SCHURTER GmbH
D – 79346 Endingen
www.schurter.com

Product Manual

PSE NO Switch

CONTENTS

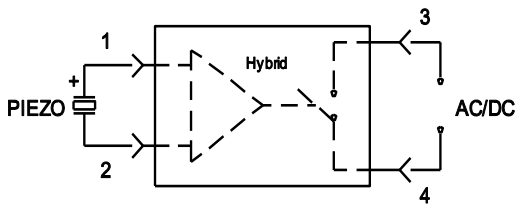
1 PRODUCT DESCRIPTION

- Variety of design options concerning size, colour, shape, illumination, connection or lettering
- especially ideal for use in harsh environments
- high reliability, long lifetime with more than 30 mill. actuations
- no maintenance costs, since no mechanical wear parts
- easy to clean due to a tightly closed surface (IP 69K)

1.1 Functional Description: NO Switch

The piezo switch is based on the functional principle of the piezoelectric crystal. The action of force on the piezo disk causes a voltage to be induced due to a charge transfer. The voltage generated is converted by the electronic connection into a polarity-neutral, electronic switch contact.
During the voltage drop, the electronic switch contact is closed for the specified pulse duration. After this, the electronic switch contact opens again, even if the force is still present. The period that the electronic switch contact remains closed depends on the actuating speed and force as well as on the duration of actuation.

Diagram of an NO switch:



The piezo disk is connected to the terminals 1 and 2. The electric circuit to be switched is connected at the terminals 3 and 4. This can be either direct voltage (DC) or alternating voltage (AC). If a pulse is applied to the piezo disk, terminal 1 becomes positive in relation to terminal 2 due to the voltage generated. The integrated switching element controls the electric circuit to be switched.
In the neutral position of the piezo switching element, the terminals 3 and 4 are non-conductive, and initial contact resistance is greater than 10 MOhm. When the piezo disk is actuated, the initial contact resistance is reduced to less than 20 Ohm.
When actuating the piezo disk, the resistance between terminals 3 and 4 is therefore changed from high resistance → low resistance → high resistance.

This corresponds in principle to the function of a conventional **NO pushbutton switch**.

1.2 Functional Description: Illumination

Ring Illumination

Single or bi-colored ring illumination is possible for the PSE switches.
When equipped with two colors, it is possible to either switch between the colors or to achieve a combination color, depending on the type of activation.

For example: Diodes of group 1 = red and diodes of group 2 = green

Only group 1 is activated	→	Ring has red illumination
Only group 2 is activated	→	Ring has green illumination
Both groups are activated at the same time	→	Ring has orange illumination

Red cable	=	Supply voltage: red LEDs
Green cable	=	Supply voltage: green LEDs
Black cable	=	Minus for all LEDs
White cable	=	Switch contact

Terminal layout see page 14 section 2.4 Switching Symbols Illumination

Special type 5 VDC upon request

Point Illumination

When illuminating the PSE switch, either a single-color LED (2 pins) is used or a bi-colored LED (3 pins). If a single-color LED is used, cable No. 2 is not needed (see section 2.4 Switching Symbols: Illumination – Point Illumination).
Switching between colors can be achieved by appropriate activation.

2 TECHNICAL DATA AND DIMENSIONAL DRAWINGS

2.1 Technical Data

Electrical Data		
Switching Voltage max.	(VAC/DC)	42/60
Switching Current max.	(mA)	100
Rated Breaking Capacity	(W)	1
Lifetime (at Rated Breaking Capacity)	(Mio.)	20
Switch resistance off (OFF=not actuated)	(MΩ)	>10
Switch resistance on (Ta=25°C) (ON=actuated)	(Ω)	<20
Capacity	(nF)	5
NO Pulse Time (depending on the actuating force, time and speed)	(ms)	20-1000
Contact Configuration		polarity-free
Switch Function		NO switch

Mechanical Data		
Actuating Force (at ambient temperature)	(N)	≤3[1)]
Actuating Travel	(mm)	0.002
Torque	(Nm)	2.5
IK Protection Class	(IK)	02

Climatic Data		
Operating Temperature	(°C)	-40 to +85
Storage Temperature	(°C)	-40 to +85
IP Degree of Protection Front Side hose water (1m water column) (IEC/DIN/EN 60529)	(IP)	67
IP Degree of Protection Front Side submerged (DIN 40050-9:1993 High-pressure cleaning test)	(IP)	69K
Degree of Protection DIN EN 60069-2-30 Db (Moist heat (air test with 55°C / 93% humidity)		front side / rear side

1) *At temperatures lower than -10°C, the actuating force increases 2- to 4-fold.*

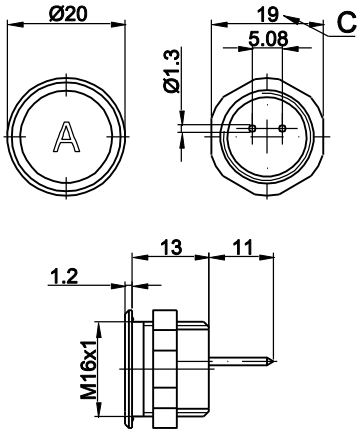
Material (Induvidual Part)	**Material** [2)]
Housing (depending on type)	Stainless Steel
	Anodized aluminum
	Polyamide
Actuating Area / Insert (with ring illumination)	Stainless steel
	Anodized aluminum
Illuminated Ring (with ring illumination)	Polyamide

2) *When using the switch in a saline or chloric environment, special materials must be used. Items available upon request.*

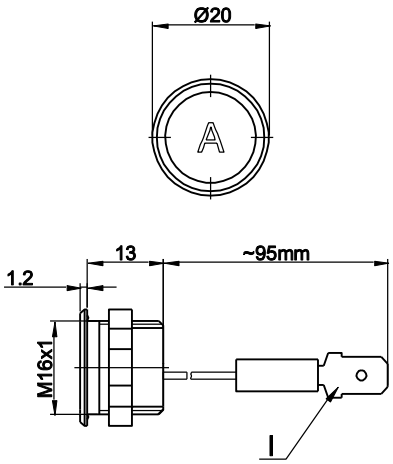
2.2 Component dimensions

2.2.1 M16 Series with Finger Guidance

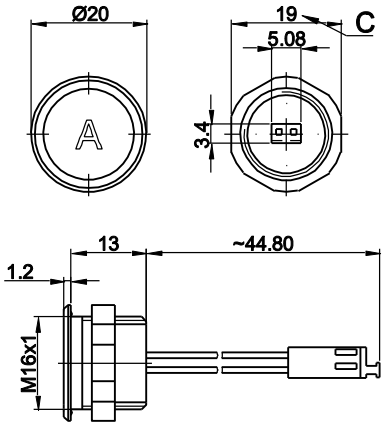
with Pins



with Crimp Terminal male



with AMP [1)]



Legend:

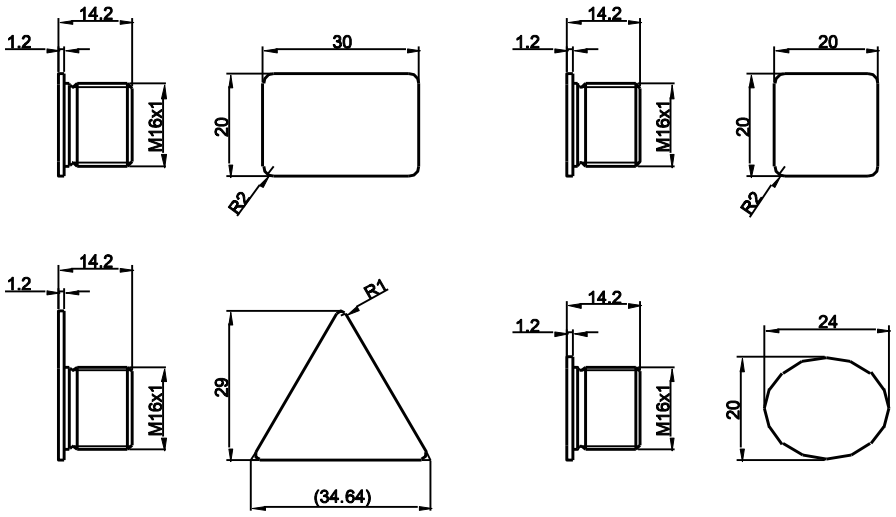
- *A = Illumination Area*
- *B = Actuating Area*
- *C = Width Across Flats*
- *I = Crimp Terminal male 6.3x0.8*

Lettering:

- *either with/without lettering*
- *position of the connections with respect to the position of the lettering is not defined*

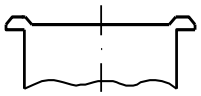
[1)] *Version available on request*

2.2.1.1 Design Possibilities for Housing Geometry: M16

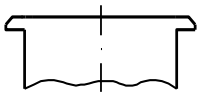


2.2.1.2 Design Possibilities for Actuating Area

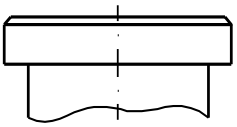
with finger guidance (standard)



without finger guidance (upon request)



elevated front design: M19 (standard, others upon request)

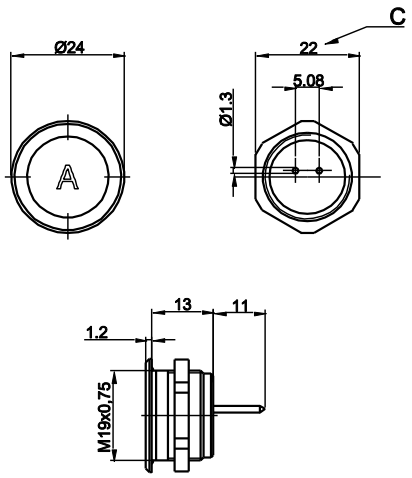


2.2.1.3 Connection variants

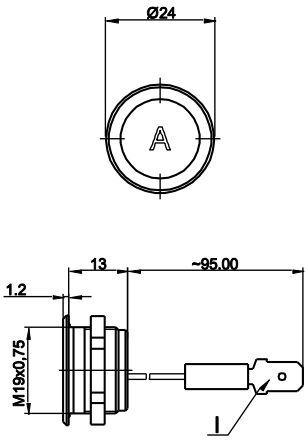
- Wire (Standard: 0.14 mm² / 200 mm wire-length)
- Pins (with Connection Terminal 0701.9225)
- Crimp Terminal male 6.3 x 0.8 mm
- AMP

2.2.2 M19 Series

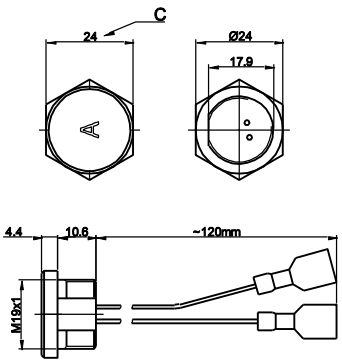
with Pins



with Crimp Terminal male [1)]



Cable with Faston, elevated front design



Terminal:
Crimp Terminal female Ultrafast red 6,3x0,8

Legend:

- *A = Illumination Area*
- *B = Actuating Area*
- *C = Width Across Flats*
- *I = Crimp Terminal male 6.3x0.8*

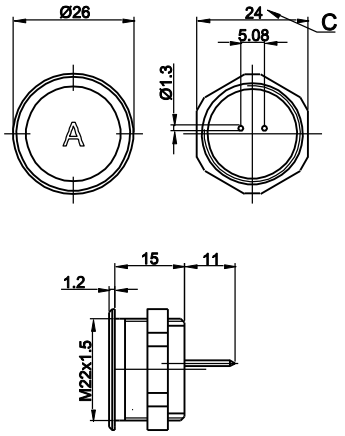
Lettering:

- *either with/without lettering*
- *position of the connections with respect to the position of the lettering is not defined*

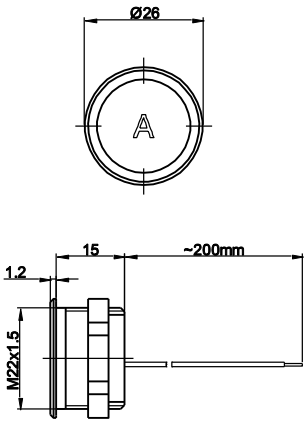
[1)] *Version available on request*

2.2.3 M22 Series

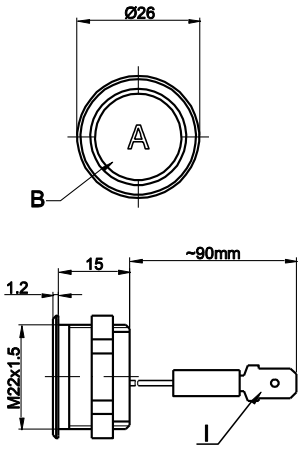
with Pins



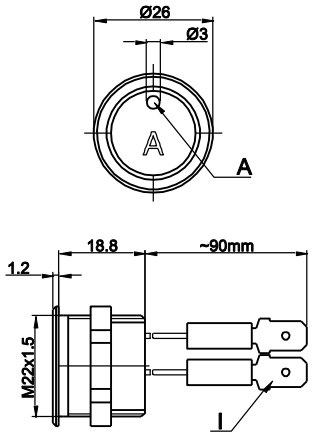
with Wire



with Crimp Terminal male [1)]



Point Illumination with Crimp Terminal male



For terminal layout see page 14

Legend:

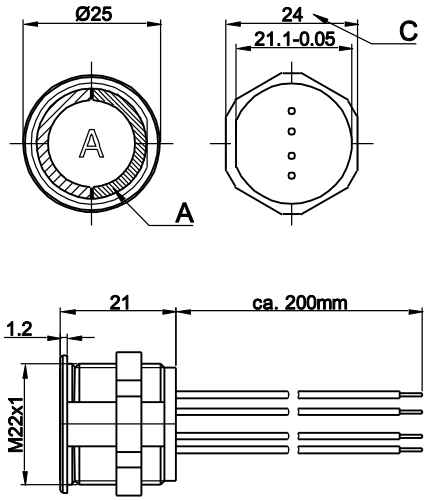
- *A = Illumination Area*
- *B = Actuating Area*
- *C = Width Across Flats*
- *I = Crimp Terminal male 6.3x0.8*

Lettering:

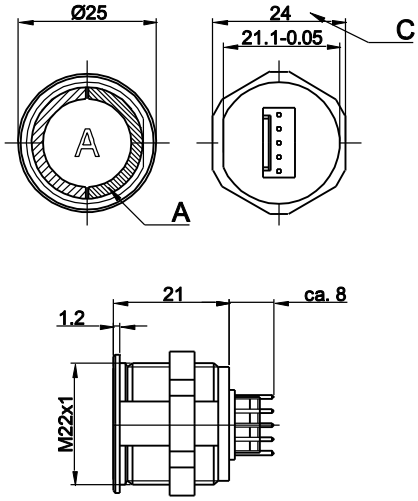
- *either with/without lettering*
- *position of the connections with respect to the position of the lettering is not defined*

1) *Version available on request*

Ring Illumination with Wires



Ring Illumination with Plug Connector



Terminal:
Molex 22-23-2051
6373 Serie

For terminal layout see page 15

Legend:

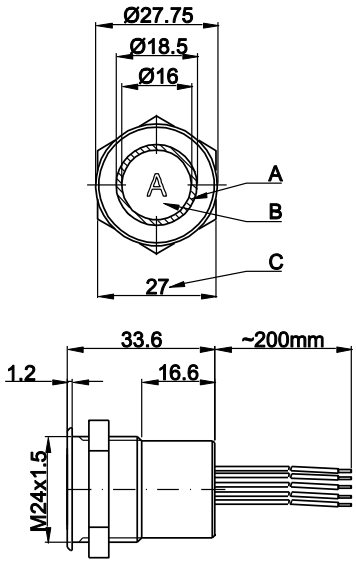
- *A = Illumination Area*
- *B = Actuating Area*
- *C = Width Across Flats*
- *I = Crimp Terminal male 6.3x0.8*

Lettering:

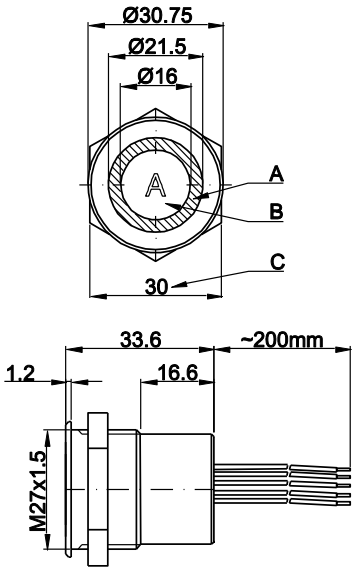
- *either with/without lettering*
- *position of the connections with respect to the position of the lettering is not defined*

2.2.4 M24 / M27 / M30 Series with Ring Illumination

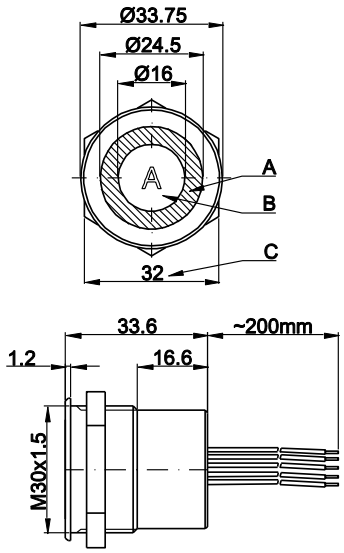
M24



M27



M30



For terminal layout see page 14

Legend:

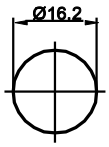
- *A = Illumination Area*
- *B = Actuating Area*
- *C = Width Across Flats*
- *I = Crimp Terminal male 6.3x0.8*

Lettering:

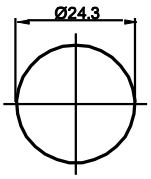
- *either with/without lettering*
- *position of the connections with respect to the position of the lettering is not defined*

2.3 Hole Dimensions

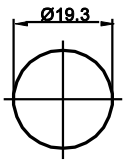
M16



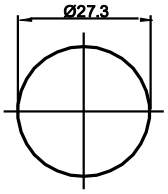
M24



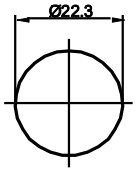
M19



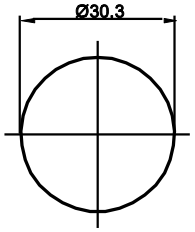
M27



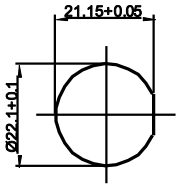
M22



M30

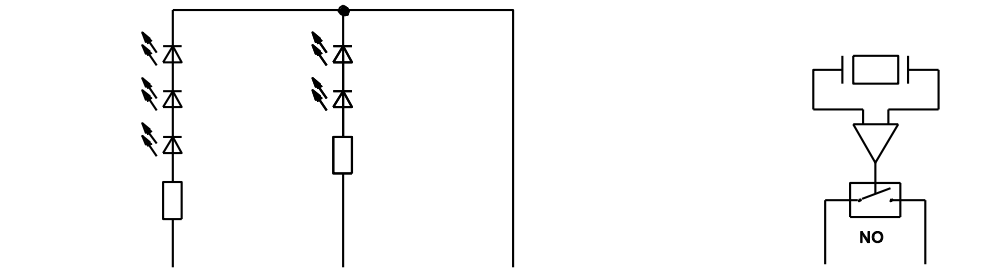


M22 RI



2.4 Switching Symbols: Illumination

Ring Illumination for the M24, M27, M30, 12/24 VDC Series



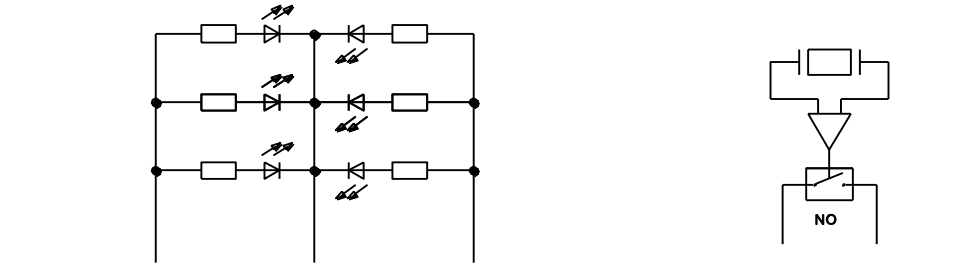
Cable 1 (color of the LEDs)
Supply voltage
first LED group

Cable 3 (color of the LEDs)
Supply voltage
second LED group

Cable2 (black)
Common mass
of both LED gropus

Cable 4 and 5 (white)
Input and output PSE switch

Special Types: 5 VDC



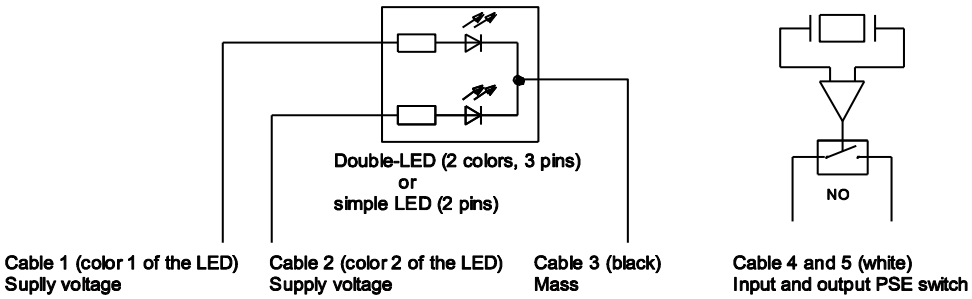
Cable 1 (color of the LEDs)
Supply voltage
first LED group

Cable 2 (black)
Common mass
of both LED groups

Cable 3 (color of the LEDs)
Supply voltage
second LED group

Cable 4 and 5 (white)
Input and output PSE switch

Point Illumination



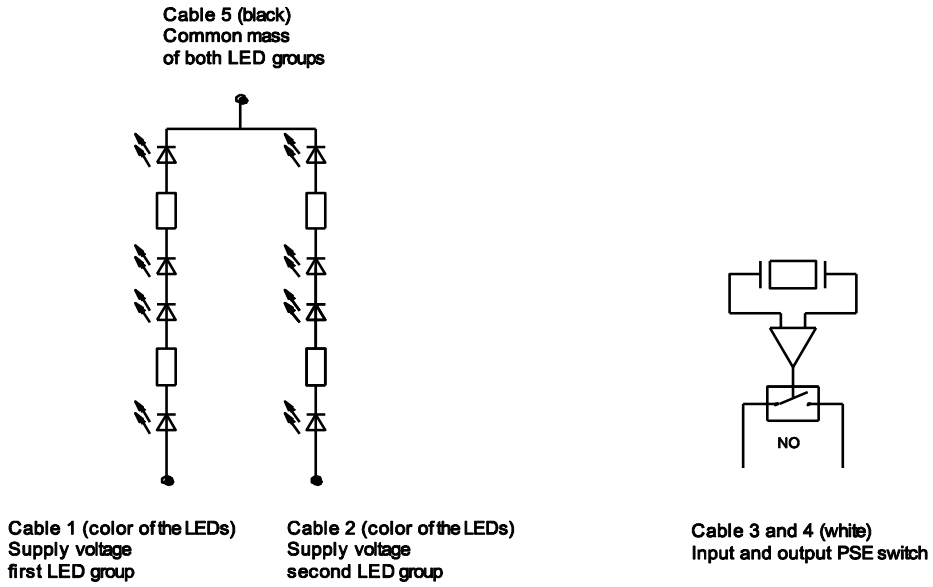
Cable 1 (color 1 of the LED)
Suplly voltage

Cable 2 (color 2 of the LED)
Supply voltage

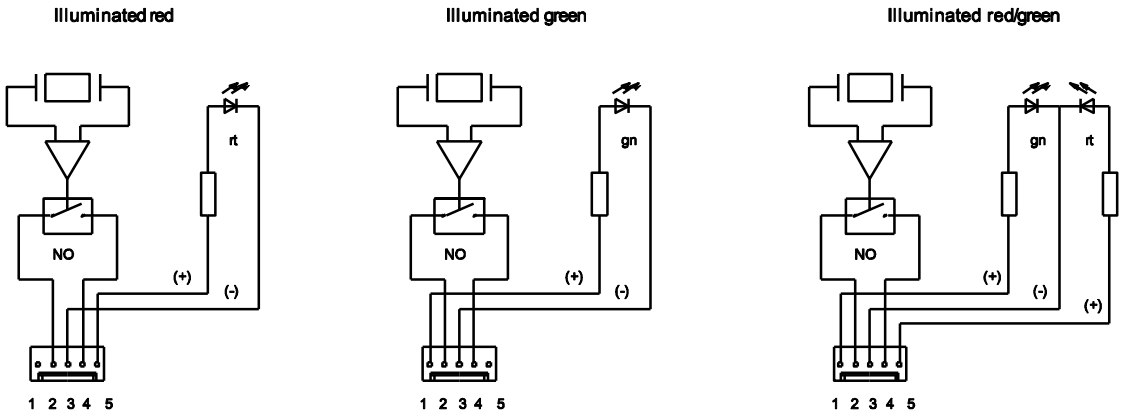
Cable 3 (black)
Mass

Cable 4 and 5 (white)
Input and output PSE switch

Ring Illumination for the M22, 12/24 VDC Series with Wires



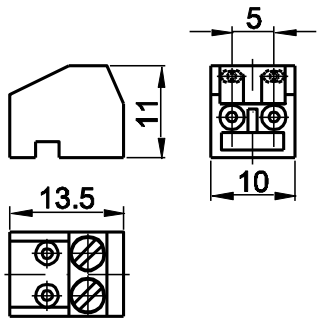
Ring Illumination for the M22, 12/24 VDC Series with Quick Connect Terminal



2.5 Accessories

Connection Terminal for version with pins

Order number: 0701.9225



3 ORDER NUMBERS

3.1 M16 Series

Item Number	Function	Connection	Housing Material	Housing Color
1241.2350	NO	Pins	Plastic	Red
1241.2351	NO	Pins	Plastic	White
1241.2352	NO	Pins	Plastic	Aluminum natural
1241.2353	NO	Pins	Plastic	Black
1241.2411.1	NO	Pins	Aluminum	Gold
1241.2411.3	NO	Pins	Aluminum	Red
1241.2411.4	NO	Pins	Aluminum	Blue
1241.2411.5	NO	Pins	Aluminum	Green
1241.2411.7	NO	Pins	Aluminum	Black
1241.2411.8	NO	Pins	Aluminum	Aluminum natural
1241.2611	NO	Pins	Stainless Steel	
1241.3000	NO	Crimp Terminal male	Aluminum	Red
1241.3001	NO	Crimp Terminal male	Aluminum	Green
1241.3002	NO	Crimp Terminal male	Aluminum	Black
1241.3003	NO	Crimp Terminal male	Aluminum	Aluminum natural

3.2 M19 Series

Item Number	Function	Connection	Housing Material	Housing Color
1241.3123	NO	Pins	Aluminum	Aluminum natural
1241.5003	NO	Cable with Faston	Aluminum	Aluminum natural
1241.3388	NO	Pins	Stainless Steel	

3.3 M22 Series

3.3.1 M22 non-illuminated

Item Number	Function	Connection	Housing Material	Housing Color
1241.3005	NO	Pins	Aluminum	Red
1241.3006	NO	Pins	Aluminum	Green
1241.3007	NO	Pins	Aluminum	Black
1241.3008	NO	Pins	Aluminum	Aluminum natural
1241.3075	NO	Pins	Stainless Steel	
1241.3593	NO	Wire	Aluminum	Aluminum natural

The listed item numbers represent a selection from the range of piezo switches.
Other mounting diameters, materials, colors and connections are available upon request.

3.3.2 M22 with Point Illumination

Item Number	Function	Connection	Housing Material	Housing Color	Illumination	Voltage
1241.3020.M	NO	Crimp Terminal male	Aluminum	Aluminum natural	Red	24 VDC
1241.3047.M	NO	Crimp Terminal male	Aluminum	Aluminum natural	Yellow	24 VDC
1241.3089.M	NO	Crimp Terminal male	Aluminum	Aluminum natural	Green	24 VDC
1241.3244.M	NO	Crimp Terminal male	Aluminum	Aluminum natural	Blue	24 VDC
1241.3166.M	NO	Crimp Terminal male	Aluminum	Red	Red	24 VDC
1241.3167.M	NO	Crimp Terminal male	Aluminum	Green	Green	24 VDC
1241.3222.M	NO	Crimp Terminal male	Aluminum	Gold	Yellow	24 VDC
1241.3594.M	NO	Wire	Stainless Steel		Green	24 VDC

3.4 M22 / M24 / M27 / M30 with Ring Illumination

3.4.1 M22 With Ring Illumination

Item Number	Function	Connection	Housing Material	Housing Color	Illumination	Voltage
1241.3250	NO	Wire	Aluminum	Aluminum natural	Red	12 VDC
1241.3251	NO	Wire	Aluminum	Aluminum natural	Green	12 VDC
1241.3252	NO	Wire	Aluminum	Aluminum natural	Red/Green	12 VDC
1241.3253	NO	Plug Connector	Aluminum	Aluminum natural	Red	12 VDC
1241.3254	NO	Plug Connector	Aluminum	Aluminum natural	Green	12 VDC
1241.3255	NO	Plug Connector	Aluminum	Aluminum natural	Red/Green	12 VDC
1241.3256	NO	Wire	Aluminum	Aluminum natural	Red	24 VDC
1241.3257	NO	Wire	Aluminum	Aluminum natural	Green	24 VDC
1241.3258	NO	Wire	Aluminum	Aluminum natural	Red/Green	24 VDC
1241.3259	NO	Plug Connector	Aluminum	Aluminum natural	Red	24 VDC
1241.3260	NO	Plug Connector	Aluminum	Aluminum natural	Green	24 VDC
1241.3261	NO	Plug Connector	Aluminum	Aluminum natural	Red/Green	24 VDC
1241.3390	NO	Wire	Aluminum	Aluminum natural	Blue	12 VDC*
1241.3413	NO	Wire	Aluminum	Aluminum natural	Blue	24 VDC

*Illumination blue 12 VDC: voltage supply 12 VDC +10% / -1%

The listed item numbers represent a selection from the range of piezo switches.
Other mounting diameters, materials, colors and connections are available upon request.

3.4.2 M24 Series

Item Number	Function	Connection	Housing Material	Housing Color	Illumination	Voltage
1241.3010	NO	Wire	Aluminum	Aluminum natural	Red/Green	24 VDC
1241.3134	*NO*	*Wire*	*Aluminum*	*Aluminum natural*	*Red/Green*	*12 VDC*

3.4.3 M27 Series

Item Number	Function	Connection	Housing Material	Housing Color	Illumination	Voltage
1241.3011	NO	Wire	Aluminum	Aluminum natural	Red/Green	24 VDC
1241.3138	*NO*	*Wire*	*Aluminum*	*Aluminum natural*	*Red/Green*	*12 VDC*

3.4.4 M30 Series

Item Number	Function	Connection	Housing Material	Housing Color	Illumination	Voltage
1241.3012	NO	Wire	Aluminum	Aluminum natural	Red/Green	24 VDC
1241.3230	*NO*	*Wire*	*Aluminum*	*Aluminum natural*	*Red/Green*	*12 VDC*
1241.3189	NO	Wire	Aluminum	Aluminum natural	Blue	24 VDC
1241.3237	NO	Wire	Stainless steel		Blue	24 VDC

- *Items in italics are available upon request*
- *Other supply voltages available upon request*

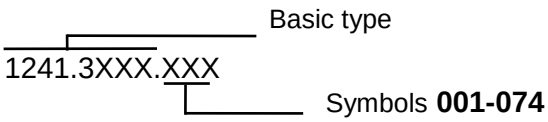
The listed item numbers represent a selection from the range of piezo switches.
Other mounting diameters, materials, colors and connections are available upon request.

3.5 Lettering:

The last three figures of the order number relate to the type of lettering.

001-074 Standard Lettering
101- Customized Lettering

Example for ordering with lettering



Order Indices for Lettering

001= **A**	016=P	031= **4**	046= ↕	061= **EIN**
002= **B**	017= **Q**	032= **5**	047= →	062= **AUS**
003= **C**	018= **R**	033= **6**	048= ←	063= **AUF**
004= **D**	019= **S**	034= **7**	049= ↓	064= **AB**
005= **E**	020= **T**	035= **8**	050= ↑	065= **ON**
006= **F**	021= **U**	036= **9**	051= **%**	066= **OFF**
007= **G**	022= **V**	037= +	052= √	067= **UP**
008= **H**	023= **W**	038= –	053= **CTRL**	068= **DOWN**
009= **I**	024= **X**	039= .	054= **RETURN**	069= **HIGH**
010= **J**	025= **Y**	040= ×	055= **SHIFT**	070= **LOW**
011= **K**	026= **Z**	041= ÷	056= **LOCK**	071= **ON/OFF**
012= **L**	027= **0**	042= *	057= **STOP**	072= **START**
013= **M**	028= **1**	043= =	058= **ENTER**	073= **RESET**
014= **N**	029= **2**	044= #	059= **BACK**	074= ⏻
015= **O**	030= **3**	045= ↔	060= **LINE**	

Font Size

PSE M16 / M19 / M24 / M30

Individual characters:	Height: 5 mm; font: Helvetica normal DIN1451-1E
Lettering, max. 3 characters:	Height: 3 mm; font: Helvetica normal DIN1451-1E
Symbols (Indices 037-052):	Height of capital letters: 5 mm; font: True Type, Symbol

PSE M22

Individual characters:	Height: 5 mm; font: Helvetica normal DIN1451-1E
Lettering, max. 3 characters:	Height: 5 mm; font: Helvetica normal DIN1451-1E
Lettering, max. 6 characters:	Height: 2.5 mm; font: Helvetica condensed DIN1451-1E
Symbols (Indices 037-052):	Height of capital letters: 5 mm; font: True Type, Symbol

Laser Lettering

Material	Colour		
Stainless Steel:	Black	Filled letters	
Aluminum natural:	Grey	Filled letters	(only after customer approval)
Anodized Aluminum:	White	Filled letters	

4 PACKAGING

PSE Switches

M16		10 pieces per carton with inlay
M19		10 pieces per carton with inlay
M22		10 pieces per carton with inlay
M24 / M27 / M30 with Ring Illumination	Air-cushion bag 1 piece	10 pieces per carton

Nuts with sealing rings are packaged separately and are enclosed in the carton.

5 QUALIFICATION TESTS

5.1 IP Protection Class

IP Protection Class IEC/DIN/EN 60529	front side	IP 67
IP Protection Class DIN 40050-9:1993 (High-pressure steam jet cleaning test)	front side	IP 69K
DIN EN 60068-2-30 Db (moist heat (air test with 55°C / 93% humidity)	front side / back side	

5.2 IK Protection Class

Tested centrically

IK Protection Class DIN EN 50102	IK 02

5.3 Salt-Spray Test

Salt-spray test according to DIN 50021- SS
24h, 48h and 96h test duration

After 8h, the start of corrosion may be discerned; after 96h, this corrosion has spread across large areas of the switch.

This surface corrosion may be removed under running water.

5.4 Hygienic Switches for Food Processing Equipment

The PSE switches meet the requirements for food processing equipment:

DGUV test certificate FW 11 040

As housing material, stainless steel is recommended for use in food processing equipment.
At the final equipment, the installation position for switches with anodized aluminum housing may not be located above the food area.

6 APPROVALS

Test	Norm
Thermal Shock	MIL-STD 202F Method 107G
High Temperature	MIL-STD 810E Method 501.3
Low Temperature	MIL-STD 810E Method 502.3
Humidity	MIL-STD 810E Method 507.3
Vibration	MIL-STD 202F Method 204D
Mechanical Shock	MIL-STD 202F Method 213B
RFI	MIL-STD 416D Method RS103
ESD	EN 61000-4-2 (+/-6 kV Kontakt, +/-16 kV Luft)
Burst	EN 61000-4-4 (+/- 1kV einzeln, +/- 2kV parallel)
Surge	EN 61000-4-5 (+/- 1kV unsym. , +/- 0,5kV sym.)

7 COMPLIANCE

All articles are ROHS-compliant and in compliance to the EMV - Directive (2004/108/EWG).