4	
	SH9 surface mount	E Ø7.8 mm	63 grey	B 11.0	B 3.0	
		K Ø11.6 mm	64 yellow	C 12.0	C 3.5	
			68 red	D 12.5	D 4.0	
			69 black	E 13.0	E 4.5	R optional
				F 14.0	F 5.0	
				G 15.0	G 5.6	
				H 16.0	H 6.4	
				J 19.0		
				K 22.5		

SQUARE

SERIES	MOUNTING	SHAPE AND SIZE	COLOR	OVERALL HEIGHT H	HEIGHT ABOVE RECESS A	TAPE
3E						
	TH9 through-hole	B 5.2 mm	60 blue	A 10.4	A 2.4	
	SH9 surface mount	F 7.8 mm	63 grey	B 11.0	B 3.0	
		L 11.6 mm	64 yellow	C 12.0	C 3.5	
			68 red	D 12.5	D 4.0	
			69 black	E 13.0	E 4.5	R optional
				F 14.0	F 5.0	
				G 15.0	G 5.6	
				H 16.0	H 6.4	
				J 19.0		
				K 22.5		

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 AxB :
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



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.



MATERIALS

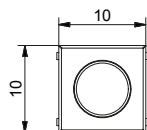
- Housing : PPS UL94V0
- Actuator : PPS UL94V0
- Sealing : Silicone rubber
- Contacts spring : Stainless steel
 - Silver : +3µAg
 - Gold : +1µAu
- Fixed contacts :
 - Silver : SnCu + 2µNI + 3µAg
 - Gold : SnCu + 2µNI + 1µAu
- Terminals : SnCu + 2µNI + 3µSn100

All tolerance if not otherwise specified ±0.2mm.

Multimec® 3

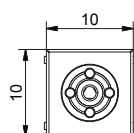
High performance tactile switches • robust

3C



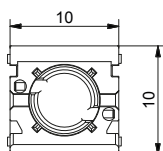
- SMD, TH or right angle TH

3E



- SMD, TH or right angle TH

3F



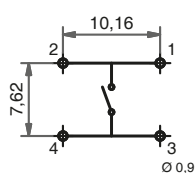
- SMD, TH or right angle TH
- single or bi-color LEDs

All tolerances unless otherwise noted : ± 0.2 mm

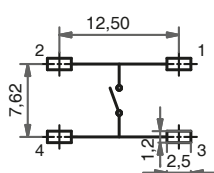


PCB LAYOUT & CIRCUIT DIAGRAM

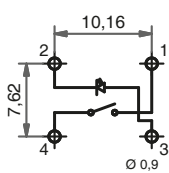
TH Non-ill.



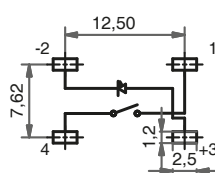
SMD non-ill.



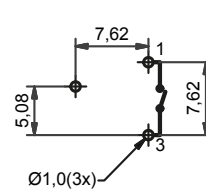
TH illuminated



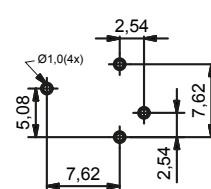
SMD illuminated



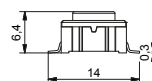
RAS



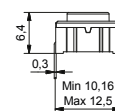
RAS illuminated



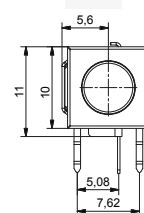
SMD



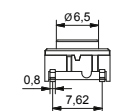
TH



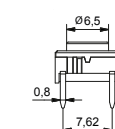
RAS



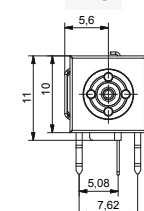
SMD



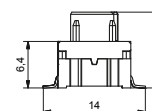
TH



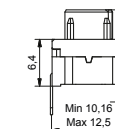
RAS



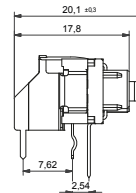
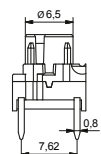
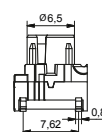
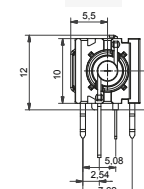
SMD



TH

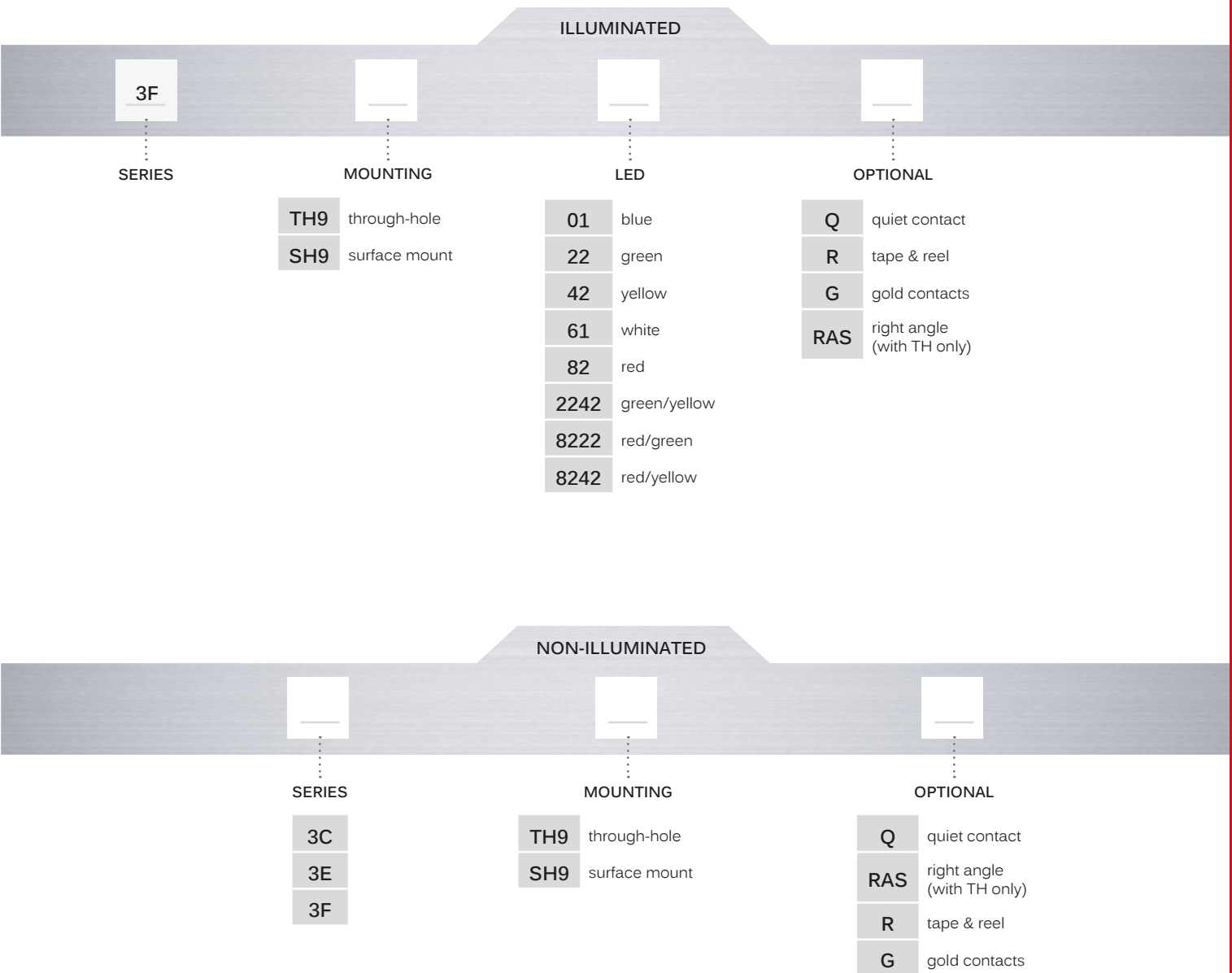


RAS





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 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

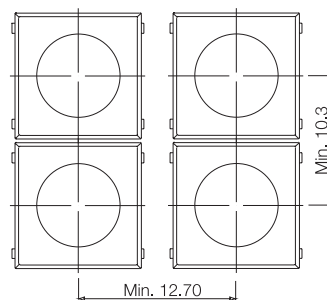
- Reel diameter: Ø330mm
- Tape width: 24mm
- Pitch: See list
- Tape and reel material : antistatic or better
- Quantity per reel : see list

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

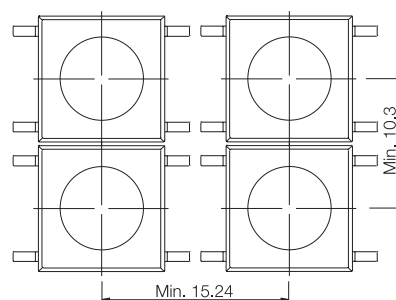


MOUNTING

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	-55/+100	-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	260 for max 5 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	△nm	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 lm/m

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

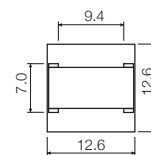
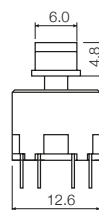
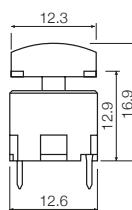
Many standard legends options

Many functions incl quiet with Unimec™ switches

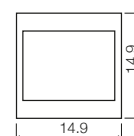
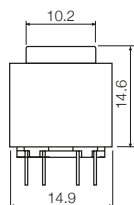
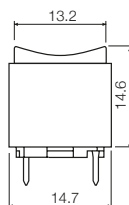


SWITCH SPECIFICATIONS : see Unimec™ series.

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

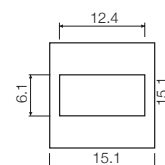
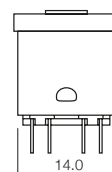
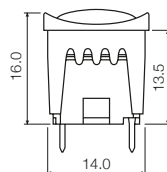
Many standard legend options for 16300 cap

Many functions incl quiet with Unimec™ switches

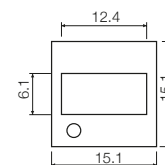
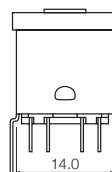
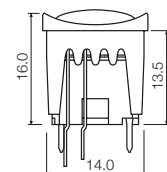


SWITCH SPECIFICATIONS : see Unimec™ series.

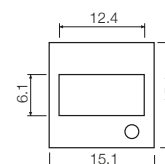
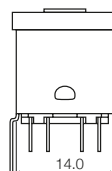
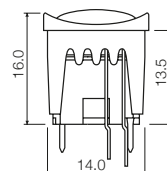
UNIMEC+16300 + 16310



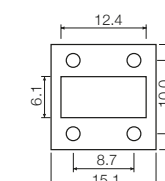
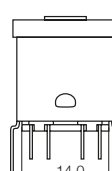
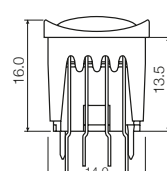
UNIMEC+16300 + 16311



UNIMEC+16300 + 16312



UNIMEC+16300 + 16315



The company reserves the right to change specifications without notice. All tolerance if not otherwise specified ± 0.2 mm.

16310-15

Square solutions • distinct tactile feel • height 16 mm • illumination option

BUILD YOUR PART NUMBER

ILLUMINATED

SERIES	FUNCTION	CAP	COLOR	BEZEL	COLOR	LED 1 - 4	COLOR
15		16300					
400	momentary quiet silver		00 blue	16311 LED in lower left		16921 terminals to the right	
401	momentary silver		02 green	16312 LED in lower right		16920 terminals to the left	
402	momentary gold		03 grey	16314 2 LEDs in lower			
420	momentary quiet gold		04 yellow	16315 4 LEDs			
451	latching silver		06 white		03 grey		02 green
452	latching gold		08 red		08 red		04 yellow
			09 black		09 black		08 red

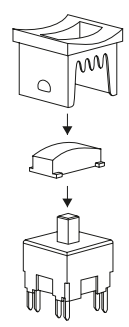
NON-ILLUMINATED

SERIES	FUNCTION	CAP	COLOR	BEZEL	COLOR
15		16300		16310	
400	momentary quiet silver		00 blue		00 blue
401	momentary silver		02 green		02 green
402	momentary gold		03 grey		03 grey
420	momentary quiet gold		04 yellow		04 yellow
451	latching silver		06 white		06 white
452	latching gold		08 red		08 red
			09 black		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

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

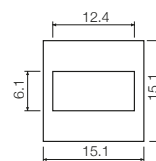
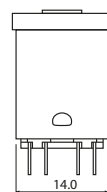
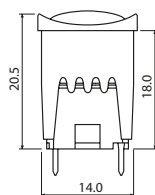
Many standard legend options for 16300 cap

Many functions incl quiet with Unimec™ switches

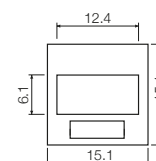
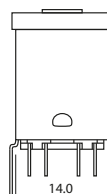
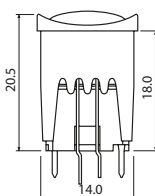


SWITCH SPECIFICATIONS : see Unimec™ series.

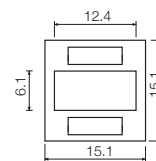
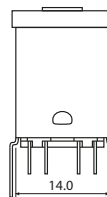
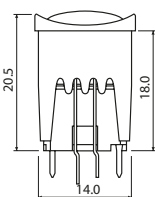
UNIMEC+16300 + 16324



UNIMEC+16300 + 16325



UNIMEC+16300 + 16326



16324-26

Square solutions • distinct tactile feel • height 20.5 mm • illumination option

BUILD YOUR PART NUMBER

ILLUMINATED

SERIES	FUNCTION	CAP	COLOR	BEZEL	LENS 1 OR 2	LENS 1 OR 2
15		16300			16927	16922
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			
				COLOR	COLOR	COLOR
				03 grey	02 green	02 green
				08 red	04 yellow	04 yellow
				09 black	08 red	08 red

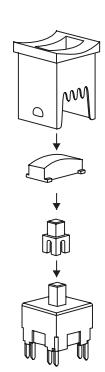
NON-ILLUMINATED

SERIES	FUNCTION	CAP	COLOR	BEZEL	COLOR
15		16300		16324	
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

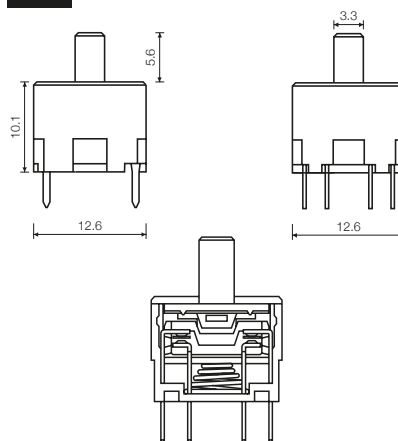
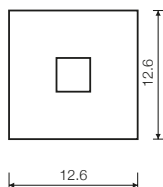
- Housing : LCP UL94V0
- Actuator : LCP UL94V0
- Switch spring : Stainless steel
- Key spring : Stainless steel
- Latch pin : Stainless steel
- Fixed contacts :
 - Silver : SnCu + 2µNI + 3µAg
 - Gold : SnCu + 2µNI + 3µAu
- Moving contacts :
 - Silver : Stainless steel + 3µAg
 - Gold : Stainless steel + 3µAg + 1µAu
- Terminals : SnCu + 2µNI + 3µSn100

All tolerance if not otherwise specified ±0.2mm.

Unimec™

8 contact functions •
2 pole • distinct tactile feel

UNIMEC



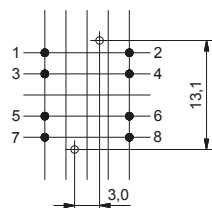
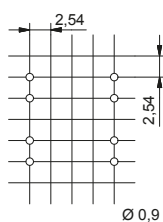
- TH
- momentary, latching or quiet
- 8 contact functions

All tolerances unless otherwise noted : ± 0.2 mm

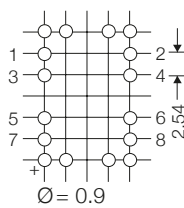


PCB LAYOUT

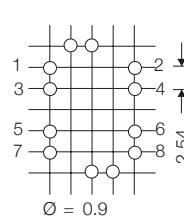
PCB MOUNTING HOLE DIMENSIONS



With 3mm LED
16923 and 16924

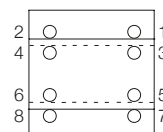


With round LED
16920 and 16921



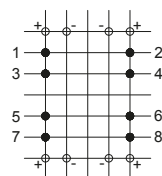
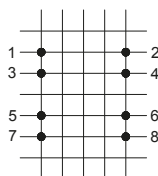
With square LED
16922

FUNCTIONAL DIAGRAM

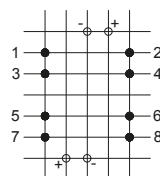


- up
-- down

CIRCUIT DIAGRAM



With round LED
16920 and 16921

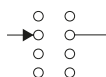


With rect. LED
16922

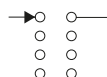


WIRING

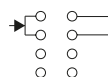
Select the contact function you require - and design your PC board accordingly



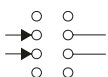
1 make contact



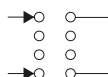
1 break contact



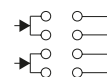
1 change
over contact



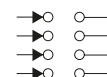
2 make contact



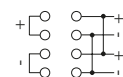
2 break contact



2 change
over contact



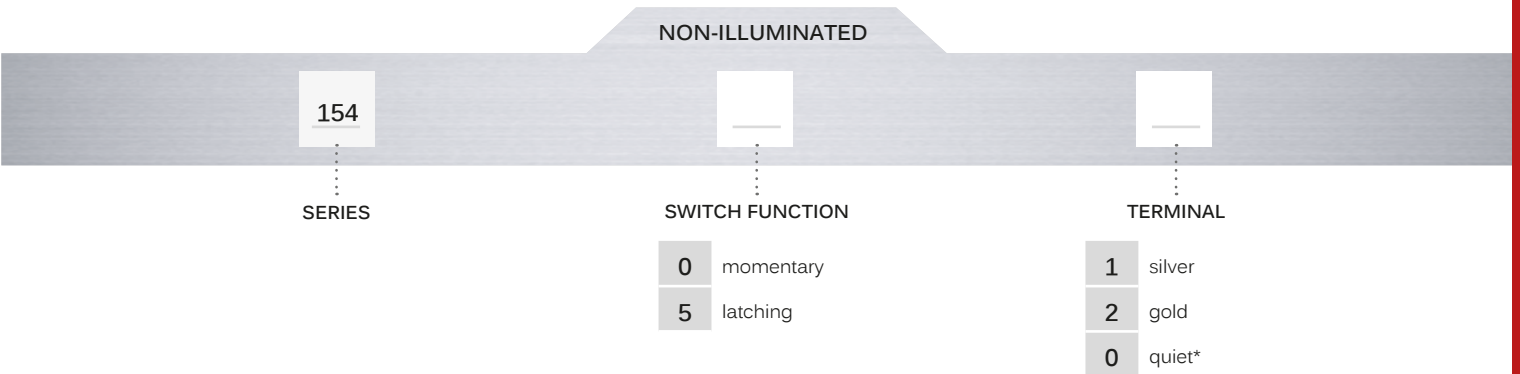
2 make
& 2 break



reverse polarity



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

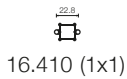
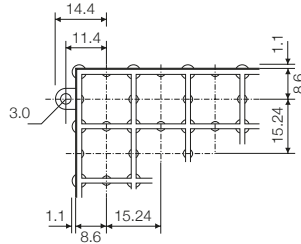
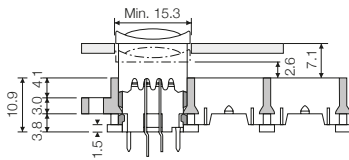
Unimec™

8 contact functions •
2 pole • distinct tactile feel

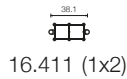


VARIO SUPPORT MOUNTING

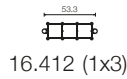
For all types of Unimec™ switches with bezels - 16310 - 16315 and 16324 - 16326.
More options available as custom.



16.410 (1x1)



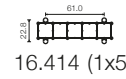
16.411 (1x2)



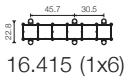
16.412 (1x3)



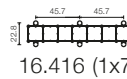
16.413 (1x4)



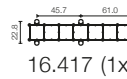
16.414 (1x5)



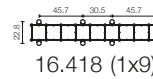
16.415 (1x6)



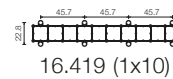
16.416 (1x7)



16.417 (1x8)



16.418 (1x9)



16.419 (1x10)



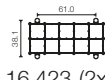
16.420 (2x2)



16.421 (2x3)



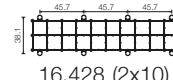
16.422 (2x4)



16.423 (2x5)



16.424 (2x6)



16.428 (2x10)

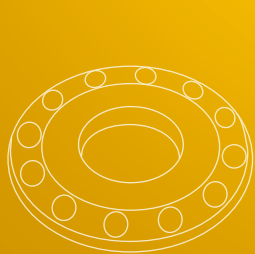
LED COMPONENT SPECIFICATIONS

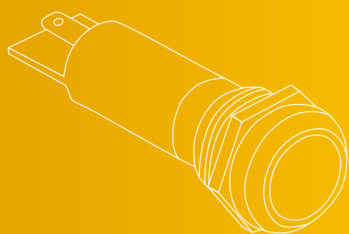
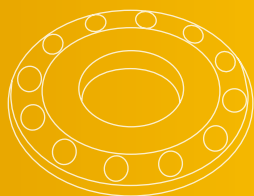
Part Nos.		16920/16921			16922			16923					16924		
Color (G=green, Y=yellow, R=red)		G	Y	R	G	Y	R	B	G	Y	W	R	G	Y	R
Color Codes		02	04	08	02	04	08	00	20	40	65	80	23	45	88
ABSOLUTE MAXIMUM RATINGS (Ta=25°C)															
Power	mW	100	100	100	135	135	135	105	70	60	120	60	150	130	300
Current forward	mA	30	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.														

*I/F=20mA, **Pulse width 1ms Duty cycle 1:5, ***I/F=50mA, ****Luminous Flux lm/m



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

★ SUPER BRIGHT LEDs
for good visibility even
in bright daylight

APEM
EXCLUSIVE



LONG LIFE EXPECTANCY



A LARGE CHOICE OF MODELS:
DIAMETERS, BEZEL SHAPES,
FINISHES, COLORS, TERMINALS,
POWER SUPPLY...



CUSTOM ENGRAVING

For more information,
see APEM website



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				

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.

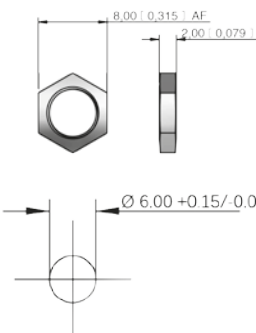
The company reserves the right to change specifications without notice.

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

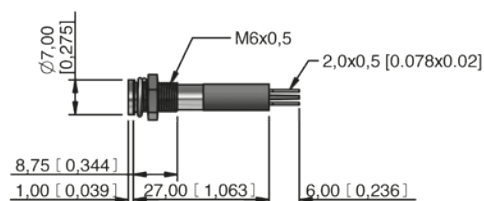


BUILD YOUR PART NUMBER

Q SERIES	MOUNTING HOLE	BEZEL STYLE	TERMINALS	BEZEL FINISH
	6 Ø6mm	P Prominent	1 Solder Lug/ Fastons (2.0 x 0.5)	C Bright Chrome
		R Recessed	2 Pins	B Black Chrome
		F Flush	3 Wires	G Satin Grey
			4 Rear epoxy Pins	
			5 Rear epoxy Wires	
			6 Short body Pins	
			7 Short body Wires	
TYPE OF ILLUMINATION	LED COLOR		VOLTAGE	SEALING
XX Fixed Light	R Red	SR Super Bright Red	02 no resistor	(Blank) Unsealed
KK Flashing Light (12V – 28VDC)	G Green	SG Super Bright Green	06 6VDC	E IP67
YY Bi-color	Y Yellow	SY Super Bright Yellow	12 12VDC	
	B Blue	SB Super Bright Blue	12A 12VAC/DC	
	W White	SW Super Bright White	24 24VDC	
	O Orange	SO Super Bright Orange	24A 24VAC/DC	
	HR Hyper Bright Red	RG Red/Green	28 28VDC	
	HG Hyper Bright Green	RY Red/Yellow	28A 28VAC/DC	
	HY Hyper Bright Yellow	GY Green/Yellow		
	HO Hyper Bright Orange			

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.

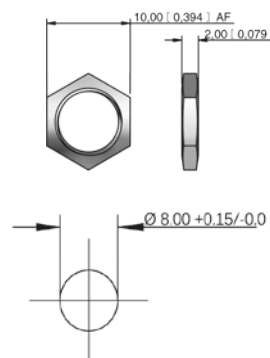
The company reserves the right to change specifications without notice.

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 (dependent 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

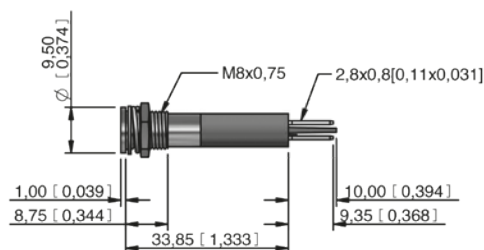


BUILD YOUR PART NUMBER

Q				
SERIES	MOUNTING HOLE	BEZEL STYLE	TERMINALS	BEZEL FINISH
	8 Ø8mm	P Prominent R Recessed F Flush	1 Solder Lug/ Fastons (2.8 x 0.8) 2 Pins 3 Wires 4 Rear epoxy Pins	C Bright Chrome B Black Chrome G Satin Grey
			5 Rear epoxy Wires 6 Short body Pins 7 Short body Wires 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 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	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	02 no resistor 06 6VDC 12 12VDC 12A 12VAC/DC 24 24VDC 24A 24VAC/DC 28 28VDC 28A 28VAC/DC 110 110VAC 220 220VAC
				(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.

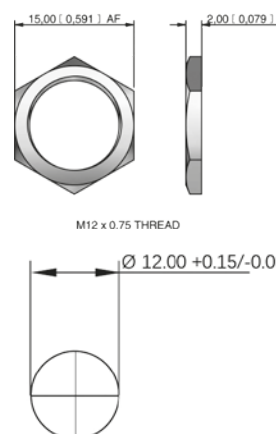
The company reserves the right to change specifications without notice.

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

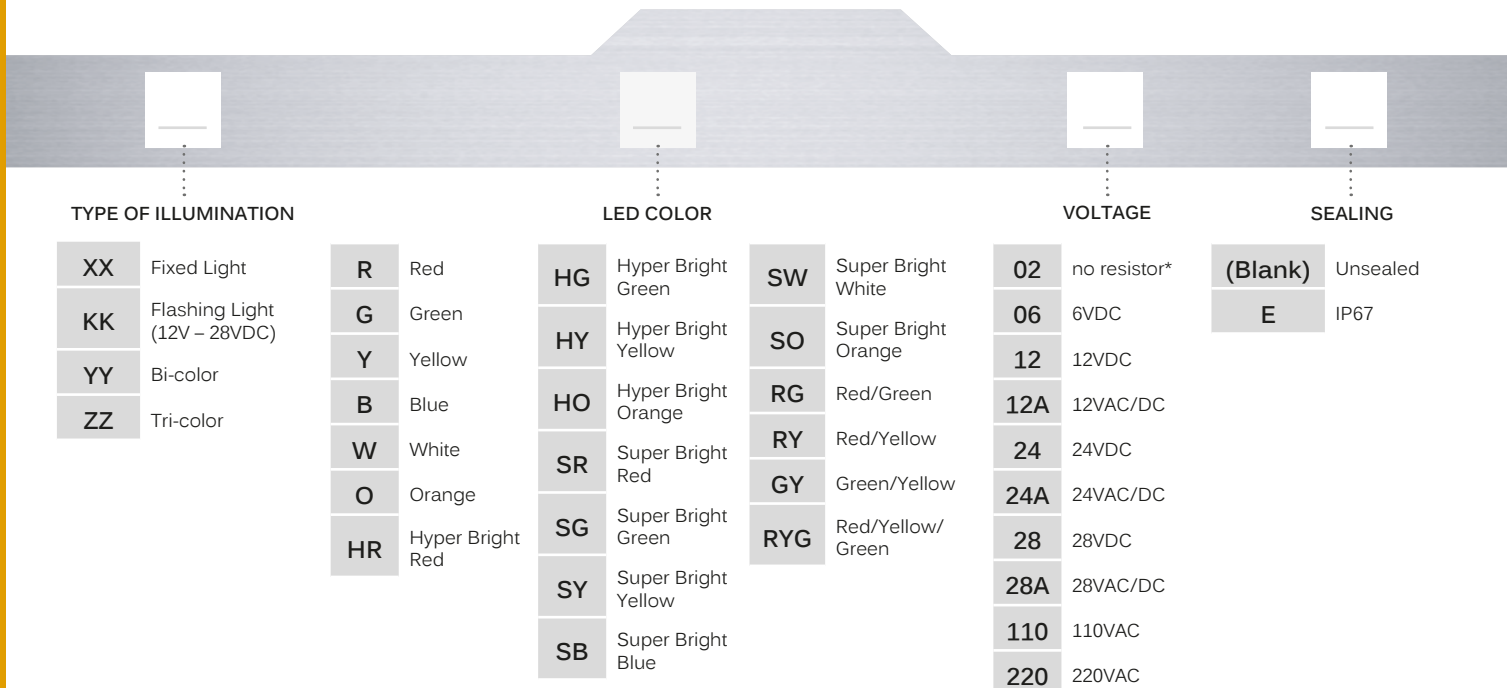
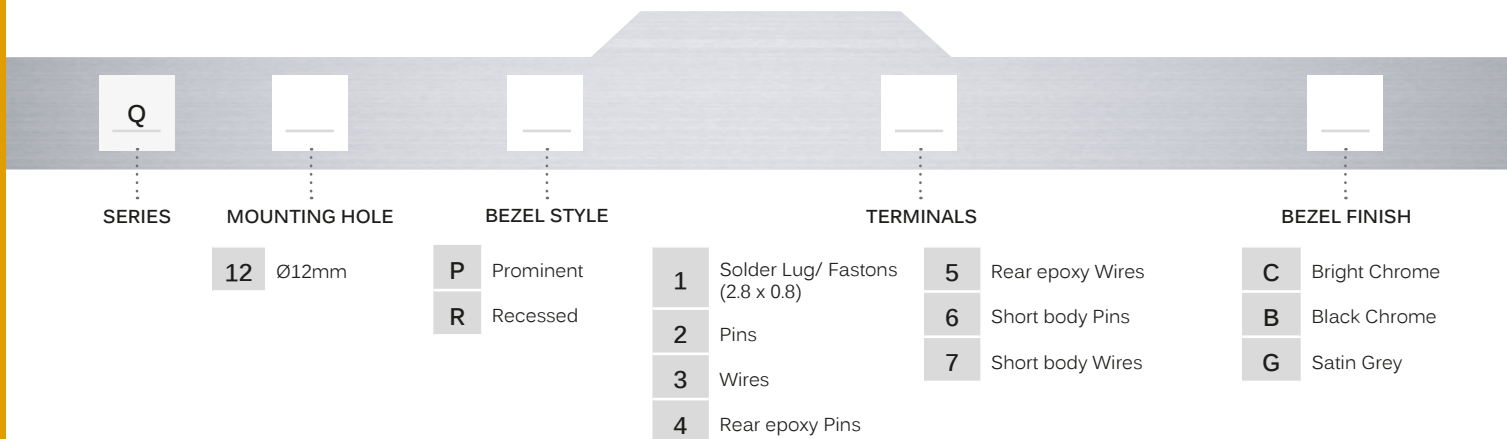
Q12 series

Ø12mm panel mount LED indicators



BUILD YOUR PART NUMBER

PROMINENT AND RECESSED BEZEL



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

Q

SERIES

12

MOUNTING HOLE

12 Ø12mm

F

BEZEL STYLE

F Flush

1

TERMINALS

1 Solder Lug/ Fastons
(2.8 x 0.8)
4 Rear epoxy Pins
5 Rear epoxy Wires

C

BEZEL FINISH

C Bright Chrome
B Black Chrome
G Satin Grey

XX

TYPE OF ILLUMINATION

XX Fixed Light

R

LED COLOR

R Red
G Green
Y Yellow
B Blue
W White
O Orange

02

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

(Blank)

SEALING

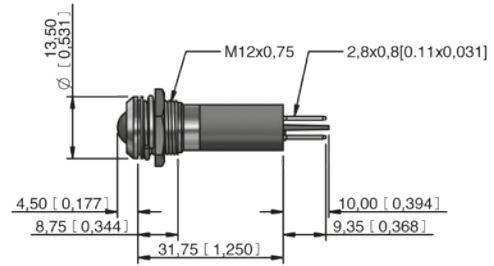
(Blank) Unsealed
E IP67

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

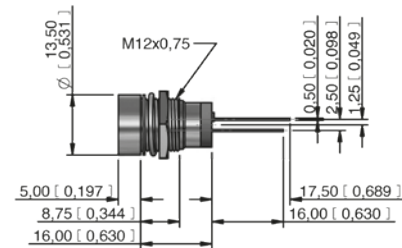
Q12 series

Ø12mm panel mount LED indicators

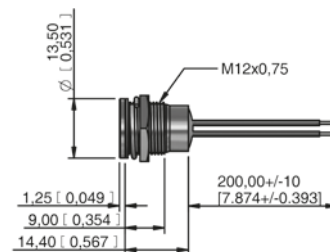
**PROMINENT BEZEL - SOLDER LUG/FASTON
TERMINALS WITH STANDARD BODY**



**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

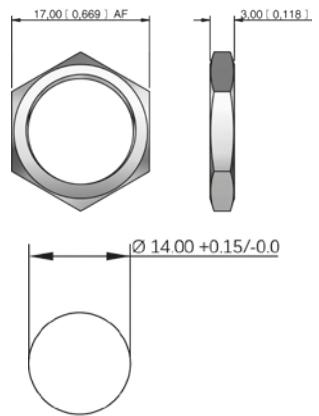
Bi-color - The color is changed by reversing the polarity of the supply voltage.
Tri-color - The indicator has red and green LEDs, when both connected yellow is produced.

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

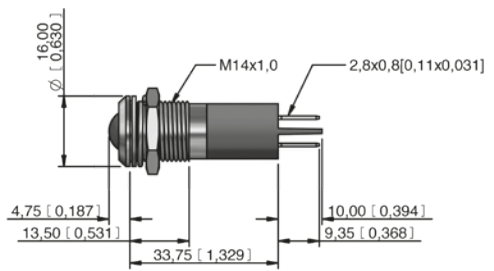
BUILD YOUR PART NUMBER

Q SERIES		— MOUNTING HOLE		— BEZEL STYLE		— TERMINALS		— BEZEL FINISH	
14 Ø14mm		P Prominent		1 Solder Lug/ Fastons (2.8 x 0.8)		5 Rear epoxy Wires		C Bright Chrome	
		F Flush		2 Pins		6 Short body Pins		B Black Chrome	
				3 Wires		7 Short body Wires		G Satin Grey	
				4 Rear epoxy Pins				ANODIZED FLUSH	
								AR Red	
								AG Green	
								AY Yellow	
								AB Blue	
								AN Black	

— TYPE OF ILLUMINATION		— LED COLOR		— VOLTAGE		— SEALING			
XX Fixed Light		R Red		HG Hyper Bright Green		02 no resistor		(Blank) Unsealed	
KK Flashing Light (12V – 28VDC)		G Green		HY Hyper Bright Yellow		06 6VDC		E IP67	
YY Bi-color		Y Yellow		HO Hyper Bright Orange		12 12VDC			
ZZ Tri-color		B Blue		SR Super Bright Red		12A 12VAC/DC			
		W White		SG Super Bright Green		24 24VDC			
		O Orange		SY Super Bright Yellow		24A 24VAC/DC			
		HR Hyper Bright Red				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.

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.

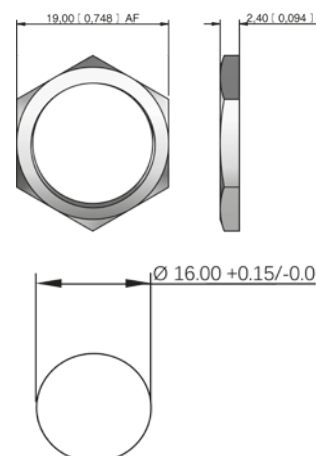
The company reserves the right to change specifications without notice.

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

P

Prominent

R

Recessed

F

Flush

Plastic

PP

Prominent

FP

Flush

1

Solder Lug/ Fastons
(2.8 x 0.8)

2

Pins

3

Wires

4

Rear epoxy Pins

5

Rear epoxy Wires

6

Short body Pins

7

Short body Wires

Metal

C

Bright Chrome

B

Black Chrome

G

Satin Grey

Plastic

BP

Black

TYPE OF ILLUMINATION

LED COLOR

VOLTAGE

SEALING

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

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

RG

Red/Green

RY

Red/Yellow

GY

Green/Yellow

RYG

Red/Yellow/
Green

02

no resistor*

06

6VDC

12

12VDC

12A

12VAC/DC

24

24VDC

24A

24VAC/DC

28

28VDC

28A

28VAC/DC

110

110VAC

220

220VAC

(Blank)

Unsealed

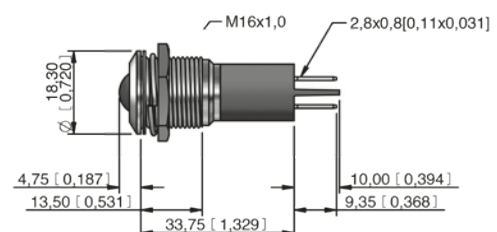
E

IP67

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

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.

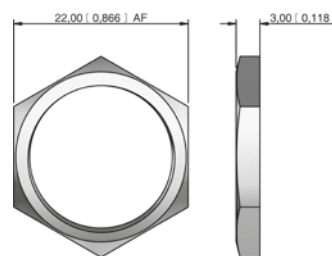
The company reserves the right to change specifications without notice.

LED characteristics are dependent upon environmental conditions. Therefore published data should be considered nominal.

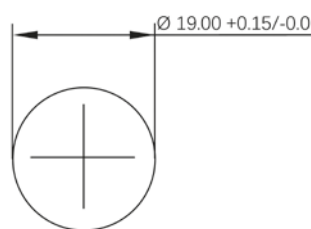


MOUNTING

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

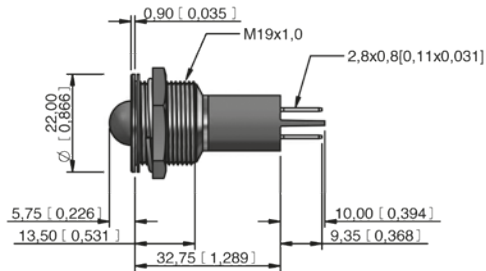
BUILD YOUR PART NUMBER

SERIES	MOUNTING HOLE	BEZEL STYLE	TERMINALS	BEZEL FINISH
Q	19 Ø19mm	Metal P Prominent R Recessed FP Flush EP Extra Prominent	1 Solder Lug/ Fastons (2.8 x 0.8) 2 Pins 3 Wires 4 Rear epoxy Pins	5 Rear epoxy Wires 6 Short body Pins 7 Short body Wires
				Metal 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 ZZ Tri-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 RG Red/Green RY Red/Yellow GY Green/Yellow RYG Red/Yellow/Green	02 no resistor 06 6VDC 12 12VDC 12A 12VAC/DC 24 24VDC 24A 24VAC/DC 28 28VDC 28A 28VAC/DC 110 110VAC 220 220VAC	(Blank) Unsealed E IP67

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



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)
05 (No Resistor)	3.3 to 9.9VDC	40mA max
12VDC	10.8 to 13.2VDC	40mA
24VDC	21.6 to 26.4VDC	40mA
28VDC	25.2 to 30.8VDC	40mA
110VAC	99 to 121VAC	5mA
220 VAC	207 to 235VAC	3mA

LED COMPONENT SPECIFICATIONS

Standard LED Intensity	Prominent and Recessed	Flush	Forward Voltage
HE Red	82mcd	70mcd	5.7V
Green	95mcd	66mcd	6.0V
Yellow	60mcd	59mcd	5.9V
Blue	120mcd	101mcd	9.9V
White	1,000mcd	150mcd	3.3V
Bi-color (Typical) (Red/Green)	80/50mcd	80/50mcd	2.0V/2.2V
Tri-color (Typical) (Red/Green/Yellow)	80/50/50mcd	80/50/50mcd	2.0V/2.2V/2.1V

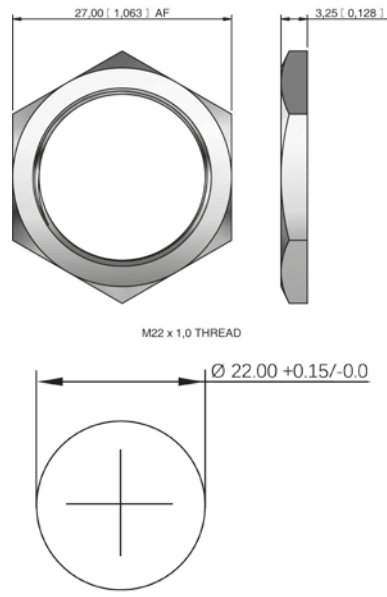
Bi-color - The color is changed by reversing the polarity of the supply voltage.
Tri-color - The indicator has red and green LEDs, when both connected yellow is produced.

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

Q22 series

Ø22mm panel mount LED indicators



BUILD YOUR PART NUMBER

Q

SERIES

MOUNTING HOLE

22 Ø22mm

BEZEL STYLE

Metal

P	Prominent
R	Recessed
F	Flush
Y	Chamfer (Stainless Steel only)

Plastic

PP	Prominent
FP	Flush

TERMINALS

1	Solder Lug/ Fastons (2.8 x 0.8)
4	Rear epoxy Pins
5	Rear epoxy Wires
6	Short body Pins
7	Short body Wires

BEZEL FINISH

Metal

C	Bright Chrome
B	Black Chrome
G	Satin Grey
S	Stainless Steel

Plastic

BP	Black
-----------	-------

Anodized Flush

AR	Red
AG	Green
AY	Yellow
AB	Blue
AN	Black

TYPE OF ILLUMINATION

XX	Fixed Light
KK	Flashing Light (only 12VDC)
YY	Bi-color
ZZ	Tri-color

LED COLOR

R	Red	SY	Super Bright Yellow
G	Green	RG	Red/Green
Y	Yellow	RY	Red/Yellow
B	Blue	GY	Green/Yellow
W	White	RYG	Red/Yellow/Green
SR	Super Bright Red		
SG	Super Bright 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

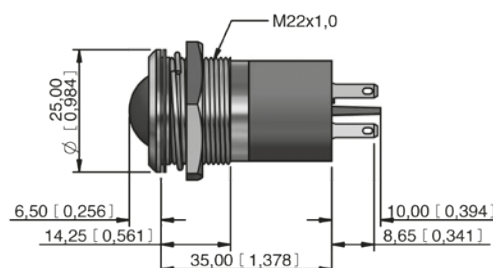
(Blank)	Unsealed
E	IP67

OPTIONS

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

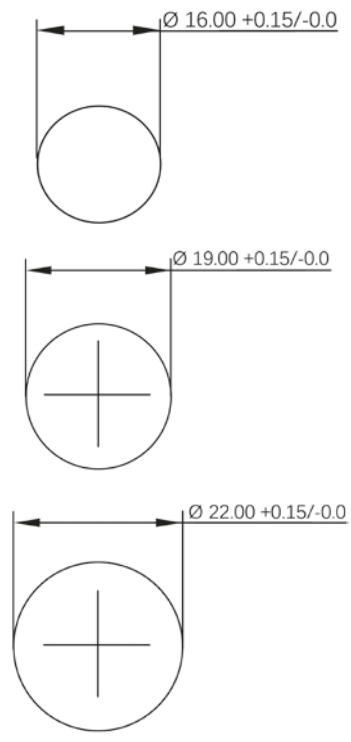
- Body : PC
- Lens : PC

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

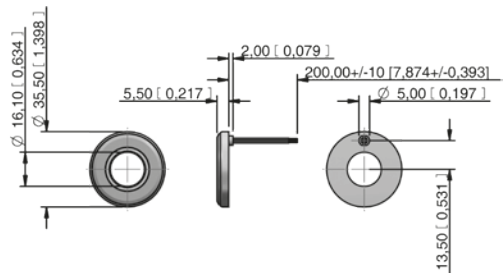
SERIES	SIZE	BEZEL COLOR	LENS COLOR	LED COLOR	SEALING
QH					
160	16mm cutout	2 Black	7 Frosted White	Single LED	U Unsealed
190	19mm cutout	5 Yellow	8 Tinted	R Red	C IP67 (panel seal)
220	22mm cutout			G Green	
22L	22mm cutout			Y Yellow	
				B Blue	
				W White (clear)	
				RGB LED	
				RGB RGB	
				Dual LED	
				RG Red/Green	
				RY Red/Yellow	
				BW Blue/White	



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

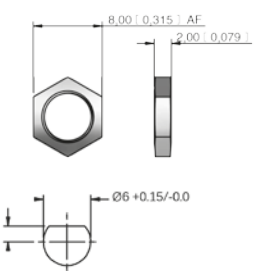
The color is changed by reversing the polarity of the supply voltage.

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



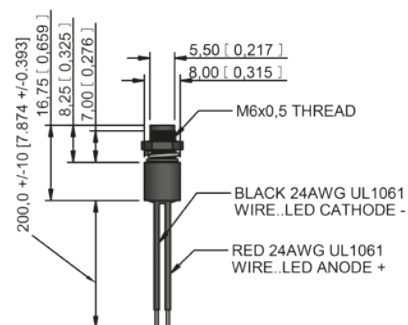
BUILD YOUR PART NUMBER

SERIES	MOUNTING HOLE	TERMINALS	BEZEL FINISH
QRM	6 Ø6mm	4 Pins 5 Wires	B Black Chrome

TYPE OF ILLUMINATION	LED COLOR	VOLTAGE	SEALING
XX Fixed Light	R Red	02 no resistor	E IP67 (Standard)
YY Bi-color	G Green	06 6VDC	
	Y Yellow	12 12VDC	
	B Blue	24 24VDC	
	W White	28 28VDC	
	HR Hyper Bright Red		
	HG Hyper Bright Green		
	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		

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



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	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

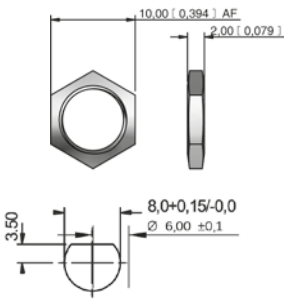
Bi-color - The color is changed by reversing the polarity of the supply voltage.
Tri-color - The indicator has red and green LEDs, when both connected yellow is produced.

The company reserves the right to change specifications without notice.
LED characteristics are dependent upon environmental conditions. Therefore published data should be considered nominal.



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

QRM8 series

Ø8mm rear panel mount LED indicators



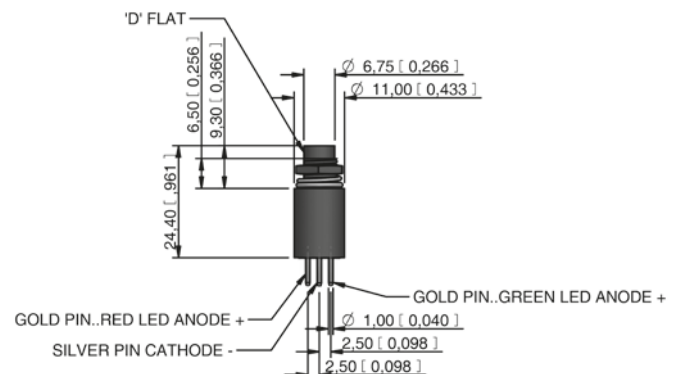
BUILD YOUR PART NUMBER

SERIES	MOUNTING HOLE	TERMINALS	BEZEL FINISH
QRM	8 Ø8mm	4 Pins 5 Wires	B Black Chrome

TYPE OF ILLUMINATION	LED COLOR	VOLTAGE	SEALING
XX Fixed Light	R Red	02 no resistor	E IP67 (Standard)
YY Bi-color	G Green	06 6VDC	
ZZ Tri-color	Y Yellow	12 12VDC	
	B Blue	12A 12VAC/DC	
	W White	24 24VDC	
	HR Hyper Bright Red	24A 24VAC/DC	
	HG Hyper Bright Green	28 28VDC	
		28A 28VAC/DC	

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 Chromaticity	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	$4.7E-8 \leq NRB \leq 1.47E-7 @ 15fL$	$r \leq 0.83$	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.

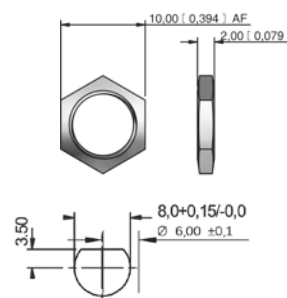
The company reserves the right to change specifications without notice.

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

8 Ø8mm

TERMINALS

4 Ridgid Pins
5 Wires

BEZEL FINISH

B Black Chrome

TYPE OF ILLUMINATION

XX Fixed Light

LED COLOR

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

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 - WIRE TERMINALS WITH STANDARD BODY

200.0 $\pm$ 10 [7.874 $\pm$ 0.393]
17.00 [0.669]
9.30 [0.366]
6.50 [0.256]
 $\varnothing$ 6.75 [0.266]
 $\varnothing$ 11.00 [0.433]
M8x0.75 THREAD
BLACK 24AWG UL1213 WIRE..CATHODE -
LED COLOUR 24AWG UL1213 WIRE..ANODE +

APEM

418

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.

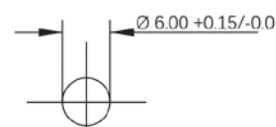
The company reserves the right to change specifications without notice.

LED characteristics are dependent upon environmental conditions. Therefore published data should be considered nominal.

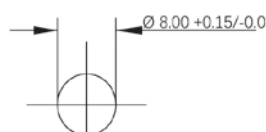


MOUNTING

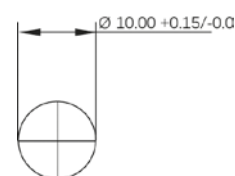
QS6 SERIES PANEL CUT-OUT



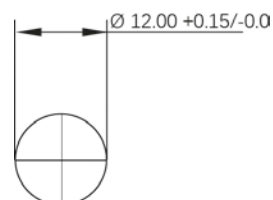
QS8 SERIES PANEL CUT-OUT



QS10 SERIES PANEL CUT-OUT



QS12 SERIES PANEL CUT-OUT



Snap-in panel mount LED indicators



GENERAL SPECIFICATIONS

- Max Reverse Voltage: 5V
- Life Expectancy: 100,000 hours



MATERIALS

- Moulded polycarbonate



BUILD YOUR PART NUMBER

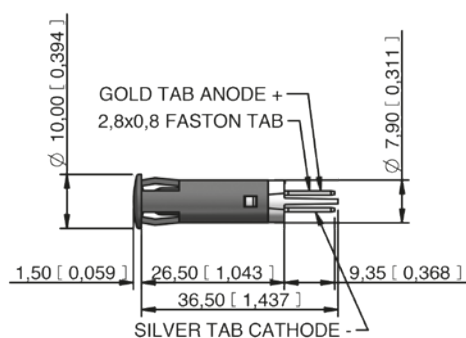
SERIES	MOUNTING HOLE	TYPE OF ILLUMINATION	LED COLOR	VOLTAGE
6	Ø6mm	XX Fixed Light	R Red	02 No resistor
8	Ø8mm	YY Bi-color	G Green	06 6VDC
10	Ø10mm	ZZ Tri-color (10mm only)	Y Yellow	12 12VDC
12	Ø12mm	KK Flashing light (12 - 28VDC)	B Blue	24 24VDC
			W White (clear)	28 28VDC
			O Orange	110 110VAC
			HR Hyper Bright Red	220 220VAC
			HG Hyper Bright Green	
			HY Hyper Bright Yellow	
			HO Hyper Bright Orange	
			RG Red/Green	
			RYG Red/Yellow/Green (10mm Only)	

TERMINALS

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	A AC/DC version
			12 12V - 14mA 24 24V - 14mA 28 28V - 14mA	

For other voltage options please contact APEM

LUMINOUS INTENSITY

	Voltage
Color	12V, 24V & 28V
R - Red	1750 mcd
G - Green	1610 mcd
Y - Yellow	630 mcd
B - Blue	490 mcd
W - White	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

MG

SERIES

TYPE

COLOR

VOLTAGE & CURRENT AC/DC

OPTIONS

M

Multi Chip

R

Red

G

Green

Y

Yellow

12

12V - 30mA

24

24V - 14mA

28

28V - 14mA

A

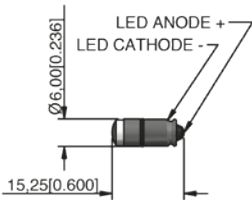
AC/DC version

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

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

SERIES	TYPE	COLOR	VOLTAGE & CURRENT AC/DC	OPTIONS
MF	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

	Voltage
Color	12V, 24V & 28V
R - Red	1750 mcd
G - Green	1610 mcd
Y - Yellow	630 mcd
B - Blue	490 mcd
W - White	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

MF MULTI CHIP

MF

SERIES

TYPE

COLOR

VOLTAGE & CURRENT AC/DC

OPTIONS

M

 Multi Chip

R

 Red

G

 Green

Y

 Yellow

12

 12V - 30mA

24

 24V - 14mA

28

 28V - 14mA

A

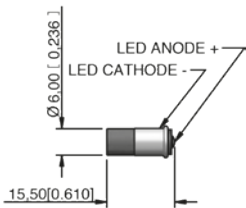
 AC/DC version

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

G

Green

Y

Yellow

B

Blue

W

White

6A

6V_9/17mA

12A

12V_9/17mA

24A

24V_9/17mA

28A

28V_9/17mA

48A

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.

E10 series

Screw cap based LED's •
single or multichip LED illumination

BUILD YOUR PART NUMBER

E10 MULTI CHIP

E10

SERIES

TYPE

C Multi Chip

COLOR

R Red

G Green

Y Yellow

B Blue

W White

VOLTAGE & CURRENT AC/DC

24A 24V - 9/17mA

28A 28V - 9/17mA

48A 48V - 8mA

130A 130VAC - 5mA

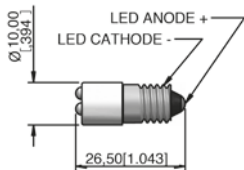
230A 230VAC - 3mA

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

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

BA9

SERIES

TYPE

S Single Chip

COLOR

R Red
G Green
Y Yellow

B Blue
W White

VOLTAGE & CURRENT AC/DC

6A	6V_9/17mA	48A	48V_9/8mA
12A	12V_9/17mA	130A	130VAC_9mA
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.

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

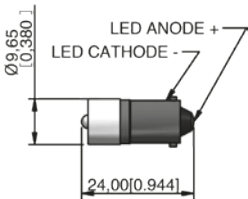
 230VAC - 3mA

For other voltage options please contact APEM

LUMINOUS INTENSITY

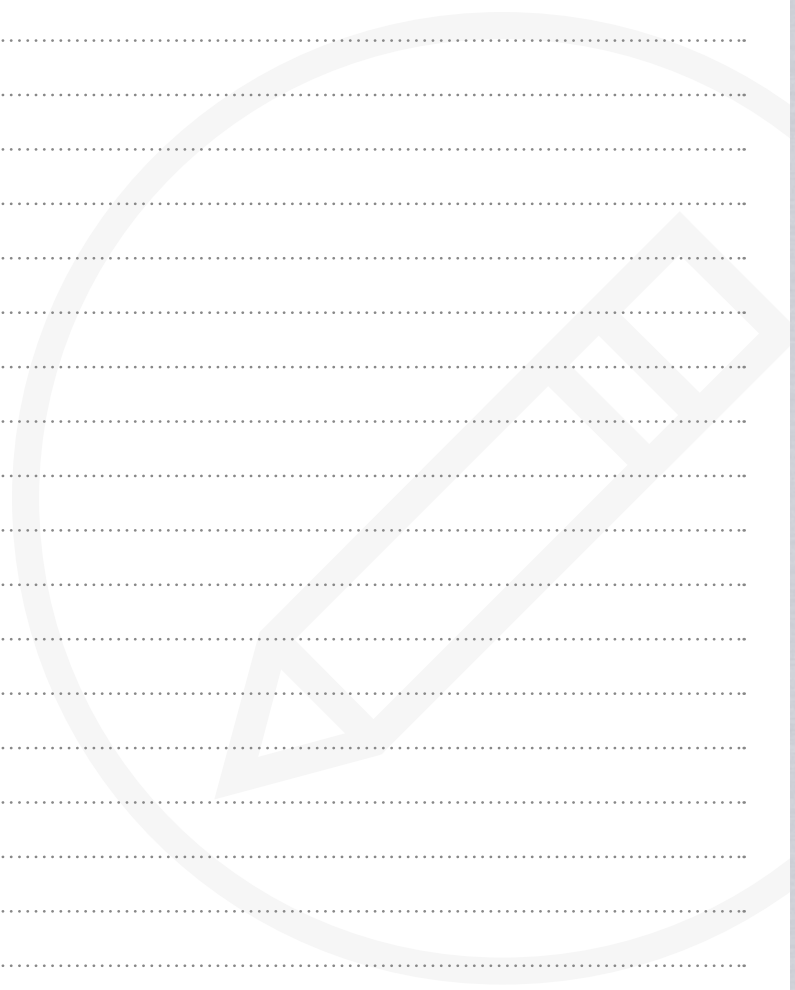
Color	Voltage			
	24V & 28V	48V	130VAC	230VAC
R - Red	3 x 1750 mcd	3 x 990	3 x 685	3 x 375
G - Green	3 x 1610 mcd	3 x 920	3 x 570	3 x 345
Y - Yellow	3 x 630 mcd	3 x 360	3 x 225	3 x 135
B - Blue	3 x 490 mcd	3 x 280	3 x 175	3 x 105
W - White	3 x 2070 mcd	3 x 1180	3 x 710	3 x 470

BA9 - SINGLE CHIP WHITE



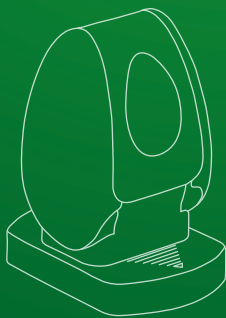
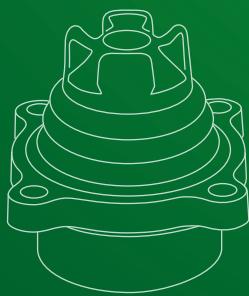


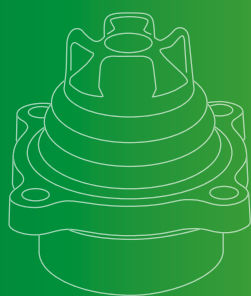
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JOYSTICKS





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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

HF SERIES

PRECISION FINGERTIP CONTROL

APEM
EXCLUSIVE

★ 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

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

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

**APEM
BEST SELLER**

★ 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
- Overvoltage 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



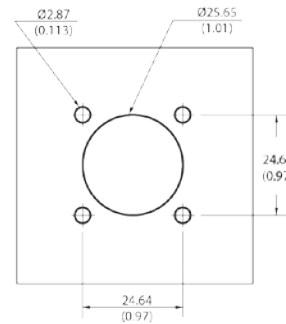
CONNECTIONS

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)

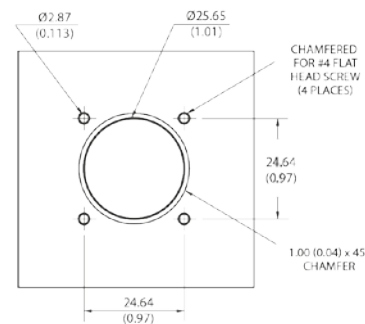


MOUNTING

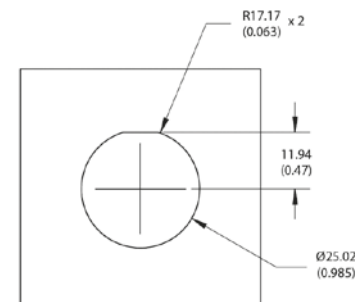
PLASTIC HOUSING - DROP-IN CUTOUT



PLASTIC HOUSING - REAR MOUNT OPTION CUTOUT



METAL THREADED HOUSING - DROP-IN CUTOUT



Proportional miniature thumb controls • non-contacting Hall effect technology



BUILD YOUR PART NUMBER

SERIES	HANDLE	MOUNTING OPTIONS	TERMINATION ¹	LIMITER
TS				
	0 None 1 Castle 2 Winged Hat 3 Conical 4 Finger Tip 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	N None D Drop-in R Rear mount A Drop-in and Rear Mount T Threaded housing	1 22AWG 25cm PTFE 2 28AWG 25cm PTFE 3 72" Overmold Cable with USB Male Type Connector 4 2.54mm (0.100") Pitch TE Connector 5 2.54mm (0.100") Pitch TE Connector with 10" Mating Harness	U Single axis S Square G Guided feel P Plus
		OUTPUT OPTIONS	POWER SUPPLY OPTIONS	
		00 0V to 5V 01 0.25V to 4.75V 02 0.5V to 4.5V 03 1V to 4V 04 0V to 5V - Sensor 1 0V to 5V - Sensor 2 05 0.5V to 4.5V - Sensor 1 0.5V to 4.5V - Sensor 2 06 0.5V to 4.5V - Sensor 1 0.5V to 4.5V - Sensor 2 07 1V to 4V - Sensor 1 1V to 4V - Sensor 2 08 0V to 5V - Sensor 1 5V to 0V - Sensor 2 09 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 12 Customer specified 13 PWM ² 14 USB (Game Controller) 15 Joyball (Cursor emulation)	A Single B Independent ³

* = 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.

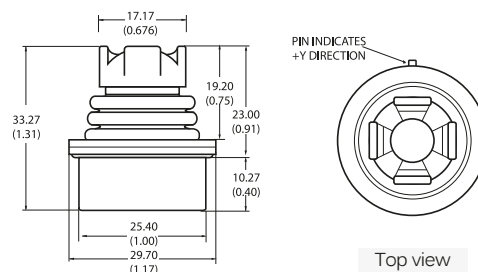
² Contact factory for PWM configuration.

³ Only available on dual output. Not available with Handle 6 (Pushbutton).
Not available with termination options 4 or 5.

TS series

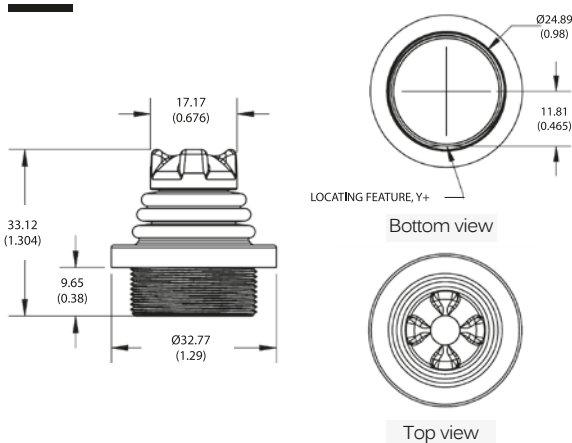
Proportional miniature thumb controls •
non-contacting Hall effect technology

PLASTIC HOUSING



Top view

METAL THREADED HOUSING



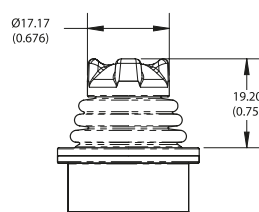
Bottom view

Top view

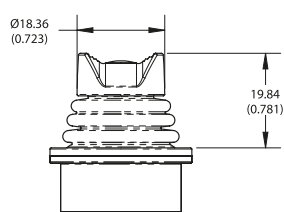


HANDLE OPTIONS

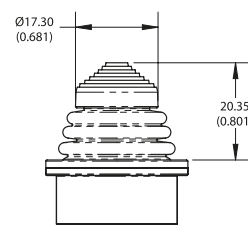
1. CASTLE
B. CASTLE (ELASTOMER)



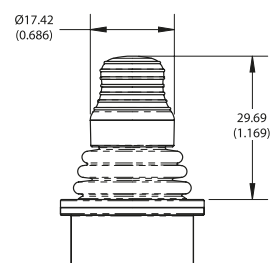
2. WINGED HAT
C. WINGED HAT (ELASTOMER)



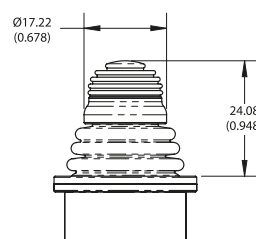
3. CONICAL
D. CONICAL (ELASTOMER)



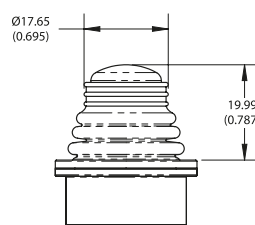
4. FINGER TIP



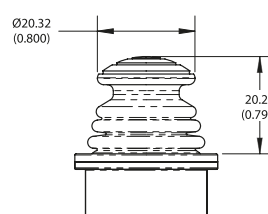
5. ROUND JOG



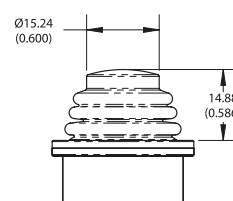
6. PUSHBUTTON



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/s^2 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/s^2 ; 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 $+85^\circ\text{C}$ - 10 cycles
- Operating Temperature: -40°C / $+65^\circ\text{C}$



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)

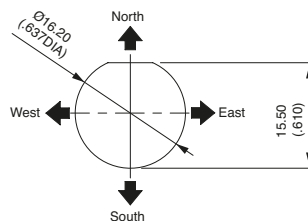


MATERIALS

- Sealing Gasket : Elastomeric
- Case : Brass, black chrome plated
- Actuator : ABS
- Lever : Steel
- Nut : Brass, black chrome plated

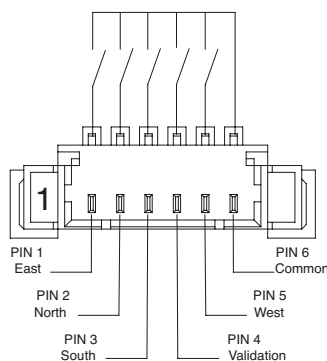


PANEL CUT-OUT



CONNECTIONS

REAR VIEW



PIN 4 for validation version only

NV series

Compact 5-way navigation thumb controls • switching technology



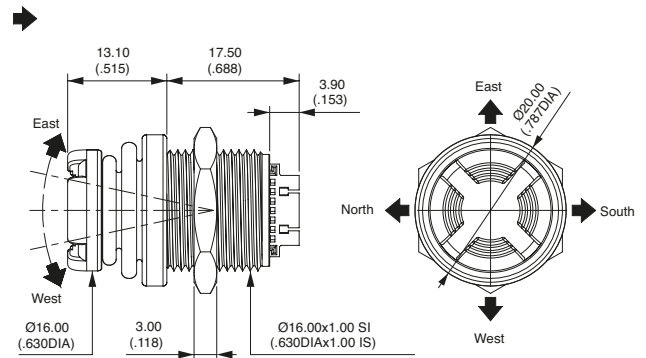
BUILD YOUR PART NUMBER

NV SERIES	H	ACTUATOR STYLES 1 Castle 2 Conical	PANEL MOUNT D Drop-in	CONTACT 1 50mA	OUTPUT C Connector	PUSHBUTTON 0 No 1 Yes
	LIMITER C Cross	ACTUATOR COLORS P1 Blue P2 Black P3 Green P4 Grey P5 Yellow P6 Red P7 White P9 Orange PM Desert tan				

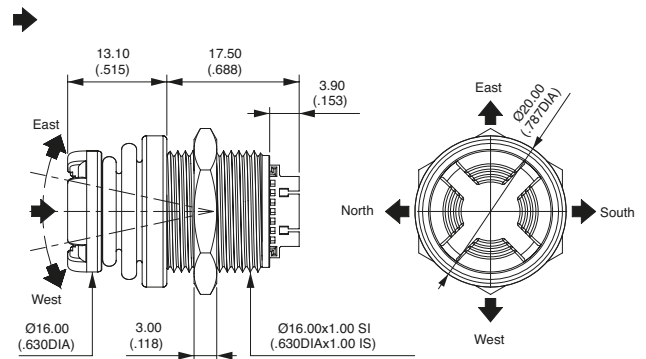
NV series

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 $\pm$ 0.250VDC
- Reverse Polarity Max: 10VDC
- Overvoltage Max: 20VDC
- Minimum load: 1K Ω
- Return to Center Voltage Tolerance (POS2): 2.50VDC $\pm$ 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 $\pm$ 5.0g (0.64oz $\pm$ 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

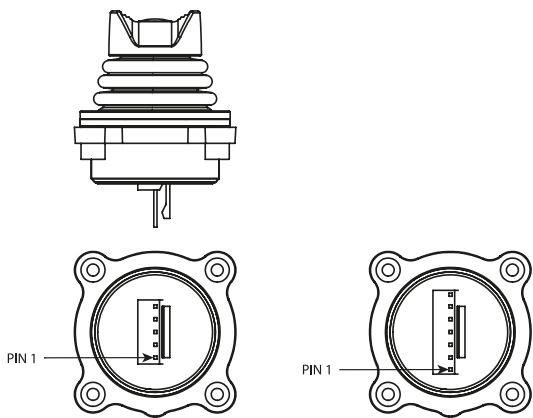


MATERIALS

- 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)

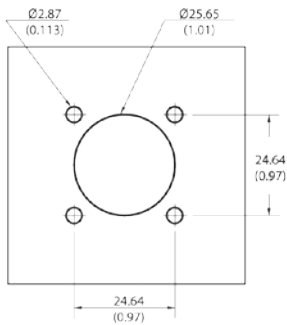
WIRING SPECIFICATION	
Black	Ground & button common
Red	Power (5V)
Blue	X axis output (alpha)
Blue/White Stripe	X axis output (beta)
Red/White Stripe	Power (5V) (beta)
Black/White Stripe	Ground (beta)

CONNECTOR TERMINATION OPTION
Single output configurations feature a ve 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 ve function harness is part number 505-499.

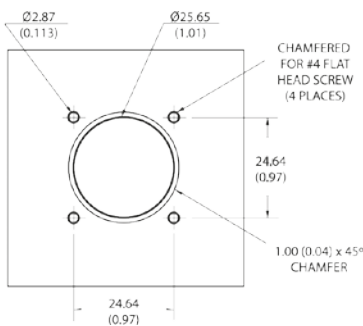


PANEL CUT-OUT

DROP-IN MOUNT



REAR MOUNT



Three position single axis thumb controls •
non-contacting Hall effect technology



BUILD YOUR PART NUMBER

SERIES	HANDLE	MOUNTING OPTIONS	TERMINATION ¹	OPERATION
FR				
0	None	N	1	U
1	Castle	D	2	
2	Winged Hat	R	3	
3	Conical	A	4	
A	Handle 1, 2, 3			

OUTPUT OPTIONS	POWER SUPPLY	HANDLE COLOR
POS1/POS2/POS3		
01	A	1
02	B	2
03		3
05		
06		
07		
09		
10		
11		

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.

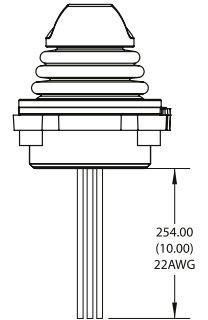
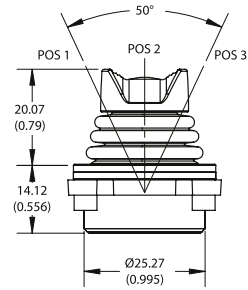
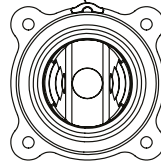
FR series

Three position single axis thumb controls •
non-contacting Hall effect technology

DIMENSIONS

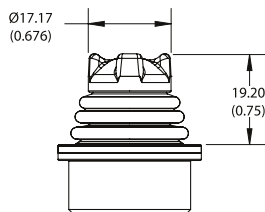


INDEX NOTCH
90° FROM DIRECTION OF TRAVEL

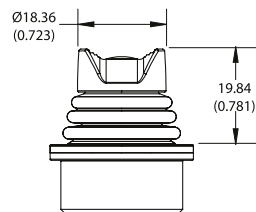


HANDLE OPTIONS

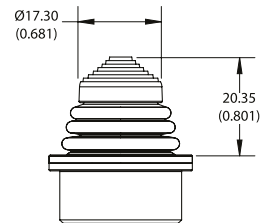
1. CASTLE



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 HS1DXXXA)
- 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



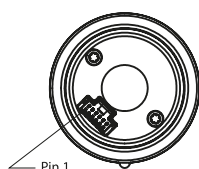
PUSHBUTTON SWITCH (OPTION 6 HANDLE)

- 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



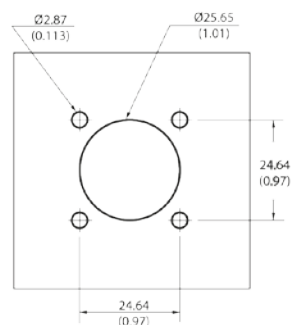
CONNECTIONS

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		

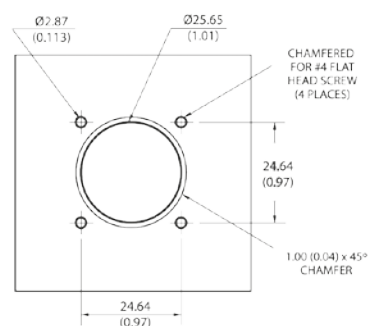


MOUNTING

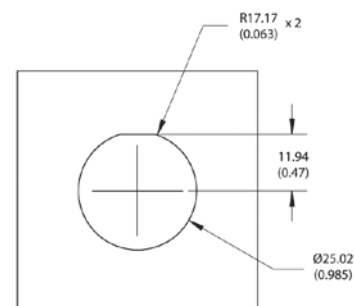
PLASTIC HOUSING - DROP-IN CUTOUT



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

HS

SERIES

HANDLE

MOUNTING STYLE

TERMINATION

LIMITER

CONTACT

A

0

None

1

Castle

2

Winged Hat

3

Conical

4

Finger Tip

5

Round Jog

6

Pushbutton

7

Mushroom*

8

Low Profile*

N

None

D

Drop-in

R

Rear mount

A

Drop-in and Rear Mount

T

Threaded housing

1

1.00mm (0.039in)
Pitch Molex Connector

2

1.00mm (0.039in)
Pitch Molex Connector
with 10" Mating Harness

2

2-way

4

4-way

S

Silver Plated

G

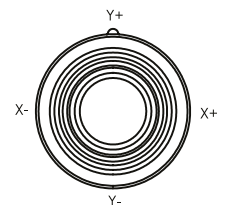
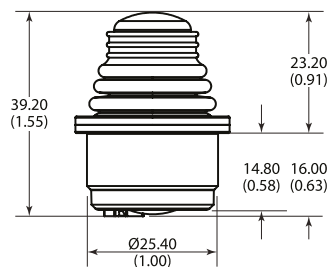
Gold Plated

*= Not available with
Threaded Housing
(Mounting Style Option "T")

HS series

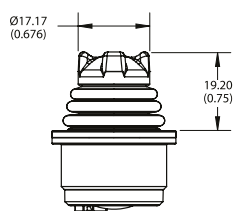
Micro switch 5-way thumb controls •
switching technology

DIMENSIONS

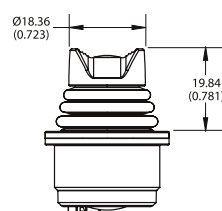


HANDLE OPTIONS

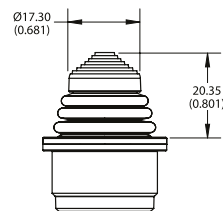
1. CASTLE



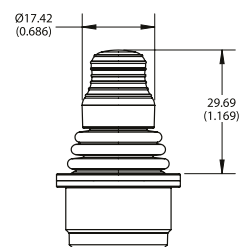
2. WINGED HAT



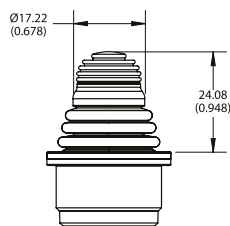
3. CONICAL



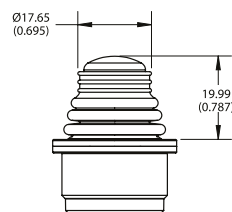
4. FINGER TIP



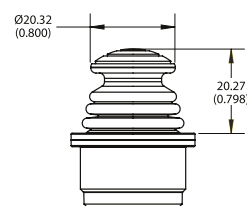
5. ROUND JOG



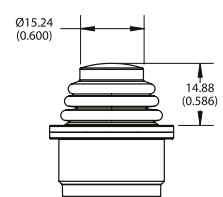
6. PUSHBUTTON



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 $\pm$ 0.50VDC
- Reverse Polarity Max: -10VDC max
- Overvoltage Max: 20V
- Consumption: 11mA max (single output), 22mA max (dual output)
- Return to Center Voltage Tolerance on Spring version (no load): 2.5VDC $\pm$ 0.2VDC



MECHANICAL SPECIFICATIONS

- Spring Version Operating Force: 4N $\pm$ 0.5N (with detent); 2N $\pm$ 0.5N (without detent)
- Friction Hold Detent Operating Force: 1.75N $\pm$ 0.5N (with 11 detents); 2.5N $\pm$ 0.5N (with 1 detent)
- Mechanical Angle of Movement: $\pm$ 35° (versions S/G/L) $\pm$ 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 $\pm$ 2g (0.4oz $\pm$ 0.07oz)

The company reserves the right to change specifications without notice.



HR series

Proportional single axis thumb controls • non-contacting Hall effect technology

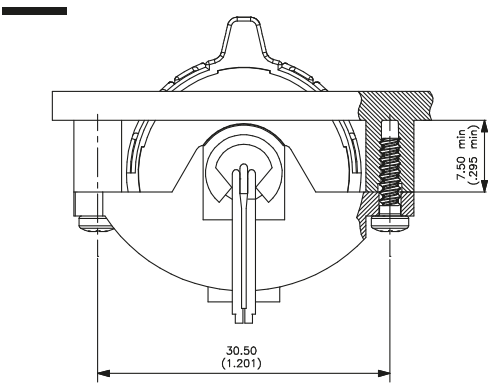


MATERIALS

- Body: Polyamide
- Wheel: Polyamide



MOUNTING



CONNECTIONS

SINGLE OUTPUT WITHOUT BACKLIGHTING

PIN	FUNCTION	COLOR
1	Power supply: +VDC 5V	Red
2		
3		
4		
5	Output	
6		
7		
6	Output	
7	Ground 0V	Black

SINGLE OUTPUT WITH BACKLIGHTING

PIN	FUNCTION	COLOR
1	Power supply: +VDC 5V	Red
2		
3		
4		
5	LED +	Yellow
6	LED -	Blue
5	Output	White
6		
7		
6	Output	
7	Ground 0V	Black

DUAL OUTPUT WITHOUT BACKLIGHTING

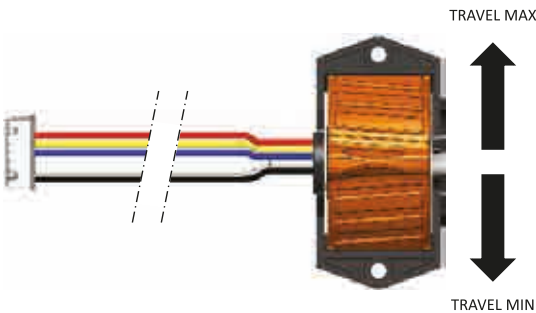
PIN	FUNCTION	COLOR
1	Power supply: +VDC 5V	Red
2		
3		
4		
5	Output 2	Green
6	Output 1	White
7	Ground 0V	Black

DUAL OUTPUT WITH BACKLIGHTING

PIN	FUNCTION	COLOR
1	Power supply: +VDC 5V	Red
2		
3		
4		
5	LED +	Yellow
6	LED -	Blue
5	Output 2	Green
6	Output 1	White
7	Ground 0V	Black



Wiring harness with multiwire leads
AWG28 - Length 140mm (5.51in)



Proportional single axis thumb controls • non-contacting Hall effect technology



BUILD YOUR PART NUMBER

HR

SERIES

ACTUATOR

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

MOUNTING OPTIONS

2

Rear

BACKLIGHTING

1

Yes

2

No

WHEEL COLORS

1

Blue

B

Dark blue

2

Black

3

Green

5

Yellow

7

White

9

Orange

OUTPUT OPTIONS

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

MECHANICAL FUNCTIONS

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

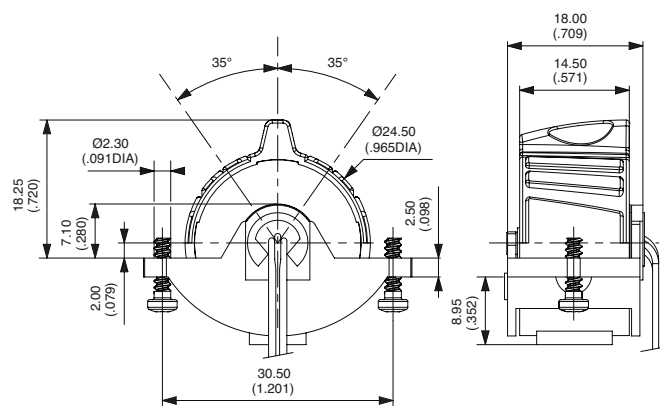
NOTE:

Other detent options available upon request.

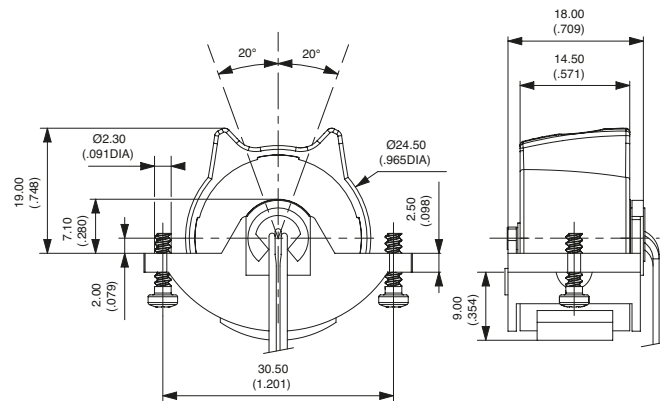
HR series

Proportional single axis thumb controls •
non-contacting Hall effect technology

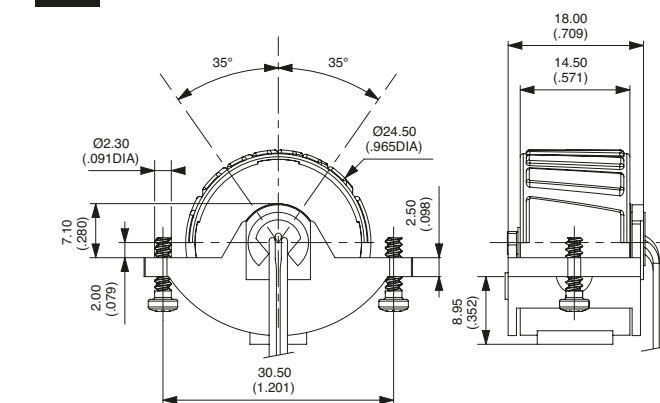
WHEEL WITH 1 TAB - OPTION S & G



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



ELECTRICAL SPECIFICATIONS

- Supply Voltage Range: 5.00VDC $\pm$ 0.250VDC
- Reverse Polarity max: -10VDC
- Overvoltage max: 16V
- Output Impedance: 2 Ω
- Return to Center Voltage Tolerance: $\pm$ 200mV initial



MECHANICAL SPECIFICATIONS

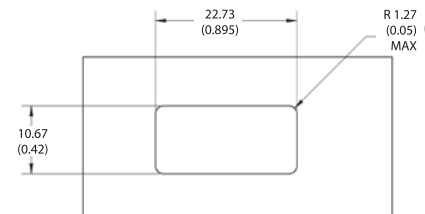
- Operating Force: 0.7N (0.15lbf)
- Maximum Vertical Load: 111N (25lbf)
- Maximum Horizontal Load: 67N (15lbf)
- Mechanical Angle of Movement: $\pm$ 45°
- Expected Life: 3 million lifecycles
- Mass/weight: 4.2g $\pm$ 1.0g (0.15oz $\pm$ 0.03oz)
- Lever Action (centering): Spring

The company reserves the right to change specifications without notice.

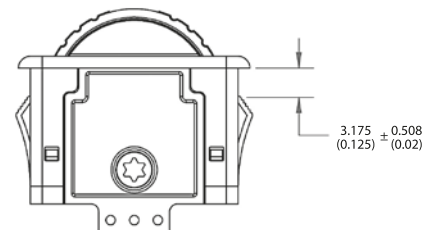


MOUNTING

PANEL CUT-OUT



PANEL THICKNESS



MATERIALS

- Body: Delrin
- Actuator: Glass filled nylon

CW series

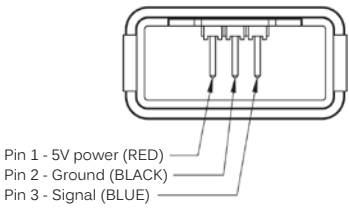
Proportional miniature thumb controls • non-contacting Hall effect technology

BUILD YOUR PART NUMBER

CW								0
SERIES		TAB SHAPE		MOUNTING		OUTPUT OPTIONS		
		0 No Tab 1 Tab 1		1 Snap-in		00 0V to 5V 01 0.25V to 4.75V 02 0.5V to 4.5V 03 1V to 4V 99 PWM ¹		
	WHEEL SHAPE		ACTUATOR COLOR		CENTERING OPTION		TERMINATION	
	A Ribbed wheel (no tab) B Smooth wheel		BK Black GY Grey		A Standard spring		A 2.54mm (.100") Pitch Male Header B 2.54mm (.100") Pitch Male Header with 10' 22AWG Mating Harness (505-507)	

¹ - Contact factory for PWM configuration.

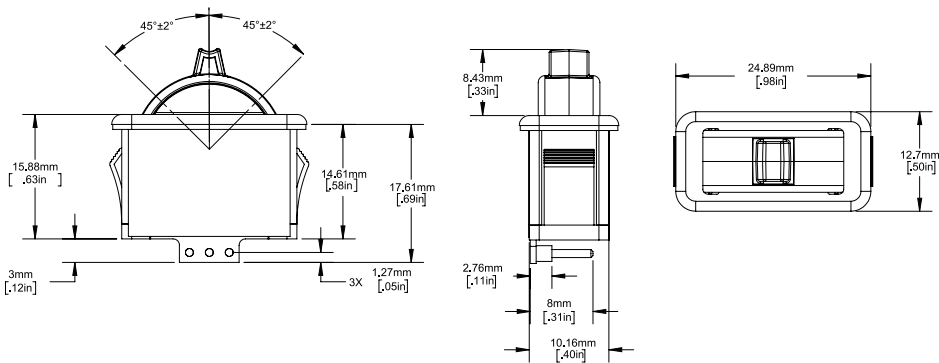
CONNECTIONS



OPTIONAL MATING HARNESS ¹ Part number: 505-507	WIRING SPECIFICATION
Wire type: 22 AWG 25cm PTFE	Red: Power (5V)
Connector: Molex 0050579503	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)



ELECTRICAL SPECIFICATIONS

- Supply Voltage Range: 5.00VDC $\pm$ 0.250VDC
- Reverse Polarity Max: -10VDC
- Overvoltage Max: 16V
- Minimum load: 1 K Ω
- Return to Center Voltage Tolerance (no load): $\pm$ 200mV



MECHANICAL SPECIFICATIONS

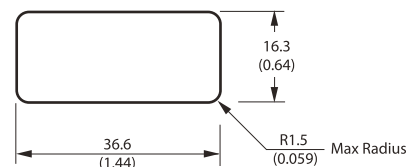
- Operating Force: 0.7N (0.15lbf)
- Maximum Vertical Load: 111N (25lbf)
- Maximum Horizontal Load: 133N (30lbf)
- Mechanical Angle of Movement: 80° ($\pm$ 40° from center)
- Expected Life: 5 million lifecycles
- Mass/Weight: 35g $\pm$ 5g (1.23oz $\pm$ 0.18oz)
- Lever Action (centering): Spring

The company reserves the right to change specifications without notice.

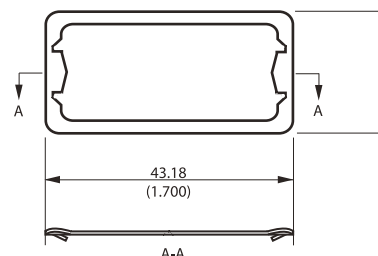


MOUNTING

MOUNTING OPTIONS



STEEL SPRING RETAINER



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

TERMINATION

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

1

2.54mm (.100") Pitch
Male Header

2

22AWG 41cm PTFE

3

28AWG 41cm PTFE

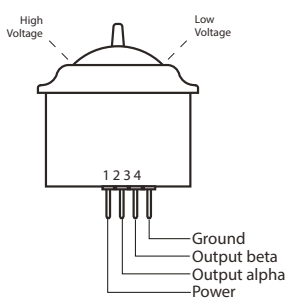
4

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

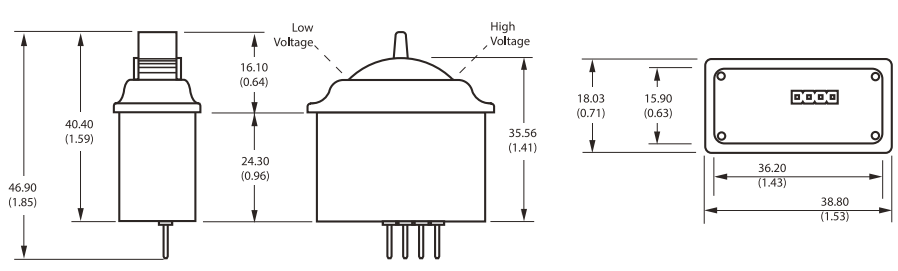
DEFAULT WIRE COLOR CODE		
COLOR	FUNCTION	AWG
Red	+5V	22
Black	Ground	
Blue	Output alpha	
Blue/White	Output beta	

OPTIONAL MATING HARNESS

The TW Series is available with an optional mating harness. the four function harness is part number 505-498.

CIRCUIT	WIRE COLOR
Pin1	Black
Pin2	Blue/White
Pin3	Blue
Pin4	Red

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 CONFIGURED WITH TS SERIES)

- Supply Voltage Range: 5.00VDC $\pm$ 0.250VDC
- Reverse Polarity Max: -10VDC
- Overvoltage Max: 20VDC
- Minimum load: 1 Ω
- Return to Center Voltage Tolerance: $\pm$ 200mV initial



MECHANICAL SPECIFICATIONS

- Operating Force: 3N $\pm$ 0.5N (TS); 6N $\pm$ 2N (IP)
- Maximum Vertical Load: 200N (45lbf) (TS)
- Maximum Horizontal Load: 150N
- Mechanical Angle of Movement: $\pm$ 25°
- Expected Mechanical Life: 1 million lifecycles
- Mass/weight: 226.8g (8oz)
- Lever Action (centering): Spring



MATERIALS

- Body: Thermoplastic

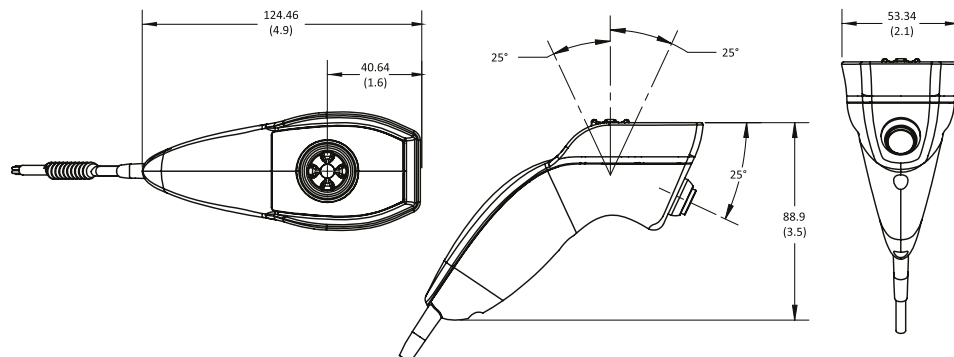
The company reserves the right to change specifications without notice.



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

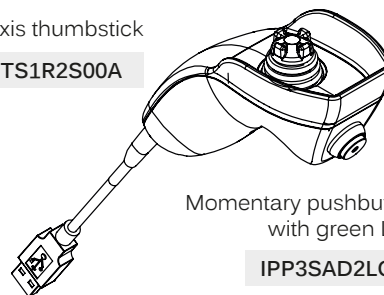
TWO AXIS TS WITH MOMENTARY PUSHBUTTON, COILED CABLE



PC 3566

Two axis thumbstick

TS1R2S00A



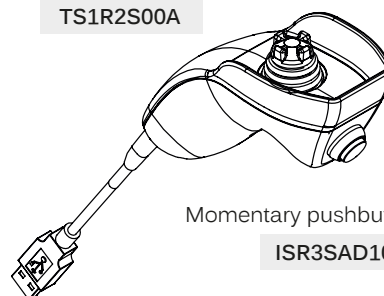
Momentary pushbutton
with green LED

IPP3SAD2LOG

OUTPUT - USB "Game Controller"

Two axis thumbstick

TS1R2S00A



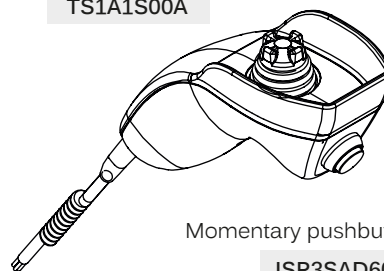
Momentary pushbutton

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 $\pm$ 0.250VDC
- Reverse Polarity Max: -10VDC
- Overvoltage 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 $\pm$ 5.0g (0.64oz $\pm$ 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



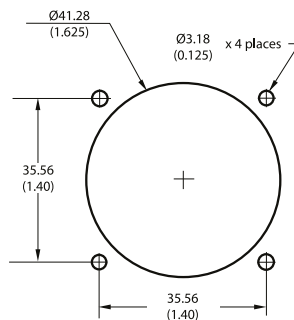
Fig 2

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.

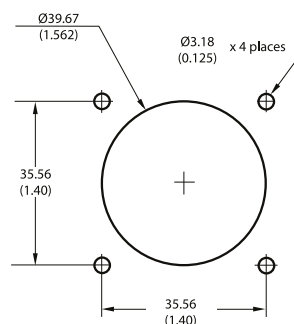


PANEL CUT OUT

DROP-IN



REAR MOUNT

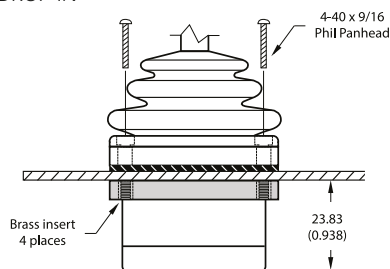


* Not available for Option 11 and 55 Handles

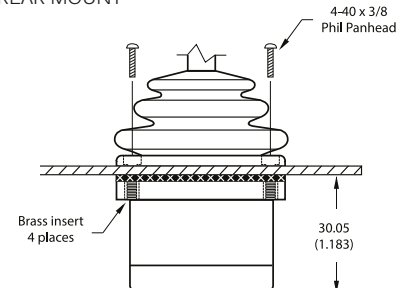


MOUNTING

DROP-IN



REAR MOUNT



Proportional multi-axis fingertip controllers •
non-contacting Hall effect technology



BUILD YOUR PART NUMBER

HF

SERIES

HANDLE

LIMITER PLATE

10	Ball Tip (2 Axis)	45	2 Pushbuttons (3 Axis)	S	Square	
11	Tapered (2 Axis)	46	Low Profile (3 Axis)	R	Round	
22	1 Pushbutton (2 Axis)	50	3 Axis, IP67 Sealed	X	Slotted	
27	1 Pushbutton (2 Axis), IP67 Sealed	51	3 Axis, 1 Pushbutton, IP67 Sealed	Y	Slotted	
33	3 Axis	52	3 Axis, 2 Pushbutton, IP67 Sealed	P	Plus	
44	1 Pushbutton (3 Axis)	55	3 Axis, 2 Pushbutton, IP67 Sealed	C	Cross	
				W	Guided Feel – Square	
				Z	Guided Feel – Round	

MOUNTING

1	Drop-in
4	Rear Mount

OUTPUT OPTIONS

0	0V to 5V	7	1V to 4V – Sensor 1 1V to 4V – Sensor 2	0-U	USB-Horizontal, Mini B termination
1	0.5V to 4.5V	8	0V to 5V – Sensor 1 5V to 0V – Sensor 2	2-U	USB-Vertical cable exit
2	0.25V to 4.75V	9	0.5V to 4.5V – Sensor 1 4.5V to 0.5V – Sensor 2	1-J	Cursor Emulation
3	1V to 4V	10	0.25V to 4.75V – Sensor 1 4.75V to 0.25V – Sensor 2	0-V	0V to 5V (Voltage regulator)*
4	0V to 5V – Sensor 1 0V to 5V – Sensor 2	11	1V to 4V – Sensor 1 4V to 1V – Sensor 2	B-V	±10V (Voltage regulator)**
5	0.5V to 4.5V – Sensor 1 0.5V to 4.5V – Sensor 2			2-C	CANbus J1939
6	0.25V to 4.75V – Sensor 1 0.25V to 4.75V – Sensor 2			3-C	CANopen

NOTES :

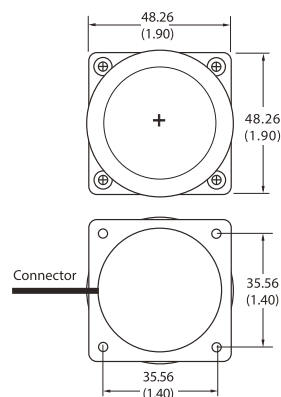
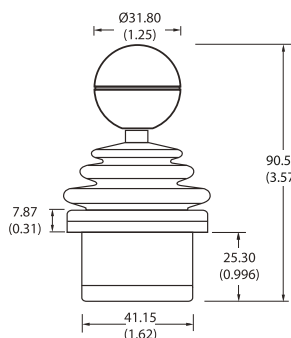
*Requires operating voltage 6V ≥ 35V

**Requires operating voltage 11V ≥ 35V

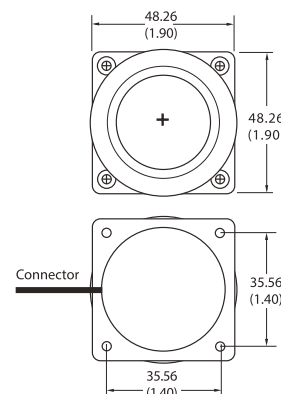
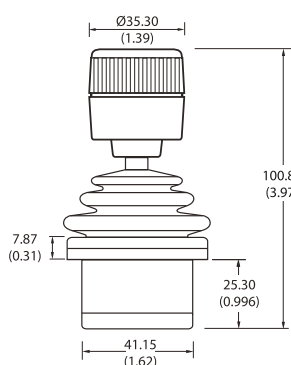
HF series

Proportional multi-axis fingertip controllers •
non-contacting Hall effect technology

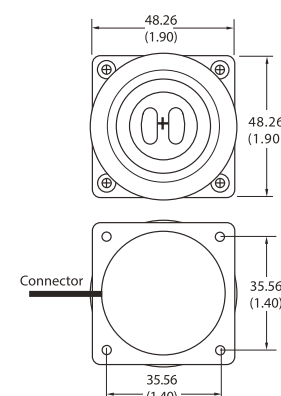
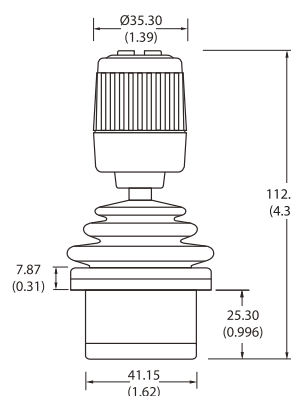
WITH HANDLE N°10 - BALL TIP - 2 AXIS



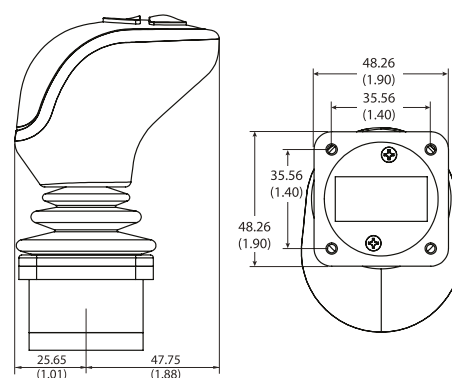
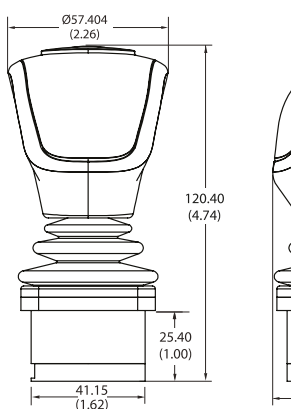
WITH HANDLE N°33 - 3 AXIS



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 $\pm 0.5V$ transient free; 3.3V $\pm 0.1V$ (configuration 2)
- Output impedance: 10 Ω
- Overvoltage 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.

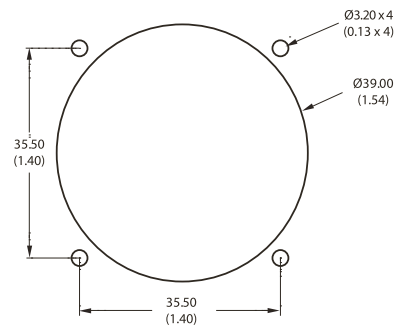
PIN	FUNCTION	COLOR
1	0V	Black
2	Center Tap Reference	Green
3	No connection	
4	Y Axis Output	Yellow
5	X Axis Output- Where Specified	Blue
6	+V	Red
7	No connection	

For details on configuration 5 pinout, please contact Customer Support.

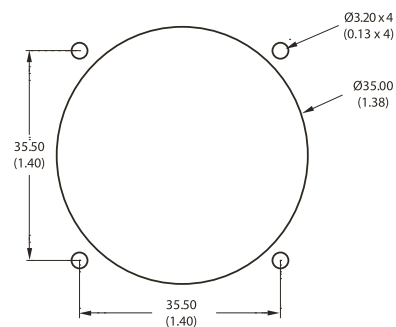


PANEL CUT-OUT

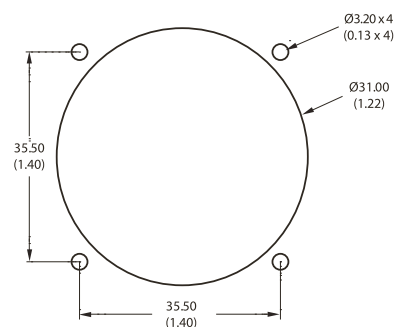
DROP-IN MOUNTING



SUB-MOUNTING OPTION A



SUB-MOUNTING OPTION B



3000 series

Robust proportional fingertip controllers •
non-contacting Hall effect technology



BUILD YOUR PART NUMBER

3

SERIES

CONFIGURATION

1	Standard
2	3.3V Operation
3	Dual Outputs
4	Inverse Dual Outputs
5	PWM

GAIN

10	±10%xV
25	±25%xV
30	±30%xV
40	±40%xV
50	±50%xV

LIMITER

A	Single Axis	⏏
C	Cross	⊕
D	Diamond	◊
R	Round	○
S	Square	□
X	X Type	◇

HANDLE*

BL	Round
E	Conical
Q	Skirted
AK	Pushbutton
AL	Third Axis

BEZEL

0	None
4	Circular (below panel)
6	Square (drop-in)
7	Circular (drop-in)

MODIFIER

00	None
20	Guided Feel

*For more handles see www.apem.com

NOTES :

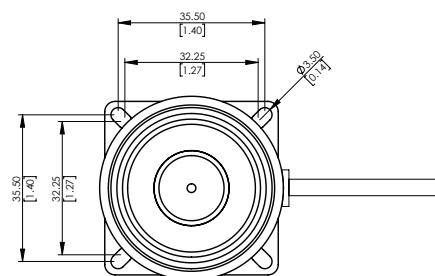
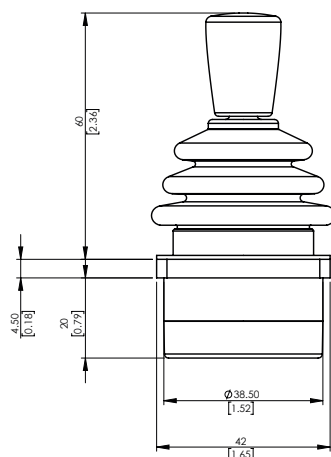
Standard option availability : The following table shows which permutations of options are possible.

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	✓	✓	✓	✓	✓	x	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2	x	x	✓	✓	✓	✓	x	x	x	x	x	✓	✓	✓	✓	✓	✓	✓	✓	✓
3	x	x	✓	✓	✓	x	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
4	x	x	✓	✓	✓	x	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
5	x	x	✓	✓	✓	x	✓	x	x	x	x	x	✓	✓	✓	✓	✓	✓	✓	✓

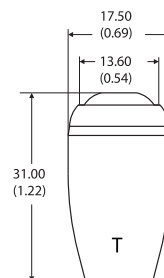
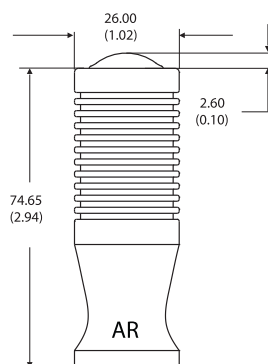
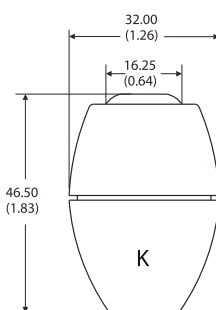
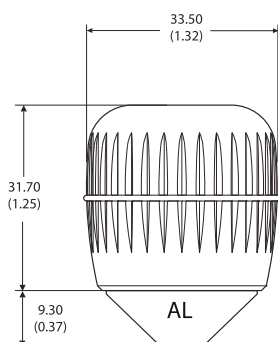
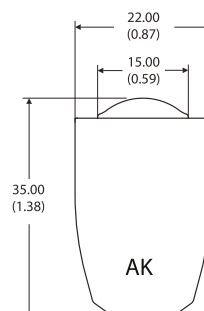
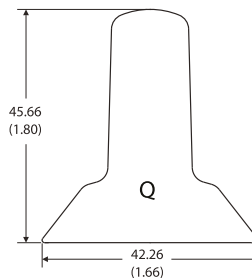
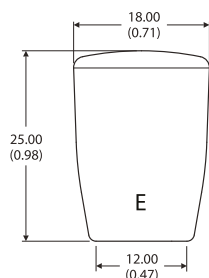
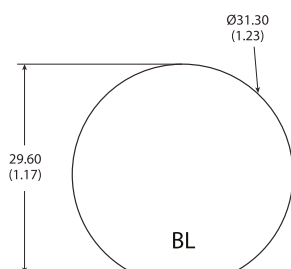
3000 series

Robust proportional fingertip controllers •
non-contacting Hall effect technology

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 $\pm$ 0.5V Transient free
- Output Impedance: 10K Ω Minimum recommended
- Return to Center Voltage Tolerance: $V/2 \pm$ (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



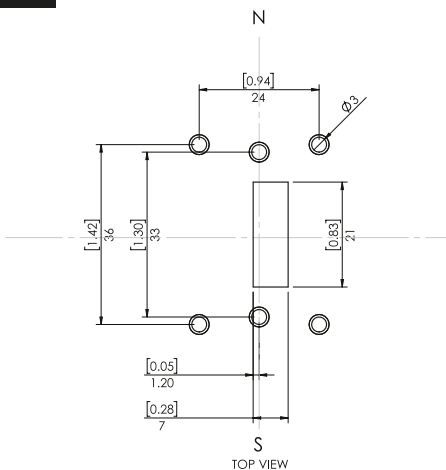
MATERIALS

- 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

BH series

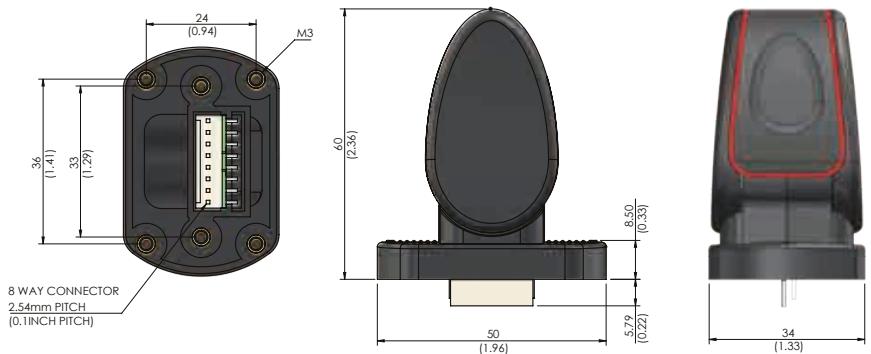
Proportional single axis paddle joystick controllers • non-contacting Hall effect technology



BUILD YOUR PART NUMBER

			
SERIES	CONFIGURATION	GAIN	LEVER OPERATION
BH 60mm (2.36in) above the panel	1 Standard Dual Outputs 2 Inverse Dual Outputs 3 PWM	10 ±10%xV 25 ±25%xV 30 ±30%xV 40 ±40%xV 50 ±50%xV	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 $\pm$ 0.5V Transient free
- Output Impedance: 10K Ω Minimum recommended
- Return to Center Voltage Tolerance: $V/2 \pm$ (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



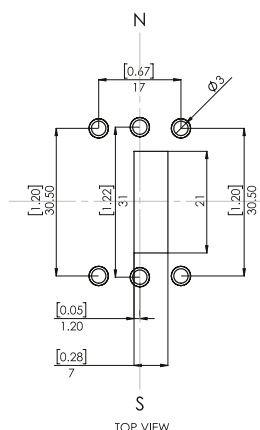
MATERIALS

- 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

Proportional single axis paddle joystick controllers •
non-contacting Hall effect technology



BUILD YOUR PART NUMBER

BL

SERIES

BL

48mm (1.91in)
BK Black above
the panel

CONFIGURATION

1

Standard Dual
Outputs

2

Inverse Dual
Outputs

3

PWM

GAIN

10

±10%xV

25

±25%xV

30

±30%xV

40

±40%xV

50

±50%xV

LEVER OPERATION

A01

Spring to Center

HANDLE

BK

Black

DETAIL COLOR

BK

Black

RE

Red

BL

Blue

YE

Yellow

GR

Green

SWITCHING POINTS

00

No Switches

05

±5 Degrees

15

±15 Degrees

30

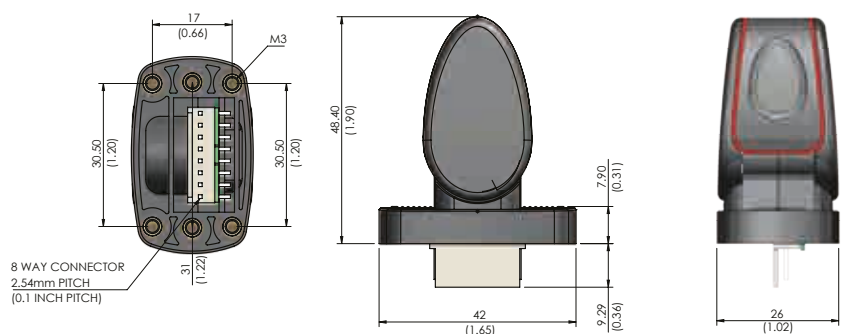
±30 Degrees

MODIFIER

00

None

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 $\pm$ 0.25V
- Reverse Polarity Max: -10V
- Overvoltage Max: +20V
- Output Impedance: 10 Ω
- Return to Center Voltage Tolerance: $V/2 \pm (5\% \times \text{Gain})$



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



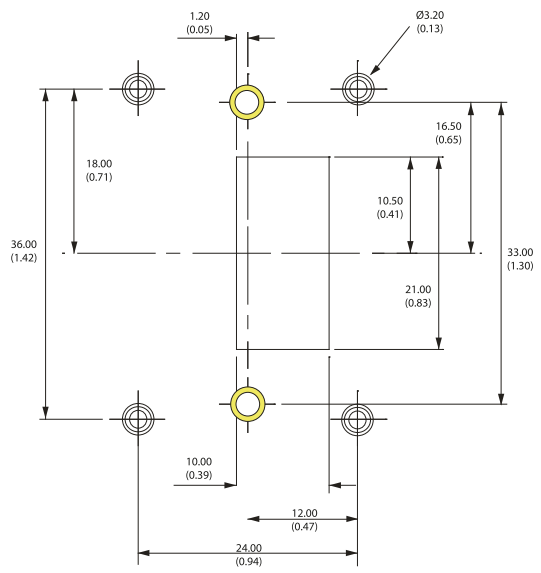
MATERIALS

- 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.

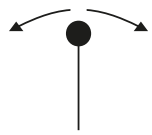
PIN	FUNCTION
1	5V
2	Switch 1(+)
3	0V
4	Analog/PWM output 1
5	Analog/PWM output 2
6	0V
7	Switch 2(-)
8	5V



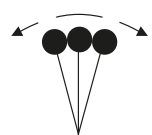
LEVER OPERATION

DETENT OPTIONS

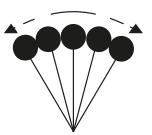
D01 = CENTER DETENT



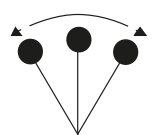
D02 = +/-12.5 DEGREES



D03 = +/- 12.5 & 25 DEGREES

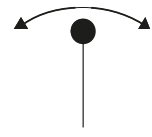


D04 = +/-25 DEGREES

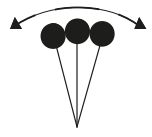


SPRING TO CENTER WITH DETENT OPTIONS

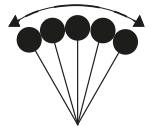
SD1 = CENTER DETENT



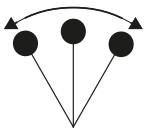
SD2 = +/-12.5 DEGREES



SD3 = +/- 12.5 & 25 DEGREES



SD4 = +/- 25 DEGREES



BF & BD series

Proportional single axis paddle joystick controllers •
non-contacting Hall effect technology



BUILD YOUR PART NUMBER



PADDLE

BF	74mm (2.91in) above the panel
BD	50mm (1.97in) above the panel



CONFIGURATION

1	Standard Dual Outputs
2	Inverse Dual Outputs
3	PWM



GAIN

10	±10%xV
25	±25%xV
30	±30%xV
40	±40%xV
50	±50%xV



LEVER OPERATION

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

BK	Black
RE	Red
BL	Blue
YE	Yellow
GR	Green



SWITCHING POINTS

00	No Switches
05	±5 Degrees
12	±12.5 Degrees
25	±25 Degrees



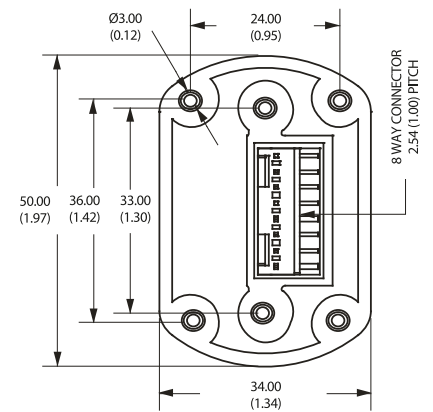
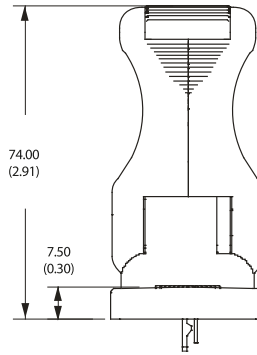
MODIFIER

00	None
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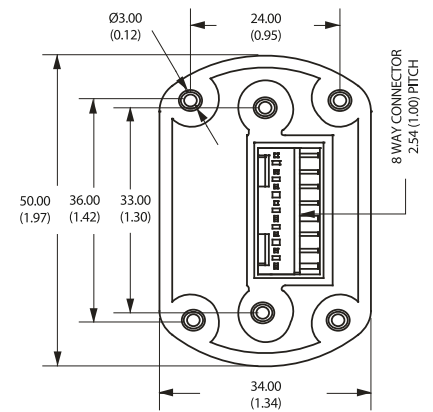
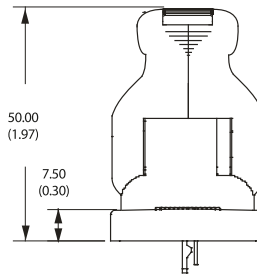
BF & BD series

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.



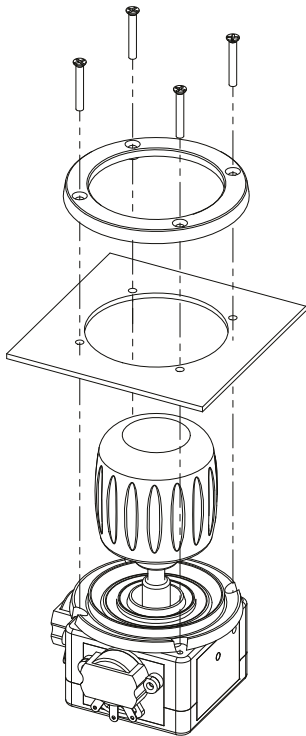
M series

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	28
Orange	Switch Common	
3 AXIS JOYSTICK WITH 2 PUSHBUTTONS - OPTION Q		
Orange	Switch 1	28
Brown	Switch 2	
Green	Switch Common	
Z AXIS IN A 3 AXIS JOYSTICK - OPTIONS 8,9,M,N,Q		
Red	Supply	28
White	Signal	
Blue	Return	



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

SERIES	MODEL	MOUNTING BEZEL	CENTERING
M	1		

HANDLE	OUTPUT OPTIONS
0 Tapered Convex	Potentiometers
1 Concave Tip	P 5K Ω , 220°
2 Flat Tipped	M 5K Ω , 56°
3 Concave Tip - Long	R 5K Ω , 50°
5 Pushbutton	
6 Straight Tip - Short	
8 3 Axis	
9 3 Axis with Pushbutton	
A Straight Tip - Mid	
B Straight Tip - Long	
C Ball Tip	
E Pushbutton	
G Pushbutton	
H Pushbutton	
M 3 Axis No Button	
N 3 Axis with 1 Button	
Q 3 Axis with 2 Buttons	

NOTES :

Mounting accessories : Standard hardware includes:

C= Ring, cup, and 4 black Phl screws 2-56x1/2in

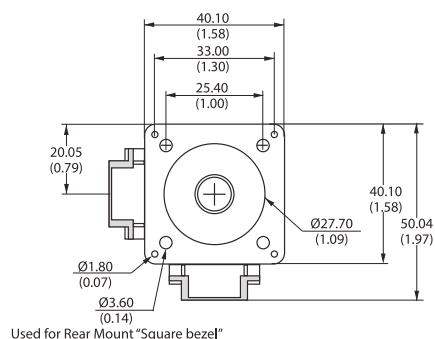
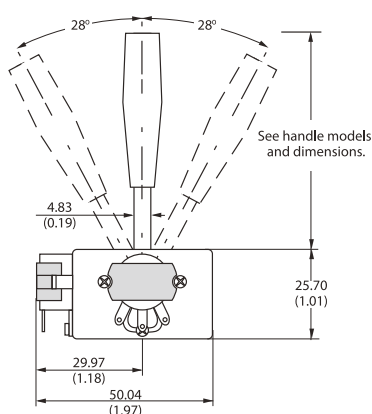
L= Ring and 4 black Phl screws 2-56x1/2in

F= Square bezel, 4 screws 2-56x1/2in Phl, and 4 screws 2-56x1/4in Phl

M series

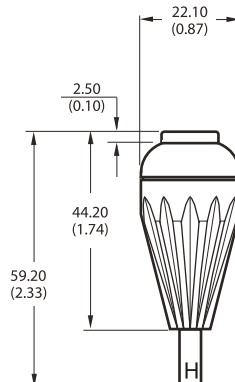
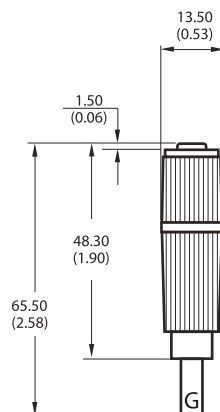
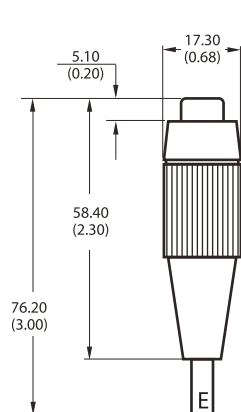
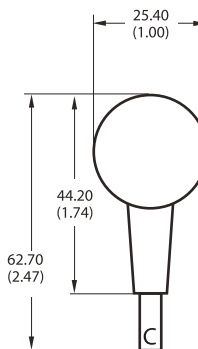
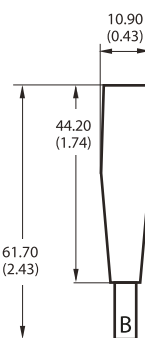
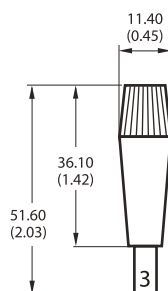
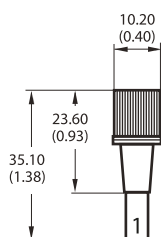
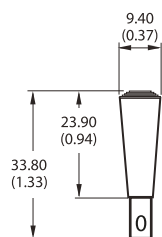
Proportional resistive fingertip controllers • potentiometer technology

WITH HANDLE OPTION A 2 AXIS

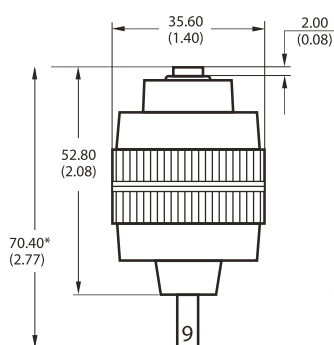
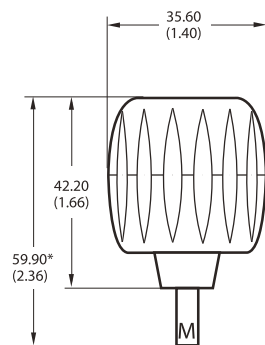
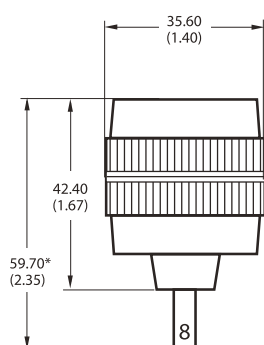


HANDLE OPTIONS

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
- Overvoltage Max: 70V
- Output Impedance: 0 to 5K Ω or 0 to 10K Ω (subject to potentiometer)
- Return to Center Voltage Tolerance: $V/2 \pm (V \cdot 2\%)$



MECHANICAL SPECIFICATIONS

- Operating Force: 1.3N (0.29lbf)
- Resistance Tolerance: $\pm 20\%$
- 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



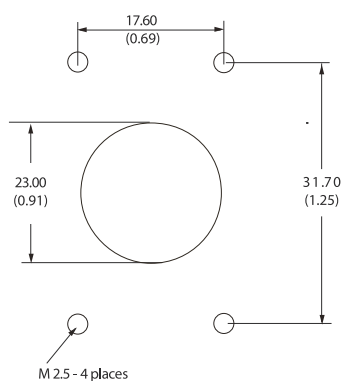
MATERIALS

- Shaft: Stainless steel
- Boot: Neoprene
- Handles:
BL, E, Q, AT - Nylon
D, AK - Aluminum
J, X - ABS

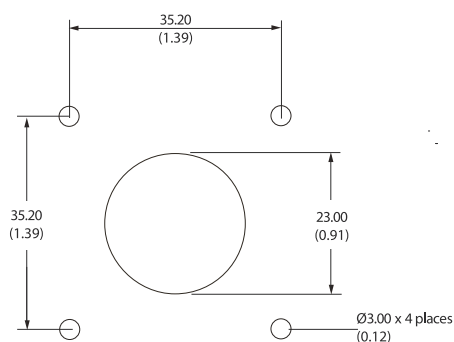


MOUNTING AND PANEL CUT-OUT

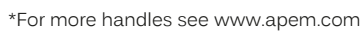
OPEN FRAME



CLOSED FRAME



APEM

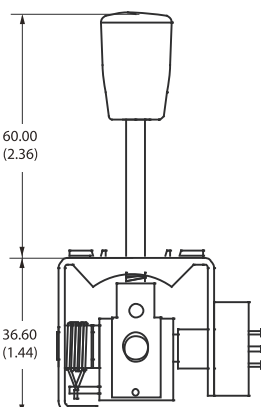


¹ Only available on 4P types.

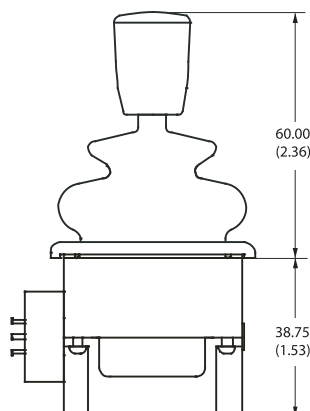
4000 series

Proportional metal fingertip controllers • potentiometer technology

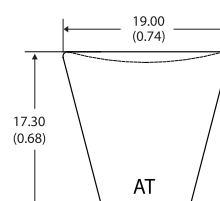
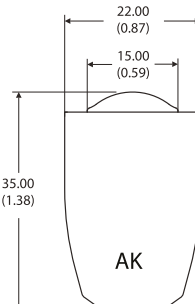
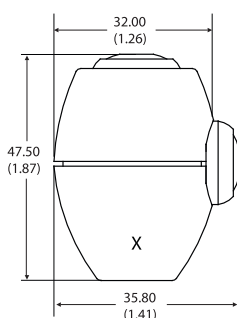
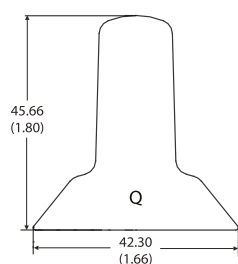
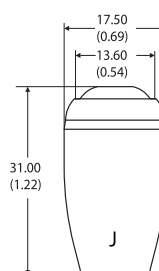
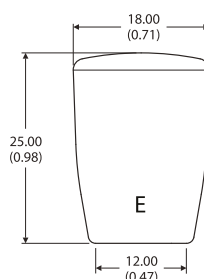
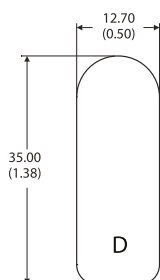
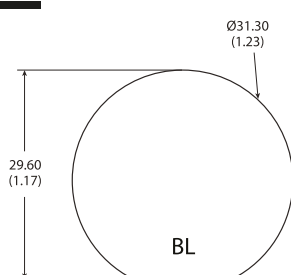
OPEN BODY



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.



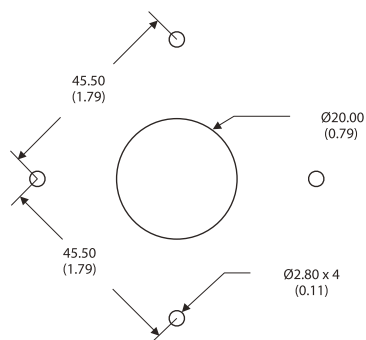
1000 series

Compact fingertip controllers •
switching technology

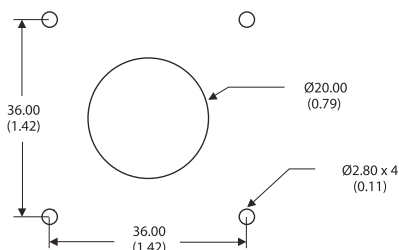


PANEL CUT-OUT

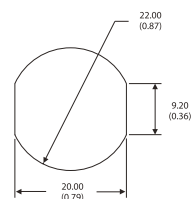
V3 SCREW MOUNT CUT-OUT



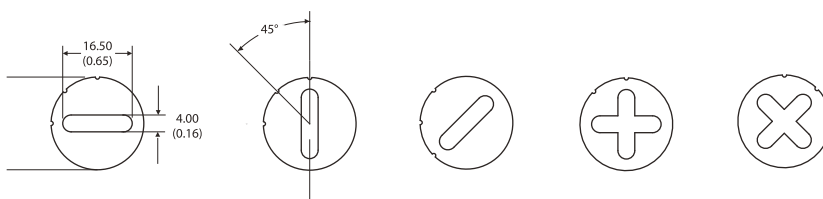
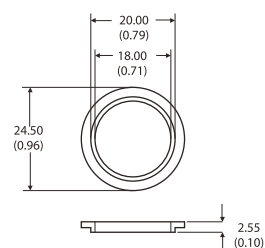
V4 SCREW MOUNT CUT-OUT



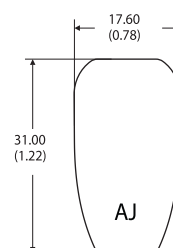
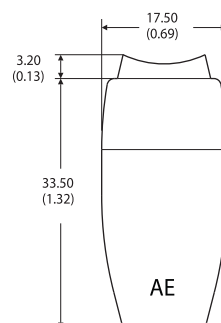
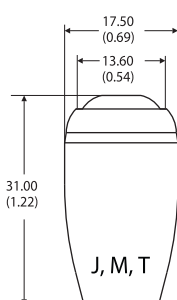
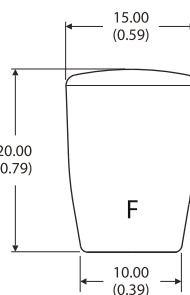
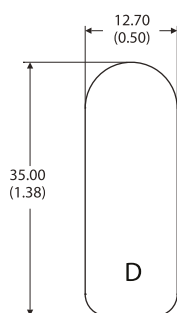
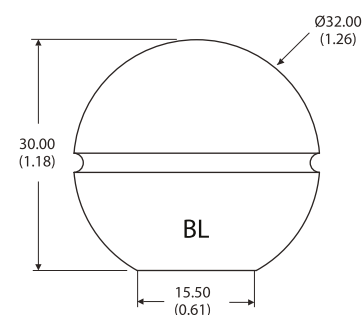
V4 BUSH MOUNT CUT-OUT



LIMITERS AND BEZEL SETS



HANDLE OPTIONS



1000 series

Compact fingertip controllers •
switching technology



BUILD YOUR PART NUMBER

SWITCHES

1	6A - V4*
2	16A - V3
3	10A - V4*
4	Right Angle V4*
5	5A/250V AC - V4* Faston Style
6	5A/250V AC - V3 Faston Style with screw fixing
7	10A/250V AC - V4* IP67

MOUNTING

D	22mm Bush*
V	4 Point Screw

POLES

1	Single Pole
2	Double Pole*

LEVER

1	Long*
5	Standard V4*
6	For Pushbutton V4*
7	For Double Pole V4 or V3
9	Double Pole and Pushbutton V4*

HANDLE

BL	Round
D	Cylindrical
F	Conical
H	Tall Conical
J	Pushbutton*
M	Pushbutton*
T	Pushbutton*
V	Bullet
AE	Rocker*
AJ	Stainless Steel

LIMITER AND BEZEL SET

0	Not Supplied
1	Standard

BOOT

1	Screw Mount
5	Bush Mount*

MODIFIER

00	None
34	+ Limiter Fitted
39	Slot Limiter Fitted

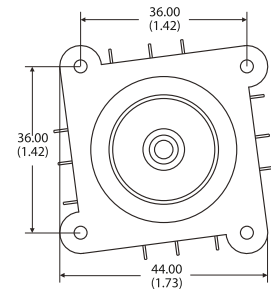
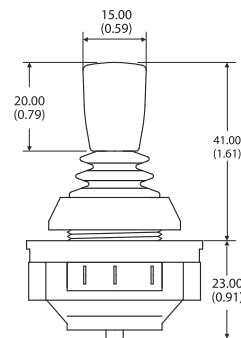
NOTES:

*Unavailable with V3 construction

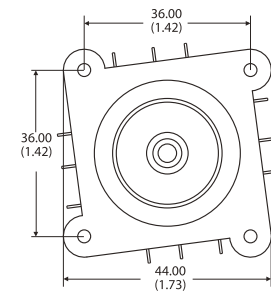
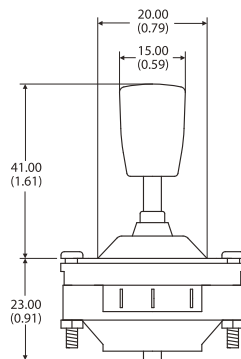
1000 series

Compact fingertip controllers • switching technology

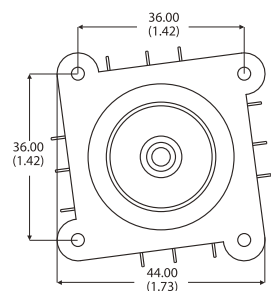
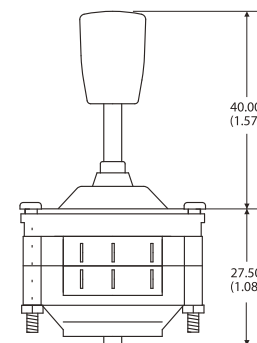
V4 BUSH MOUNT



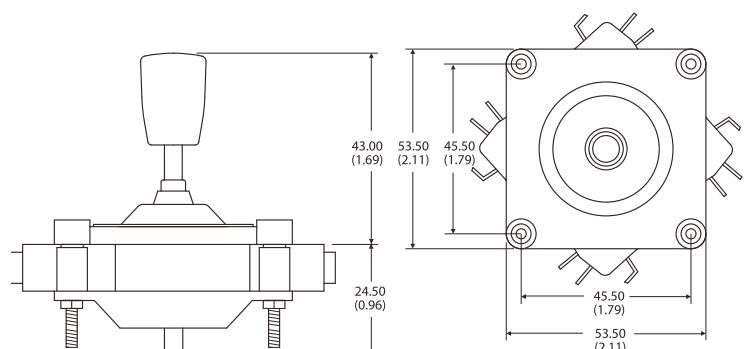
V4 SCREW MOUNT



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)



MATERIALS

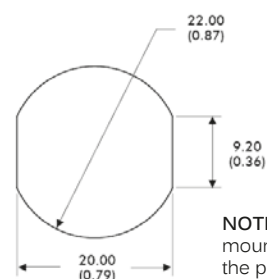
- Shaft: Stainless steel
- Boot: Neoprene
- Housing: Mineral filled nylon-6
- Handles :
 - BH - Aluminum
 - BE - Aluminum and phenolic

The company reserves the right to change specifications without notice.



MOUNTING

PANEL CUT-OUT



NOTE : The joystick is mounted from beneath the panel



Apply the assembled base through the mounting cut-out.

1000HE series

Compact & rugged switch fingertip controllers • switching technology



BUILD YOUR PART NUMBER

SWITCHES

1	6A - V4
3	10A - V4
3	Right angle V4
5	5A/250VAC - V4 Faston Style
7	10A/250VAC - V4 IP67

POLES

1	Single Pole
2	Double Pole

HANDLE

BE	Round
BH	Toggle

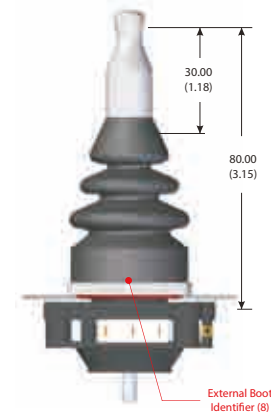
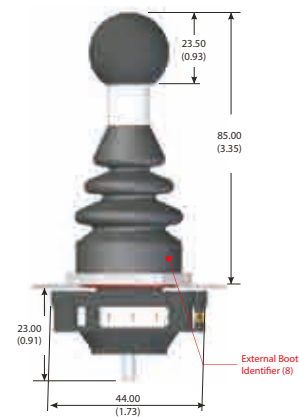
MODIFIER

135	+ Limiter Fitted
136	- Limiter Fitted

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.

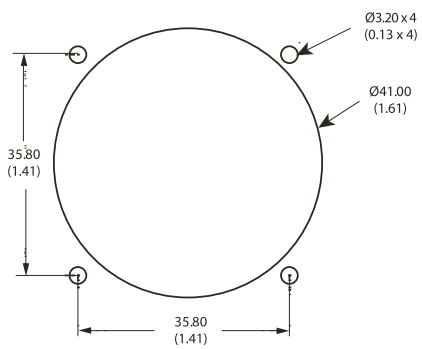


8000 series

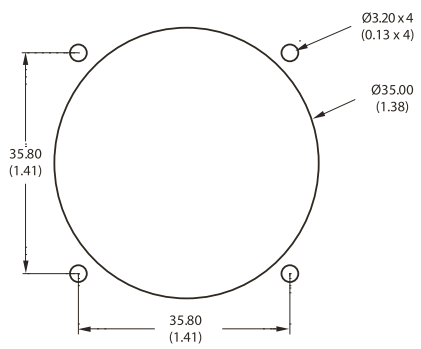
Rugged switch fingertip controllers • switching technology

PANEL CUT-OUT

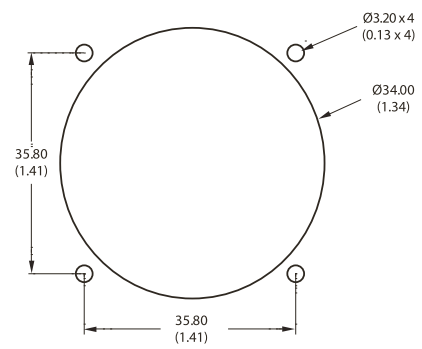
DROP-IN MOUNTING



OPTION A MOUNTING



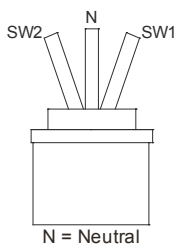
OPTION B MOUNTING



SWITCHING OPTIONS

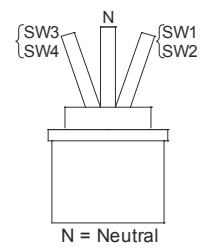
SINGLE AXIS CONFIGURATION

SWITCHING OPTION A



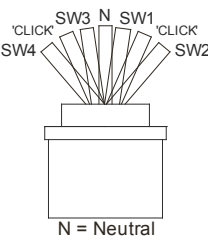
One switch will actuate as the joystick moves away from center in either direction.

SWITCHING OPTION B



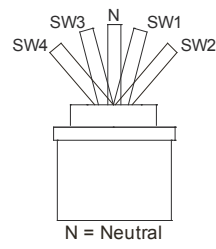
Two switches will actuate as the joystick moves away from center in either direction.

SWITCHING OPTION C



As per option D, but with a mechanical detent between actuation of the first and second switch.

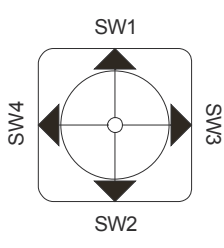
SWITCHING OPTION D



One switch will actuate after 50% of travel, with a further switch at the end of travel in either direction.

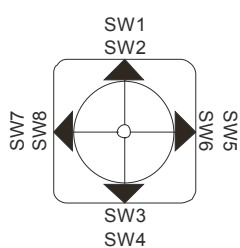
TWO AXIS CONFIGURATION

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

SERIES	AXIS	SWITCHING	CENTER DETECT	LIMITER
8	A One B Two	A Single Axis, Single Pole B Single Axis, Double Pole C Single Axis, Progressive with Detents D Single Axis, Progressive E Two Axis, Single Pole F Two Axis, Double Pole	1 Fitted (See note 1) 2 Not Fitted	A Single Axis  C Cross  D Diamond  R Round  S Square 
HANDLE*	BEZEL	BOOT	MODIFIER	
BL Round D Cylindrical E Conical K Pushbutton, Tactile Q Skirted X Two Pushbutton, Tactile AK One Pushbutton Q Tall, One Pushbutton AT Conical, Low Profile BB Three Button	0 Not Supplied 4 Circular R.M.¹ 6 Square D.I.² 7 Circular D.I.² ¹Rear Mounting ²Drop In Mounting	5	00 None 20 Guided Feel (See note 2)	

*For more handles see www.apem.com

NOTES:

¹ The additional center detect switch is not available on joysticks with progressive switching.

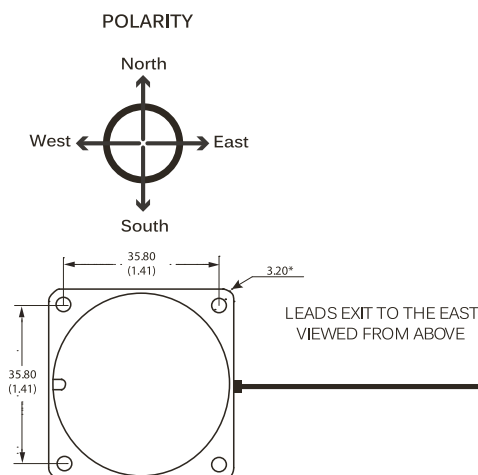
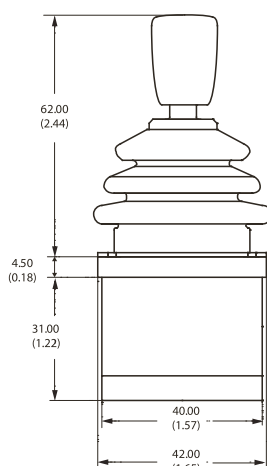
² Guided feel is only available on two axis joysticks. Further non-standard options including custom handles, special limiters and detents are available. Please refer to APEM.

³ Only a square limiter will allow sufficient travel in a diagonal direction to activate both speed and steer switches.

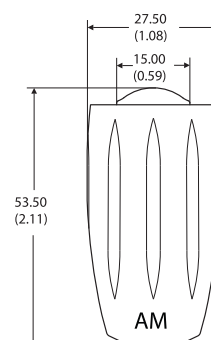
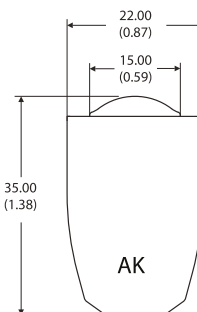
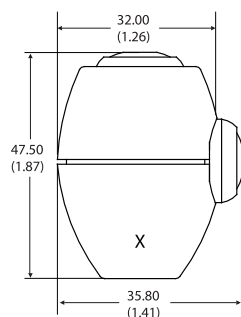
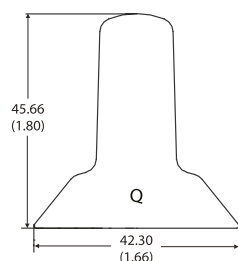
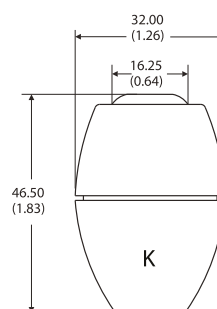
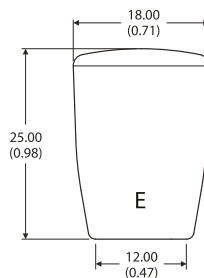
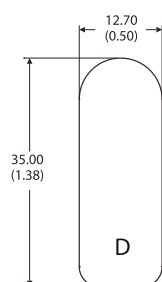
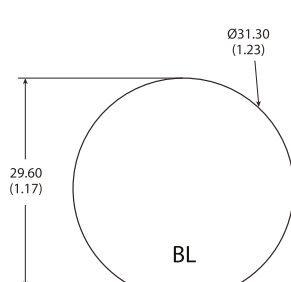
8000 series

Rugged switch fingertip controllers • switching technology

DIMENSIONS



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 $\pm$ 0.5V transient free
- Reverse Polarity Max: -10VDC
- Overvoltage Max: 20V
- Output Impedance: 10 Ω



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

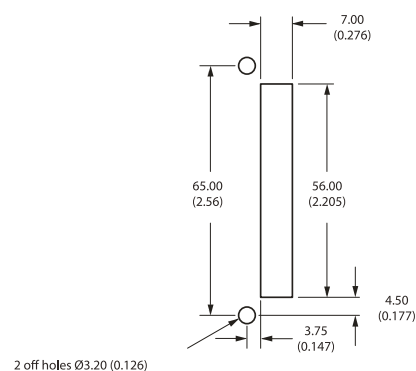
- Lever: Acetyl (black)
- Housing: Mineral filled nylon (black)
- Handles: Aluminum (silver anodized)
- Screening plates: Mild steel (zinc plated)

The company reserves the right to change specifications without notice.



MOUNTING

INSTALLATION DIMENSIONS



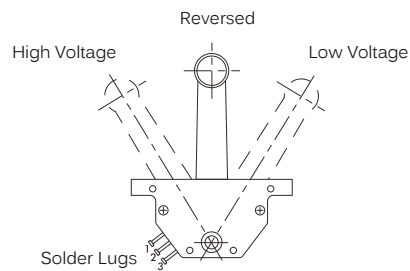
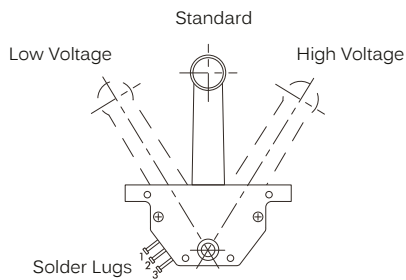
SN series

Proportional single axis fingertip controllers •
non-contacting Hall effect technology



CONNECTIONS

OUTPUT VOLTAGE POLARITY



BUILD YOUR PART NUMBER

SN

SERIES

OUTPUT

- 1 Analog
- 2 PWM

GAIN

- 01 $\pm 50\% \times V$
- 02 $\pm 40\% \times V$
- 03 $\pm 30\% \times V$
- 04 $\pm 25\% \times V$
- 05 $\pm 10\% \times V$

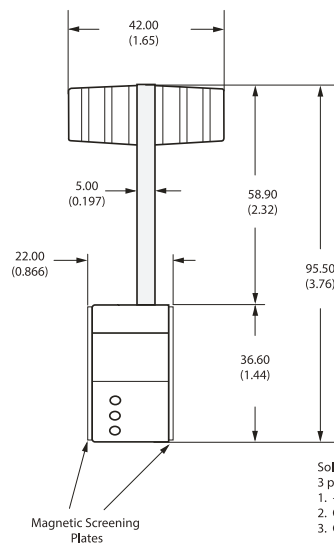
POLARITY

- S Standard
- R Reversed

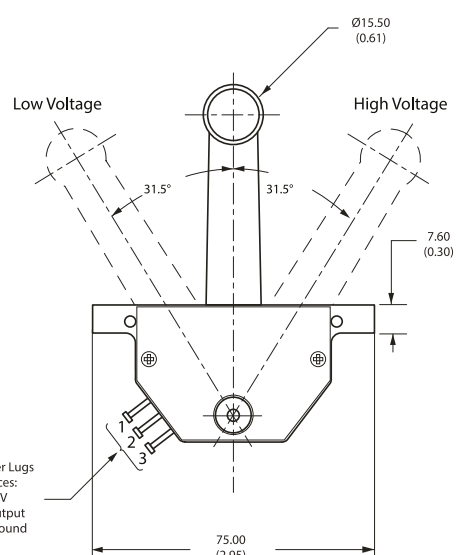
HANDLE

- S Barrel Handle
- N Bullet Handle

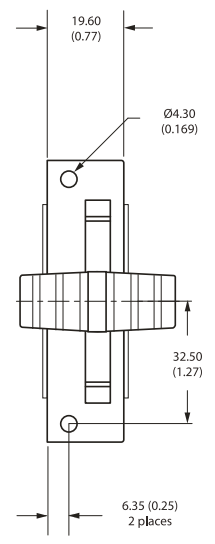
DIMENSIONS



Front view



Side view



Top view

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)



ELECTRICAL SPECIFICATIONS

- Maximum Voltage: 125VAC
- Output Impedance: $<1 \Omega$



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)



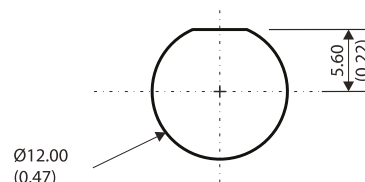
MATERIALS

- Shaft: Stainless steel
- Boot: Silicone rubber
- Housing: Mineral filled nylon-6

The company reserves the right to change specifications without notice.



PANEL CUT-OUT

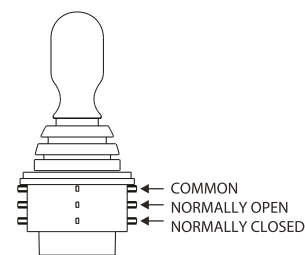


CONNECTIONS

CONNECTION OPTION 0

No Harness

Switches suitable for 125VAC @ 2A
(Resistive load)



For Polyimide tail options see
www.apem.com

NZ series

Compact switch fingertip controllers • switching technology



BUILD YOUR PART NUMBER

NZ

SERIES

SWITCHES

LEVER / BOOT

CONNECTION

MODIFIER

A

Standard

B

Sealed

A

Half Boot + Lever

B

Full Boot + Lever

Z

Specified

0

No harness

1

Polyimide Tail 5 Way

2

Polyimide Tail 12 Way

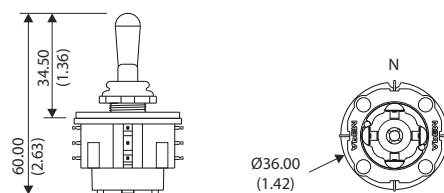
00

None

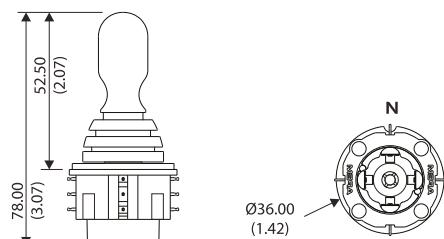
135

+ Limiter Fitted

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: ASTM B117, 96 hours



ELECTRICAL SPECIFICATIONS

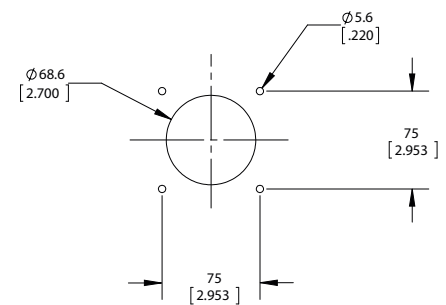
- Sensor : Hall effect
- Supply Voltage : 5.0V ± 0.2 VDC Regulated
- Reverse Polarity max: -10V max
- Overvoltage max : +20V max
- Current Consumption max: 11mA max (single output)
- Output Voltage: See configuration guide
- Output Voltage Tolerance (Handle centered): ± 0.1VDC
- Output Voltage Tolerance (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

SC

2

A

SERIES

HANDLE

PANEL CUT-OUT

SPRING FORCE

OUTPUT ONE

OUTPUT TWO

CONNECTIONS

A

Rocker switch & operator presence lever

2

Drop in, pattern one

A

Standard

A

1.0 to 4.0V output

B

0 to 5.0V output

C

0 TO 5.0V

2

None

3

Inverse of output one

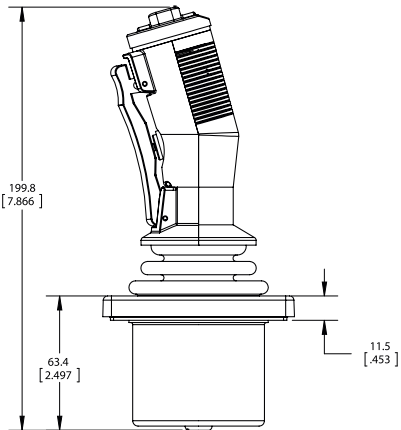
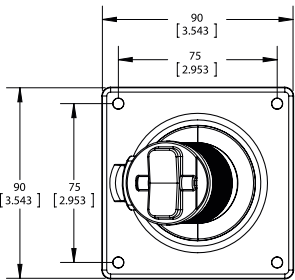
4

Matching output one

A

22AWG, 406mm ±13mm (16.0" ±0.5")

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 $\pm$ 0.250VDC
- Reverse Polarity Max: -10VDC
- Overvoltage Max: 20V
- Minimum load: 1 Ω
- Return to Center Voltage Tolerance: $\pm$ 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° ($\pm$ 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

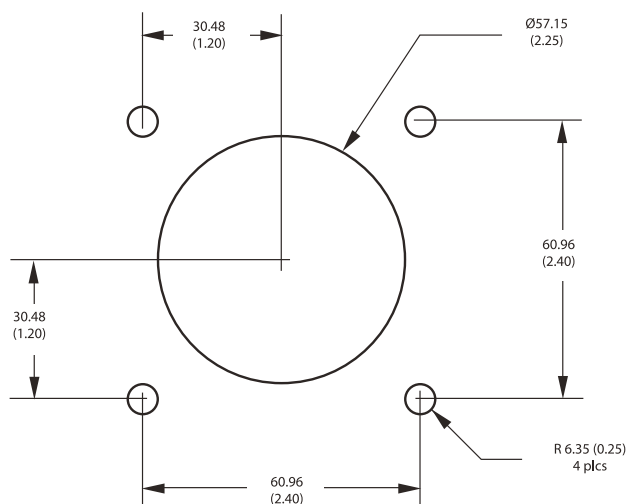
CANBUS J1939

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.

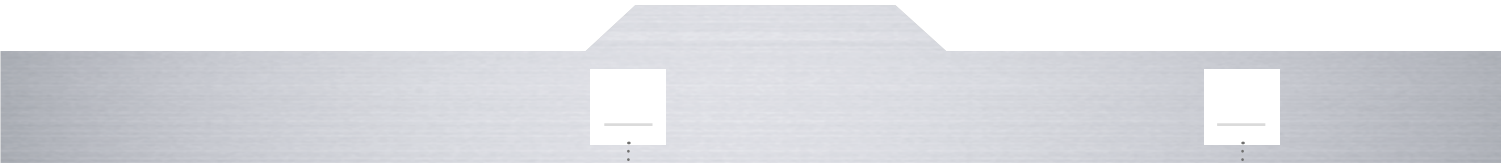
- Connector options : Cable assembly with Deutsch DT04 style plugs
- CANbus configuration : Contact technical support for assistance



PANEL CUT-OUT



APEN

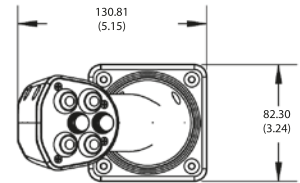
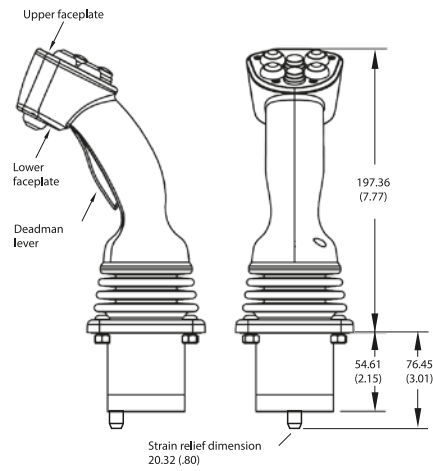


4. Mounting accessories. Standard hardware includes: 4 Phil. screws (6-32x7/8).

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 $\pm$ 0.25VDC, CAN/CANOpen: 6-35VDC
- Reverse Polarity Max: -14.5V
- Overvoltage Max: 16V
- Minimum load: 1 Ω
- Return to Center Voltage Tolerance (no load): $\pm$ 0.2V



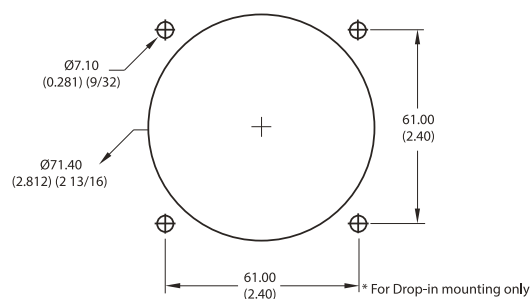
MECHANICAL SPECIFICATIONS

- 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



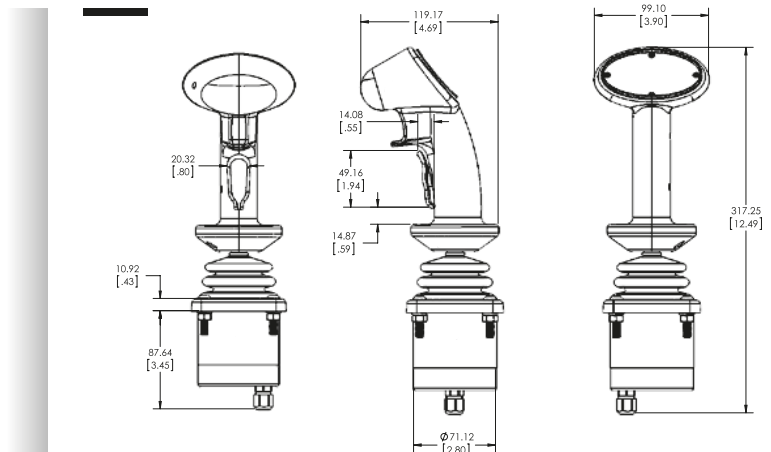
BUILD YOUR PART NUMBER

SERIES	AXIS	SPRING	OPERATOR PRESENCE PADDLE	INDEX TRIGGER	CUSTOM
HJ	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	FACEPLATE		
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	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 ± 0.25 VDC, CAN/CANOpen: 6-35VDC
- Reverse Polarity Max: -10V
- Output Impedance: 1100 Ω
- Overvoltage max: 20V



MECHANICAL SPECIFICATIONS

- Maximum Horizontal Load: 670Nm (400lbf)
- Mechanical Angle of Movement: 40° $\pm 2^\circ$
- Expected Life: 10 million lifecycles
- Lever Action (centering): Spring



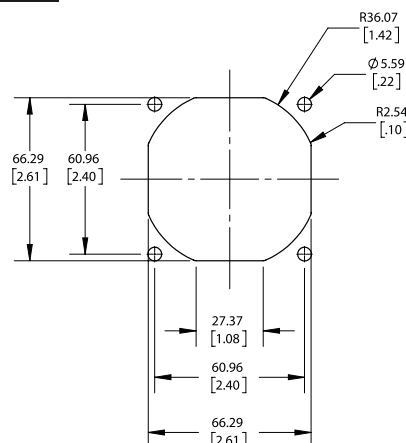
MATERIALS

- Shaft: Stainless steel
- Boot: Silicone
- Handles: Depends on handle

The company reserves the right to change specifications without notice.



PANEL CUT-OUT



XD series

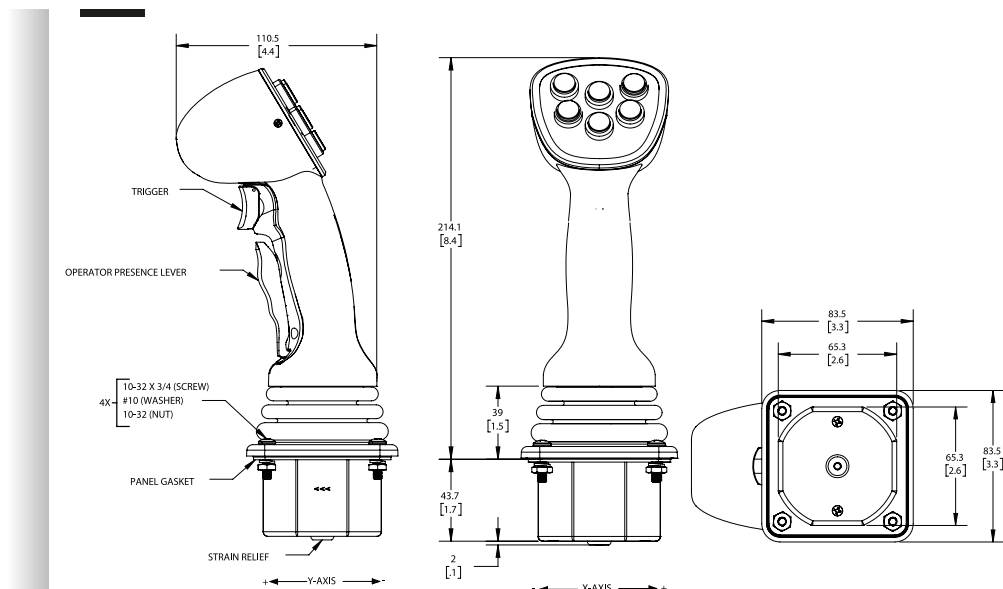
Proportional, industrial hand grip controllers • non-contacting Hall effect technology

BUILD YOUR PART NUMBER

XD	GT					N																	
SERIES	HANDLE	OPERATION	CENTERING	SPRING FORCE	MECHANICAL FEATURES	OUTPUT																	
		X One axis - X Y One axis - Y T Two axis	2 Spring centering	S Standard	N None	A 0-5V B 0.25V - 4.75V C 0.5V - 4.5V D 1 - 4V E (0 - 5V) (5 - 0V) F (0.25V - 4.75V) (4.75V-0.25V)	G (0.5V-4.5V) (4.5V-0.5V) H (1-4V) (4-1V) J CANbus J1939 K CANopen																
						A	N																
OPERATOR PRESENCE PADDLE		INDEX TRIGGER		FACEPLATE*																			
Y Yes N No		Y Yes N No		<table border="0"> <tr> <td>A Blank</td> <td>E Toggle switch, two pushbuttons</td> <td>H Two toggle switches</td> <td>K Four pushbuttons</td> </tr> <tr> <td>B Two thumbwheels, one pushbutton</td> <td>F Mini joystick, two pushbuttons</td> <td>I One thumbwheel, three pushbuttons</td> <td>M Five pushbuttons</td> </tr> <tr> <td>C One pushbutton</td> <td>G Two pushbuttons</td> <td>J Three pushbuttons</td> <td>N Six pushbuttons</td> </tr> <tr> <td>D Mini joystick</td> <td></td> <td></td> <td></td> </tr> </table>				A Blank	E Toggle switch, two pushbuttons	H Two toggle switches	K Four pushbuttons	B Two thumbwheels, one pushbutton	F Mini joystick, two pushbuttons	I One thumbwheel, three pushbuttons	M Five pushbuttons	C One pushbutton	G Two pushbuttons	J Three pushbuttons	N Six pushbuttons	D Mini joystick			
A Blank	E Toggle switch, two pushbuttons	H Two toggle switches	K Four pushbuttons																				
B Two thumbwheels, one pushbutton	F Mini joystick, two pushbuttons	I One thumbwheel, three pushbuttons	M Five pushbuttons																				
C One pushbutton	G Two pushbuttons	J Three pushbuttons	N Six pushbuttons																				
D Mini joystick																							

*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 $\pm$ 0.250VDC
- Reverse Polarity Max: -10VDC
- Overvoltage Max: 16V
- Minimum load: 1 Ω
- Return to Center Voltage Tolerance (no load): $\pm$ 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

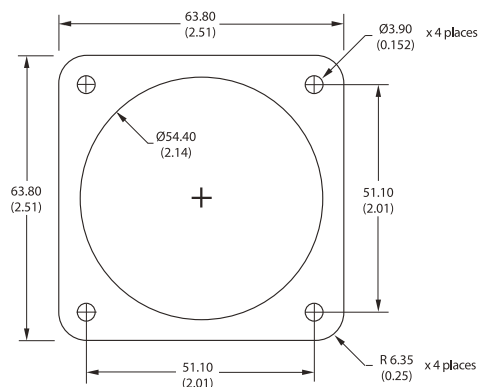


MATERIALS

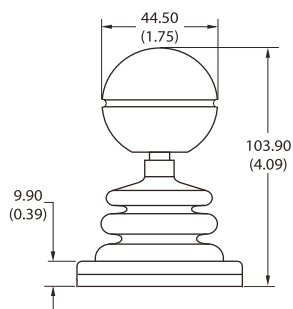
- Body: Glass filled nylon
- Boot: Silicone
- Handles: Glass filled nylon



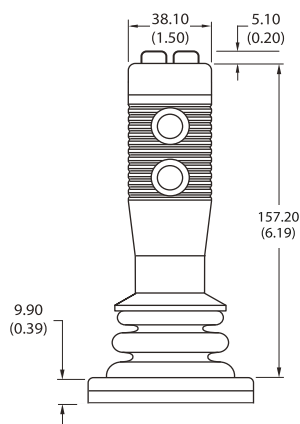
PANEL CUT-OUT



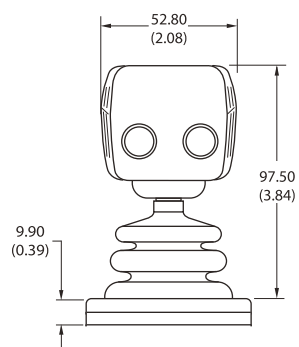
HANDLE OPTIONS



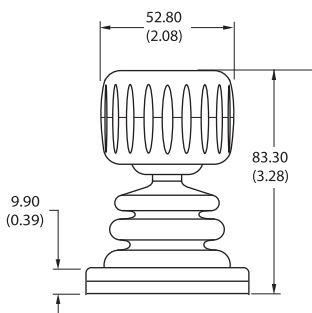
MS10



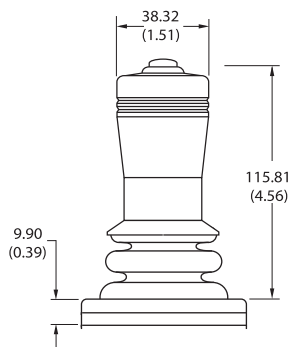
MS42



MS54
MS55



MS23
MS24



MS31

APEN



SPRING TENSION		OUTPUT OPTIONS				ADDITIONAL OPTIONS			
00	Standard	0	0V to 5V (Rail to Rail)	6	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	V	Voltage Regulator
		1	0.5V to 4.5V	7	1V to 4V – Sensor 1 1V to 4V – Sensor 2	0-U	USB	E	Environmental Sealing
		2	0.25V to 4.75V	8	0V to 5V – Sensor 1 5V to 0V – Sensor 2	13	Cursor Emulation		
		3	1V to 4V	9	0.5V to 4.5V – Sensor 1 4.5V to 0.5V – Sensor 2	1-J	CANbus J1939		
		4	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	3-C	CANopen		
		5	0.5V to 4.5V – Sensor 1 0.5V to 4.5V – Sensor 2						

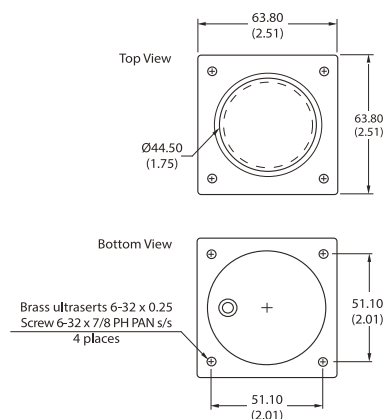
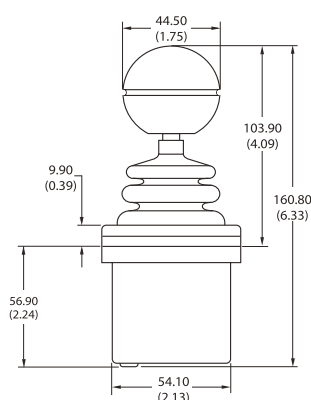


4. Mounting accessories. Standard hardware includes: 4 screws (6-32x7/8) Phil.

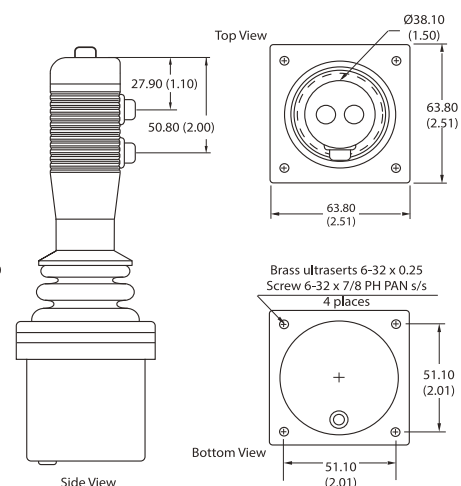
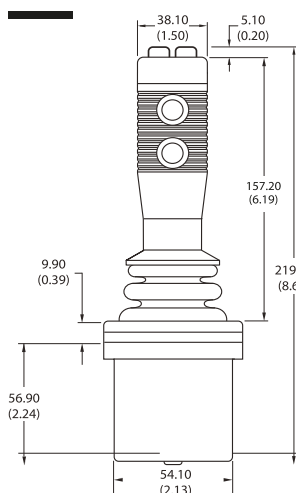
MS series

Proportional compact hand grip controllers •
non-contacting Hall effect technology

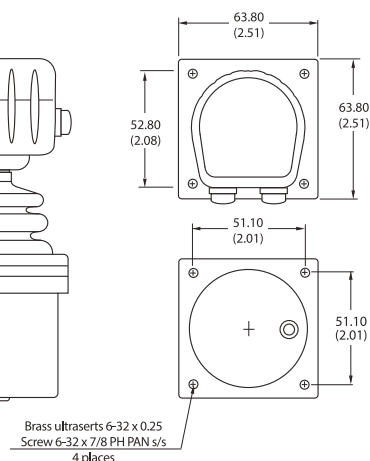
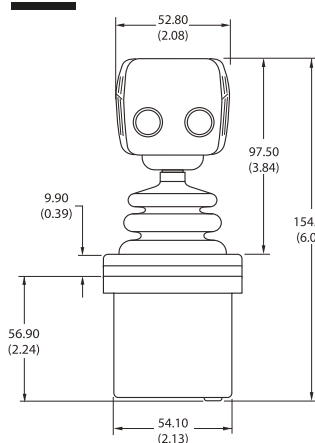
WITH HANDLE N°10 - BALL TRIP



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 $\pm$ 2.0N (1.70lbf $\pm$ 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

HANDLE

INDEX TRIGGER GUARD

MOUNTING HARDWARE

ELECTRICAL OUTPUT OR INTERFACE

N

None

M

Momentary

P

Proportional¹

D

DP/DT²

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

1

Oval

1

None

2

Red

3

Black

1

None

2

Plate and screws

1

Voltage output

2

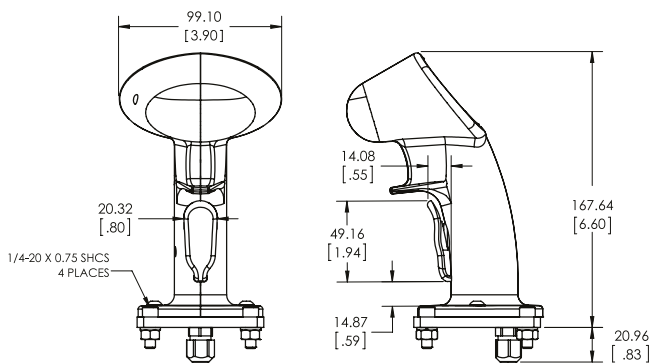
USB

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

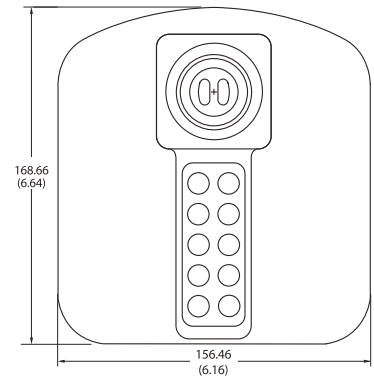
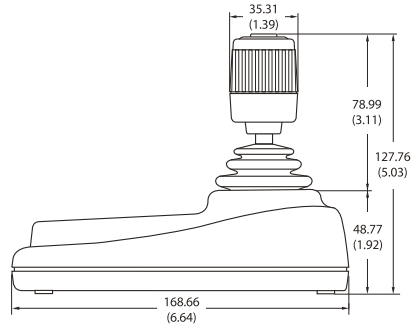
The company reserves the right to change specifications without notice.



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

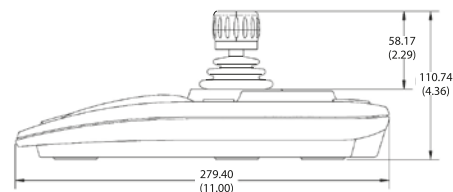
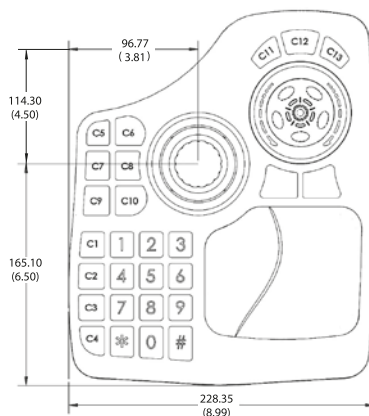
The company reserves the right to change specifications without notice.



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

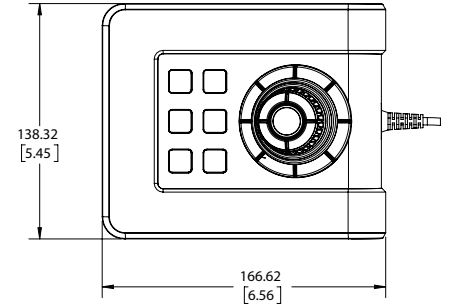
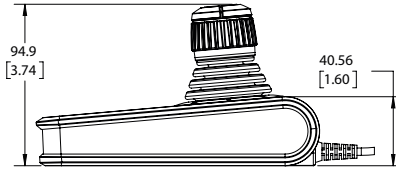
The company reserves the right to change specifications without notice.



RS Desktop

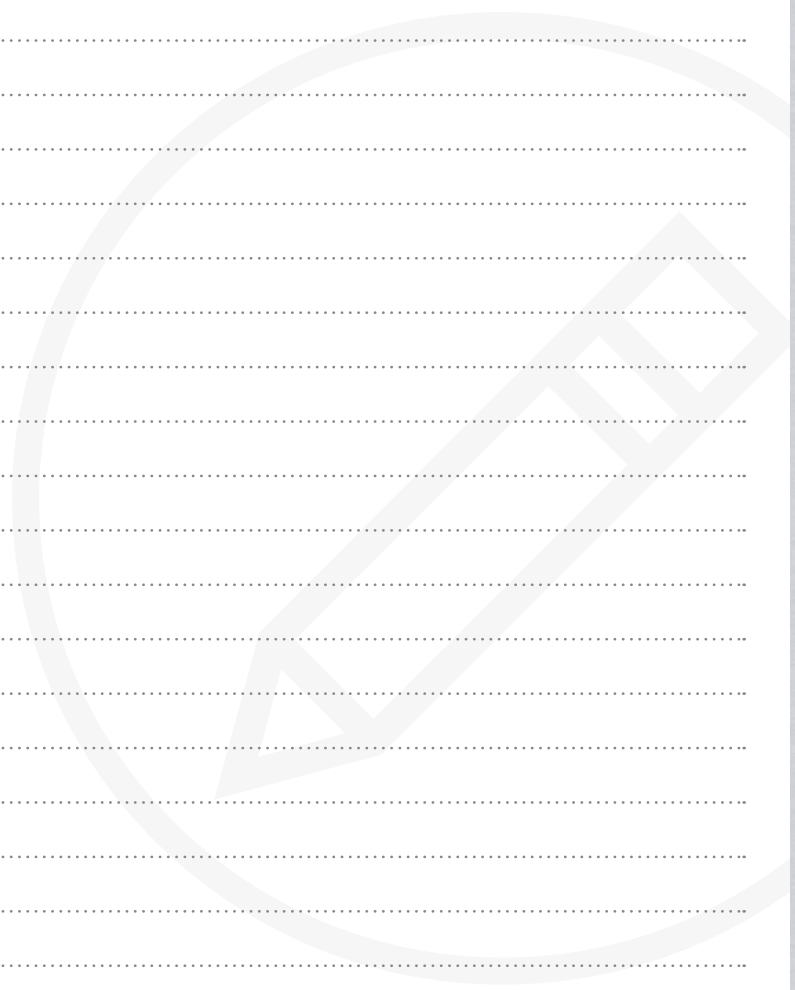
Proportional USB desktop controllers •
non-contacting Hall effect technology

DIMENSIONS





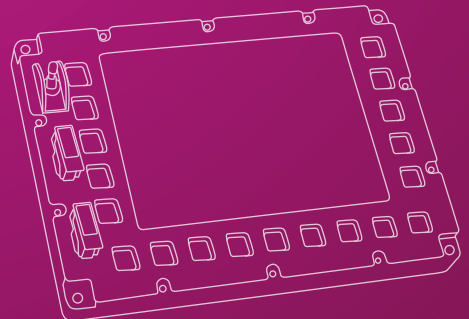
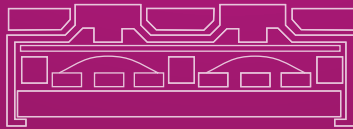
Handwriting practice lines consisting of horizontal dotted lines on a light gray background.

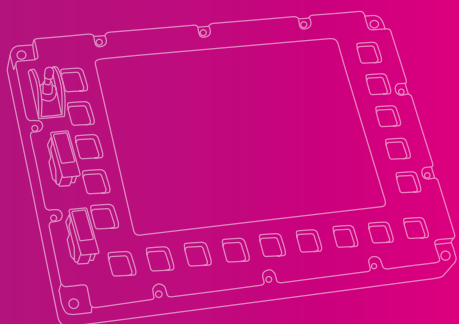
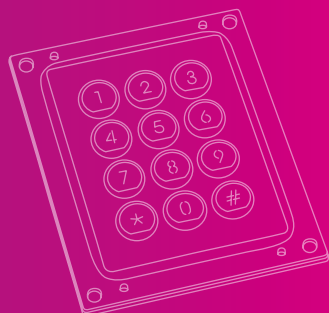




Handwriting practice area with horizontal dotted lines and a large, faint watermark logo in the center.

SWITCH PANELS





SELECTION GUIDE

SWITCH PANELS	532
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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

Our ruggedized keyboards combine critical electronic and software design expertise, along with our core knowledge of milling, printing and discrete switch integration.

APEM's extensive development process allows us to meet critical military specifications such as MIL, STANAG and GAM.

MEMBRANE KEYPAD

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.

THIN BACKLIGHTED

The APEM thin backlit panel enables the use of front mounted interface products with a high quality backlit design and status LED indicators.

This 3mm thick keyboard will easily allow membrane keypad users to bring backlit features to their products.

FILM IN MOLD

The APEM Film In Mold (FIM) technology features molded pushbuttons designed into a printed plastic film.

The FIM technology combines an extremely low profile keypad with durable markings at a competitive price for large quantities.

METAL KEYBOARD

APEM's stainless steel keyboards meet the highest level of vandal resistant specifications (IK10) with a visually appealing design.

Resistant to the harshest environments, our stainless steel keyboards are weather proof and can withstand most corrosive agents.



ELECTRONIC & SOFTWARE DESIGN

★ INTEGRATION OF
COMMUNICATION PROTOCOLS
SUCH AS CANOPEN, CAN J1939,
ISOBUS, USB & RS432

APEM
EXCLUSIVE



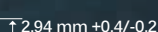
EASY FRONT MOUNTING



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

APEM designs and manufactures capacitive keyboards to complement 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.

ELASTOMER KEYBOARD

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.

PIEZO KEYBOARD

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.

MEC BASED KEYBOARD

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.

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	- 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	- 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	- 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	Silver rivet, gold plated (11000 and 12000 series).

FOR INDUSTRIAL SWITCHES

A	- 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	Silver plated copper or brass.

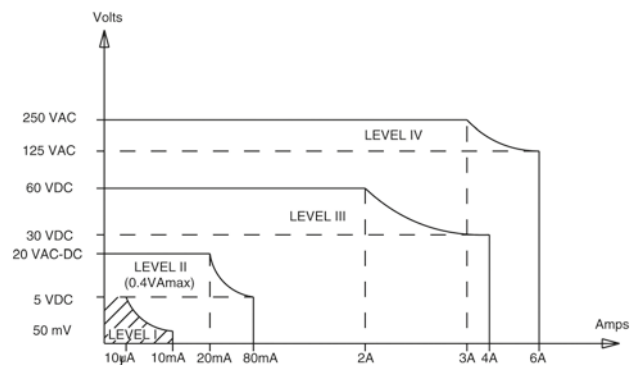
Silver cadmium oxide contacts (S) available on the 4000 - 600H - 600NH and 2600 series, can be replaced by silver tin oxide contacts.

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

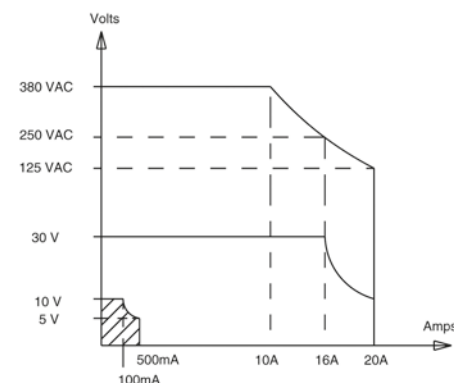
Level I : very low level
Telecommunications
D, AD or CD contacts

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.

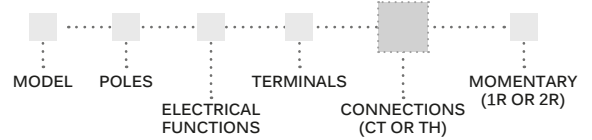
TECHNICAL INFORMATION

Positions and connections for 3-way switches • Function 4

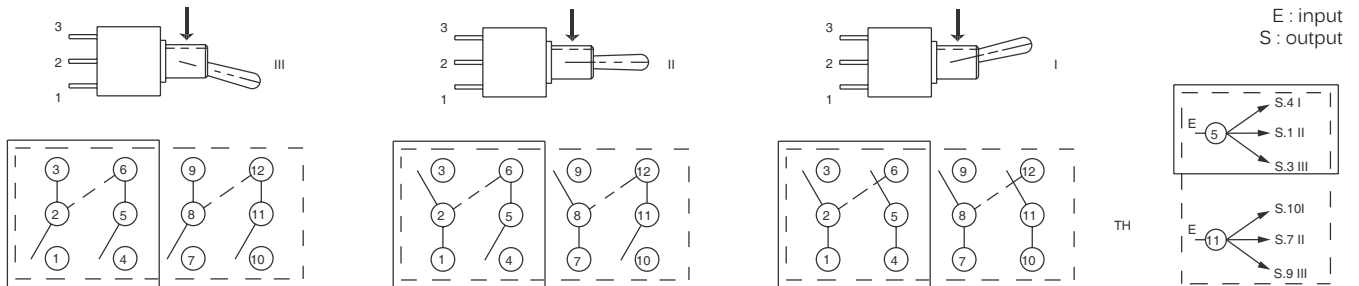
MINIATURE SWITCHES

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.

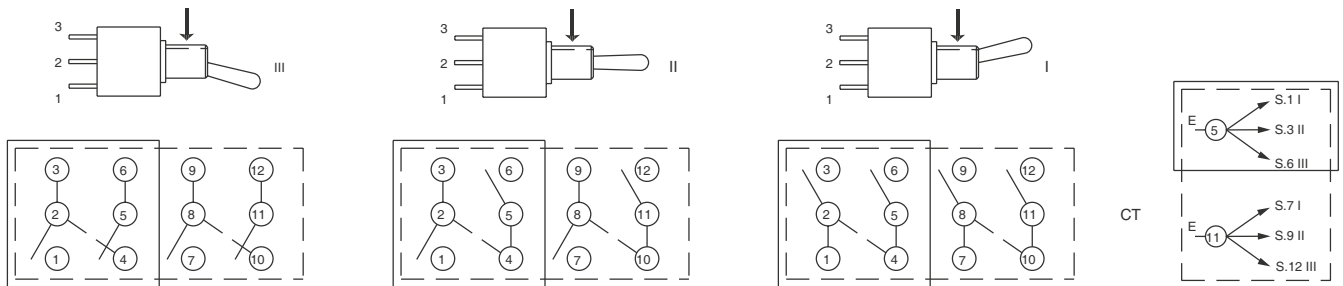
Model structure 5000 and 7000 series



FUNCTION 4 - TYPE TH (PREFERRED) - 5000 - 7000 - 12000 - S - SR SERIES



FUNCTION 4 - TYPE CT (REVERSED) - 5000 - 7000 SERIES

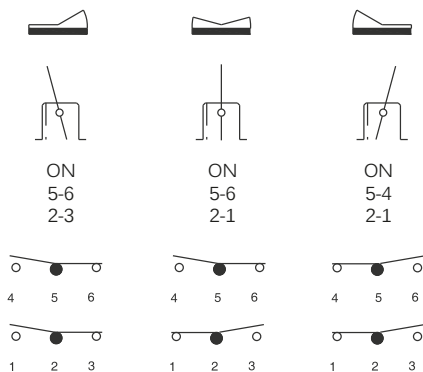


Single pole switches in a double pole case ☐ SP ☐ DP
Double pole switches in a four pole case

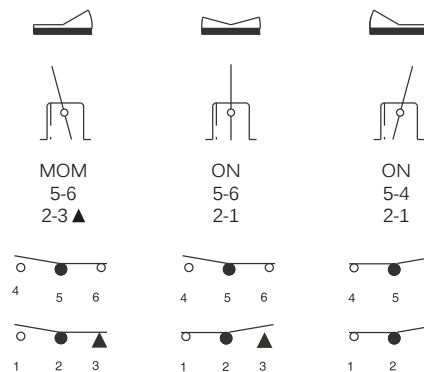
Dotted line between poles : jumper to be wired by the user.

INDUSTRIAL SWITCHES : 600 600H - 3600NF - 6000 AND 2600 SERIES

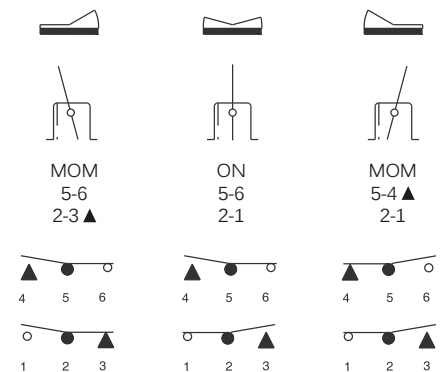
FUNCTION 4



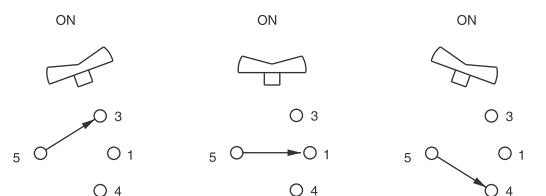
FUNCTION 4-1R (MOMENTARY ONE SIDE)



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.



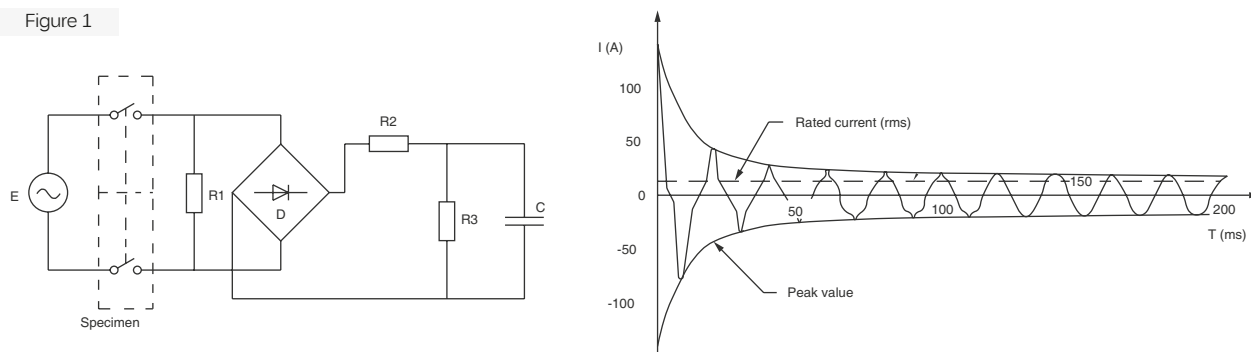
TECHNICAL INFORMATION

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

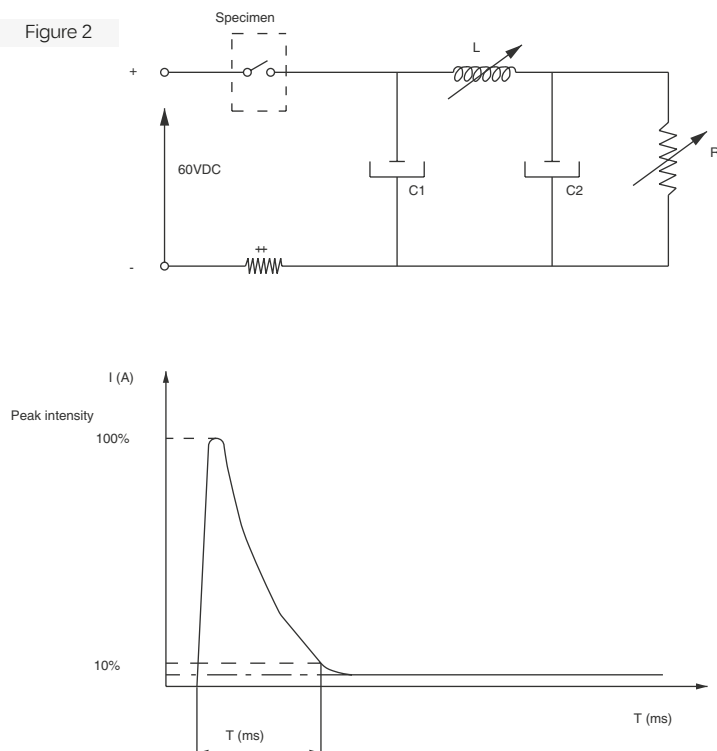
TESTING CIRCUIT AC VOLTAGE

Figure 1



TESTING CIRCUIT DC VOLTAGE

Figure 2



CURRENT/VOLTAGE RATING EXAMPLES

4 / 100A	250VAC	10.000 cycles
↓	↓	↓
Inrush current (Fig 1)		Life
↓		
Nominal AC current	Max. AC voltage	
3 / 80A	(10 ms)	60VDC
↓	↓	↓
Inrush current (Fig 2)		Max. voltage
↓		↓
Nominal AC current	Inrush duration	Life

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 : I P 6 5

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 (1.968) 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)

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)

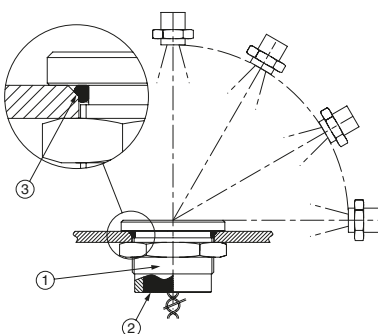
IK CODE : MECHANICAL PROTECTION

The degree of mechanical protection is now defined by the letters IK according to EN 62262.



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.

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

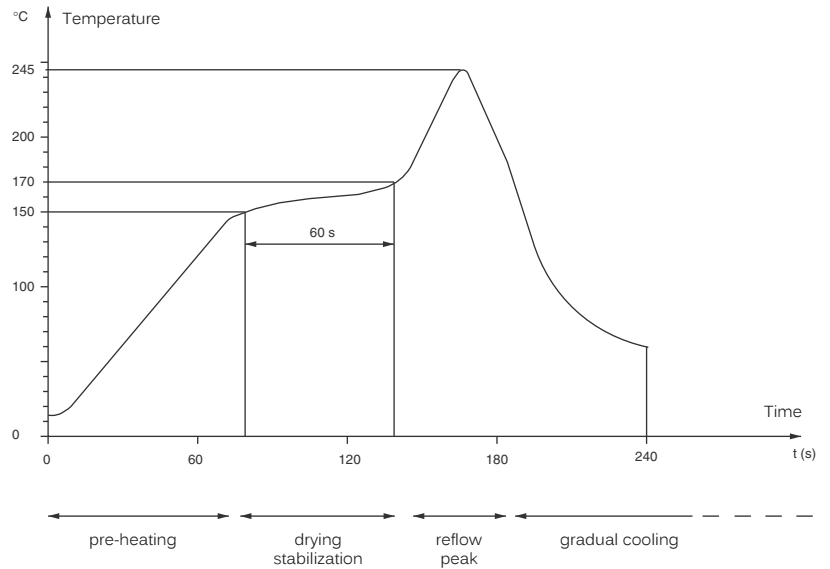
TECHNICAL INFORMATION

Surface mount

TYPICAL SMT REFLOW PROFILE

The PC board, carried by a conveyor belt, goes through the different areas of a reflow soldering oven :

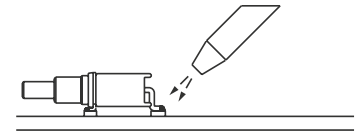
- pre-heating (maximum 170°C, 60 secs)
- reflow peak (maximum 245°C)
- final cleaning (optional)



BOARD REWORK TECHNIQUE

Hot air reflow technique is preferred. Avoid use of a traditional soldering iron.

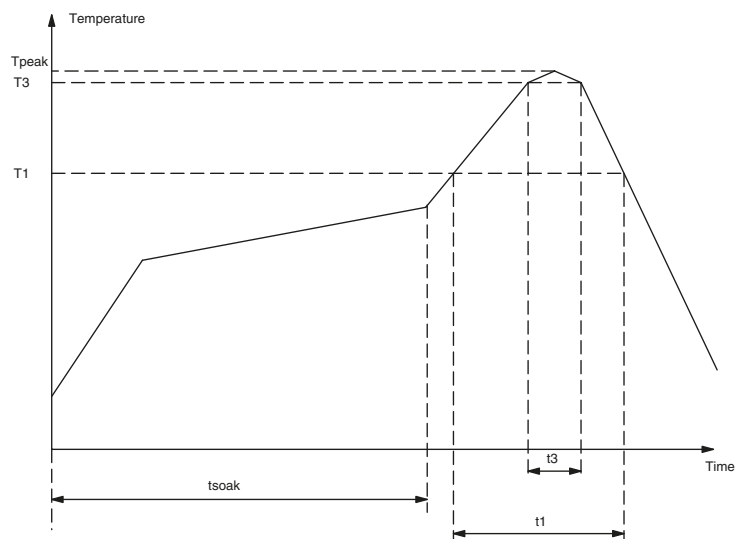
Caution : Excessive and/or repeated high temperature exposure may affect switch performance and reliability.



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	t_{soak}	2-3 minutes
Time above 217°C	t_1	60-150 seconds
Time within 5°C of actual peak temperature	t_3	20-40 seconds
Peak temperature in reflow	T_{peak}	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

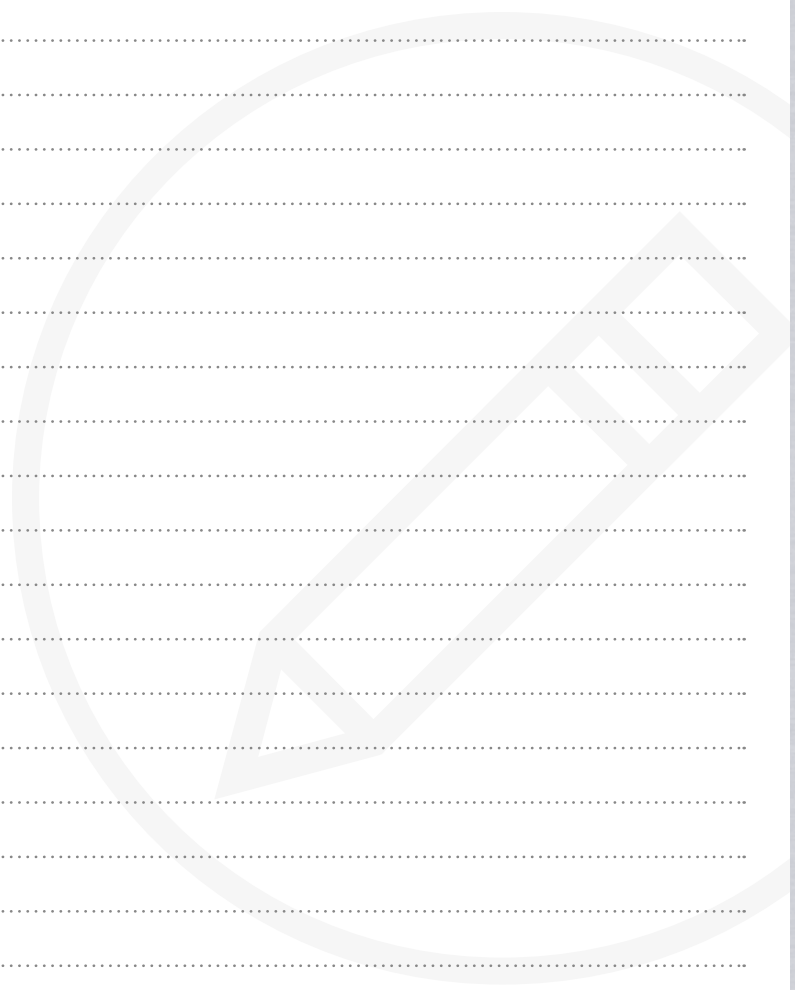
A method of soldering in which a wave of molten solder contacts the components on the PCB as the PC Board with the components is conveyed through the process.

WIPING ACTION

Sliding of contacts over one another resulting in cleaning of the contacts.



Handwriting practice lines consisting of horizontal dotted lines on a white background.



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