

Product Manual

PSE NO Switch

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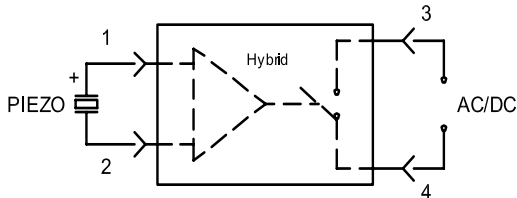
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# 1 PRODUCT DESCRIPTION

## 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**.

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## 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 5V 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.

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## 2 TECHNICAL DATA AND DIMENSIONAL DRAWINGS

### 2.1 Technical Data

<b>Electrical Data</b>		
Switching Voltage max.	(VAC/DC)	42/60
Switching Current max.	(mA)	100
Rated Breaking Capacity	(W)	1
Lifetime (at Rated Breaking Capacity)	(million)	20
Insulation Resistance (OFF=not actuated)	(kΩ)	>10
Initial Contact Resistance (ON=actuated)	(mΩ)	<20
Capacity	(pF)	30
NO Pulse Time (depending on the actuating force, time and speed)	(ms)	20-1000
Contact Configuration		polarity-free
Switch Function		NO switch

<b>Mechanical Data</b>		
Actuating Force (at ambient temperature)	(N)	1-3 <sup>1)</sup>
Actuating Travel	(mm)	0.002
Torque	(Nm)	2.5
IK Protection Class	(IK)	02

<b>Climatic Data</b>		
Operating Temperature	(°C)	-40 to +85
Storage Temperature	(°C)	-40 to +85
IP Degree of Protection Front Side submerged	(IP)	67
IP Degree of Protection Front Side hose water		69K

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

<b>Point Illumination</b>	
Stockable types are designed for a supply voltage of 24 V. Other possible supply voltages are 5 V and 12 V.	

<b>Ring Illumination</b>	
Stockable types are designed for a supply voltage of 24 V. Other possible supply voltages are 5 V and 12 V.	

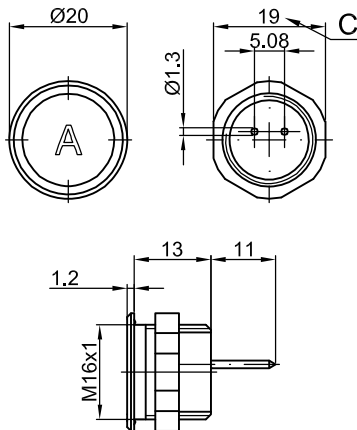
<b>Material</b>	
<b>Individual Part</b>	<b>Material</b>
Housing (depending on type)	Stainless Steel 1)
	Anodized aluminum
	Polyamide
Actuating Area / Insert (with ring illumination)	Stainless steel 1)
	Anodized aluminum
Illuminated Ring (with ring illumination)	Polyamide

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

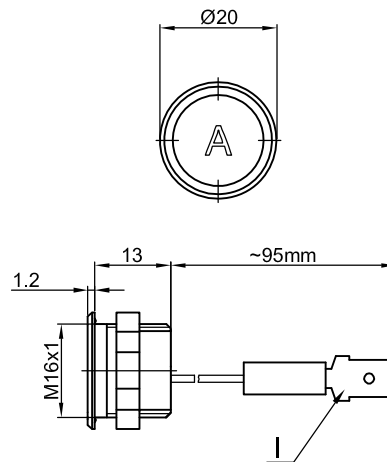
## 2.2 Component dimensions

### 2.2.1 M16 Series with Finger Guidance

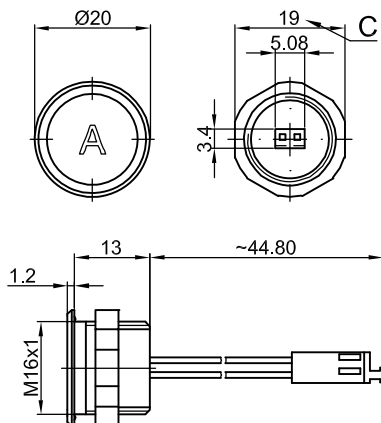
#### with Pins



#### with Quick Connect Terminal



#### with AMP <sup>1)</sup>



#### Legend:

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

#### Lettering:

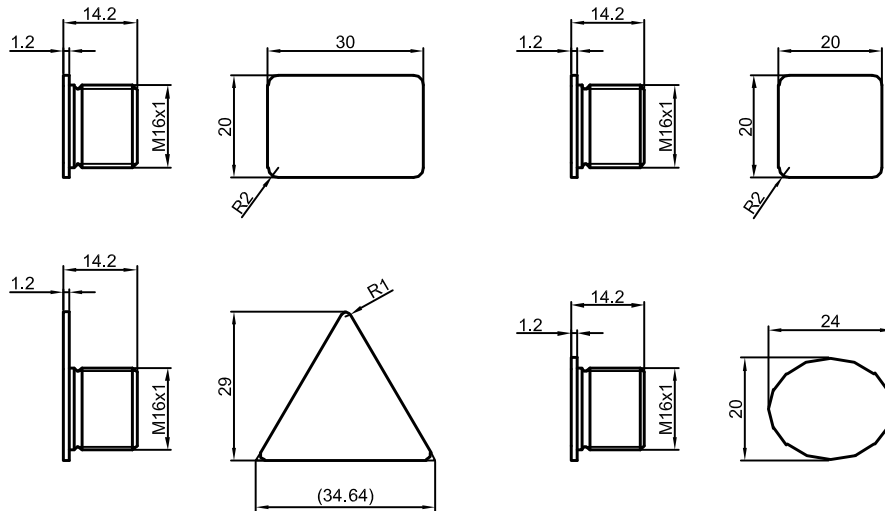
- either with/without lettering
- position of the connections with respect to the position of the lettering is not defined

<sup>1)</sup> Version available on request

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2.2.1.1 Design Possibilities for Housing Geometry: M16

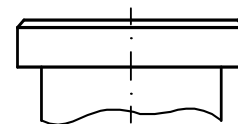
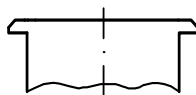
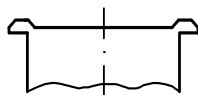


2.2.1.2 Design Possibilities for Actuating Area

with finger guidance  
(standard)

without finger guidance  
(upon request)

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



Material	Color
Anodized aluminum	Aluminum natural
Anodized aluminum	Gold
Anodized aluminum	Red
Anodized aluminum	Blue
Anodized aluminum	Green
Anodized aluminum	Black
Stainless Steel	Stainless Steel natural

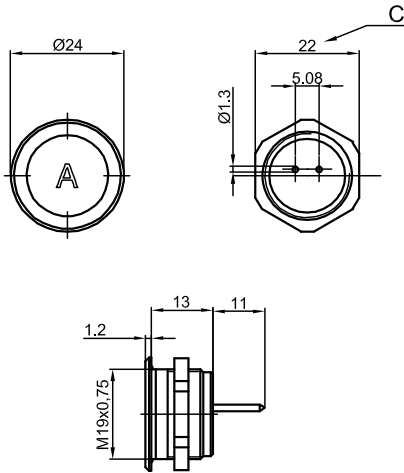
Connector types: wires, pin, quick connect terminal

Order numbers are generated individually.

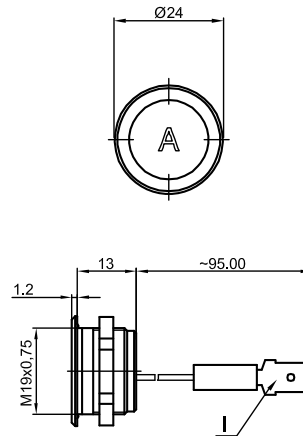


2.2.2 M19 Series

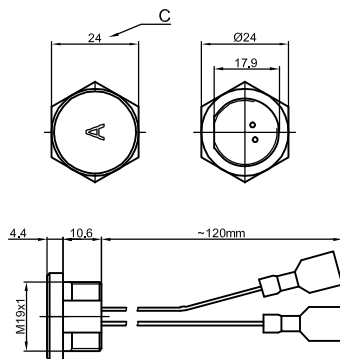
**with Pins**



**with Quick Connect Terminal <sup>1)</sup>**



**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:**

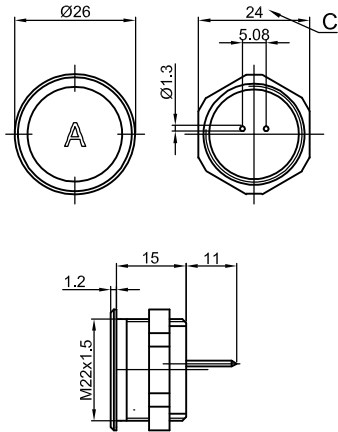
- either with/without lettering
- position of the connections with respect to the position of the lettering is not defined

<sup>1)</sup> Version available on request

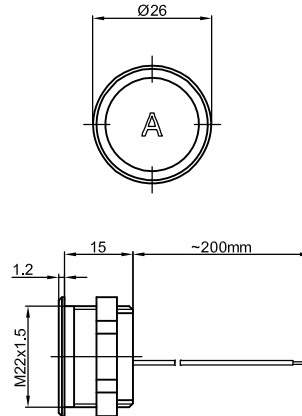
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2.2.3 M22 Series

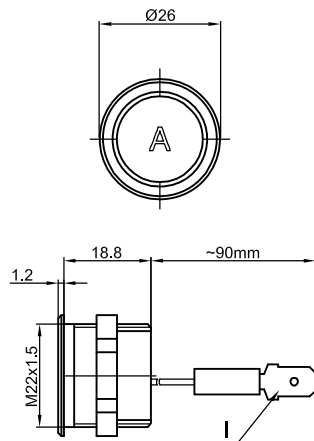
**with Pins**



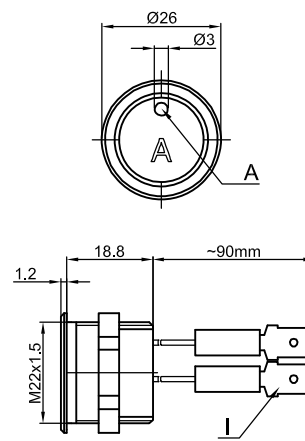
**with Wire <sup>1)</sup>**



**with Quick Connect Terminal <sup>1)</sup>**



**Point Illumination  
with Quick Connect Terminal <sup>1)</sup>**



**For terminal layout see page 14**

**Legend:**

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

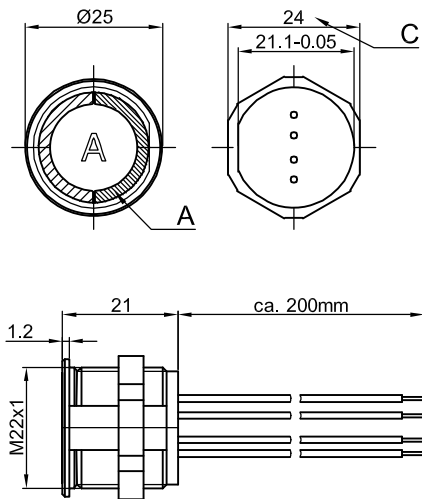
**Lettering:**

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

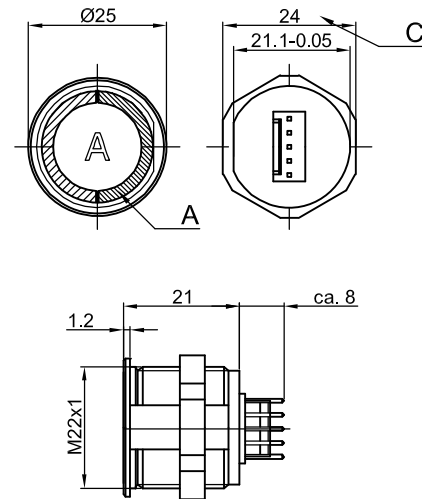
<sup>1)</sup> Version available on request

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**Ring Illumination with Wires**



**Ring Illumination with Plug Connector**



Terminal:  
Molex 22-23-2051  
6373 Serie

**For terminal layout see page 15**

**Legend:**

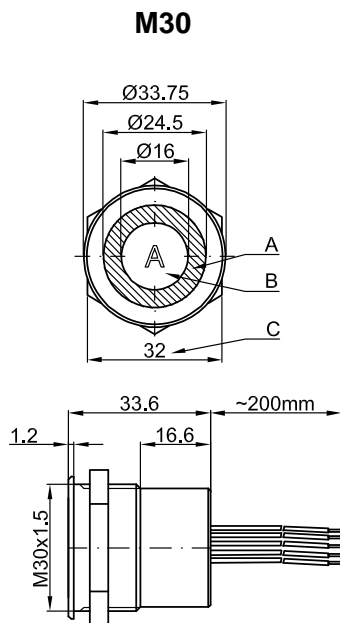
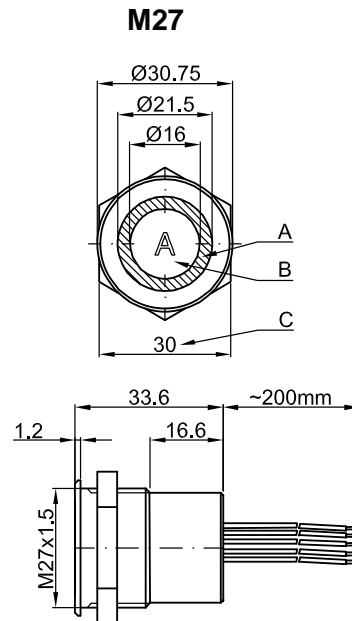
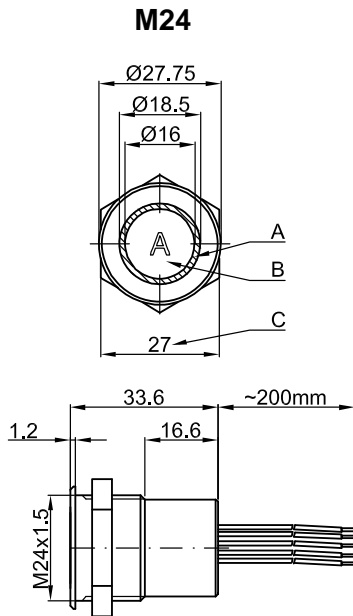
- A = Illumination Area
- B = Actuating Area
- C = Width Across Flats
- I = Crimp Terminal male 6.3x0.8

**Lettering:**

- either with/without lettering
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2.2.4 M24 / M27 / M30 Series with Ring Illumination



**For terminal layout see page 14**

**Legend:**

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

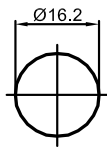
**Lettering:**

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

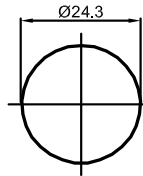
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### 2.3 Hole Dimensions

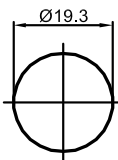
**M16**



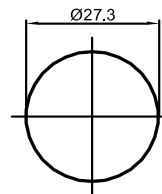
**M24**



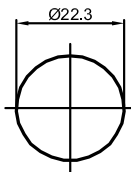
**M19**



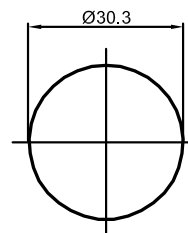
**M27**



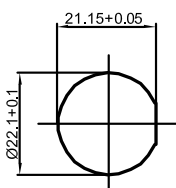
**M22**



**M30**



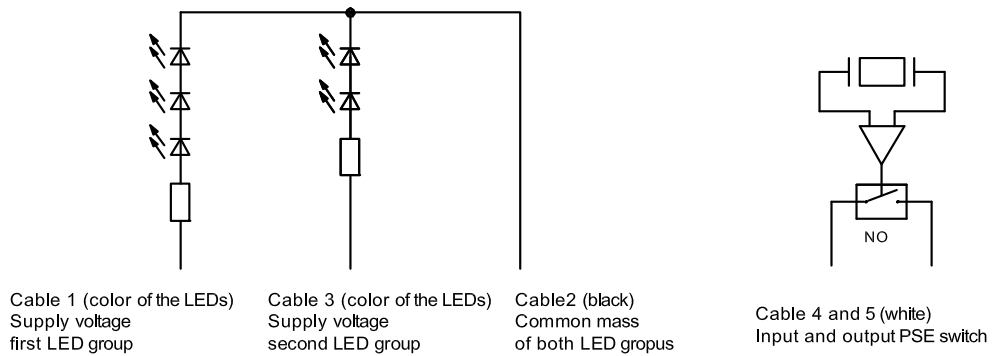
**M22 RI**



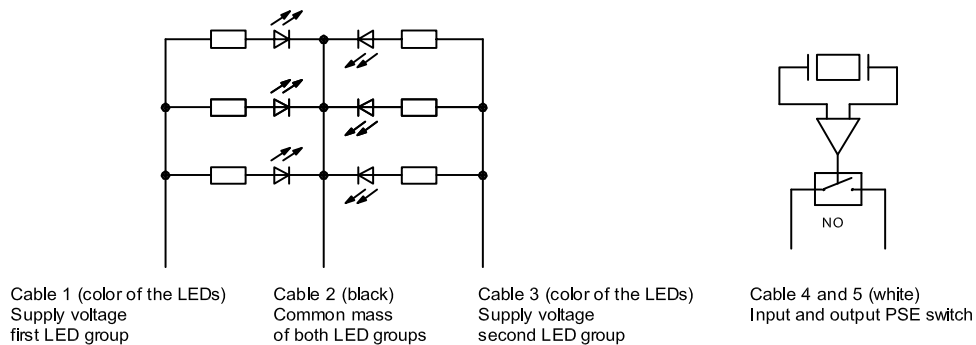
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## 2.4 Switching Symbols: Illumination

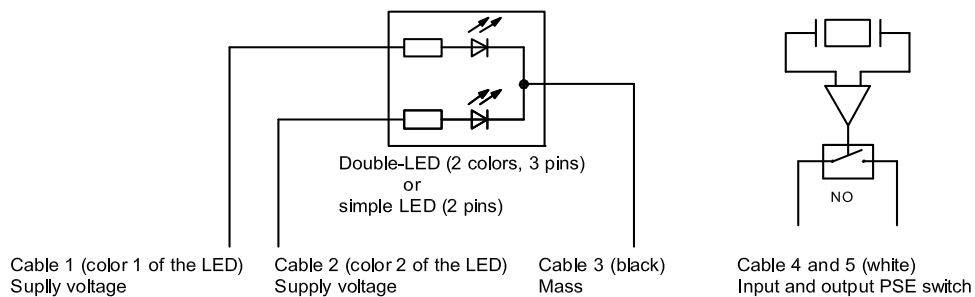
### Ring Illumination for the M24, M27, M30, 12/24 V Series



### Special Types: 5V



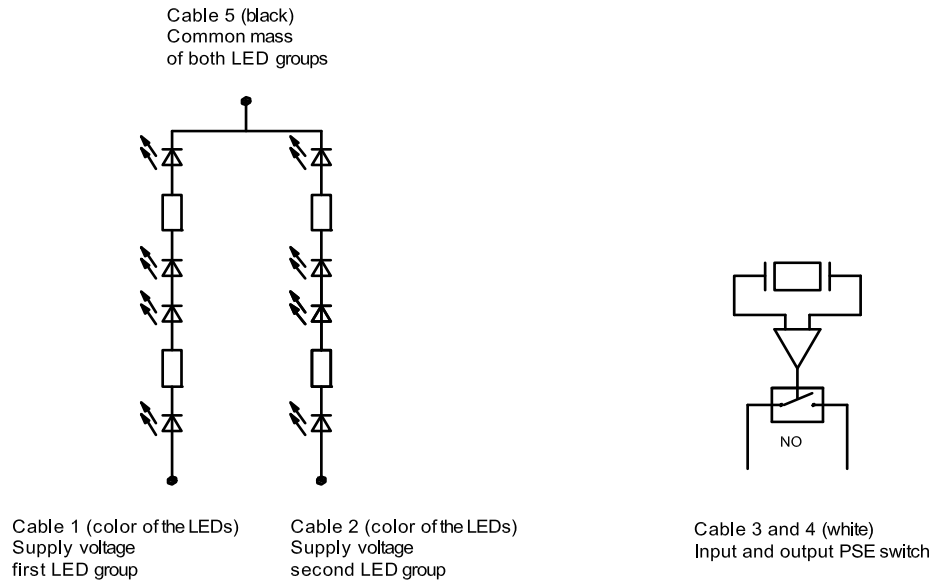
### Point Illumination



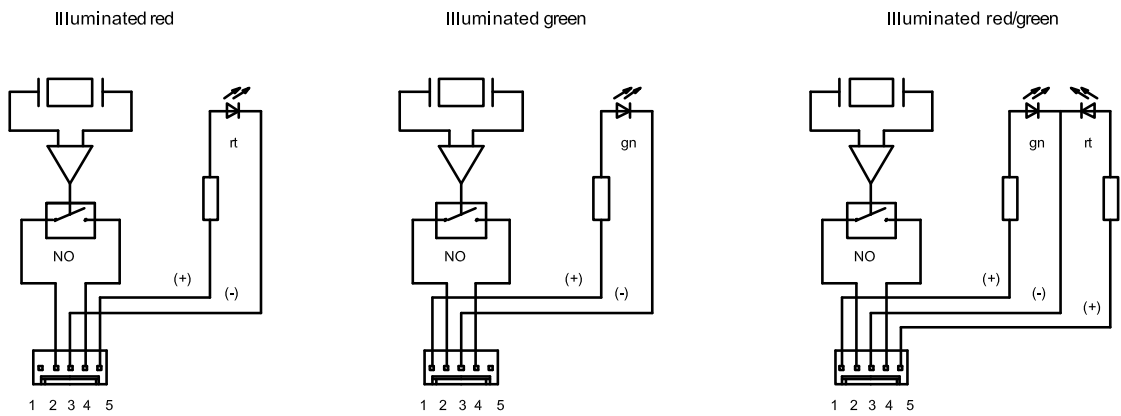
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### Ring Illumination for the M22, 12/24 V Series with Wires



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



## 2.5 Accessories

### Connecting Terminal for Pin Types

Order Number: 0701.9225

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### 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	Quick Connect Terminal	Aluminum	Red
1241.3001	NO	Quick Connect Terminal	Aluminum	Green
1241.3002	NO	Quick Connect Terminal	Aluminum	Black
1241.3003	NO	Quick Connect Terminal	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

#### 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	

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

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### 3.3.2 M22 with Point Illumination

Item Number	Function	Connection	Housing Material	Housing Color	Illumination
1241.3020.M	NO	Quick Connect Terminal	Aluminum	Aluminum natural	Red
1241.3047.M	NO	Quick Connect Terminal	Aluminum	Aluminum natural	Yellow
1241.3089.M	NO	Quick Connect Terminal	Aluminum	Aluminum natural	Green
1241.3244.M	NO	Quick Connect Terminal	Aluminum	Aluminum natural	Blue
1241.3166.M	NO	Quick Connect Terminal	Aluminum	Red	Red
1241.3167.M	NO	Quick Connect Terminal	Aluminum	Green	Green
1241.3222.M	NO	Quick Connect Terminal	Aluminum	Gold	Yellow

## 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	12V
1241.3251	NO	Wire	Aluminum	Aluminum natural	Green	12V
1241.3252	NO	Wire	Aluminum	Aluminum natural	Red/Green	12V
1241.3253	NO	Plug Connector	Aluminum	Aluminum natural	Red	12V
1241.3254	NO	Plug Connector	Aluminum	Aluminum natural	Green	12V
1241.3255	NO	Plug Connector	Aluminum	Aluminum natural	Red/Green	12V
1241.3256	NO	Wire	Aluminum	Aluminum natural	Red	24V
1241.3257	NO	Wire	Aluminum	Aluminum natural	Green	24V
1241.3258	NO	Wire	Aluminum	Aluminum natural	Red/Green	24V
1241.3259	NO	Plug Connector	Aluminum	Aluminum natural	Red	24V
1241.3260	NO	Plug Connector	Aluminum	Aluminum natural	Green	24V
1241.3261	NO	Plug Connector	Aluminum	Aluminum natural	Red/Green	24V

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

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### 3.4.2 M24 Series

Item Number	Function	Connection	Housing Material	Housing Color	Illumination	Voltage
1241.3010	NO	Wire	Aluminum	Aluminum natural	Red/Green	24V
<i>1241.3134</i>	<i>NO</i>	<i>Wire</i>	<i>Aluminum</i>	<i>Aluminum natural</i>	<i>Red/Green</i>	<i>12V</i>

### 3.4.3 M27 Series

Item Number	Function	Connection	Housing Material	Housing Color	Illumination	Voltage
1241.3011	NO	Wire	Aluminum	Aluminum natural	Red/Green	24V
<i>1241.3138</i>	<i>NO</i>	<i>Wire</i>	<i>Aluminum</i>	<i>Aluminum natural</i>	<i>Red/Green</i>	<i>12V</i>

### 3.4.4 M30 Series

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

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

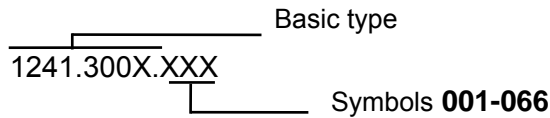
*The listed item numbers represent a selection from the range of piezo switches.  
Other mounting diameters, materials, colors and connections are available upon request.*

### 3.5 Lettering:

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

001-066 Standard Lettering  
101- Customized Lettering

#### Example for ordering with lettering



#### Order Indices for Lettering

001= <b>A</b>	013= <b>M</b>	025= <b>Y</b>	037= +	049= ↓
002= <b>B</b>	014= <b>N</b>	026= <b>Z</b>	038= –	050= ↑
003= <b>C</b>	015= <b>O</b>	027= <b>0</b>	039= .	051= %
004= <b>D</b>	016= <b>P</b>	028= <b>1</b>	040= ×	052= √
005= <b>E</b>	017= <b>Q</b>	029= <b>2</b>	041= ÷	
006= <b>F</b>	018= <b>R</b>	030= <b>3</b>	042= *	
007= <b>G</b>	019= <b>S</b>	031= <b>4</b>	043= =	061= EIN
008= <b>H</b>	020= <b>T</b>	032= <b>5</b>	044= #	062= AUS
009= <b>I</b>	021= <b>U</b>	033= <b>6</b>	045= ↔	063= AUF
010= <b>J</b>	022= <b>V</b>	034= <b>7</b>	046= ⇕	064= AB
011= <b>K</b>	023= <b>W</b>	035= <b>8</b>	047= →	065= ON
012= <b>L</b>	024= <b>X</b>	036= <b>9</b>	048= ←	066= OFF

Changes that contribute to technical improvement are subject to alternations.

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## Font Size

### **PSE M16 / M19 / M24 / M30**

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

### **PSE M22**

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

## Standard Colors for Lettering

<b>Stainless Steel:</b>	Black	Filled letters	
<b>Aluminum natural:</b>	Gray	Filled letters	(only after customer approval)
<b>Anodized Aluminum:</b>	White	Filled letters	

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## 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.



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## 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-cleaning test)	Front Side	IP 69K

### 5.2 IK Protection Class

Tested centrally

IK Protection Class DIN EN 50102	IK 02
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### 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.

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## 6 APPROVALS

MIL-STD 202F Method 107G	Thermal Shock
MIL-STD 810E Method 501.3	High Temperature
MIL-STD 810E Method 502.3	Low Temperature
MIL-STD 810E Method 507.3	Humidity
MIL-STD 202F Method 107G	Vibration
MIL-STD 202F Method 107G	Mechanical Shock
MIL-STD 416D Method RS103	RFI
EN 61000-4-2	ESD
EN 61000-4-4	Burst

## 7 ROHS COMPLIANCE

All items listed are RoHS-compliant.



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