

EAO – Your Expert Partner for  
**Human Machine Interfaces**



## EAO Product Information

Series 18





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**Product Information****General notes**

The series 18 comprises compact indicators for direct connection to 2.2, 12 or 24 VDC and illuminated pushbuttons with maintained or momentary action.

The illuminated pushbuttons are equipped with a snap-action switching system with normally open or normally closed contacts.

The dimensions of the front are 9 x 14 mm, 9 x 9 mm or 9 mm dia.

Indicators and illuminated pushbuttons for use with overhanging lenses 14 x 14 mm or 14 mm dia. are also available for flush mounting.

**Mounting**

Mounting from the front through the mounting hole 8 mm dia.

(15.8 x 15.8 mm resp. 16 mm dia. for flush mounting) is assured even with the wiring already attached.

The units are provided with soldering terminals.

**Lenses**

The flat lenses are available in various colours and a transparent version. The surface is nonreflecting (matt).

**Illumination**

Perfect illumination of the lenses, which can be supplied in various colours, is assured by Bi-Pin T1 LEDs (2.2 VDC) in the colours red, yellow and green.

(Compact indicators for connection to 12 or 24 VDC.) The Bi-Pin T1 LED are already integrated in the lenses.

Luminosity and wave length scattering caused by the technology used in the LED manufacturing processes may lead to visual differences in our products.

**Position indication**

The status of a maintained action switch can be determined by the position of the lens.

**Specimen order**Illuminated pushbutton :

- Illuminated pushbutton actuator, 9 x14 mm, 18-147.035  
momentary action, 1 normally open, soldering  
terminal

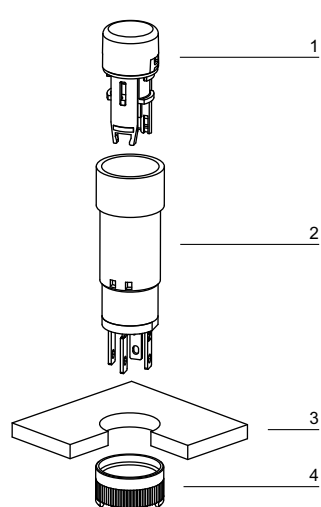
Essential accessories :

- Lens with LED plastic yellow, transparent, 18-941.4  
flush, 9 x 14 mm

*We reserve the right to modify technical data*

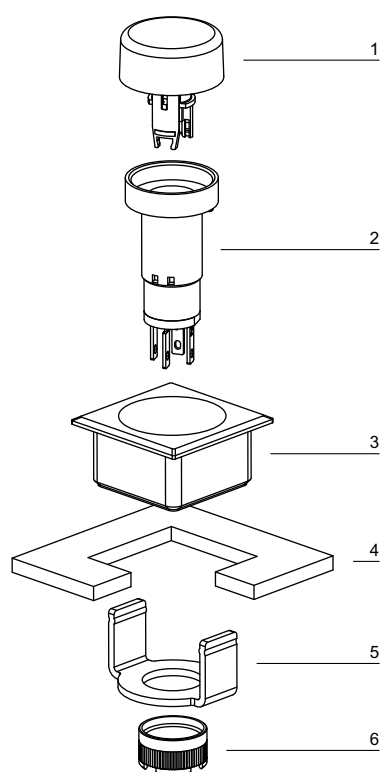
*All dimensions in mm*

## Pushbutton illuminative, raised mounting



- 1 Lens
- 2 Switch housing
- 3 Front panel
- 4 Fixing nut

## Pushbutton illuminative, flush mounting



- 1 Lens
- 2 Switch housing
- 3 Front bezel set (upper part)
- 4 Front panel
- 5 Front bezel set (lower part)
- 6 Fixing nut

## Indicator



|           | Front protection | Operating voltage/-current | Lens           | Terminals | Ø 9 x 9 mm<br>Typ-Nr. | Ø 9 x 14 mm<br>Typ-Nr. | Ø 9 mm<br>Typ-Nr. | Component layout | Mounting dimensions | Technical drawing | Circuit drawing |       |
|-----------|------------------|----------------------------|----------------|-----------|-----------------------|------------------------|-------------------|------------------|---------------------|-------------------|-----------------|-------|
| Indicator | IP 40            | 12 VDC, 20 mA              | Plastic green  | S         | 18-051.0055           | 18-041.0055            | 18-031.0055       | 1                | 1                   | 1                 | 1               | 0.002 |
|           |                  |                            | Plastic red    | S         | 18-051.0052           | 18-041.0052            | 18-031.0052       | 1                | 1                   | 1                 | 1               | 0.002 |
|           |                  |                            | Plastic yellow | S         | 18-051.0054           | 18-041.0054            | 18-031.0054       | 1                | 1                   | 1                 | 1               | 0.002 |
|           |                  | 2.2 VDC, 20 mA             | Plastic green  | S         | 18-050.0055           | 18-040.0055            | 18-030.0055       | 1                | 1                   | 1                 | 1               | 0.002 |
|           |                  |                            | Plastic red    | S         | 18-050.0052           | 18-040.0052            | 18-030.0052       | 1                | 1                   | 1                 | 1               | 0.002 |
|           |                  |                            | Plastic yellow | S         | 18-050.0054           | 18-040.0054            | 18-030.0054       | 1                | 1                   | 1                 | 1               | 0.002 |
|           |                  | 24 VDC, 20 mA              | Plastic green  | S         | 18-052.0055           | 18-042.0055            | 18-032.0055       | 1                | 1                   | 1                 | 1               | 0.002 |
|           |                  |                            | Plastic red    | S         | 18-052.0052           | 18-042.0052            | 18-032.0052       | 1                | 1                   | 1                 | 1               | 0.002 |
|           |                  |                            | Plastic yellow | S         | 18-052.0054           | 18-042.0054            | 18-032.0054       | 1                | 1                   | 1                 | 1               | 0.002 |

Terminals: S = Soldering terminal

Component layout from page 11, Mounting dimensions from page 12, Technical drawing from page 12, Circuit drawing from page 13

## Illuminated pushbutton actuator



### Essential Accessories:

Lens with LED page 7

|                                 | Front protection | Switching system | Contacts | Switching action | Terminals | Ø 9 x 9 mm<br>Typ-Nr. | Ø 9 x 14 mm<br>Typ-Nr. | Ø 9 mm<br>Typ-Nr. | Component layout | Mounting dimensions | Technical drawing | Circuit drawing |       |
|---------------------------------|------------------|------------------|----------|------------------|-----------|-----------------------|------------------------|-------------------|------------------|---------------------|-------------------|-----------------|-------|
| Illuminated pushbutton actuator | IP 40            | SA               | 1 NC     | MA               | S         | 18-258.035            | 18-248.035             | 18-238.035        | 2                | 1                   | 2                 | 2               | 0.002 |
|                                 |                  |                  |          | M                | S         | 18-158.035            | 18-148.035             | 18-138.035        | 2                | 1                   | 2                 | 4               | 0.002 |
|                                 |                  |                  | 1 NO     | MA               | S         | 18-257.035            | 18-247.035             | 18-237.035        | 2                | 1                   | 2                 | 3               | 0.002 |
|                                 |                  |                  |          | M                | S         | 18-157.035            | 18-147.035             | 18-137.035        | 2                | 1                   | 2                 | 5               | 0.002 |

Switching system: SA = Snap-action switching element

Contacts: NC = Normally closed, NO = Normally open

Switching action: MA = Maintained action, M = Momentary action

Terminals: S = Soldering terminal

Component layout from page 11, Mounting dimensions from page 12, Technical drawing from page 12, Circuit drawing from page 13

## Indicator actuator, flush mounting



### Essential Accessories:

Front bezel set, flush mounting page 8

|                                    | Front protection | Operating voltage/-current | Lens           | Terminals | 19 x 19 mm<br>Typ-Nr. | Ø 19 mm<br>Typ-Nr. | Component layout | Mounting dimensions | Technical drawing | Circuit drawing |       |
|------------------------------------|------------------|----------------------------|----------------|-----------|-----------------------|--------------------|------------------|---------------------|-------------------|-----------------|-------|
| Indicator actuator, flush mounting | IP 40            | 12 VDC, 20 mA              | Plastic green  | S         | 18-081.0055           | 18-061.0055        | 2                | 2                   | 3                 | 1               | 0.003 |
|                                    |                  |                            | Plastic red    | S         | 18-081.0052           | 18-061.0052        | 2                | 2                   | 3                 | 1               | 0.003 |
|                                    |                  |                            | Plastic yellow | S         | 18-081.0054           | 18-061.0054        | 2                | 2                   | 3                 | 1               | 0.003 |
|                                    |                  | 2.2 VDC, 20 mA             | Plastic green  | S         | 18-080.0055           | 18-060.0055        | 2                | 2                   | 3                 | 1               | 0.002 |
|                                    |                  |                            | Plastic red    | S         | 18-080.0052           | 18-060.0052        | 2                | 2                   | 3                 | 1               | 0.002 |
|                                    |                  |                            | Plastic yellow | S         | 18-080.0054           | 18-060.0054        | 2                | 2                   | 3                 | 1               | 0.002 |
|                                    |                  | 24 VDC, 20 mA              | Plastic green  | S         | 18-082.0055           | 18-062.0055        | 2                | 2                   | 3                 | 1               | 0.003 |
|                                    |                  |                            | Plastic red    | S         | 18-082.0052           | 18-062.0052        | 2                | 2                   | 3                 | 1               | 0.003 |
|                                    |                  |                            | Plastic yellow | S         | 18-082.0054           | 18-062.0054        | 2                | 2                   | 3                 | 1               | 0.003 |

Terminals: S = Soldering terminal

Component layout from page 11, Mounting dimensions from page 12, Technical drawing from page 12, Circuit drawing from page 13

## Illuminated pushbutton actuator, flush mounting



### Essential Accessories:

Front bezel set, flush mounting page 8

Lens with LED, flush mounting page 7

|                                                 | Front protection | Switching system | Contacts | Switching action | Terminals | 19 x 19 mm<br>Typ-Nr. | Ø 19 mm<br>Typ-Nr. | Component layout | Mounting dimensions | Technical drawing | Circuit drawing |       |
|-------------------------------------------------|------------------|------------------|----------|------------------|-----------|-----------------------|--------------------|------------------|---------------------|-------------------|-----------------|-------|
| Illuminated pushbutton actuator, flush mounting | IP 40            | SA               | 1 NC     | MA               | S         | 18-288.035            | 18-268.035         | 2                | 2                   | 4                 | 2               | 0.002 |
|                                                 |                  |                  |          | M                | S         | 18-188.035            | 18-168.035         | 2                | 2                   | 4                 | 4               | 0.002 |
|                                                 |                  |                  | 1 NO     | MA               | S         | 18-287.035            | 18-267.035         | 2                | 2                   | 4                 | 3               | 0.002 |
|                                                 |                  |                  |          | M                | S         | 18-187.035            | 18-167.035         | 2                | 2                   | 4                 | 5               | 0.002 |

Switching system: SA = Snap-action switching element

Contacts: NC = Normally closed, NO = Normally open

Switching action: MA = Maintained action, M = Momentary action

Terminals: S = Soldering terminal

Component layout from page 11, Mounting dimensions from page 12, Technical drawing from page 12, Circuit drawing from page 13

## Front

## Lens without LED

|                                         | Lens                             | ∅ 9 x 9 mm<br>Typ-Nr. | ∅ 9 x 14 mm<br>Typ-Nr. | Ø 9 mm<br>Typ-Nr. |  |
|-----------------------------------------|----------------------------------|-----------------------|------------------------|-------------------|-------------------------------------------------------------------------------------|
| <b>Lens without LED</b><br>illuminative | Plastic green translucent flush  | <b>18-952.5</b>       | <b>18-942.5</b>        | <b>18-932.5</b>   | 0.001                                                                               |
|                                         | Plastic red translucent flush    | <b>18-952.2</b>       | <b>18-942.2</b>        | <b>18-932.2</b>   | 0.001                                                                               |
|                                         | Plastic white translucent flush  | <b>18-952.9</b>       | <b>18-942.9</b>        | <b>18-932.9</b>   | 0.001                                                                               |
|                                         | Plastic yellow translucent flush | <b>18-952.4</b>       | <b>18-942.4</b>        | <b>18-932.4</b>   | 0.001                                                                               |
| non-illuminative                        | Plastic black opaque flush       | <b>18-952.0</b>       | <b>18-942.0</b>        | <b>18-932.0</b>   | 0.001                                                                               |
|                                         | Plastic grey opaque flush        | <b>18-952.8</b>       | <b>18-942.8</b>        | <b>18-932.8</b>   | 0.001                                                                               |



## Lens with LED

|                                                                                                  | Lens                             | ∅ 9 x 9 mm<br>Typ-Nr. | ∅ 9 x 14 mm<br>Typ-Nr. | Ø 9 mm<br>Typ-Nr. |  |
|--------------------------------------------------------------------------------------------------|----------------------------------|-----------------------|------------------------|-------------------|-------------------------------------------------------------------------------------|
| <b>Lens with LED</b><br>without built-in series resistor, typ.<br>forward voltage 2.2 VDC, 20 mA | Plastic green translucent flush  | <b>18-951.5</b>       | <b>18-941.5</b>        | <b>18-931.5</b>   | 0.001                                                                               |
|                                                                                                  | Plastic red translucent flush    | <b>18-951.2</b>       | <b>18-941.2</b>        | <b>18-931.2</b>   | 0.001                                                                               |
|                                                                                                  | Plastic yellow translucent flush | <b>18-951.4</b>       | <b>18-941.4</b>        | <b>18-931.4</b>   | 0.001                                                                               |



## Lens without LED, flush mounting

|                                                         | Lens                             | ∅ 19 x 19 mm<br>Typ-Nr. | Ø 19 mm<br>Typ-Nr. |  |
|---------------------------------------------------------|----------------------------------|-------------------------|--------------------|---------------------------------------------------------------------------------------|
| <b>Lens without LED, flush mounting</b><br>illuminative | Plastic green translucent flush  | <b>18-982.5</b>         | <b>18-962.5</b>    | 0.001                                                                                 |
|                                                         | Plastic red translucent flush    | <b>18-982.2</b>         | <b>18-962.2</b>    | 0.001                                                                                 |
|                                                         | Plastic white translucent flush  | <b>18-982.9</b>         | <b>18-962.9</b>    | 0.001                                                                                 |
|                                                         | Plastic yellow translucent flush | <b>18-982.4</b>         | <b>18-962.4</b>    | 0.001                                                                                 |
| non-illuminative                                        | Plastic black opaque flush       | <b>18-982.0</b>         | <b>18-962.0</b>    | 0.001                                                                                 |
|                                                         | Plastic grey opaque flush        | <b>18-982.8</b>         | <b>18-962.8</b>    | 0.001                                                                                 |



## Lens with LED, flush mounting

|                                                                                                                  | Lens                             | ∅ 19 x 19 mm<br>Typ-Nr. | Ø 19 mm<br>Typ-Nr. |  |
|------------------------------------------------------------------------------------------------------------------|----------------------------------|-------------------------|--------------------|---------------------------------------------------------------------------------------|
| <b>Lens with LED, flush mounting</b><br>without built-in series resistor, typ. forward<br>voltage 2.2 VDC, 20 mA | Plastic green translucent flush  | <b>18-981.5</b>         | <b>18-961.5</b>    | 0.001                                                                                 |
|                                                                                                                  | Plastic red translucent flush    | <b>18-981.2</b>         | <b>18-961.2</b>    | 0.001                                                                                 |
|                                                                                                                  | Plastic yellow translucent flush | <b>18-981.4</b>         | <b>18-961.4</b>    | 0.001                                                                                 |



## Front bezel set, flush mounting

|                                                          | Front bezel   | Ø 19 x 19 mm<br>Typ-Nr. | Ø 19 mm<br>Typ-Nr. | Mounting dimensions |  |
|----------------------------------------------------------|---------------|-------------------------|--------------------|---------------------|-------------------------------------------------------------------------------------|
| <b>Front bezel set, flush mounting</b><br>for Lens round | Plastic black | <b>18-920.2</b>         | <b>18-920.3</b>    | 2                   | 0.006                                                                               |
| for Lens square                                          | Plastic black | <b>18-920.1</b>         |                    | 2                   | 0.006                                                                               |

Mounting dimensions from page 12



## Blind plug

|                   | Ø 9 x 9 mm<br>Typ-Nr. | Ø 9 mm<br>Typ-Nr. | Mounting dimensions |  |
|-------------------|-----------------------|-------------------|---------------------|-------------------------------------------------------------------------------------|
| <b>Blind plug</b> | <b>19-948.0</b>       | <b>19-949.0</b>   | 3                   | 0.001                                                                               |

Mounting dimensions from page 12



## Backside

### PCB plug-in base

|                                       | Terminals | Typ-Nr.       | Component layout | Technical drawing |  |
|---------------------------------------|-----------|---------------|------------------|-------------------|---------------------------------------------------------------------------------------|
| <b>PCB plug-in base</b><br>Pins axial | P         | <b>18-945</b> | 3                | 5                 | 0.001                                                                                 |
| Pins bent at right-angles             | P         | <b>18-946</b> | 4                | 6                 | 0.001                                                                                 |

Terminals: P = PCB terminal

Component layout from page 11, Technical drawing from page 12



## Assembling

### Lens remover

|                     | Typ-Nr.       |  |
|---------------------|---------------|---------------------------------------------------------------------------------------|
| <b>Lens remover</b> | <b>18-910</b> | 0.002                                                                                 |



Mounting tool

|                                                    |               |                                                                                     |
|----------------------------------------------------|---------------|-------------------------------------------------------------------------------------|
|                                                    | Typ-Nr.       |  |
| <b>Mounting tool</b><br>for Fixing nut long 19-991 | <b>19-905</b> | 0.011                                                                               |



## Actuator with snap-action switching element

### Switching system

The snap-action switching system was designed for switching low powers in electronic circuits.  
Single-break snap-action contact.

### Material

#### Lens

Polymethylacrylate (PMMA), Polycarbonate (PC)

#### Material of contact

Gold contact on nickel plating

#### Actuator housing

Polyamide, colour black

### Service temperature

-25 °C ... +65 °C

### Protection degree

IP 40 front side, as per IEC 60529

### Shock resistance

(Single impacts, semi-sinusoidal)  
50 g for 11 ms, as per IEC 60068-2-27

### Vibration resistance

(sinusoidal) 10 g at 10-2000 Hz, amplitude 0.75 mm, as per IEC 60512-4-4

## Approvals

### Declaration of conformity

RoHS

## Mechanical characteristics

### Terminals

The terminals can be used as soldering terminals.  
Max.wire diameter: 2 x 0.5 mm<sup>2</sup>  
Max.wire cross-section of stranded cable 1 x 0.75 mm<sup>2</sup>  
Wire cross-section of terminal 1.6 x 0.4 mm

### Tightening torque

for fixing nut max. 20 Ncm

### Actuating force

1.4 N

### Actuating travel

2.2 mm ±0.2 mm

### Rebound time

≤2.5 ms

### Mechanical lifetime

Momentary action 2 million cycles of operation  
Maintained action 1 million cycles of operation,  
as per IEC 60512-5-9a

## Electrical characteristics

### Contact resistance

≤100 mΩ starting value (initial), as per IEC 60512-2-2b

### Electrical life

≥500 000 cycles of operation at 30 VDC, 100 mA, as per IEC 60512-5-9c

### Power consumption LED

20 mA

### Switch rating

min. 10 µA at 100 µV  
max. 100 mA at 42 VAC/VDC

### Electric strength

500 VAC, 50 Hz, 1 min. between all terminals and earth, as per IEC 60512-2-11

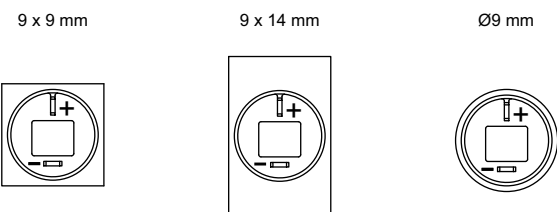
## Environmental conditions

### Storage temperature

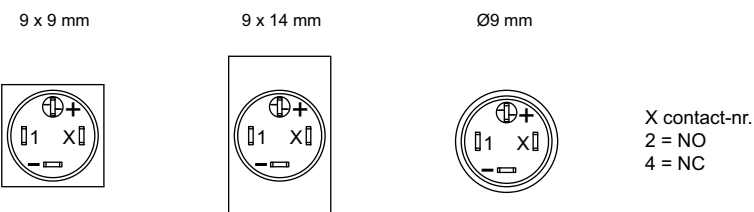
-40 °C ... +80 °C

## Component layout

### 1 Indicator page 5

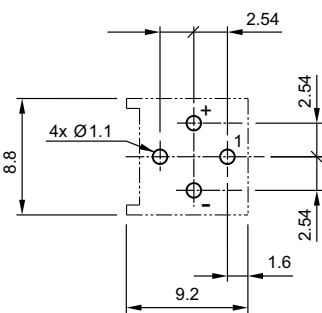


### 2 Illuminated pushbutton actuator page 5 | Indicator actuator, flush mounting page 6 | Illuminated pushbutton actuator, flush mounting page 6



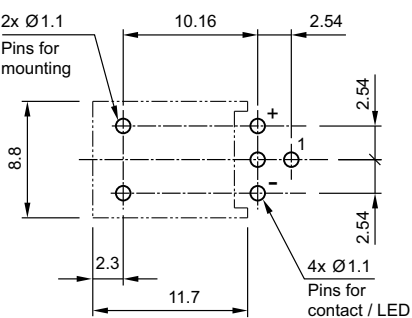
### 3 PCB plug-in base page 8

Drilling plan (element side)  
Through-connection recommended



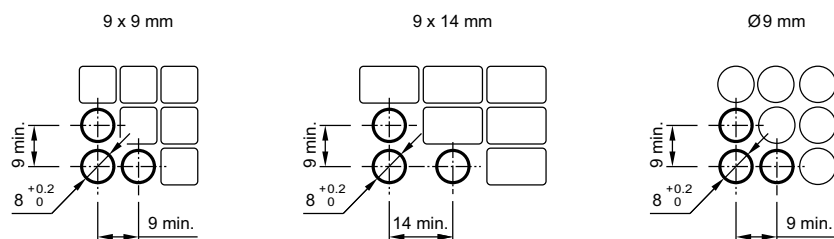
### 4 PCB plug-in base page 8

Drilling plan (element side)  
Through-connection recommended

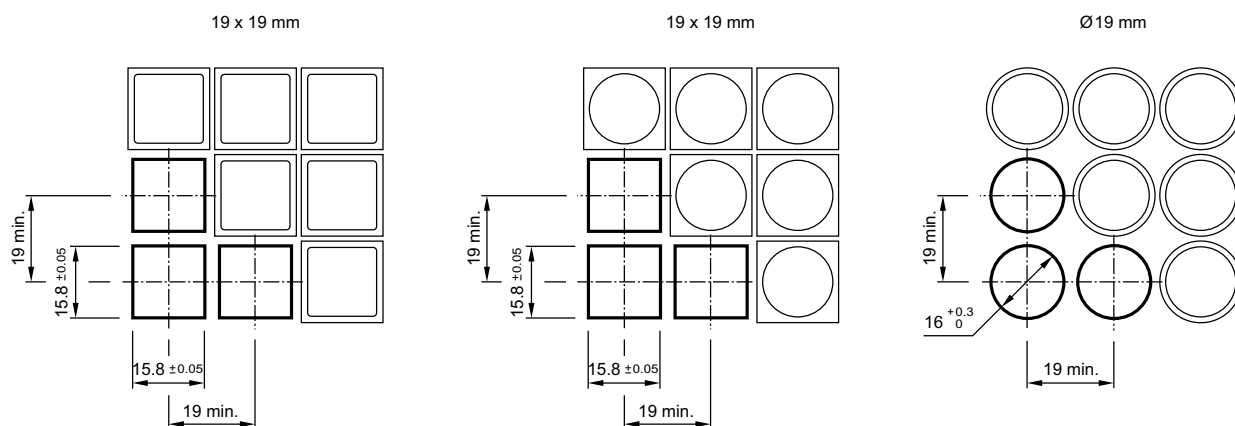


## Mounting dimensions

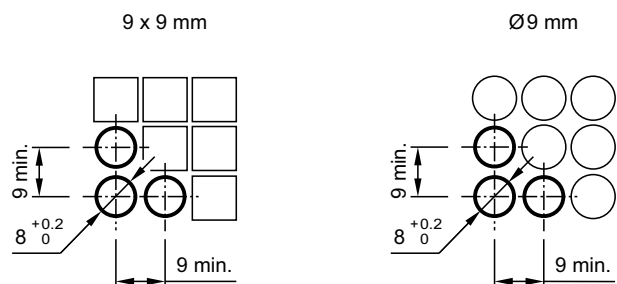
### 1 Indicator page 5 | Illuminated pushbutton actuator page 5



### 2 Indicator actuator, flush mounting page 6 | Illuminated pushbutton actuator, flush mounting page 6 | Front bezel set, flush mounting page 8

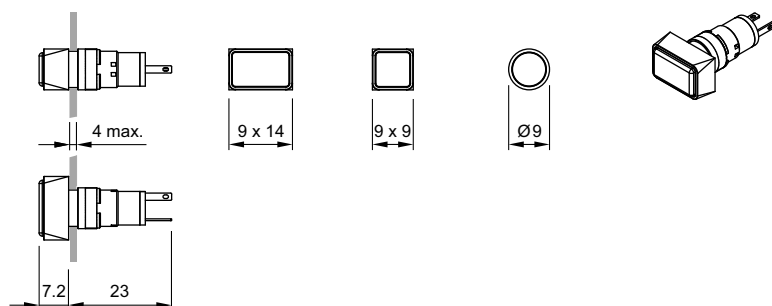


### 3 Blind plug page 8

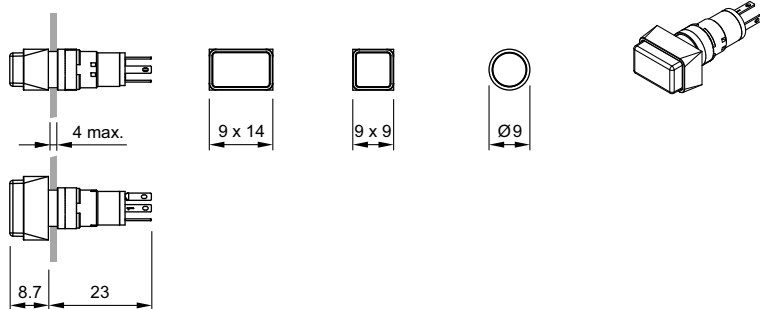


## Technical drawing

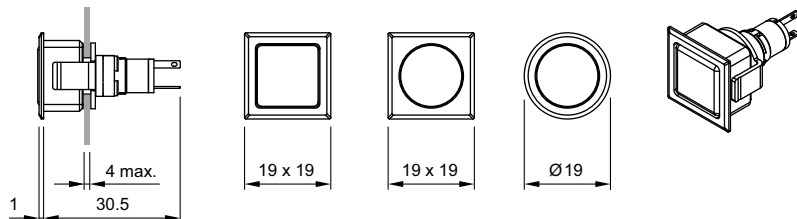
### 1 Indicator page 5



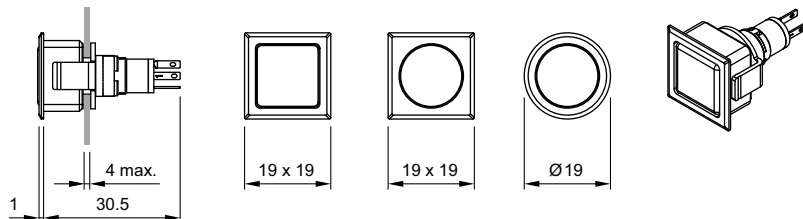
## 2 Illuminated pushbutton actuator page 5



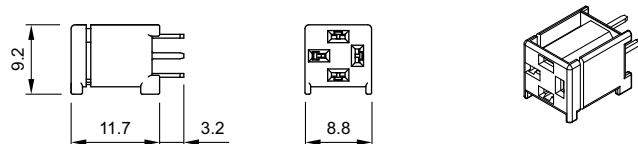
## 3 Indicator actuator, flush mounting page 6



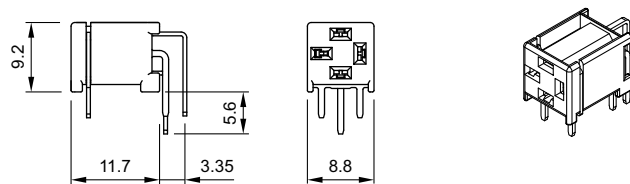
## 4 Illuminated pushbutton actuator, flush mounting page 6



## 5 PCB plug-in base page 8



## 6 PCB plug-in base page 8

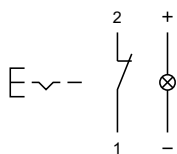


## Circuit drawing

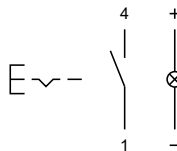
### 1 Indicator page 5 | Indicator actuator, flush mounting page 6



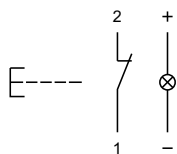
**2 Illuminated pushbutton actuator** page 5 | **Illuminated pushbutton actuator, flush mounting** page 6



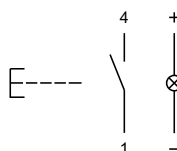
**3 Illuminated pushbutton actuator** page 5 | **Illuminated pushbutton actuator, flush mounting** page 6



**4 Illuminated pushbutton actuator** page 5 | **Illuminated pushbutton actuator, flush mounting** page 6



**5 Illuminated pushbutton actuator** page 5 | **Illuminated pushbutton actuator, flush mounting** page 6



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| 18-030.0054 | 5    | 18-288.035 | 6    |         |      |
| 18-030.0055 | 5    | 18-910     | 8    |         |      |
| 18-031.0052 | 5    | 18-920.1   | 8    |         |      |
| 18-031.0054 | 5    | 18-920.2   | 8    |         |      |
| 18-031.0055 | 5    | 18-920.3   | 8    |         |      |
| 18-032.0052 | 5    | 18-931.2   | 7    |         |      |
| 18-032.0054 | 5    | 18-931.4   | 7    |         |      |
| 18-032.0055 | 5    | 18-931.5   | 7    |         |      |
| 18-040.0052 | 5    | 18-932.0   | 7    |         |      |
| 18-040.0054 | 5    | 18-932.2   | 7    |         |      |
| 18-040.0055 | 5    | 18-932.4   | 7    |         |      |
| 18-041.0052 | 5    | 18-932.5   | 7    |         |      |
| 18-041.0054 | 5    | 18-932.8   | 7    |         |      |
| 18-041.0055 | 5    | 18-932.9   | 7    |         |      |
| 18-042.0052 | 5    | 18-941.2   | 7    |         |      |
| 18-042.0054 | 5    | 18-941.4   | 7    |         |      |
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| 18-050.0052 | 5    | 18-942.0   | 7    |         |      |
| 18-050.0054 | 5    | 18-942.2   | 7    |         |      |
| 18-050.0055 | 5    | 18-942.4   | 7    |         |      |
| 18-051.0052 | 5    | 18-942.5   | 7    |         |      |
| 18-051.0054 | 5    | 18-942.8   | 7    |         |      |
| 18-051.0055 | 5    | 18-942.9   | 7    |         |      |
| 18-052.0052 | 5    | 18-945     | 8    |         |      |
| 18-052.0054 | 5    | 18-946     | 8    |         |      |
| 18-052.0055 | 5    | 18-951.2   | 7    |         |      |
| 18-060.0052 | 6    | 18-951.4   | 7    |         |      |
| 18-060.0054 | 6    | 18-951.5   | 7    |         |      |
| 18-060.0055 | 6    | 18-952.0   | 7    |         |      |
| 18-061.0052 | 6    | 18-952.2   | 7    |         |      |
| 18-061.0054 | 6    | 18-952.4   | 7    |         |      |
| 18-061.0055 | 6    | 18-952.5   | 7    |         |      |
| 18-062.0052 | 6    | 18-952.8   | 7    |         |      |
| 18-062.0054 | 6    | 18-952.9   | 7    |         |      |
| 18-062.0055 | 6    | 18-961.2   | 7    |         |      |
| 18-080.0052 | 6    | 18-961.4   | 7    |         |      |
| 18-080.0054 | 6    | 18-961.5   | 7    |         |      |
| 18-080.0055 | 6    | 18-962.0   | 7    |         |      |
| 18-081.0052 | 6    | 18-962.2   | 7    |         |      |
| 18-081.0054 | 6    | 18-962.4   | 7    |         |      |
| 18-081.0055 | 6    | 18-962.5   | 7    |         |      |
| 18-082.0052 | 6    | 18-962.8   | 7    |         |      |
| 18-082.0054 | 6    | 18-962.9   | 7    |         |      |
| 18-082.0055 | 6    | 18-981.2   | 7    |         |      |
| 18-137.035  | 5    | 18-981.4   | 7    |         |      |
| 18-138.035  | 5    | 18-981.5   | 7    |         |      |
| 18-147.035  | 5    | 18-982.0   | 7    |         |      |
| 18-148.035  | 5    | 18-982.2   | 7    |         |      |
| 18-157.035  | 5    | 18-982.4   | 7    |         |      |
| 18-158.035  | 5    | 18-982.5   | 7    |         |      |
| 18-167.035  | 6    | 18-982.8   | 7    |         |      |
| 18-168.035  | 6    | 18-982.9   | 7    |         |      |
| 18-187.035  | 6    | 19-905     | 9    |         |      |
| 18-188.035  | 6    | 19-948.0   | 8    |         |      |
| 18-237.035  | 5    | 19-949.0   | 8    |         |      |
| 18-238.035  | 5    |            |      |         |      |
| 18-247.035  | 5    |            |      |         |      |
| 18-248.035  | 5    |            |      |         |      |
| 18-257.035  | 5    |            |      |         |      |
| 18-258.035  | 5    |            |      |         |      |
| 18-267.035  | 6    |            |      |         |      |
| 18-268.035  | 6    |            |      |         |      |

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