

Series 19

Characteristics

The compact 8mm Series 19 is especially suited for:

- Raised design
- PCB (with adaptor)

The low level switching element is laid out for low current applications.

Functions

The Series 19 incorporates the following functions:

- Indicator
- Pushbutton
- Illuminated pushbutton

Market segments

The EAO Series 19 is especially suited for applications in the segments:

- Audio and video
- Laboratory and measuring equipment

Please refer to the EAO website to obtain detailed information regarding this series www.products.eao.com
Configure a product to your exact needs and request a quotation.



Overview**Raised design**

Indicator 4

Illuminated pushbutton 5

Accessories 7**Drawings** 14**Technical data** 15**Application guidelines** 17

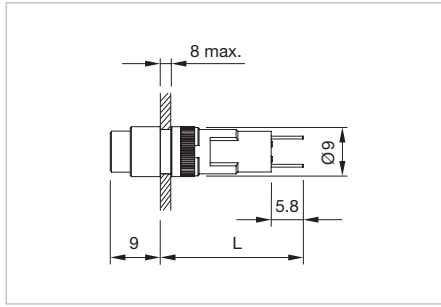
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19 Raised design

Indicator, IP 40



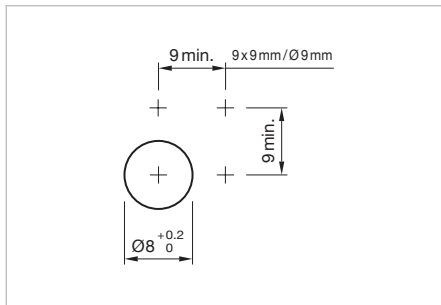
Product can differ from the current configuration.



Dimensions [mm]

Additional Information

- For LED element fitting information see «Application guidelines»



Mounting cut-outs [mm]

Equipment consisting of (schematic overview)



Lens page 7



Single-LED page 10





Actuator



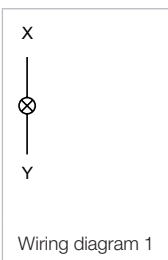
Fixing nut

Each Part Number listed below includes all the black components shown in the 3D-drawing.

To obtain a complete unit, please select the red components from the pages shown.

| Behind panel depth | Terminal | Part No. | Component layout | Wiring diagram | Weight |
|--|--------------------|-------------------|------------------|----------------|----------|
|  <p>Indicator actuator, Front dimension 9 x 9 mm</p> | | | | | |
| 25 mm | Solder 2.0 x 0.5mm | 19-050.005 | 1 | 1 | 0.001 kg |
| 33 mm | Solder 2.0 x 0.5mm | 19-051.005 | 1 | 1 | 0.002 kg |
|  <p>Indicator actuator, Front dimension Ø 9 mm</p> | | | | | |
| 25 mm | Solder 2.0 x 0.5mm | 19-030.005 | 1 | 1 | 0.001 kg |
| 33 mm | Solder 2.0 x 0.5mm | 19-031.005 | 1 | 1 | 0.002 kg |

The component layouts you will find from page 14



Illuminated pushbutton, IP 40

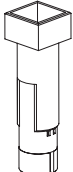
Equipment consisting of (schematic overview)



Lens page 7



Single-LED page 10



Actuator



Fixing nut

Each Part Number listed below includes all the black components shown in the 3D-drawing.

To obtain a complete unit, please select the red components from the pages shown.



Dimensions



Mounting cut-outs [mm]



Product can differ from the current configuration.

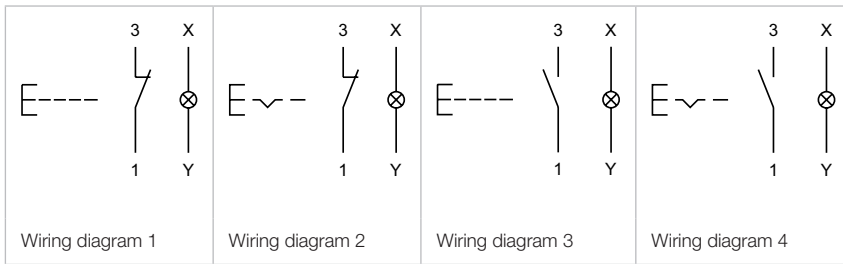
Additional Information

- For LED element fitting information see «Application guidelines»

| Switching system | Contacts | Contact material | Switching action | Terminal | Part No. | Component layout | Wiring diagram | Weight |
|---|----------|------------------|------------------|--------------------|-------------------|------------------|----------------|----------|
|  <p>Illuminated pushbutton actuator, Front dimension 9 x 9 mm</p> | | | | | | | | |
| Low-level element | 1 NC | Gold | B | Solder 2.0 x 0.5mm | 19-452.035 | 2 | 1 | 0.002 kg |
| | | | C | Solder 2.0 x 0.5mm | 19-482.035 | 2 | 2 | 0.002 kg |
| | 1 NO | Gold | B | Solder 2.0 x 0.5mm | 19-451.035 | 2 | 3 | 0.002 kg |
| | | | C | Solder 2.0 x 0.5mm | 19-481.035 | 2 | 4 | 0.002 kg |
| Snap-action switching element | 1 NO | Gold | B | Solder 2.0 x 0.5mm | 19-159.035 | 2 | 3 | 0.002 kg |
| | | | C | Solder 2.0 x 0.5mm | 19-289.035 | 2 | 4 | 0.002 kg |
| | | Silver | B | Solder 2.0 x 0.5mm | 19-159.015 | 2 | 3 | 0.002 kg |
| | | | C | Solder 2.0 x 0.5mm | 19-289.015 | 2 | 4 | 0.002 kg |
|  <p>Illuminated pushbutton actuator, Front dimension Ø 9 mm</p> | | | | | | | | |
| Low-level element | 1 NC | Gold | B | Solder 2.0 x 0.5mm | 19-432.035 | 2 | 1 | 0.002 kg |
| | | | C | Solder 2.0 x 0.5mm | 19-472.035 | 2 | 2 | 0.002 kg |
| | 1 NO | Gold | B | Solder 2.0 x 0.5mm | 19-431.035 | 2 | 3 | 0.002 kg |
| | | | C | Solder 2.0 x 0.5mm | 19-471.035 | 2 | 4 | 0.002 kg |
| Snap-action switching element | 1 NO | Gold | B | Solder 2.0 x 0.5mm | 19-139.035 | 2 | 3 | 0.002 kg |
| | | | C | Solder 2.0 x 0.5mm | 19-279.035 | 2 | 4 | 0.002 kg |
| | | Silver | B | Solder 2.0 x 0.5mm | 19-139.015 | 2 | 3 | 0.002 kg |
| | | | C | Solder 2.0 x 0.5mm | 19-279.015 | 2 | 4 | 0.002 kg |



Contacts: NC = Normally closed, NO = Normally open
 Switching action: B = Momentary, C = Maintain
 The component layouts you will find from page 14

19 Raised design



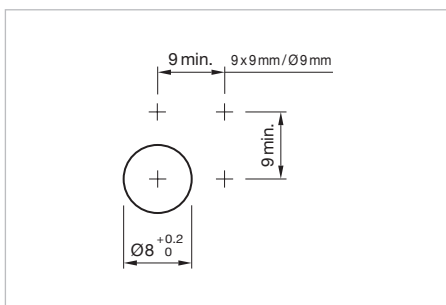
Front

Lens



| Product attribute | Dimension | Lens | Part No. | Weight |
|--|--------------|--------------------------------|-----------------|----------|
|  <p>Lens</p> | | | | |
| illuminative, holder translucent | 7.3 x 7.3 mm | Plastic red transparent | 19-951.2 | 0.001 kg |
| | | Plastic yellow transparent | 19-951.4 | 0.001 kg |
| | | Plastic green transparent | 19-951.5 | 0.001 kg |
| | | Plastic blue transparent | 19-951.6 | 0.001 kg |
| | | Plastic white transparent | 19-951.9 | 0.001 kg |
| illuminative, not recommended for film insert, holder transparent | 7.3 x 7.3 mm | Plastic red transparent | 19-952.2 | 0.001 kg |
| | | Plastic yellow transparent | 19-952.4 | 0.001 kg |
| | | Plastic green transparent | 19-952.5 | 0.001 kg |
| | | Plastic blue transparent | 19-952.6 | 0.001 kg |
| | | Plastic colourless transparent | 19-952.7 | 0.001 kg |
| non-illuminative | 7.3 x 7.3 mm | Plastic black opaque | 19-951.0 | 0.001 kg |
| | | Plastic grey opaque | 19-951.8 | 0.001 kg |
|  <p>Lens</p> | | | | |
| illuminative, holder translucent | Ø 7.3 mm | Plastic red transparent | 19-931.2 | 0.001 kg |
| | | Plastic yellow transparent | 19-931.4 | 0.001 kg |
| | | Plastic green transparent | 19-931.5 | 0.001 kg |
| | | Plastic blue transparent | 19-931.6 | 0.001 kg |
| | | Plastic white transparent | 19-931.9 | 0.001 kg |
| illuminative, not recommended for film insert, holder transparent | Ø 7.3 mm | Plastic red transparent | 19-932.2 | 0.001 kg |
| | | Plastic yellow transparent | 19-932.4 | 0.001 kg |
| | | Plastic green transparent | 19-932.5 | 0.001 kg |
| | | Plastic blue transparent | 19-932.6 | 0.001 kg |
| | | Plastic colourless transparent | 19-932.7 | 0.001 kg |
| non-illuminative | Ø 7.3 mm | Plastic black opaque | 19-931.0 | 0.001 kg |
| | | Plastic grey opaque | 19-931.8 | 0.001 kg |

19 Accessories

Blind plug



Mounting cut-outs [mm]



| Dimension | Mounting cut-out | Material | Colour | Part No. | Weight |
|---|--------------------|----------|--------|-----------------|----------|
|  Blind plug | | | | | |
| 9 x 9 mm | $\varnothing 8$ mm | Plastic | black | 19-948.0 | 0.001 kg |
|  Blind plug | | | | | |
| $\varnothing 9$ mm | $\varnothing 8$ mm | Plastic | black | 19-949.0 | 0.001 kg |

Rear side




Dimensions [mm]

PCB plug-in base


| pins | Terminal | Part No. | Component layout | Weight |
|--|----------|---------------|------------------|----------|
|  <p>PCB plug-in base</p> | | | | |
| axial | PCB | 19-940 | 4 | 0.001 kg |
|  <p>PCB plug-in base</p> | | | | |
| right-angled | PCB | 19-941 | 3 | 0.001 kg |

The component layouts you will find from page 14

Flat receptacle

| Product attribute | Part No. | Weight |
|---|---------------|----------|
|  <p>Flat receptacle</p> | | |
| 2.0 x 0.5 mm plug-in terminal | 31-945 | 0.001 kg |

Insulation sleeve

| Product attribute | Part No. | Weight |
|---|---------------|----------|
|  <p>Insulation sleeve</p> | | |
| for flat receptacle 2.0 mm | 31-928 | 0.001 kg |

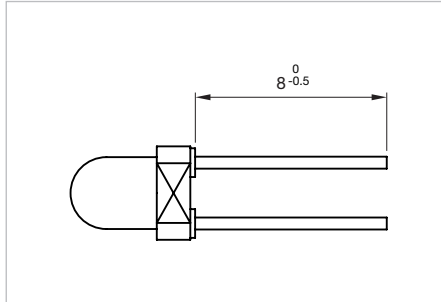
19 Accessories

Illumination


Single-LED, T1 Bi-Pin

Additional Information

- For LED element fitting information see «Application guidelines, LED polarity»
- Luminosity and wave length variations caused by LED manufacturing processes may cause slight differences regarding the illumination



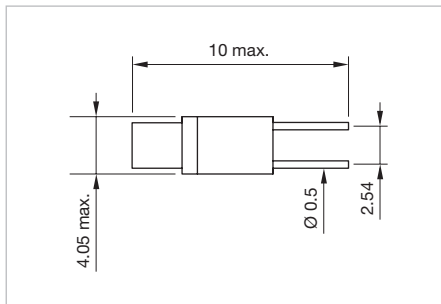
Dimensions [mm]

| Pins | LED colour | Lumi. intensity | Dom. wavelength | Forward voltage typ. | Part No. | Weight |
|---|------------|-----------------|-----------------|----------------------|----------------------|----------|
|  <p>Single-LED</p> | | | | | | |
| Single-LED max. length: 8 mm | red | 450 mcd | 635 nm | 2.0 VDC @ 20 mA | 10-2601.3172K | 0.001 kg |
| | yellow | 450 mcd | 587 nm | 2.1 VDC @ 20 mA | 10-2601.3174K | 0.001 kg |
| | green | 1600 mcd | 525 nm | 3.2 VDC @ 20 mA | 10-2603.3175K | 0.001 kg |
| | blue | 500 mcd | 465 nm | 3.2 VDC @ 20 mA | 10-2603.3176K | 0.001 kg |
| | white | 4600 mcd | x0.31/y0.32 nm | 3.0 VDC @ 20 mA | 10-2603.3178K | 0.001 kg |


Single-LED, T1 Bi-Pin

Additional Information

- For LED element fitting information see «Application guidelines»
- Luminosity and wave length variations caused by LED manufacturing processes may cause slight differences regarding the illumination



Dimensions [mm]

| Pins | LED-colour | Lumi. intensity | Dom. wavelength | Operating voltage | Operation current | Part No. | Weight |
|---|------------|-----------------|-----------------|-------------------|-------------------|---------------------|----------|
|  <p>Single-LED</p> | | | | | | | |
| Single Led T1 Bi-Pin, max. length: 5 mm | red | 45 mcd | 625 nm | 28 VAC/DC +10 % | 5 mA/9mA ±15 % | 10-2613.1072 | 0.001 kg |
| | yellow | 270 mcd | 580 nm | 28 VAC/DC +10 % | 5 mA/9mA ±15 % | 10-2613.1074 | 0.001 kg |
| | green | 320 mcd | 525 nm | 28 VAC/DC +10 % | 5 mA/9mA ±15 % | 10-2613.1075 | 0.001 kg |


Filament lamp, T1 Bi-Pin

| pins | Operating voltage | Operation current | Part No. | Weight |
|---|-------------------|-------------------|---------------------|----------|
|  <p>Filament lamp</p> | | | | |
| max. length: 5 mm | 6 VAC/DC | 70 mA | 10-1606.1309 | 0.001 kg |
| | 12 VAC/DC | 25 mA | 10-1609.1199 | 0.001 kg |
| | 24 VAC/DC | 20 mA | 10-1612.1179 | 0.001 kg |

19 Accessories

Mounting


Fixing nut

| Dimension | Part No. | Weight |
|---|----------|----------|
|  Fixing nut | | |
| Ø 9/M8 x 13 mm | 19-991 | 0.001 kg |


Dressing tool

Additional Information

- For aligning buttons

| Part No. | Weight |
|--|----------|
|  Dressing tool | |
| 19-906 | 0.011 kg |


Lens remover

| Part No. | Weight |
|---|----------|
|  Lens remover | |
| 19-910 | 0.002 kg |

Lamp remover

Additional Information


▲ **Caution:** A switching process might be released when replacing the lamp

| Part No. | Weight |
|--|----------|
|  <p>Lamp remover</p> | |
| 11-906 | 0.003 kg |

Mounting tool

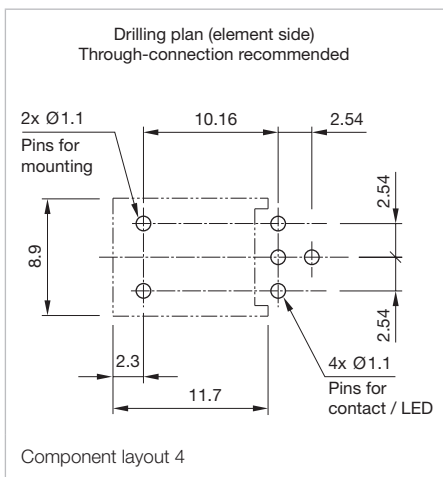
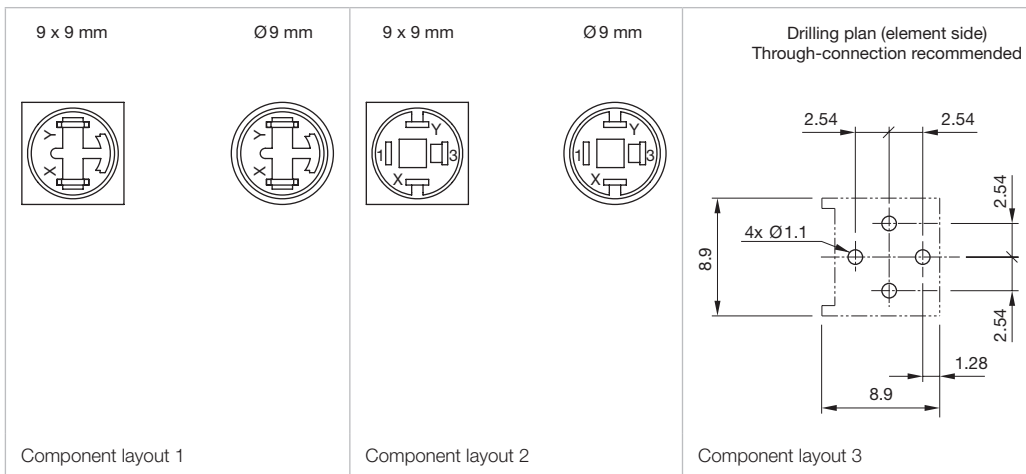
Additional Information

- For fixing nut long Part No. 19-991

| Part No. | Weight |
|---|----------|
|  <p>Mounting tool</p> | |
| 19-905 | 0.011 kg |

19 Drawings

Drawings



Actuator with snap-action switching element
Switching system

Single-break, snap-action switching system.
1 normally open contact

Material
Material of contact

Gold plated Silver, Silver plated

Switch housing

Polyetherimide (PEI), self-extinguishing

Actuator housing

Polyphenyleneoxide (PPO), self-extinguishing, colour black

Mechanical characteristics
Terminals

Universal terminal:
Max. wire diameter 2 x 0.8 mm
Max. wire cross-section of stranded cable 1 x 0.75 mm²

Plug-in terminal: 2.0 x 0.5 mm

For these terminals we can also supply a plug-in base which, when soldered on to the board, enables the switch to be plugged in.

Tightening torque

for fixing nut max. 20 Ncm

Actuating force

1.6 N

Actuating travel

2.8 mm ±0.2 mm

Mechanical lifetime

2 million operations

Electrical characteristics
Switch rating

Silver plated:
Max. 50 VAC, 0.8 A/72 VDC, 0.7 A
Min. 20 V, 10 mA

Gold plated:

Max. 50 VAC, 100 mA/72 VDC, 70 mA
Min. 100 µV, 50 µA

Electric strength

2500 VAC, 50 Hz, 1 min. between all terminals and earth, as per IEC 60512-2-11

Environmental conditions
Storage temperature

-40 °C ... +85 °C

Service temperature

without illumination -25 °C ... +65 °C
with incandescent lamp -25 °C ... +45 °C
with LED -25 °C ... +65 °C
for indicators and illuminated pushbuttons mounted as a block, make sure the heat can escape freely

Protection degree

IP 40 front side, as per IEC 60529

Actuator with low level switching element
Switching system

This low-level switching system was designed for switching low powers in electronic circuits. The switching system assures reliable switching of loads.

Single-break momentary contact, as normally open or normally closed with 4 independent points of contact.

Special features are the long life, extremely short rebound time and stable contact resistance.

1 normally open or 1 normally closed contact.

Material
Material of contact

Gold plated

Actuator housing

Polyphenyleneoxide (PPO), self-extinguishing, colour black

Mechanical characteristics
Terminals

Universal terminal:
Max. wire diameter 2 x 0.8 mm
Max. wire cross-section of stranded cable 1 x 0.75 mm²

Plug-in terminal: 2.0 x 0.5 mm

For these terminals we can also supply a plug-in base which, when soldered on to the board, enables the switch to be plugged in.

Tightening torque

for fixing nut max. 20 Ncm

Actuating force

1.8 N ±0.3 N

19 Technical data

Actuating travel

2.8mm ±0.2mm

Rebound time

Typ. < 100µs

Mechanical lifetime

5 million operations

Electrical characteristics**Contact resistance**

≤ 50mΩ starting value (initial) as per IEC 60512-2-2b

Switch rating

10µA, 100µV to 100mA at 42VAC/VDC

Electric strength

2500VAC, 50Hz, 1 min. between all terminals and earth, as per IEC 60512-2-11

Environmental conditions**Storage temperature**

-40°C ... +85°C

Service temperature

without illumination -25°C ... +65°C

with incandescent lamp -25°C ... +45°C

with LED -25°C ... +65°C

for indicators and illuminated pushbuttons mounted as a block, make sure the heat can escape freely

Protection degree

IP 40 front side, as per IEC 60529

Shock resistance

(Single impacts, semi-sinusoidal)

15g for 11ms, as per IEC 60512-4-3, IEC 60068-2-27

EAO reserves the right to alter specifications without further notice.

Suppressor circuits

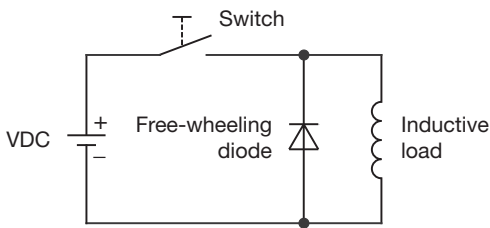
When switching inductive loads such as relays, DC motors, and DC solenoids, it is always important to absorb surges (e.g. with a diode) to protect the contacts. When these inductive loads are switched off, a counter emf can severely damage switch contacts and greatly shorten lifetime.

Fig. 1 shows an inductive load with a free-wheeling diode connected in parallel. This free-wheeling diode provides a path for the inductor current to flow when the current is interrupted by the switch. Without this free-wheeling diode, the voltage across the coil will be limited only by dielectric breakdown voltages of the circuit or parasitic elements of the coil. This voltage can be kilovolts in amplitude even when nominal circuit voltages are low (e.g. 12VDC) see Fig. 2.

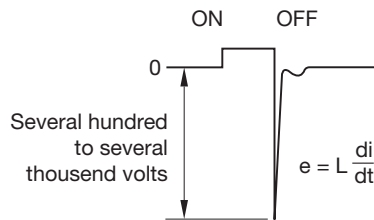
The free-wheeling diode should be chosen so that the reverse breakdown voltage is greater than the voltage driving the inductive load. The DC blocking voltage (V_R) of the free-wheeling diode can be found in the datasheet of a diode. The forward current should be equal or greater than the maximum current flowing through the load.

To get an efficient protection, the free-wheeling diode must be connected as close as possible to the inductive load!

Switching with inductive load
Fig. 1

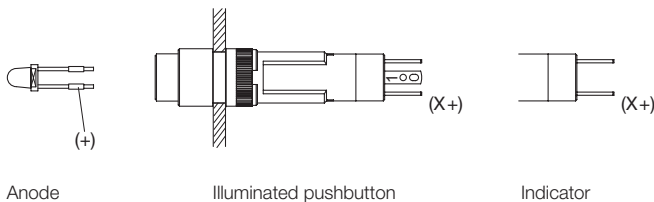


Counter EMF
over load without free-wheeling diode
Fig. 2



LED polarity

When fitting the LED elements the polarity has to correspond with the respective terminal, (x+) goes to +.



Recommended LED series resistors for optimum illumination

Resistor size 0207.1 %

| | LED red | LED yellow | LED green | LED white | LED blue |
|--------|---------|------------|-----------|-----------|----------|
| 6 VDC | 390R | 390R | 1K5 | 390R | 390R |
| 12 VDC | 1K | 1K | 4K7 | 1K | 1K |
| 24 VDC | 2K2 | 2K2 | 10K | 2K2 | 2K2 |

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| 19-031.005 | 4 |
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| 19-139.035 | 5 |
| 19-159.015 | 5 |
| 19-159.035 | 5 |
| 19-279.015 | 5 |
| 19-279.035 | 5 |
| 19-289.015 | 5 |
| 19-289.035 | 5 |
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