

## Series 19

*Proven. Streamlined and tactile.*

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# 19 Information about the Series

## Key advantages

- Excellent tactile feedback
- Gold contacts available for low voltages and currents
- Bright, homogenous illumination
- Compact construction
- Can be mounted on PCBs

## Typical application areas

- Audio / video
- Measurement technology
- Medical engineering

## Functions

- Illuminated pushbutton
- Indicator

## Design

- Raised

## IP front protection

- IP40

## Rating

- 42 VAC (100 mA)

## Mounting cut-outs

- Ø 8 mm

## Terminal

- Soldering terminal
- PCB (with PCB plug-in base)

## Lens Material

- Plastic

## Markings

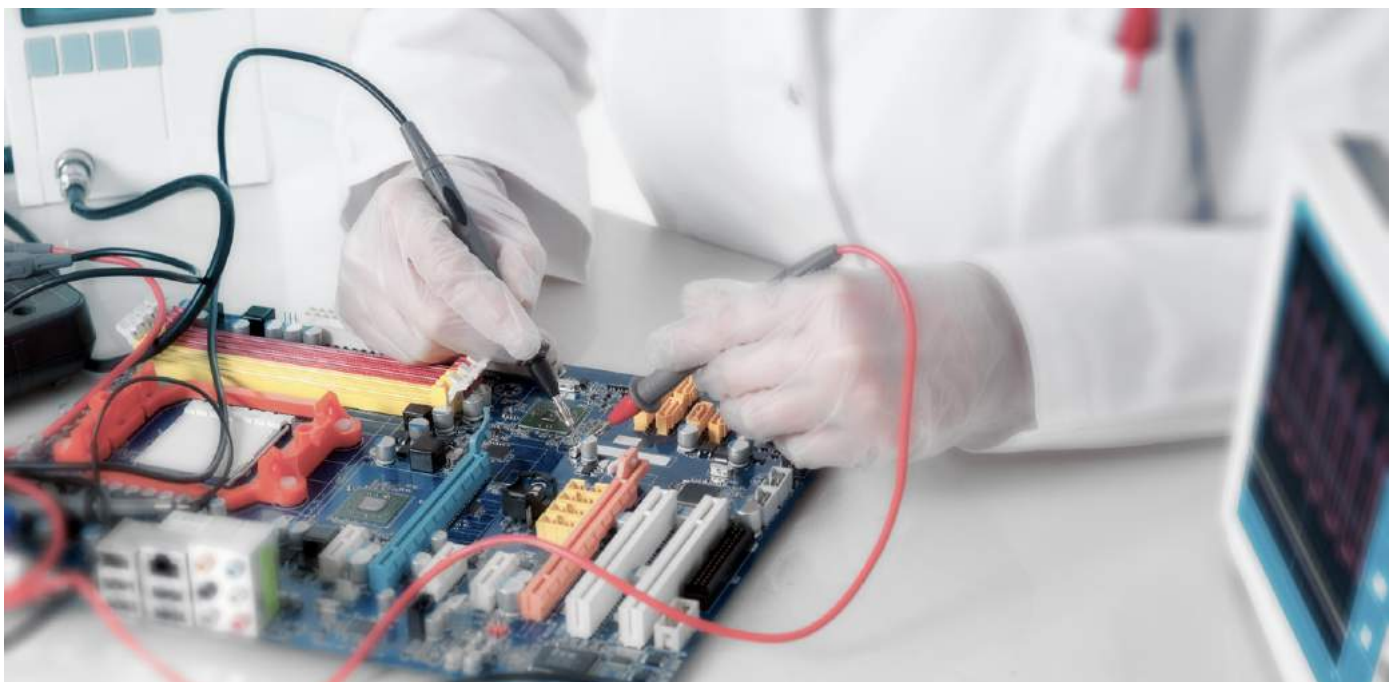
- Engraving
- Film insert

## Approvals

- No approvals

## Conformities

- CE
- 2011/65/EU (RoHS)



<b>Raised design</b>	
Illuminated pushbutton square	410
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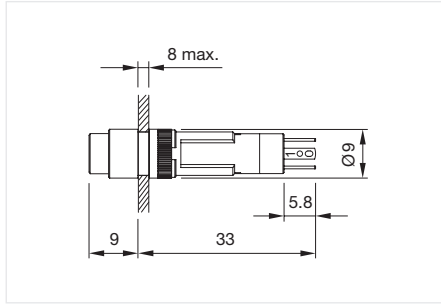
96

# 19 Raised design

## Illuminated pushbutton square, IP40



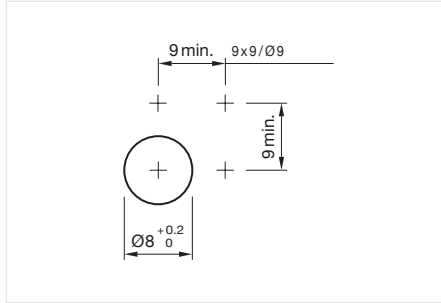
Product can differ from the current configuration.



Dimensions [mm]

### General information

- For LED element fitting information see Application guidelines, LED polarity



Mounting cut-outs [mm]

### Equipment consisting of (schematic overview)



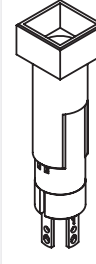
Lens

Page 418



Single-LED

Page 418



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.

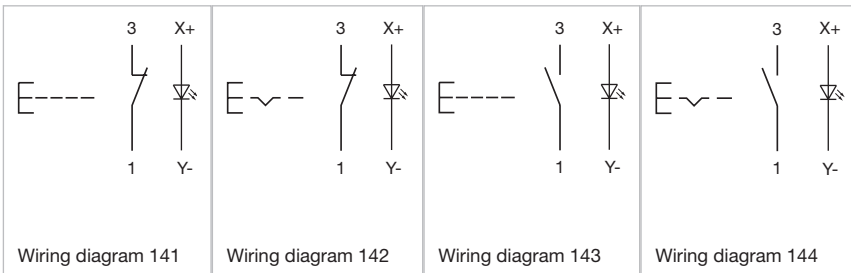


Actuator, Front dimension 9 mm x 9 mm

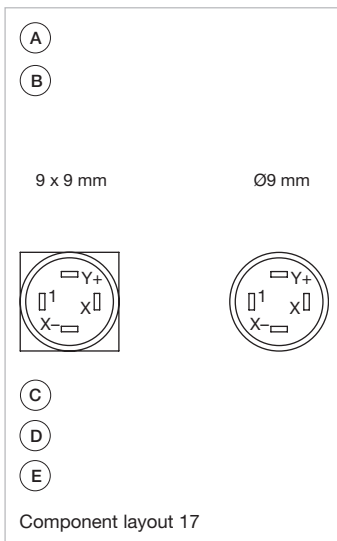
Terminal	Switching system	Switching action	Contacts	Contact material	Part No.	Wiring diagram	Component Layout
Plug-in terminal	Snap-action switching element	Momentary	1 NO	Silver	19-159.015	143	17
	Snap-action switching element	Momentary	1 NO	Gold	19-159.035	143	17
	Snap-action switching element	Maintained	1 NO	Silver	19-289.015	144	17
	Snap-action switching element	Maintained	1 NO	Gold	19-289.035	144	17
	Low-level element	Momentary	1 NO	Gold	19-451.035	143	17
	Low-level element	Momentary	1 NC	Gold	19-452.035	141	17
	Low-level element	Maintained	1 NO	Gold	19-481.035	144	17
	Low-level element	Maintained	1 NC	Gold	19-482.035	142	17

Contacts: NC = Normally closed, NO = Normally open

## Wiring diagrams



## Component layouts



- A = Terminals (rear side)
- B = Illuminated pushbutton
- C = x = Contact no.
- D = 2 = Normally open
- E = 4 = Normally close

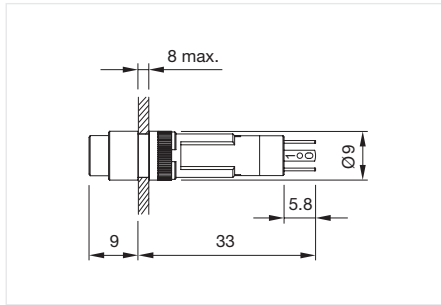
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# 19 Raised design

## Illuminated pushbutton round, IP40



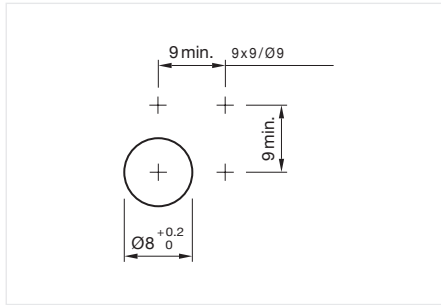
Product can differ from the current configuration.



Dimensions [mm]

### General information

- For LED element fitting information see Application guidelines, LED polarity



Mounting cut-outs [mm]

### Equipment consisting of (schematic overview)



Lens

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Single-LED

Page 418



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.

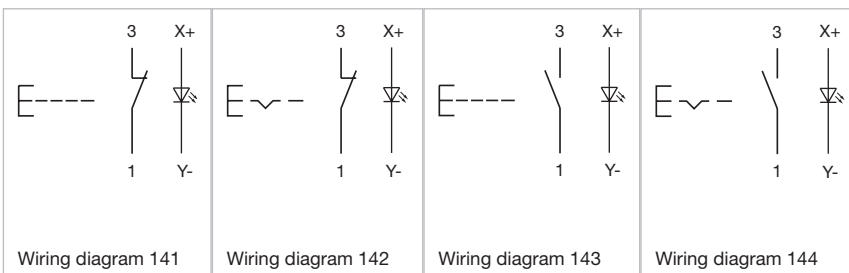


### Actuator, Front dimension Ø 9 mm

Terminal	Switching system	Switching action	Contacts	Contact material	Part No.	Wiring diagram	Component Layout
Plug-in terminal	Snap-action switching element	Momentary	1 NO	Silver	19-139.015	143	17
	Snap-action switching element	Momentary	1 NO	Gold	19-139.035	143	17
	Snap-action switching element	Maintained	1 NO	Silver	19-279.015	144	17
	Snap-action switching element	Maintained	1 NO	Gold	19-279.035	144	17
	Low-level element	Momentary	1 NO	Gold	19-431.035	143	17
	Low-level element	Momentary	1 NC	Gold	19-432.035	141	17
	Low-level element	Maintained	1 NO	Gold	19-471.035	144	17
	Low-level element	Maintained	1 NC	Gold	19-472.035	142	17

Contacts: NC = Normally closed, NO = Normally open

## Wiring diagrams



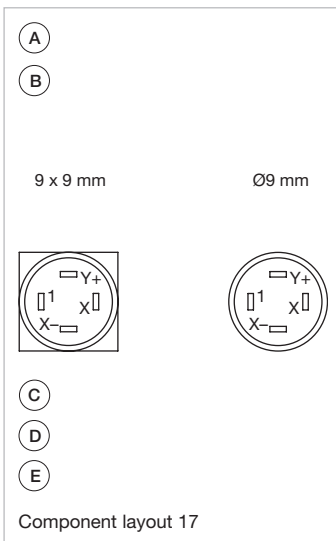
Wiring diagram 141

Wiring diagram 142

Wiring diagram 143

Wiring diagram 144

Component layouts



- A = Terminals (rear side)
- B = Illuminated pushbutton
- C = x = Contact no.
- D = 2 = Normally open
- E = 4 = Normally close

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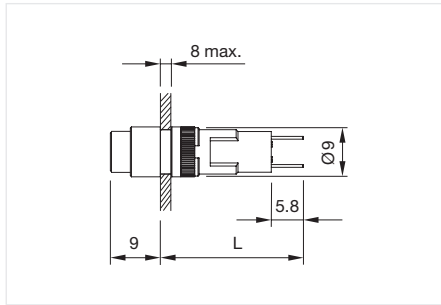
[On our website you can download technical data, assembly instructions, catalogs, brochures and much more.](#)

# 19 Raised design

## Indicator square, IP40



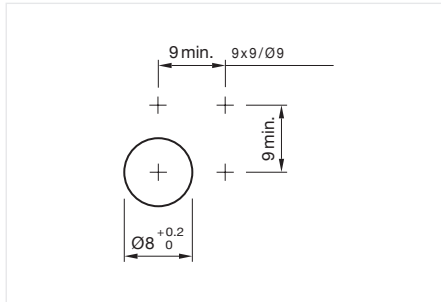
Product can differ from the current configuration.



Dimensions [mm]

### General information

- For LED element fitting information see Application guidelines, LED polarity



Mounting cut-outs [mm]

### Equipment consisting of (schematic overview)



Lens

Page 418



Single-LED

Page 418



Actuator



Fixing nut

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

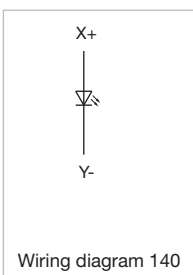
To obtain a complete unit, please select the red components from the pages shown.



Actuator, Front dimension 9 mm x 9 mm

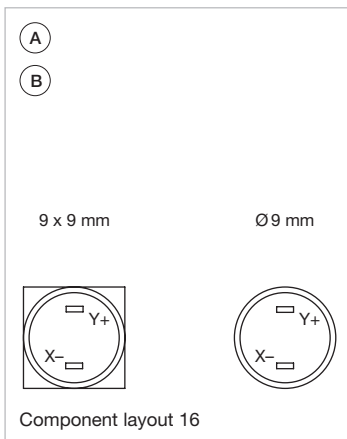
Terminal	Back panel depth	Part No.	Wiring diagram	Component Layout
Plug-in terminal	25 mm	19-050.005	140	16
	33 mm	19-051.005	140	16

## Wiring diagrams





## Component layouts



A = Terminals (rear side)  
 B = Indicator

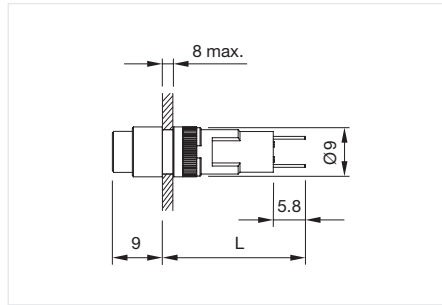
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# 19 Raised design

## Indicator round, IP40



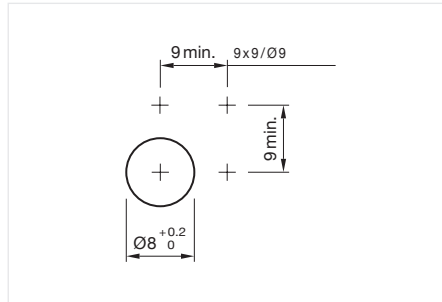
Product can differ from the current configuration.



Dimensions [mm]

### General information

- For LED element fitting information see Application guidelines, LED polarity



Mounting cut-outs [mm]

### Equipment consisting of (schematic overview)



Lens

Page 418



Single-LED

Page 418



Actuator



Fixing nut

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

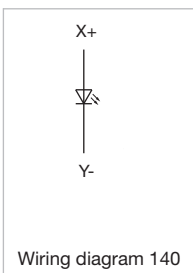
To obtain a complete unit, please select the red components from the pages shown.



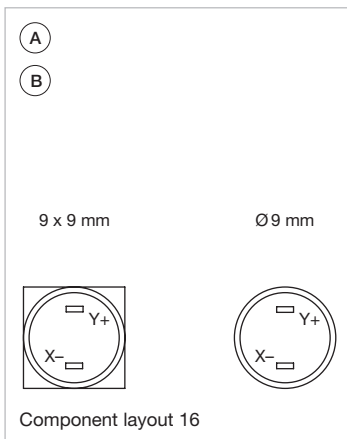
Actuator, Front dimension Ø 9 mm

Terminal	Back panel depth	Part No.	Wiring diagram	Component Layout
Plug-in terminal	25 mm	19-030.005	140	16
	33 mm	19-031.005	140	16

## Wiring diagrams



## Component layouts



A = Terminals (rear side)  
 B = Indicator

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# 19 Components



Lens

Product attributes	Lens material	Lens colour	Lens optics	Lens shape	Lens illumination	Dimensions	Part No.
For film insert	Plastic	Red	transparent	flush	illuminative	7.3 mm x 7.3 mm	19-951.2
	Plastic	Yellow	transparent	flush	illuminative	7.3 mm x 7.3 mm	19-951.4
	Plastic	Green	transparent	flush	illuminative	7.3 mm x 7.3 mm	19-951.5
	Plastic	Blue	transparent	flush	illuminative	7.3 mm x 7.3 mm	19-951.6
	Plastic	White	transparent	flush	illuminative	7.3 mm x 7.3 mm	19-951.9
Not recommended for film insert	Plastic	Red	transparent	flush	illuminative	7.3 mm x 7.3 mm	19-952.2
	Plastic	Yellow	transparent	flush	illuminative	7.3 mm x 7.3 mm	19-952.4
	Plastic	Green	transparent	flush	illuminative	7.3 mm x 7.3 mm	19-952.5
	Plastic	Blue	transparent	flush	illuminative	7.3 mm x 7.3 mm	19-952.6
	Plastic	Colourless	transparent	flush	illuminative	7.3 mm x 7.3 mm	19-952.7
	Plastic	Black	opaque	flush	non illuminative	7.3 mm x 7.3 mm	19-951.0
For film insert	Plastic	Grey	opaque	flush	non illuminative	7.3 mm x 7.3 mm	19-951.8



Lens round

Product attributes	Lens material	Lens colour	Lens optics	Lens shape	Lens illumination	Dimensions	Part No.
For film insert	Plastic	Red	transparent	flush	illuminative	Ø 7.3 mm	19-931.2
	Plastic	Yellow	transparent	flush	illuminative	Ø 7.3 mm	19-931.4
	Plastic	Green	transparent	flush	illuminative	Ø 7.3 mm	19-931.5
	Plastic	Blue	transparent	flush	illuminative	Ø 7.3 mm	19-931.6
	Plastic	White	transparent	flush	illuminative	Ø 7.3 mm	19-931.9
Not recommended for film insert	Plastic	Red	transparent	flush	illuminative	Ø 7.3 mm	19-932.2
	Plastic	Yellow	transparent	flush	illuminative	Ø 7.3 mm	19-932.4
	Plastic	Green	transparent	flush	illuminative	Ø 7.3 mm	19-932.5
	Plastic	Blue	transparent	flush	illuminative	Ø 7.3 mm	19-932.6
	Plastic	Colourless	transparent	flush	illuminative	Ø 7.3 mm	19-932.7
	Plastic	Black	opaque	flush	non illuminative	Ø 7.3 mm	19-931.0
	Plastic	Grey	opaque	flush	non illuminative	Ø 7.3 mm	19-931.8



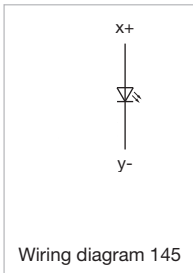
Single-LED

Pins	Illumination colour	Lumi. Intensity	Dom. Wavelength	Forward voltage	Part No.	Wiring diagram
Max. length: 8 mm	Red	450 mcd	635 nm	2.0 VDC @ 20 mA	10-2601.3172K	145
	Yellow	450 mcd	587 nm	2.1 VDC @ 20 mA	10-2601.3174K	145
	Green	1600 mcd	525 nm	3.2 VDC @ 20 mA	10-2603.3175K	145
	Blue	500 mcd	465 nm	3.2 VDC @ 20 mA	10-2603.3176K	145
	White	4600 mcd	x: 0.31 / y: 0.32 nm	3.2 VDC @ 20 mA	10-2603.3178K	145

#### 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. The customer has to decide what resistor shall be used to the LED

## Wiring diagrams



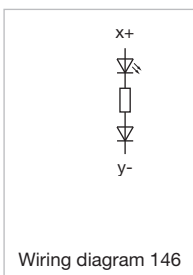
### Single-LED, T1 Bi-Pin

Illumination colour	Operating voltage	Operation current	Lumi. Intensity	Dom. Wavelength	Part No.	Wiring diagram
Red	28 V AC/DC +10%	5 - 9 mA ±15 %	45 mcd	625 nm	10-2613.1072	146
Yellow	28 V AC/DC +10%	5 - 9 mA ±15 %	270 mcd	580 nm	10-2613.1074	146
Green	28 V AC/DC +10%	5 - 9 mA ±15 %	320 mcd	525 nm	10-2613.1075	146

#### Additional information

- Luminosity and wave length variations caused by LED manufacturing processes may cause slight differences regarding the illumination.

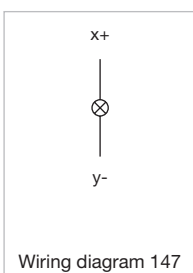
## Wiring diagrams



### Filament lamp

Pins	Operating voltage	Operation current	Part No.	Wiring diagram
Max. length: 8 mm	6 V AC/DC	70 mA ±10 %	10-1606.1309	147
Max. length: 5 mm	12 V AC/DC	25 mA ±10 %	10-1609.1199	147
	24 V AC/DC	20 mA ±10 %	10-1612.1179	147

## Wiring diagrams



# 19 Accessories

## Front side



Blind plug

Dimensions	Material	Colour	Mounting cut-out	Part No.
9 mm x 9 mm	plastic	Black	Ø 8 mm	19-948.0
Ø 9 mm	plastic	Black	Ø 8 mm	19-949.0



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## Rear side



**Flat receptacle**

Product attributes	Material	Part No.
2.0 x 0.5 mm plug-in terminal	metal	31-945



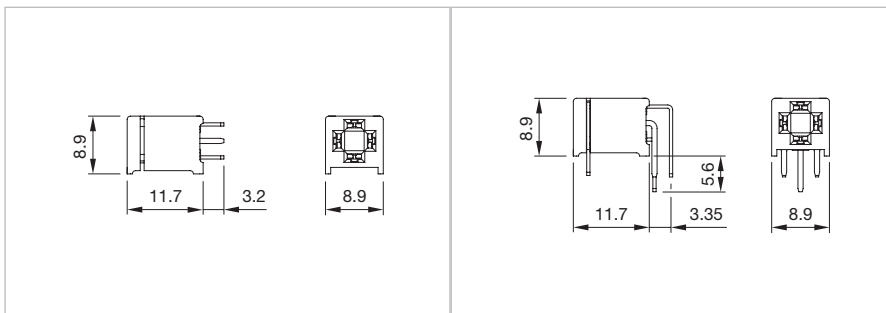
**Insulation sleeve**

Product attributes	Material	Part No.
For flat receptacle 2.0 mm	plastic	31-928



**PCB plug-in base**

Dimensions	Terminal	Pins	Part No.	Component Layout
8.9 mm x 11.7 mm x 8.9 mm	PCB terminal	Axial	19-940	4
8.9 mm x 11.7 mm x 8.9 mm	PCB terminal	90° angled	19-941	3



Dimensions [mm]  
for Part No. 19-940

Dimensions [mm]  
for Part No. 19-940

# 19 Accessories

## Mounting



**Fixing nut**

Dimensions	Material	Thread	Part No.
Ø 9 mm	metal	M8 x 13 mm	19-991



**Lens remover**

Material	Part No.
metal	19-910



**Lamp remover**

Product attributes	Material	Part No.
A switching action may occur when replacing the lamp	plastic	11-906



**Mounting tool**

Product attributes	Material	Part No.
For fixing nut long Part No. 19-991	metal	19-905



**Dressing tool**

Product attributes	Material	Part No.
For aligning buttons	metal	19-906



## 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

Plastic

#### Actuator housing

Plastic, colour black

### Mechanical characteristics

#### Terminals

Universal terminal  
Max. wire diameter 2 x 0.8mm  
Max. wire cross-section of stranded cable 1 x 0.75mm<sup>2</sup>

Plug-in terminal 2.0mm x 0.5mm  
For these terminals we offer sockets for PCB mounting.

#### Tightening torque

For fixing nut max. 0.2Nm

#### Actuating force

1.6N

#### Actuating travel

Approx. 2.8mm ±0.2mm

#### Mechanical lifetime

2 million cycles of operations

### Electrical characteristics

#### Switching voltage and switching current

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

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

#### Electric strength

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

### Ambient conditions

#### Operating 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.

#### Storage temperature

-40 °C ... +85 °C

#### Protection degree

IP40 front side, as per DIN EN 60529

### Approvals

#### Conformities

2011/65/EC (RoHS)

# 19 Technical data

## Actuator with low-level switching element

### Switching system

This low-level switching system was developed for low switching voltages and currents.

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

1 normally open or 1 normally closed contact.

### Material

**Material of contact**  
Gold plated

**Actuator housing**  
Plastic, 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 mm<sup>2</sup>

Plug-in terminal 2.0 mm x 0.5 mm

For these terminals we offer sockets for PCB mounting.

**Tightening torque**  
For fixing nut max. 0.2 Nm

**Actuating force**  
1.8 N ± 0.3 N

**Actuating travel**  
Approx. 2.8 mm ± 0.2 mm

**Mechanical lifetime**  
5 million cycles of operation

EAO reserves the right to alter specifications without further notice.

### Electrical characteristics

**Switching voltage and switching current**  
100 mA at 42 VAC/VDC

**Electric strength**  
2500 VAC, 50 Hz, 1 minute between all terminals and earth, as per IEC 60512-2-11

### Ambient conditions

**Operating 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.

**Storage temperature**  
-40 °C ... +85 °C

**Protection degree**  
IP40 front side, as per DIN EN 60529

**Shock resistance**  
(Single impacts, semi-sinusoidal)  
15 g for 11 ms, as per IEC 60512-4-3, DIN EN 60068-2-27

### Approvals

**Conformities**  
2011/65/EC (RoHS)

## 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.

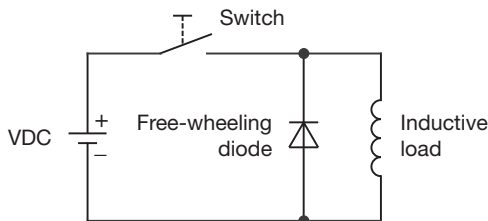
Fig. 1 shows an inductive load with a free-wheeling diode connected in parallel. This free-wheeling diode provides a path for the inductor current to flow when the current is interrupted by the switch. Without this free-wheeling diode, the voltage across the coil will be limited only by dielectric breakdown voltages of the circuit or parasitic elements of the coil. This voltage can be kilo-

volts in amplitude even when nominal circuit voltages are low (e.g. 12 VDC) see Fig. 2.

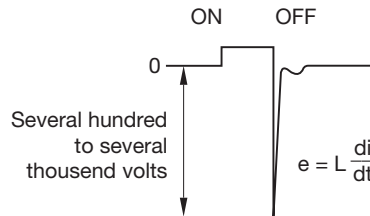
The free-wheeling diode should be chosen so that the reverse breakdown voltage is greater than the voltage driving the inductive load. The DC blocking voltage (VR) of the free-wheeling diode can be found in the datasheet of a diode. The forward current should be equal or greater than the maximum current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

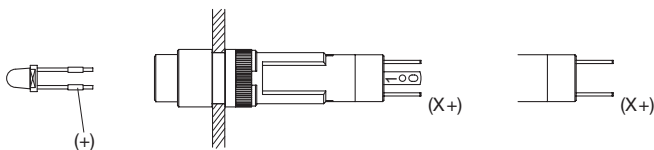


Counter EMF  
over load without free-wheeling diode  
Fig. 2



## LED polarity

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



### Recommended LED series resistors for optimum illumination

	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

