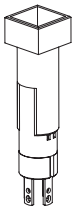
Illuminated pushbutton, IP 40

Equipment consisting of (schematic overview)

Lens *page 7*

Single-LED *page 10*

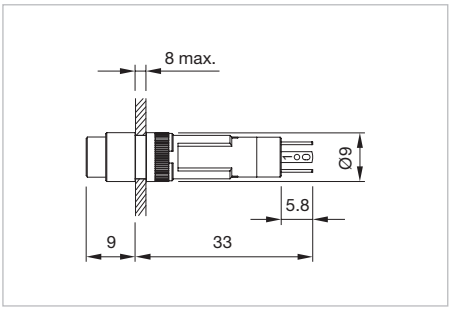


Actuator

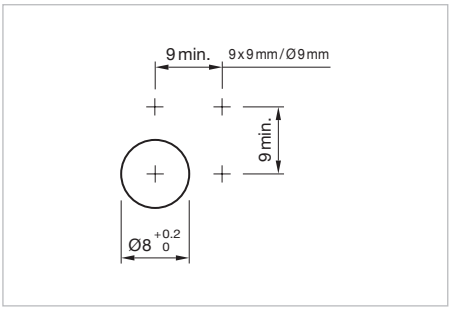
Fixing nut

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

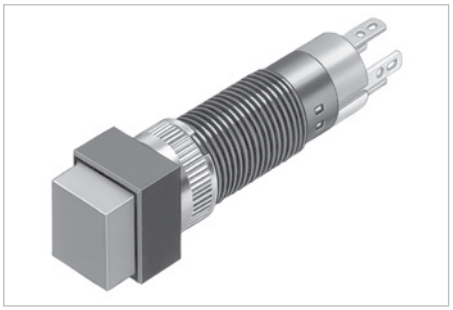
To obtain a complete unit, please select the red components from the pages shown.



Dimensions



Mounting cut-outs [mm]



Product can differ from the current configuration.

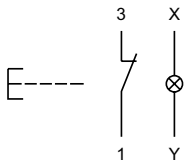
Additional Information

- For LED element fitting information see «Application guidelines»

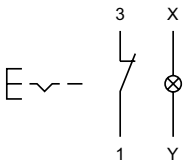
Switching system	Contacts	Contact material	Switching action	Terminal	Part No.	Component layout	Wiring diagram	Weight
 **Illuminated pushbutton actuator, Front dimension 9 x 9 mm**								
Low-level element	1 NC	Gold	B	Solder 2.0 x 0.5mm	**19-452.035**	2	1	0.002 kg
			C	Solder 2.0 x 0.5mm	**19-482.035**	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
 **Illuminated pushbutton actuator, Front dimension Ø 9 mm**								
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

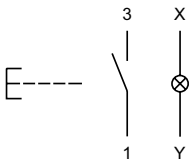
19 Raised design



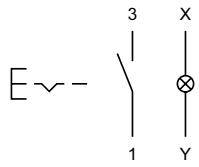
Wiring diagram 1



Wiring diagram 2



Wiring diagram 3



Wiring diagram 4

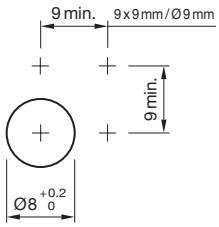
Front

Lens

Product attribute	Dimension	Lens	Part No.	Weight
 **Lens**				
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
 **Lens**				
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

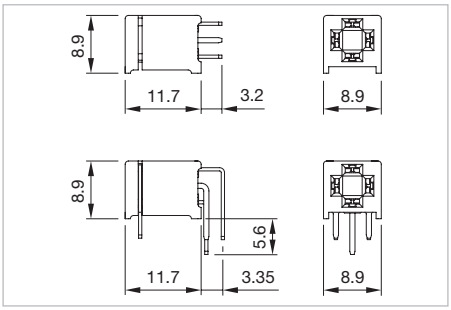
Blind plug



Mounting cut-outs [mm]

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

Rear side



Dimensions [mm]

PCB plug-in base

pins	Terminal	Part No.	Compo-nent layout	Weight
 **PCB plug-in base**				
axial	PCB	**19-940**	4	0.001 kg
 **PCB plug-in base**				
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
 **Flat receptacle**		
2.0 x 0.5 mm plug-in terminal	**31-945**	0.001 kg

Insulation sleeve

Product attribute	Part No.	Weight
 **Insulation sleeve**		
for flat receptacle 2.0 mm	**31-928**	0.001 kg

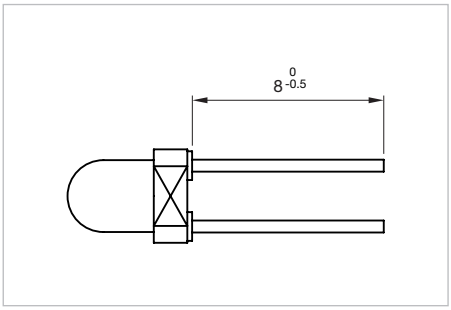
19 Accessories

Illumination

Single-LED, T1 Bi-Pin

Additional Information

- For LED element fitting information see «Application guidelines»
- 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
 **Single-LED**						
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

Multi-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

pins	LED colour	Operating voltage	Operation current	Part No.	Weight
 **Multi-LED**					
Multi-LED max. length: 5 mm	red	28 VDC ±5%	12 mA	**10-4613.3102B**	0.001 kg
	orange	28 VDC ±5%	12 mA	**10-4613.3103B**	0.001 kg
	yellow	28 VDC ±5%	12 mA	**10-4613.3104B**	0.001 kg
	green	28 VDC ±5%	12 mA	**10-4613.3105B**	0.001 kg

Filament lamp, T1 Bi-Pin

pins	Operating voltage	Operation current	Part No.	Weight
 **Filament lamp**				
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
 **Lamp remover**	
11-906	0.003 kg

Mounting tool

Additional Information

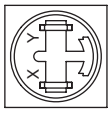
- For fixing nut long Part No. 19-991

Part No.	Weight
 **Mounting tool**	
19-905	0.011 kg

19 Drawings

Drawings

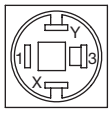
9 x 9 mm



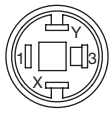
Ø 9 mm

Component layout 1

9 x 9 mm

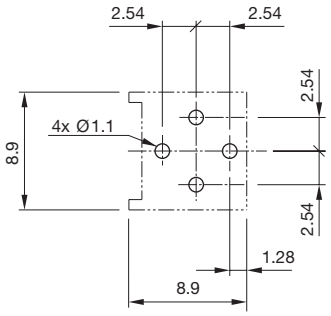


Ø 9 mm



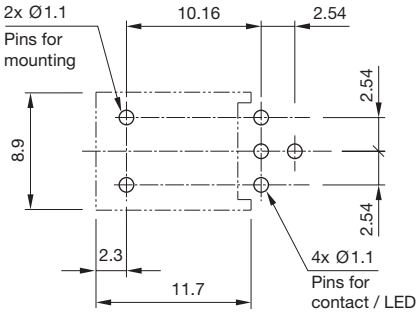
Component layout 2

Drilling plan (element side)
Through-connection recommended



Component layout 3

Drilling plan (element side)
Through-connection recommended



Component layout 4

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
2.8 mm ±0.2 mm

Rebound time
Typ. < 100 µs

Mechanical lifetime
5 million operations

Electrical characteristics

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

Switch rating
10 µA, 100 µV to 100 mA at 42 VAC/VDC

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

EAO reserves the right to alter specifications without further notice.

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

Suppressor circuits

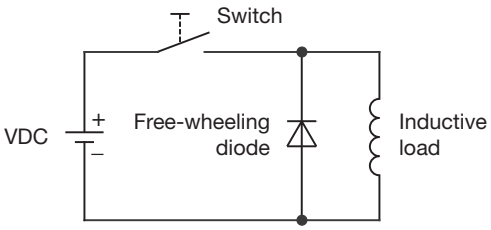
When switching inductive loads such as relays, DC motors, and DC solenoids, it is always important to absorb surges (e. g. with a diode) to protect the contacts. When these inductive loads are switched off, a counter emf can severely damage switch contacts and greatly shorten lifetime.

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. 12 VDC) see Fig. 2.

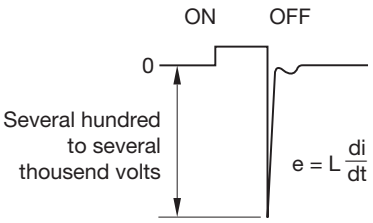
The free-wheeling diode should be chosen so that the reverse breakdown voltage is greater than the voltage driving the inductive load. The DC blocking voltage (VR) of the free-wheeling diode can be found in the datasheet of a diode. The forward current should be equal or greater than the maximum current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

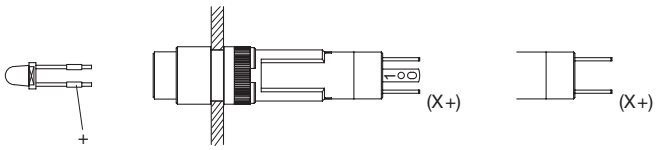


Counter EMF
over load without free-wheeling diode
Fig. 2



LED polarity

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



Illuminated pushbutton

Indicator