EAO – Your Expert Partner for
Human Machine Interfaces



EAO Product Information

Series 19

eao



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Product Information

General notes
The series contains indicators and illuminated pushbuttons with maintained and momentary action and one contact which may be normally closed or normally open (snap-action element for closing). The illuminated pushbuttons are fitted with snap-action or low-level switching systems.
The front dimensions are 9 x 9 mm or 9 mm dia.

Mounting
Mounting from the front through the mounting hole is assured even when the wiring has already been attached.
The units are equipped with soldering/plug-in terminals.

Lenses
The flat lenses, made of polycarbonate, are obtainable in various colours. The transparent lens is available with translucent or transparent support.

Marking
A limited amount of marking can be provided.

Illumination
Perfect illumination of the different coloured lenses is assured by filament lamps Bi-Pin T1 longlife (6 ... 24 V) or LED Bi-Pin T1. LED are available in the colours white, red, yellow, orange and green. 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 determinded by the position of the lens.

Specimen order

Indicator :

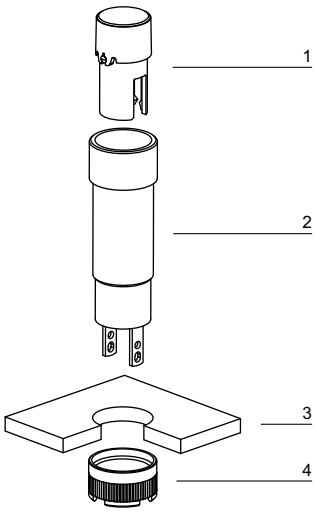
- Indicator actuator, 9 mm dia., soldering terminal	19-030.005

Essential accessories :

- Lens plastic blue, transparent, flush, 9 mm dia.	19-931.6
- Single-LED, T1 Bi-Pin, 3.6 VDC, weiss	10-2603.3179C

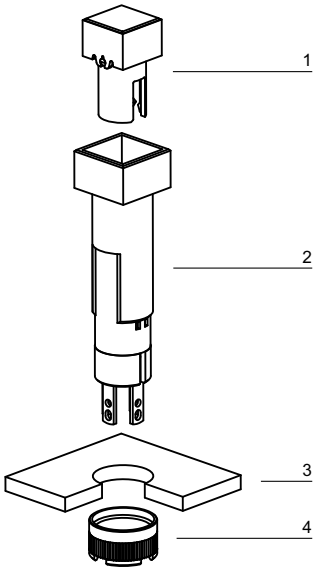
We reserve the right to modify technical data
All dimensions in mm

Indicator, raised mounting



1 Lens
2 Switch housing
3 Front plate
4 Fixing nut

Pushbutton illuminative, raised mounting



1 Lens
2 Switch housing
3 Front plate
4 Fixing nut

Indicator actuator




Essential Accessories:

Lens page 6
Single-LED page 7

	Front protection	Terminals	⍈ 9 x 9 mm Typ-Nr.	Ø 9 mm Typ-Nr.	Component layout	Mounting dimensions	Technical drawing	Circuit drawing	kg
Indicator actuator Mounting depth : 25 mm	IP 40	S2	**19-050.005**	**19-030.005**	1	1	1	1	0.001
Mounting depth : 33 mm	IP 40	S2	**19-051.005**	**19-031.005**	1	1	3	1	0.002

Terminals: S2 = Soldering terminal (also pluggable 2.0 x 0.5 mm)
Component layout from page 12, Mounting dimensions from page 12, Technical drawing from page 13, Circuit drawing from page 14

Illuminated pushbutton actuator




Essential Accessories:

Lens page 6
Single-LED page 7

	Front protection	Switching system	Contact material	Contacts	Switching action	Terminals	⍈ 9 x 9 mm Typ-Nr.	Ø 9 mm Typ-Nr.	Component layout	Mounting dimensions	Technical drawing	Circuit drawing	kg
Illuminated pushbutton actuator	IP 40	LL	Au	1 NC	MA	S2	**19-482.035**	**19-472.035**	2	1	2	2	0.002
					M	S2	**19-452.035**	**19-432.035**	2	1	2	4	0.002
				1 NO	MA	S2	**19-481.035**	**19-471.035**	2	1	2	3	0.002
					M	S2	**19-451.035**	**19-431.035**	2	1	2	5	0.002
		SA	Au	1 NO	MA	S2	**19-289.035**	**19-279.035**	2	1	2	3	0.002
					M	S2	**19-159.035**	**19-139.035**	2	1	2	5	0.002
			Ag	1 NO	MA	S2	**19-289.015**	**19-279.015**	2	1	2	3	0.002
					M	S2	**19-159.015**	**19-139.015**	2	1	2	5	0.002

Switching system: LL = Low level switching element, SA = Snap-action switching element
Contact material: Au = Gold, Ag = Silver
Contacts: NC = Normally closed, NO = Normally open
Switching action: MA = Maintained action, M = Momentary action
Terminals: S2 = Soldering terminal (also pluggable 2.0 x 0.5 mm)
Component layout from page 12, Mounting dimensions from page 12, Technical drawing from page 13, Circuit drawing from page 14

Front

Lens



	Lens	□ 9 x 9 mm Typ-Nr.	Ø 9 mm Typ-Nr.	kg
Lens illuminative, holder translucent	Plastic flush transparent blue	**19-951.6**	**19-931.6**	0.001
	Plastic flush transparent green	**19-951.5**	**19-931.5**	0.001
	Plastic flush transparent red	**19-951.2**	**19-931.2**	0.001
	Plastic flush transparent white	**19-951.9**	**19-931.9**	0.001
	Plastic flush transparent yellow	**19-951.4**	**19-931.4**	0.001
illuminative (not recommended for film insert), holder transparent	Plastic flush transparent blue	**19-952.6**	**19-932.6**	0.001
	Plastic flush transparent colourless	**19-952.7**	**19-932.7**	0.001
	Plastic flush transparent green	**19-952.5**	**19-932.5**	0.001
	Plastic flush transparent red	**19-952.2**	**19-932.2**	0.001
	Plastic flush transparent yellow	**19-952.4**	**19-932.4**	0.001
non-illuminative	Plastic flush opaque black	**19-951.0**	**19-931.0**	0.001
	Plastic flush opaque grey	**19-951.8**	**19-931.8**	0.001

Blind plug



	Blind plug	□ 9 x 9 mm Typ-Nr.	Ø 9 mm Typ-Nr.	Mounting dimensions	kg
Blind plug	Plastic black	**19-948.0**	**19-949.0**	1	0.001

Mounting dimensions from page 12

Backside

PCB plug-in base



	Terminals	Typ-Nr.	Component layout	Technical drawing	kg
PCB plug-in base Pins axial	P	**19-940**	3	4	0.001
Pins bent at right-angles	P	**19-941**	4	5	0.001

Terminals: P = PCB terminal

Component layout from page 12, Technical drawing from page 13

Flat receptacle

	Typ-Nr.	kg
Flat receptacle 2.0 x 0.5 mm	**31-945**	0.001



Insulation sleeve

	Typ-Nr.	kg
Insulation sleeve for Flat receptacle 31-945	**31-928**	0.001



Illumination

Filament lamp

	Socket	Operating voltage/-current	Typ-Nr.	kg
Filament lamp max. PIN length 5 mm	T1 Bi-Pin	12 VAC/DC, 25 mA	**10-1609.1199**	0.001
		24 VAC/DC, 20 mA	**10-1612.1179**	0.001
		6 VAC/DC, 70 mA	**10-1606.1309**	0.001



Single-LED

	Socket	Light colour	Operating voltage/-current	Typ-Nr.	kg
Single-LED max. PIN length 8 mm	T1 Bi-Pin	green	2.2 VDC, 20 mA	**10-2602.3175C**	0.001
		red	2.2 VDC, 20 mA	**10-2602.3172C**	0.001
		white	3.6 VDC, 20 mA	**10-2603.3179C**	0.001
		yellow	2.2 VDC, 20 mA	**10-2602.3174C**	0.001



Multi-LED

	Socket	Light colour	Operating voltage/-current	Typ-Nr.	kg
Multi-LED max. PIN length 5 mm	T1 Bi-Pin	green	28 VDC, 12 mA	**10-4613.3105B**	0.001
		orange	28 VDC, 12 mA	**10-4613.3103B**	0.001
		red	28 VDC, 12 mA	**10-4613.3102B**	0.001
		yellow	28 VDC, 12 mA	**10-4613.3104B**	0.001



Assembling

Fixing nut

	Typ-Nr.	kg
Fixing nut Ø 9/M8 x 13 mm	**19-991**	0.001



Dressing tool

	Typ-Nr.	kg
Dressing tool for aligning buttons	**19-906**	0.011



Lens remover

	Typ-Nr.	kg
Lens remover	**19-910**	0.002



Lamp remover

	Typ-Nr.	kg
Lamp remover	**11-906**	0.003



CAUTION
A switching process might be released when replacing the Lamp/LED !

Mounting tool

	Typ-Nr.	kg
Mounting tool for Fixing nut long 19-991	**19-905**	0.011



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 / 72 VDC, 0.8 A or 50 W
Min. 20 V, 10 mA
Gold plated:
Max. 50 VAC / 72 VDC, 100 mA or 5 W
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

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

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

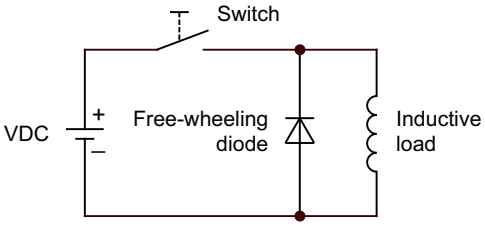
When switching inductive loads such as relays, DC motors, and DC solenoids, it is always important to absorb surges (e.g. with a diode) to protect the contacts. When these inductive loads are switched off, a counter emf can severely damage switch contacts and greatly shorten lifetime.

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.

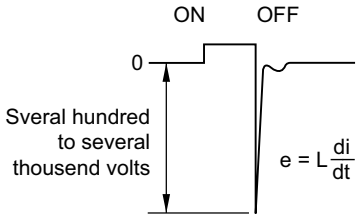
The free-wheeling diode should be chosen so that the reverse breakdown voltage is greater than the voltage driving the inductive load. The DC blocking voltage (VR) of the free-wheeling diode can be found in the datasheet of a diode. The forward current should be equal or greater than the maximum current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



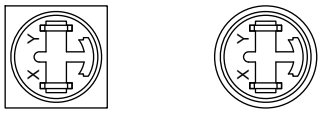
Counter emf
over load without free-wheeling diode
Fig. 2



Component layout

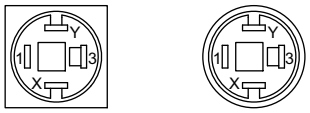
1 Indicator actuator page 5

9 x 9 mm Ø 9 mm



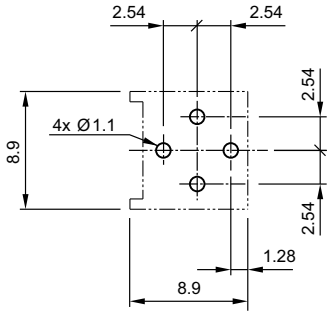
2 Illuminated pushbutton actuator page 5

9 x 9 mm Ø 9 mm



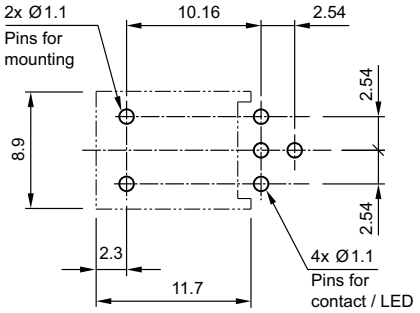
3 PCB plug-in base page 6

Drilling plan (element side)
Through-connection recommended



4 PCB plug-in base page 6

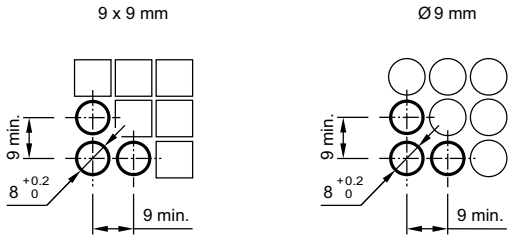
Drilling plan (element side)
Through-connection recommended



Mounting dimensions

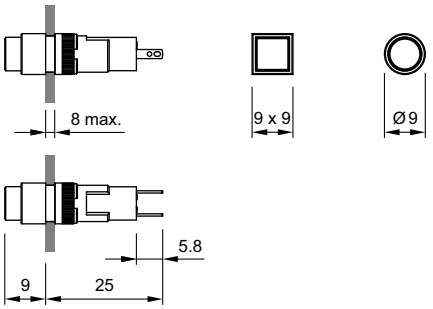
1 Indicator actuator page 5 **| Illuminated pushbutton actuator** page 5 **| Blind plug** page 6

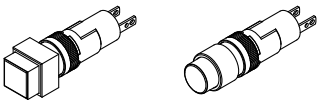
9 x 9 mm Ø 9 mm



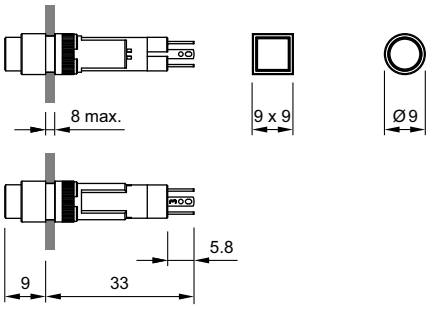
Technical drawing

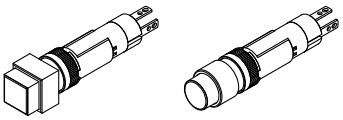
1 Indicator actuator page 5



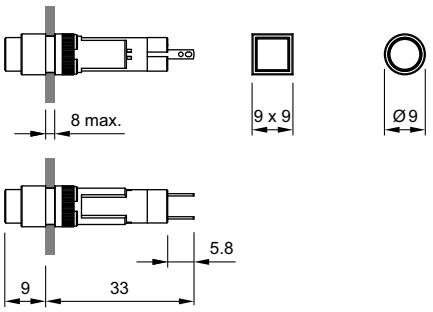


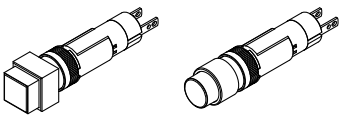
2 Illuminated pushbutton actuator page 5



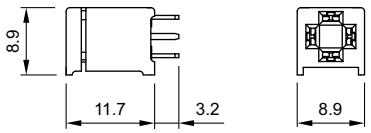


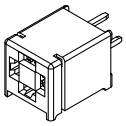
3 Indicator actuator page 5



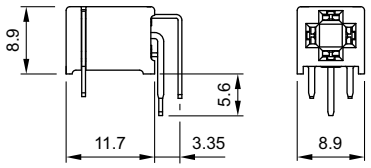


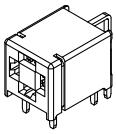
4 PCB plug-in base page 6





5 PCB plug-in base page 6



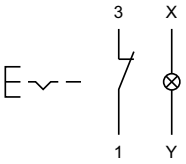


Circuit drawing

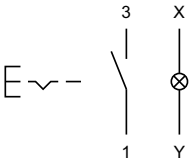
1 Indicator actuator page 5



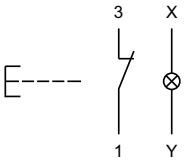
2 Illuminated pushbutton actuator page 5



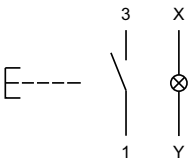
3 Illuminated pushbutton actuator page 5



4 Illuminated pushbutton actuator page 5



5 Illuminated pushbutton actuator page 5



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