TecnelSystem SpA
equipaggiamenti elettrici industriali

Series 02

Characteristics
The robust Series 02 is especially suited for:

- Flush design

The rectangular construction (24 x 36 mm) provides large surfaces for illumination and labelling.

Functions
The Series 02 incorporates the following functions:

- Indicator
- Pushbutton
- Illuminated pushbutton
- Keylock switch
- Buzzer

Market segments
The EAO Series 02 is especially suited for applications in the segments:

- Ship building
- Panel building

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Content 02

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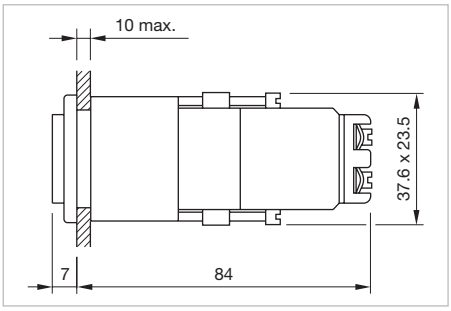
02 Flush design

Indicator, IP 40

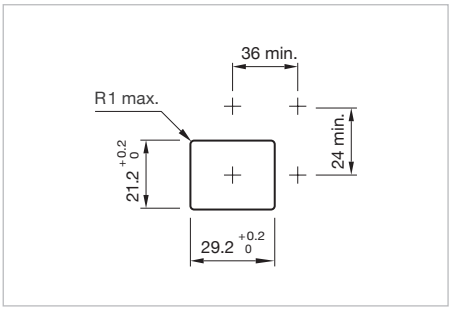
Product can differ from the current configuration.



Dimensions [mm]

Additional Information

- For front dimension 24 x 36 mm
- For indicator 02-07x.00x can only filament lamps be used (no LEDs)
- For LED element fitting information see chapter «Application guidelines»
- Take note of heat generating



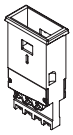
Mounting cut-outs [mm]

Equipment consisting of (schematic overview)

Front bezel *page 13*

Lens *page 11*

LED *page 17*



Actuator

Fixing bezel

Each article 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.

Product attribute	Behind panel depth	Terminal	Part No.	Wiring diagram	Weight
Indicator actuator					
without serie resistor, for LED or filament lamp	60 mm	Screw	**02-021.001**	1	0.030 kg
Indicator actuator					
with built-in lamp series resistor, 240 VAC/DC to 48 V, 25 mA, for filament lamp	84 mm	Screw	**02-070.001**	1	0.045 kg
with built-in lamp series resistor, 110 VAC/DC to 48 V, 25 mA, for filament lamp	84 mm	Screw	**02-071.001**	1	0.045 kg
with built-in lamp series resistor, 125 VAC/DC to 48 V, 25 mA, for filament lamp	84 mm	Screw	**02-072.001**	1	0.045 kg
with built-in lamp series resistor and diode, 240 VAC/DC to 48 V, 25 mA, for filament lamp	84 mm	Screw	**02-073.001**	1	0.045 kg

Wiring diagram 1

Buzzer, IP 40

Equipment consisting of (schematic overview)

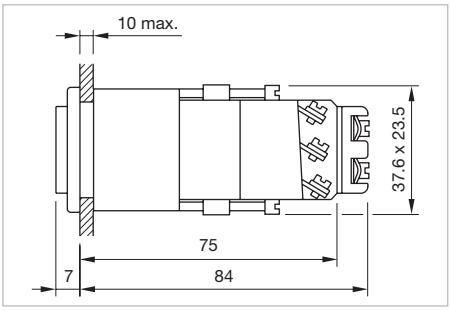
Front bezel *page 13*

Buzzer

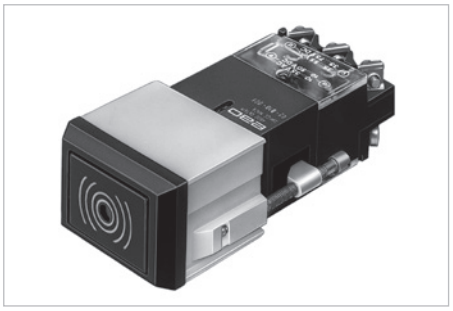
Fixing bezel

Each article number listed below includes all the black components shown in the 3D-drawing.

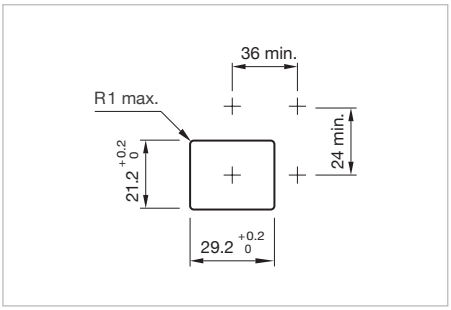
To obtain a complete unit, please select the red components from the pages shown.



Dimensions [mm]



Product can differ from the current configuration.

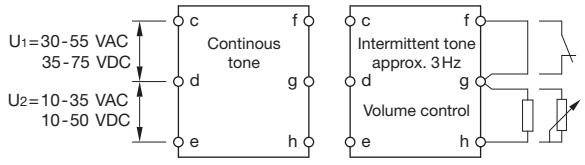


Mounting cut-outs [mm]

Additional Information

- For front dimension 24 x 36 mm
- Further information in chapter «Technical Data»

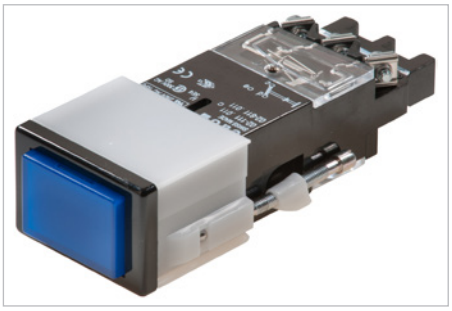
Operating voltage	Front cap	Terminal	Part No.	Wiring diagram	Weight
Buzzer					
10 ... 55 VAC, 10 ... 75 VDC	Pastic black	Screw	**02-810.001**	1	0.060 kg



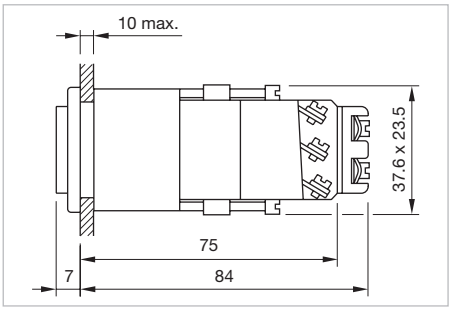
Wiring diagram 1

02 Flush design

Pushbutton, IP 40



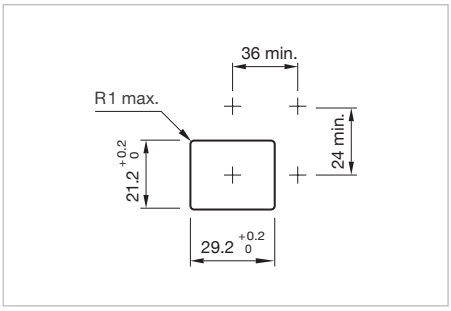
Product can differ from the current configuration.



Dimensions [mm]

Additional Information

- For front dimension 24 x 36 mm

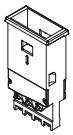


Mounting cut-outs [mm]

Equipment consisting of (schematic overview)

Front bezel *page 13*

Lens *page 11*



Actuator

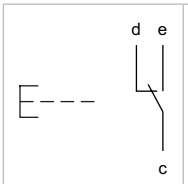
Fixing bezel

Each article number listed below includes all the black components shown in the 3D-drawing.

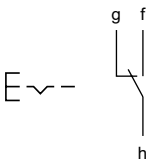
To obtain a complete unit, please select the red components from the pages shown.

Contacts	Switching action	Terminal	Part No.	Wiring diagram	Weight
1 C	A	Screw	**02-611.011**	1	0.045 kg
	C	Screw	**02-613.011**	2	0.045 kg
2 C	A	Screw	**02-612.011**	3	0.050 kg
	C	Screw	**02-614.011**	4	0.050 kg
	B - C	Screw	**02-615.011**	5	0.050 kg

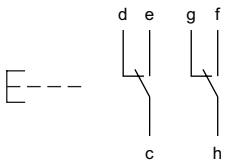
Contacts: C = Changeover
Switching action: B = Momentary, C = Maintain



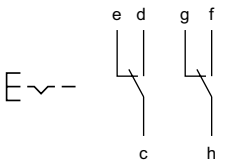
Wiring diagram 1



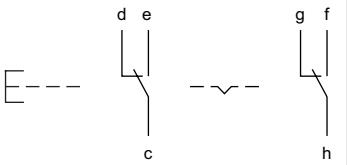
Wiring diagram 2



Wiring diagram 3



Wiring diagram 4



Wiring diagram 5

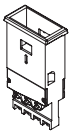
Illuminated pushbutton, IP 40

Equipment consisting of (schematic overview)

Front bezel *page 13*

Lens *page 11*

LED *page 17*

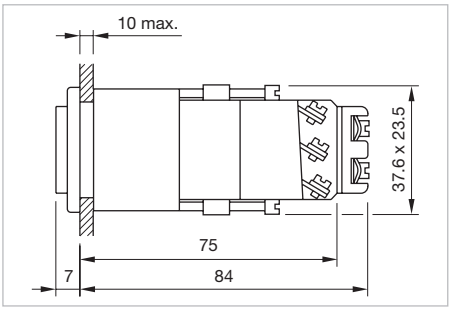


Actuator

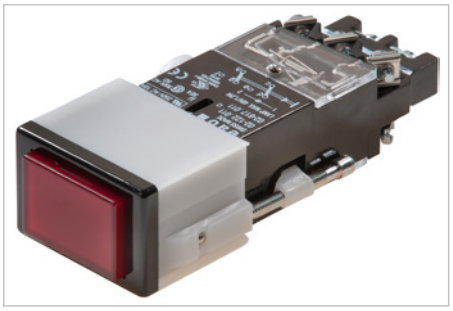
Fixing bezel

Each article number listed below includes all the black components shown in the 3D-drawing.

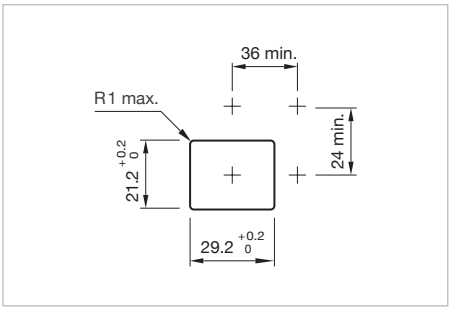
To obtain a complete unit, please select the red components from the pages shown.



Dimensions [mm] [mm]



Product can differ from the current configuration.



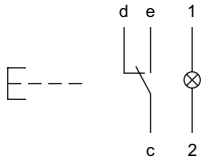
Mounting cut-outs [mm]

Additional Information

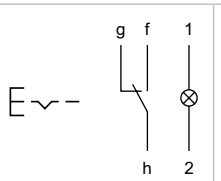
- For front dimension 24 x 36 mm
- For LED element fitting information see chapter «Application guidelines»

Contacts	Switching action	Terminal	Part No.	Wiring diagram	Gewicht
Illuminated pushbutton actuator					
1 C	B	Screw	**02-616.011**	1	0.050 kg
	C	Screw	**02-618.011**	2	0.050 kg
2 C	B	Screw	**02-617.011**	3	0.055 kg
	C	Screw	**02-619.011**	4	0.055 kg
	B - C	Screw	**02-620.011**	5	0.055 kg

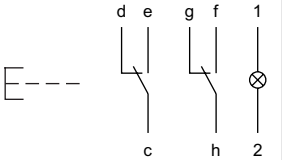
Contacts: C = Changeover
Switching action: B = Momentary, C = Maintain



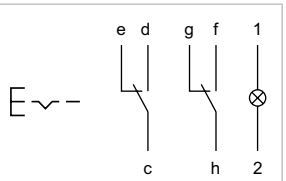
Wiring diagram 1



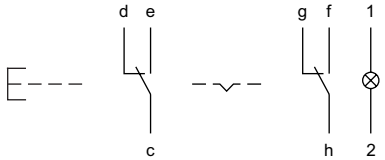
Wiring diagram 2



Wiring diagram 3



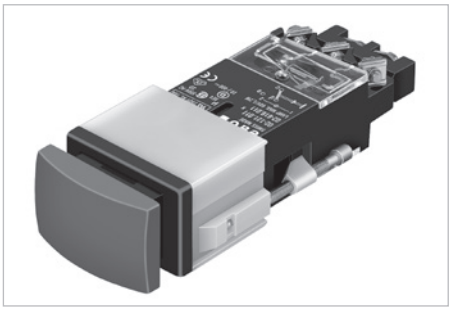
Wiring diagram 4



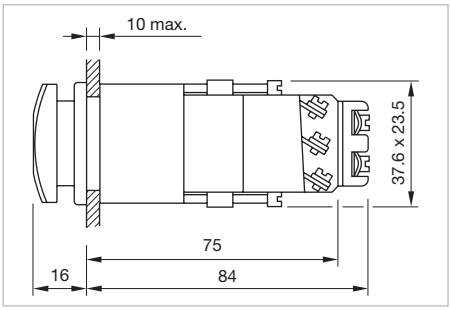
Wiring diagram 5

02 Flush design

Mushroom-head pushbutton, IP 40



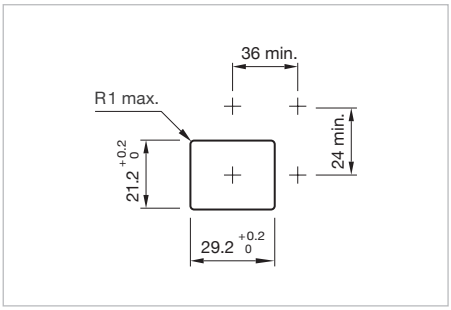
Product can differ from the current configuration.



Dimensions [mm]

Additional Information

- For front dimension 24 x 36 mm
- Use only flush front bezel

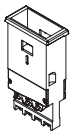


Mounting cut-outs[mm]

Equipment consisting of (schematic overview)

Mushroom-head cap *page 11*

Front bezel *page 13*



Actuator

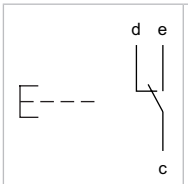
Fixing sleeve

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

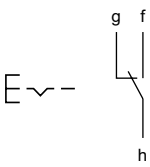
To obtain a complete unit, please select the red components from the pages shown.

Contacts	Switching action	Terminal	Part No.	Wiring diagram	Weight
Mushroom-head pushbutton actuator					
1 C	B	Screw	**02-611.011**	1	0.045 kg
	C	Screw	**02-613.011**	2	0.045 kg
2 C	B	Screw	**02-612.011**	3	0.050 kg
	C	Screw	**02-614.011**	4	0.050 kg
	B - C	Screw	**02-615.011**	5	0.050 kg

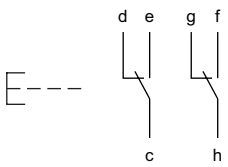
Contacts: C = Changeover
Switching action: B = Momentary, C = Maintain



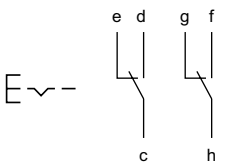
Wiring diagram 1



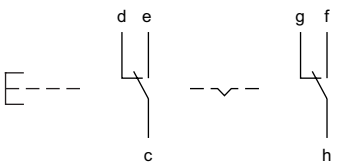
Wiring diagram 2



Wiring diagram 3



Wiring diagram 4



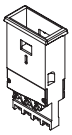
Wiring diagram 5

Keylock switch 2 positions, IP 40

Equipment consisting of (schematic overview)

Front bezel *page 13*

Keylock front bezel *page 12*

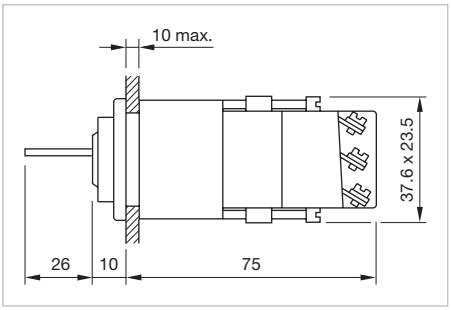


Actuator

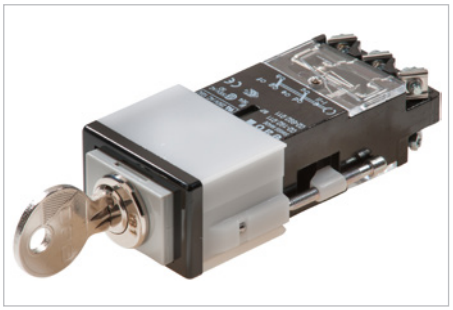
Fixing bezel

Each article number listed below includes all the black components shown in the 3D-drawing.

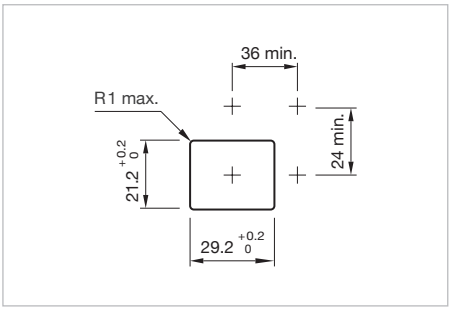
To obtain a complete unit, please select the red components from the pages shown.



Dimensions [mm]



Product can differ from the current configuration.



Mounting cut-outs [mm]

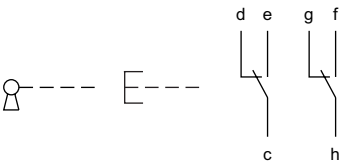
Additional Information

- For front dimension 24 x 36 mm
- Front plastic grey
- Keylock number YB1
- After turning the key 90° clockwise, the switch can be operated
- In the unlocked switch positions always perform a momentary action
- Two keys are supplied with each key lock switch

Switching positions (A = Rest, B = Momentary)

Product attribute	Contacts	Switching angle	Key remove	Terminal	Part No.	Wiring diagram	Gewicht
Schlüsselschalter-Vorsatz 2 Stellungen							
A = lockable, actuated	2 C	B = 90°	A	Screw	**02-690.011**	1	0.055 kg
A = lockable, non-actuated or actuated	2 C	B = 90°	A	Screw	**02-692.011**	1	0.055 kg
A = lockable, non-actuated	2 C	B = 90°	A	Screw	**02-691.011**	1	0.055 kg

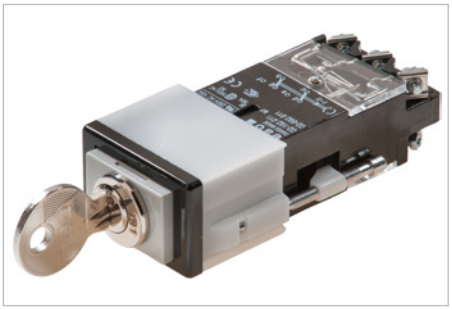
Contacts: C = Changeover



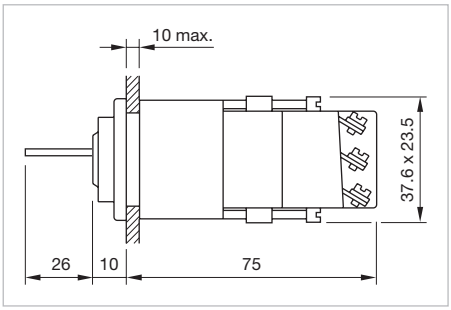
Wiring diagram 1

02 Flush design

Keylock switch 2 positions, IP 40



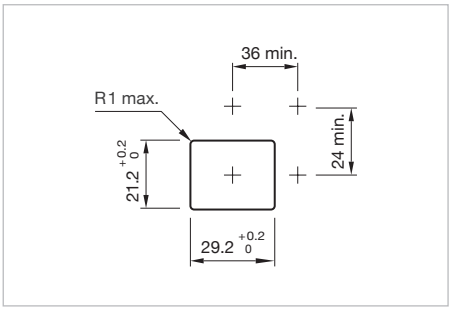
Product can differ from the current configuration.



Dimensions [mm]

Additional Information

- For front dimension 24 x 36 mm
- Front plastic grey
- Keylock number YB1
- After turning the key 90° clockwise, the switch can be operated
- In the unlocked switch positions always perform a momentary action
- Two keys are supplied with each key lock switch

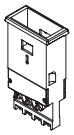


Mounting cut-outs [mm]

Equipment consisting of (schematic overview)

Front bezel *page 13*

Keylock front bezel



Actuator

Fixing bezel

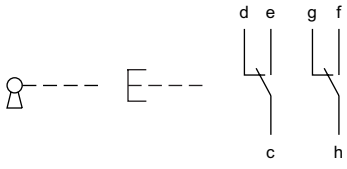
Each article number listed below includes all the black components shown in the 3D-drawing.

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

Switching positions (A = Rest, B = Momentary)

Product attribute	Contacts	Switching angle	Key remove	Terminal	Part No.	Wiring diagram	Gewicht
Schlüsselschalter-Vorsatz 2 Stellungen							
A = lockable, non-actuated, B = lockable, key not removable	2 C	B = 90°	A	Screw	**02-695.011**	1	0.055 kg
A = lockable, non-actuated or actuated; can be used with protective cover Part No. 22-925	2 C	B = 90°	A	Screw	**02-198.011**	1	0.055 kg

Contacts: C = Changeover



Wiring diagram 1

Front

Lens

Additional Information

- Material plastic

Product attribute	Dimension	Lens	Part No.	Weight
Lens				
illuminative, not suitable for film insert, ripped	17.5 x 25.4 mm	smoked translucent	**02-901.1**	0.004 kg
		red translucent	**02-901.2**	0.004 kg
		orange translucent	**02-901.3**	0.004 kg
		yellow translucent	**02-901.4**	0.004 kg
		green translucent	**02-901.5**	0.004 kg
		blue translucent	**02-901.6**	0.004 kg
		colourless transparent	**02-901.7**	0.004 kg
		white translucent	**02-901.9**	0.004 kg
illuminative, use holder for film insert	17.5 x 25.4 mm	red translucent	**02-902.2**	0.004 kg
		green translucent	**02-902.5**	0.004 kg
		colourless transparent	**02-902.7**	0.004 kg
non-illuminative	17.5 x 25.4 mm	black opaque	**02-901.0**	0.004 kg
		grey opaque	**02-901.8**	0.004 kg

Keylock front bezel

Additional Information

- Keylock number YB1
- Further lock numbers see «Technical data»

Product attribute	Dimension	Material	Colour	Part No.	Weight
Keylock front bezel					
	17.5 x 25.5 mm	Plastic	grey	**02-980.1**	0.002 kg
for keylock switch Part No. 02-695	17.5 x 25.5 mm	Plastic	grey	**02-982.1**	0.002 kg

02 Accessories

Holder

Additional Information

- For lens with film insert

Material	Colour	Optics	Part No.	Weight
Holder				
Plastic	red	translucent	**02-908.2**	0.001 kg
	orange	translucent	**02-908.3**	0.001 kg
	yellow	translucent	**02-908.4**	0.001 kg
	green	translucent	**02-908.5**	0.001 kg
	blue	translucent	**02-908.6**	0.001 kg
	colourless	transparent	**02-908.7**	0.001 kg
	white	translucent	**02-908.9**	0.001 kg

Diffusor plate

Additional Information

- For lens with film insert

Part No.	Weight
Diffusor plate	
02-909	0.001 kg

Front bezel flush

Additional Information

- Lens only removable with lens remover Part No. 02-905

Front bezel	Part No.	Weight
Front bezel flush, Front dimension 24 x 36 mm		
Pastic black	**02-965.0**	0.001 kg

Front bezel raised

Additional Information

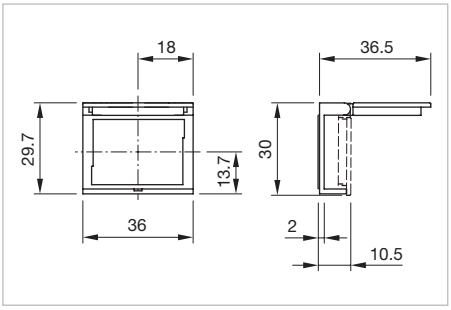
- Lens only removable with lens remover Part No. 98-969

Front bezel	Part No.	Weight
Front bezel raised, Front dimension 24 x 36 mm		
Pastic black	**02-967.0**	0.001 kg

Protective cover, IP 65

Additional Information

- Please note that bigger minimum distances are necessary
- Use only flush front bezel
- Hinged, with means for sealing
- Front panel thickness reduces by 2 mm



Dimensions [mm]

Product attribute	Material	Optics	Dimension	Part No.	Weight
Protective cover					
for button with mounting cut-out 21.2 x 29.2 mm	Plastic	transparent	36 x 29.7 mm	**22-925**	0.004 kg

02 Accessories

Spare key

Additional Information

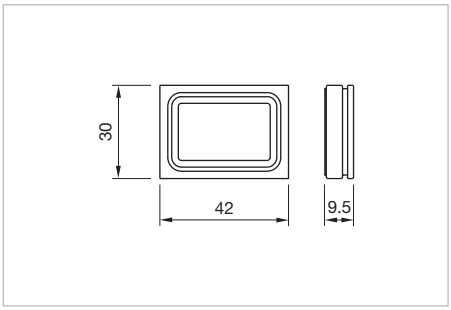
- Keylock number YB1

Part No.	Weight
Spare key	
02-989.001	0.001 kg

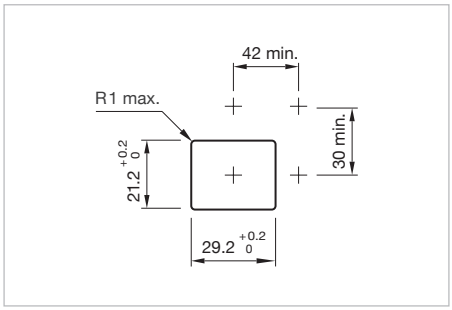
Front protective cap, IP 65

Additional Information

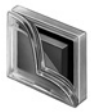
- Use only flush front bezel
- Three-part



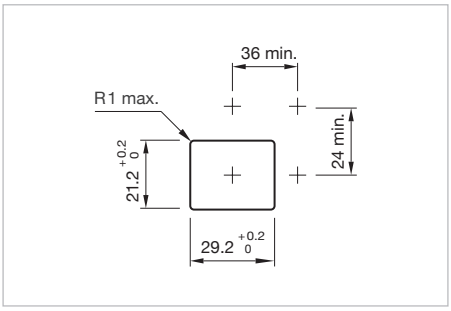
Dimensions [mm]



Mounting cut-outs [mm]

Material	Colour	Optics	Temperature	Part No.	Weight
 **Front protective cap**					
PVC	colourless	transparent	-20 ... +60 °	**02-924**	0.005 kg
			-25 ... +85 °	**02-935**	0.005 kg

Blind plug



Mounting cut-outs [mm]

Dimension	Material	Colour	Part No.	Weight
Blind plug				
24 x 36 mm	Plastic	black	**02-949.0**	0.004 kg
		grey	**02-949.8**	0.004 kg

Backside

Terminal cover

Additional Information

- For all connection methods
- Not suitable for indicators with built-in series resistor with lamp

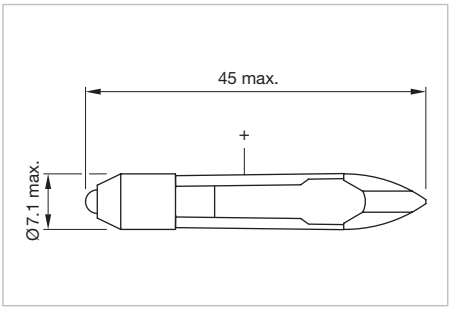
Part No.	Weight
Terminal cover	
02-929	0.005 kg

Illumination

Single-LED, T6.8

Additional Information

- For LED element fitting information see «Application guidelines»
- Due to high surface temperatures, the series resistor must not be soldered directly to the terminals of the equipment (use a terminal plate)
- When using AC/DC types with AC operation, slight flickering can occure
- Luminous intensity data of the LEDs on direct voltage
- Electrical and optical data are measured at 25 °C
- The specified versions are built with a protection diode (halve wave rectifier) in series and the LED
- Luminosity and wave length variations caused by LED manufacturing processes may cause slight differences regarding the illumination
- For supply voltages above 48 V, it is necessary to use a voltage reduction element (external series resistor or transformer)



Dimensions [mm]

LED colour	Operating voltage	Operation current	Lumi. intensity	Dom. wavelength	Part No.	Weight
Single-LED						
red	6 VDC	17 mA ±15 %	400 mcd	630 nm	**10-2K06.3152**	0.002 kg
	12 VAC/DC	9/17 mA ±15 %	400 mcd	630 nm	**10-2K09.1072**	0.002 kg
	24 VAC/DC	9/17 mA ±15 %	400 mcd	630 nm	**10-2K12.1072**	0.002 kg
	28 VAC/DC	9/17 mA ±15 %	400 mcd	630 nm	**10-2K13.1072**	0.002 kg
	48 VAC/DC	4/8 mA ±15 %	200 mcd	630 nm	**10-2K19.1052**	0.002 kg
yellow	6 VDC	17 mA ±15 %	340 mcd	340 nm	**10-2K06.3154**	0.002 kg
	12 VAC/DC	9/17 mA ±15 %	340 mcd	340 nm	**10-2K09.1074**	0.002 kg
	24 VAC/DC	9/17 mA ±15 %	340 mcd	340 nm	**10-2K12.1074**	0.002 kg
	28 VAC/DC	9/17 mA ±15 %	340 mcd	340 nm	**10-2K13.1074**	0.002 kg
	48 VAC/DC	4/8 mA ±15 %	180 mcd	340 nm	**10-2K19.1054**	0.002 kg
green	6 VDC	7 mA ±15 %	1050 mcd	525 nm	**10-2K06.3155**	0.002 kg
	12 VAC/DC	4/7 mA ±15 %	1050 mcd	525 nm	**10-2K09.1075**	0.002 kg
	24 VAC/DC	4/7 mA ±15 %	1050 mcd	525 nm	**10-2K12.1075**	0.002 kg
	28 VAC/DC	4/7 mA ±15 %	1050 mcd	525 nm	**10-2K13.1075**	0.002 kg
	48 VAC/DC	2/4 mA ±15 %	600 mcd	525 nm	**10-2K19.1055**	0.002 kg
blue	6 VDC	17 mA ±15 %	780 mcd	470 nm	**10-2K06.3156**	0.002 kg
	12 VAC/DC	9/17 mA ±15 %	780 mcd	470 nm	**10-2K09.1076**	0.002 kg
	24 VAC/DC	9/17 mA ±15 %	780 mcd	470 nm	**10-2K12.1076**	0.002 kg
	28 VAC/DC	9/17 mA ±15 %	780 mcd	470 nm	**10-2K13.1076**	0.002 kg
	48 VAC/DC	4/8 mA ±15 %	400 mcd	470 nm	**10-2K19.1056**	0.002 kg

LED colour	Operating voltage	Operation current	Lumi. intensity	Dom. wavelength	Part No.	Weight
white	6 VDC	6 mA ±15 %	900 mcd	x0.31/y0.32 nm	**10-2K06.3159**	0.002 kg
	12 VAC/DC	3/6 mA ±15 %	900 mcd	x0.31/y0.32 nm	**10-2K09.1079**	0.002 kg
	24 VAC/DC	3/6 mA ±15 %	900 mcd	x0.31/y0.32 nm	**10-2K12.1079**	0.002 kg
	28 VAC/DC	2.5/5 mA ±15 %	750 mcd	x0.31/y0.32 nm	**10-2K13.1079**	0.002 kg
	48 VAC/DC	2/4 mA ±15 %	600 mcd	x0.31/y0.32 nm	**10-2K19.1059**	0.002 kg

Filament lamp, T6.8

Operating voltage	Operation current	Part No.	Weight
Filament lamp			
12 VAC/DC	50 mA ±10 %	**10-1209.1279**	0.001 kg
12 VAC/DC	100 mA ±10 %	**10-1209.1329**	0.001 kg
24 VAC/DC	25 mA ±10 %	**10-1212.1199**	0.001 kg
24 VAC/DC	50 mA ±10 %	**10-1212.1279**	0.001 kg
28 VAC/DC	40 mA ±10 %	**10-1213.1249**	0.001 kg
30 VAC/DC	40 mA ±10 %	**10-1214.1249**	0.001 kg
36 VAC/DC	35 mA ±10 %	**10-1216.1229**	0.001 kg

Series resistor

Additional Information

- For filament lamp 48 VAC, 25 mA
- For lamp voltage reduction
- Keep to the country specific safety instructions
- Due to high surface temperatures, the series resistor must not be soldered directly to the terminals of the equipment (use a terminal plate)

Operating voltage	Resistance	Part No.	Weight
Series resistor			
110 VAC	2.7 kOhm	**02-904.0**	0.003 kg
125 VAC	3.3 kOhm	**02-904.1**	0.003 kg
145 VAC	4.7 kOhm	**02-904.3**	0.003 kg
240 VAC	10 kOhm	**02-904.7**	0.003 kg

Terminal plate empty

Additional Information

- For fitting with series resistors

Product attribute	Dimension	Part No.	Weight
Terminal plate empty			
5 spaces	62.5 x 60 x 15 mm	**02-912.1**	0.025 kg
10 spaces	125 x 60 x 15 mm	**02-912.2**	0.045 kg
15 spaces	187.6 x 60 x 15 mm	**02-912.3**	0.090 kg
20 spaces	250 x 60 x 15 mm	**02-912.4**	0.095 kg

02 Accessories

Mounting

Lens remover

Product attribute	Part No.	Weight
Lens remover		
for flush front bezel	**02-905**	0.011 kg
Lens remover		
for raised front bezel	**98-968**	0.004 kg

Lamp remover

Additional Information

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

Product attribute	Part No.	Weight
Lamp remover		
for LED	**03-996**	0.027 kg
Lamp remover		
for filament lamp	**61-9740.0**	0.003 kg

Actuator with snap-action switching element

Switching system

1 or 2 self-cleaning, snap-action switching elements.
1 or 2 double-throw contacts.

Material

Material of contact
Standard version:
Silver (U > 20 V)
Special versions: (on request)
Gold/Silver 700 Au/300 Ag (U < 50 V)
Silver/Palladium 700 Ag/300 Pd (U > 20 V) for atmospheres containing sulphur

Switch housing
Thermosetting material, heat-resistant

Indicator housing with reduced length
Polyamide

Mechanical characteristics

Terminals
Screw terminal (with self-lifting clip):
max. wire cross-section, 2 x 2.5 mm²
max. wire cross-section of stranded cable, 2 x 1.5 mm²

Tightening torque
For fixing sleeve max. 20 Ncm
For screw terminal max. 80 Ncm

Actuating force
6 N … 12 N

Actuating travel
5 mm

Mechanical lifetime
Momentary action 2 million operations
Maintained action 1 million operations

Electrical characteristics

Standards
The switches comply with the “Standards for low-voltage switching devices” IEC 60947-5-1

Rated insulation voltage
400 VAC/440 VDC, as per IEC 60947-5-1

Conventional free air thermal current
10 A
The maximum current in continuous operation and at ambient temperature not exceeding the quoted maximum values.

Switch rating
400 VAC, 10 A, cosφ 0.95, as per IEC 60947-5-1
250 VAC, 10 A, as per UL

Electric strength
2500 VAC, 50 Hz, 1 min. between all terminals and earth, as per IEC 60947-5-1

Environmental conditions

Storage temperature
-30 °C … +85 °C

Service temperature
-25 °C … +55 °C
For indicators and illuminated pushbuttons mounted as a block, make sure the heat can escape freely.

Protection degree
Front side IP 40, IP 65 with spray cover, as per IEC 60529

Shock resistance
15 g for 11 ms, as per IEC 60068-2-27

Vibration resistance
10 g at 10 … 2000 Hz, amplitude 1.0 mm, as per IEC 60068-2-6

Approvals

Approbations
CB (IEC 60947-5-1)
CSA
Germanischer Lloyd
UL

Declaration of conformity
CE

02 Technical data

Buzzer

Buzzer system

System
Electronic non-contacting buzzer with IC oscillator

Material

Buzzer case
Thermosetting material

Front cap
Polycarbonate (PC)

Front bezel
Polymethylacrylate

Mechanical characteristics

Terminals
Screw terminal

Tightening torque
For fixing sleeve max. 20 Ncm
For screw terminal max. 80 Ncm

Electrical characteristics

Frequency (tone)
Approx. 2.8 kHz

Sound pressure
85 dB (A) ±8 dB at a distance of 0.1 m
Volume variable with a MΩ potentiometer or corresponding fixed resistor

Operation Voltage/Current
typical

10 … 55 VAC	10 … 75 VDC
25 mA	15 mA

Environmental conditions

Storage temperature
-40 °C … +85 °C

Operating temperature
-25 °C … +55 °C

Protection degree
Front side IP 40, as per IEC 60529

Approvals

Approbations
CB (IEC 60947-5-1)

Declaration of conformity
CE

EAO reserves the right to alter specifications without further notice.

General notes

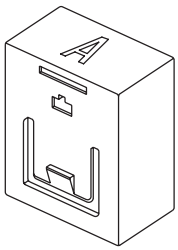
1. Engraving
In addition to the most commonly used world languages, in DIN1451-3 close spacing, other typefaces are available as Scandinavian, Slavic, Greek, Russian and Polish. Red, blue and black lenses are filled with white colour. Other colour lenses are filled in black. Standard height of letters is 3 mm. If the height is not specified, we will supply 3 mm engraved letters.

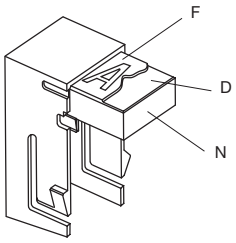
2. Hot stamping
For larger series it is worth considering markings by means of hot stamping. We will pleased to advise you. For letters and figures, typefaces with 2.5 mm, 3 mm and 4 mm are available.

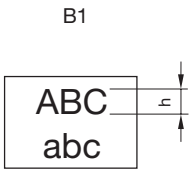
3. Film inserts
Instead of using engraving the lenses can be fitted with transparent film inserts, as an alternative. For this purpose, though, it is advisible to use lenses without ripped pattern. In the case of use of a smoke-black lens the fitted film becomes readable only if the lamp is on. The film (F) is inserted in the cap. To ensure even illumination a diffusor (D) is recommended, which is inserted beneath the film. If, on the other hand, the diffusor is inserted above the film, the lettering only becomes legible when the lamp is alight. To hold the film and diffusor in position, the use of a holder (N) is advised. The film thickness is 0.2 mm.

All dimensions in mm

Film insert max. size	Height of letters h	Number of lines	Number of capital letters per line (target value)	Number of small letters per line (target value)	Image
14.3 x 22.4	3	4	11	13	B1
			7–8	8–9	B2
	4	2	7	9	B1
		4	5	5–6	B2
	5	2	5–6	6–7	B1
		3	3–4	4	B2
	6	1	5	6	B1
		2	3	4	B2
	8	1	3	4	B1
			2	2	B2







02 Application guidelines

Suppressor circuits

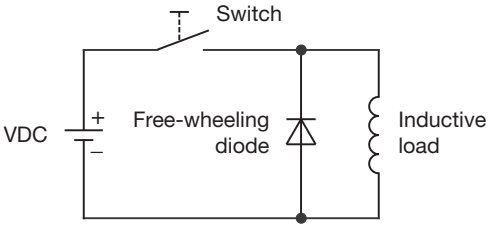
When switching inductive loads such as relays, DC motors, and DC solenoids, it is always important to absorb surges (e. g. with a diode) to protect the contacts. When these inductive loads are switched off, a counter emf can severely damage switch contacts and greatly shorten lifetime.

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.

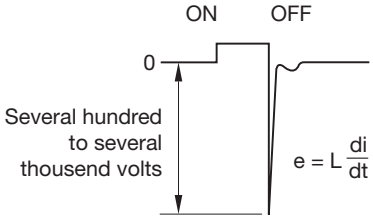
The free-wheeling diode should be chosen so that the reverse breakdown voltage is greater than the voltage driving the inductive load. The DC blocking voltage (VR) of the free-wheeling diode can be found in the datasheet of a diode. The forward current should be equal or greater than the maximum current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

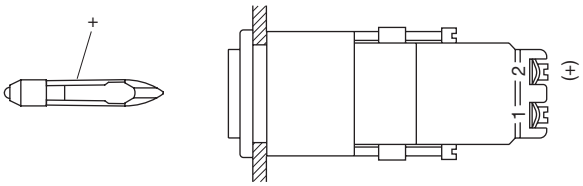


Counter EMF
over load without free-wheeling diode
Fig. 2



LED polarity

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



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02-617.011	7
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02-619.011	7
02-620.011	7
02-690.011	9
02-691.011	9
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