

EAO – Your Expert Partner for  
**Human Machine Interfaces**



## EAO Product Information

Series 22





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## Product Information

### General notes

The illuminated pushbuttons, keylock switches, mushroom pushbuttons with momentary or maintained action and indicators are primarily noteworthy for their degree of protection IP 65 of the front (i.e. dust and splash-proof). Their robust, compact design, mounting by one man, their screw and plug-in terminals proof against inadvertent contact, and their large surface area for engraving and illumination are other quality features.

The switching element is a double-break snap-action system, the current being carried by a through-contact bar.

The dimensions of the front bezel are 24 x 36 mm. For indicators and illuminated pushbuttons you can choose the design of the front to suit your requirements from two front bezels which clip on in different ways. The raised front bezel of keylock switches is fixed Typ-Nr. 02-967.0.

### Mounting

Mounting by one man from the front. The switch, pushed into the square opening in the panel from the front, can be fixed with two clamping elements (tighten screws with max. 30 Ncm).

### Lenses

The flat lenses, made of Polymethyl Methacrylate, are obtainable in various colours, as well as transparent or translucent.

The lens has to be fitted in the unactuated position.

### Marking

For further information about engraving, hot stamping and film inserts see part Marking.

### Illumination

The T1 <sup>3</sup>/<sub>4</sub> Midget Groove incandescent (filament) lamp (6 ... 48 V) ensures perfect illumination of the lenses, which are supplied in various colours.

T1 <sup>3</sup>/<sub>4</sub> Midget Groove Single-LED (6, 12, 24, 28, 48 V) are also available in blue, green, red, white or yellow.

Luminosity and wave length scattering caused by the technology used in the LED manufacturing processes may lead to visual differences in our products.

For supply voltages above 48 V, it is necessary to use a voltage reduction element (external series resistor or transformer).

### Position indication

The status of a maintained action switch can be determined by the position of the lens.

### Keylock switch

Standard lock (Index D). Standard lock number is 311. If the lock number is not specified, we will supply standard number 311.

An additional 134 special locks (Index X) are available on request.

Master keys for lock numbers 311 ... 445 may be ordered by quoting Typ-Nr. 31-989.300. Two keys are supplied with each keylock switch. Spare keys (Index D) for standard locks may be ordered by quoting Typ-Nr. 31-989.xxx (please state the lock number).

### Number structure

Nomenclature in accordance with ' IEC 61058 TEST REPORT '. The certification document we dispatch to them on demands.

## Specimen order

### Indicator :

- Indicator actuator, 24 x 36 mm, screw terminal 22-040.004

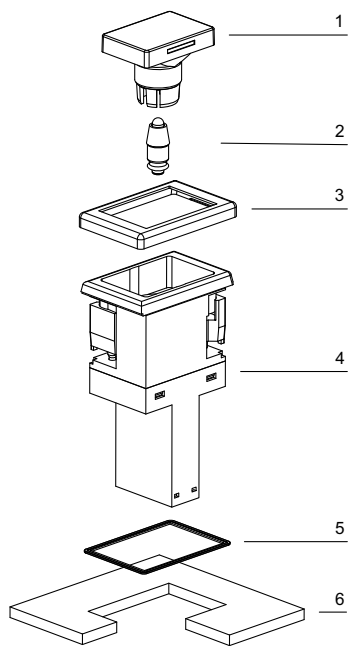
### Essential accessories :

- Lens plastic red, transparent 22-903.2
- Front bezel flush, black 22-965.0
- Single-LED, T1 <sup>3</sup>/<sub>4</sub> MG, 24 VAC/DC, red 10-2J12.1062

*We reserve the right to modify technical data*

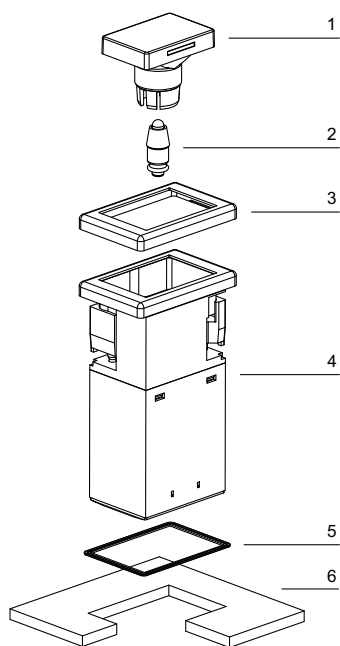
*All dimensions in mm*

## Indicator



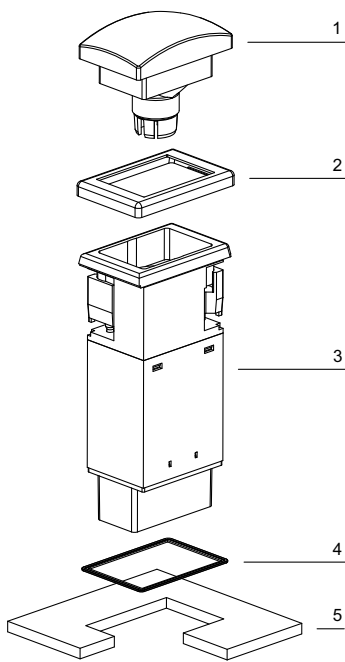
- 1 Lens
- 2 LED
- 3 Front bezel clip-on
- 4 Switch housing
- 5 Sealing
- 6 Front plate

## Illuminated pushbutton



- 1 Lens
- 2 LED
- 3 Front bezel clip-on
- 4 Switch housing
- 5 Sealing
- 6 Front plate

## Mushroom-head pushbutton






- 1 Mushroom-head cap
- 2 LED
- 3 Front bezel clip-on
- 4 Switch housing
- 5 Sealing
- 6 Front plate

## Indicator actuator



### Essential Accessories:

-  Front bezel flush page 10
-  Lens plastic page 10
-  Single-LED page 12

|                           | Front protection | Terminals | □ 24 x 36 mm<br>Typ-Nr. | Mounting dimensions | Technical drawing | Circuit drawing |  |
|---------------------------|------------------|-----------|-------------------------|---------------------|-------------------|-----------------|---|
| <b>Indicator actuator</b> | IP 65            | PT 6.3    | <b>22-040.004</b>       | 1                   | 2                 | 1               | 0.019   |
|                           |                  | ST        | <b>22-040.001</b>       | 1                   | 2                 | 1               | 0.022   |

Terminals: PT 6.3 = Plug-in terminal 6.3 mm, ST = Screw terminal




Mounting dimensions from page 17, Technical drawing from page 17, Circuit drawing from page 19





## Illuminated pushbutton actuator



### Essential Accessories:

-  Front bezel flush page 10
-  Lens plastic page 10
-  Single-LED page 12

|  | Front protection | Switching system | Contacts    | Switching action | Terminals         |  24 x 36 mm<br>Typ-Nr. | Mounting dimensions | Technical drawing | Circuit drawing |  |
|--|------------------|------------------|-------------|------------------|-------------------|---|---------------------|-------------------|-----------------|---|
| <b>Illuminated pushbutton actuator</b> | IP 65            | SA               | 1 NC        | MA               | PT 6.3            | <b>22-222.014</b>   | 1                   | 3                 | 3               | 0.032   |
|  |                  |                  |             |                  | ST                | <b>22-222.011</b>   | 1                   | 3                 | 3               | 0.037   |
|  |                  |                  | M           | PT 6.3           | <b>22-212.014</b> | 1   | 3                   | 8                 | 0.032           |   |
|  |                  |                  |             | ST               | <b>22-212.011</b> | 1   | 3                   | 8                 | 0.037           |   |
|  |                  |                  | 1 NC + 1 NO | MA               | PT 6.3            | <b>22-225.014</b>   | 1                   | 3                 | 5               | 0.034   |
|  |                  |                  |             |                  | ST                | <b>22-225.011</b>   | 1                   | 3                 | 5               | 0.044   |
|  |                  |                  |             | M                | PT 6.3            | <b>22-215.014</b>   | 1                   | 3                 | 10              | 0.034   |
|  |                  |                  |             |                  | ST                | <b>22-215.011</b>   | 1                   | 3                 | 10              | 0.044   |
|  |                  |                  | 1 NO        | MA               | PT 6.3            | <b>22-221.014</b>   | 1                   | 3                 | 4               | 0.032   |
|  |                  |                  |             |                  | ST                | <b>22-221.011</b>   | 1                   | 3                 | 4               | 0.037   |
|  |                  |                  |             | M                | PT 6.3            | <b>22-211.014</b>   | 1                   | 3                 | 9               | 0.032   |
|  |                  |                  |             |                  | ST                | <b>22-211.011</b>   | 1                   | 3                 | 9               | 0.037   |
|  |                  |                  | 2 NC        | MA               | PT 6.3            | <b>22-224.014</b>   | 1                   | 3                 | 2               | 0.034   |
|  |                  |                  |             |                  | ST                | <b>22-224.011</b>   | 1                   | 3                 | 2               | 0.044   |
|  |                  |                  |             | M                | PT 6.3            | <b>22-214.014</b>   | 1                   | 3                 | 7               | 0.034   |
|  |                  |                  |             |                  | ST                | <b>22-214.011</b>   | 1                   | 3                 | 7               | 0.044   |
|  |                  |                  | 2 NO        | MA               | PT 6.3            | <b>22-223.014</b>   | 1                   | 3                 | 6               | 0.044   |
|  |                  |                  |             |                  | ST                | <b>22-223.011</b>   | 1                   | 3                 | 6               | 0.044   |
|  |                  |                  |             | M                | PT 6.3            | <b>22-213.014</b>   | 1                   | 3                 | 11              | 0.034   |
|  |                  |                  |             |                  | ST                | <b>22-213.011</b>   | 1                   | 3                 | 11              | 0.044   |

Switching system: SA = Snap-action switching element

Contacts: NC = Normally closed, NO = Normally open

Switching action: MA = Maintained action, M = Momentary action



Terminals: PT 6.3 = Plug-in terminal 6.3 mm, ST = Screw terminal


Mounting dimensions from page 17, Technical drawing from page 17, Circuit drawing from page 19

## Mushroom-head pushbutton actuator



### Essential Accessories:

-  Front bezel flush page 10
-  Mushroom-head cap page 10

|  | Switching system | Contacts    | Switching action | Terminals | □ 24 x 36 mm<br>Typ-Nr. | Mounting dimensions |                 |    |  |
|--|------------------|-------------|------------------|-----------|-------------------------|---------------------|-----------------|----|---|
|  |                  |             |                  |           |                         | Technical drawing   | Circuit drawing |    |   |
| <b>Mushroom-head pushbutton actuator</b> | SA               | 1 NC        | MA               | PT 6.3    | <b>22-222.014</b>       | 1                   | 4               | 3  | 0.032   |
|  |                  |             |                  | ST        | <b>22-222.011</b>       | 1                   | 4               | 3  | 0.037   |
|  |                  |             | M                | PT 6.3    | <b>22-212.014</b>       | 1                   | 4               | 8  | 0.032   |
|  |                  |             |                  | ST        | <b>22-212.011</b>       | 1                   | 4               | 8  | 0.037   |
|  |                  | 1 NC + 1 NO | MA               | PT 6.3    | <b>22-225.014</b>       | 1                   | 4               | 5  | 0.034   |
|  |                  |             |                  | ST        | <b>22-225.011</b>       | 1                   | 4               | 5  | 0.044   |
|  |                  |             | M                | PT 6.3    | <b>22-215.014</b>       | 1                   | 4               | 10 | 0.034   |
|  |                  |             |                  | ST        | <b>22-215.011</b>       | 1                   | 4               | 10 | 0.044   |
|  |                  | 1 NO        | MA               | PT 6.3    | <b>22-221.014</b>       | 1                   | 4               | 4  | 0.032   |
|  |                  |             |                  | ST        | <b>22-221.011</b>       | 1                   | 4               | 4  | 0.037   |
|  |                  |             | M                | PT 6.3    | <b>22-211.014</b>       | 1                   | 4               | 9  | 0.032   |
|  |                  |             |                  | ST        | <b>22-211.011</b>       | 1                   | 4               | 9  | 0.037   |
|  |                  | 2 NC        | MA               | PT 6.3    | <b>22-224.014</b>       | 1                   | 4               | 2  | 0.034   |
|  |                  |             |                  | ST        | <b>22-224.011</b>       | 1                   | 4               | 2  | 0.044   |
|  |                  |             | M                | PT 6.3    | <b>22-214.014</b>       | 1                   | 4               | 7  | 0.034   |
|  |                  |             |                  | ST        | <b>22-214.011</b>       | 1                   | 4               | 7  | 0.044   |
|  |                  | 2 NO        | MA               | PT 6.3    | <b>22-223.014</b>       | 1                   | 4               | 6  | 0.044   |
|  |                  |             |                  | ST        | <b>22-223.011</b>       | 1                   | 4               | 6  | 0.044   |
|  |                  |             | M                | PT 6.3    | <b>22-213.014</b>       | 1                   | 4               | 11 | 0.034   |
|  |                  |             |                  | ST        | <b>22-213.011</b>       | 1                   | 4               | 11 | 0.044   |

Switching system: SA = Snap-action switching element

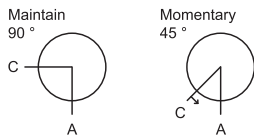
Contacts: NC = Normally closed, NO = Normally open

Switching action: MA = Maintained action, M = Momentary action

Terminals: PT 6.3 = Plug-in terminal 6.3 mm, ST = Screw terminal

Mounting dimensions from page 17, Technical drawing from page 17, Circuit drawing from page 19

## Keylock switch 2 positions



|  | Front protection | Switching system | Contacts    | Switching action   | Terminals | Key remove | □ 24 x 36 mm<br>Typ-Nr. | Mounting dimensions | Technical drawing | Circuit drawing |       |
|--|------------------|------------------|-------------|--------------------|-----------|------------|-------------------------|---------------------|-------------------|-----------------|-------|
| <b>Keylock switch 2 positions</b><br>Position A : Basic position<br>Position C : Maintained action<br>Standard lock 311<br>Front : Plastic black | IP 65            | SA               | 1 NC + 1 NO | MA                 | PT 6.3    | A          | <b>22-335.114D</b>      | 1                   | 5                 | 16              | 0.046 |
|  |                  |                  |             |                    |           | C          | <b>22-335.314D</b>      | 1                   | 5                 | 16              | 0.046 |
|  |                  |                  |             |                    |           | C + A      | <b>22-335.514D</b>      | 1                   | 5                 | 16              | 0.046 |
|  |                  |                  |             |                    | ST        | A          | <b>22-335.111D</b>      | 1                   | 5                 | 16              | 0.051 |
|  |                  |                  |             |                    |           | C          | <b>22-335.311D</b>      | 1                   | 5                 | 16              | 0.051 |
|  |                  |                  |             |                    |           | C + A      | <b>22-335.511D</b>      | 1                   | 5                 | 16              | 0.051 |
|  |                  |                  | 1 NO        | MA                 | PT 6.3    | A          | <b>22-331.114D</b>      | 1                   | 5                 | 15              | 0.046 |
|  |                  |                  |             |                    |           | C          | <b>22-331.314D</b>      | 1                   | 5                 | 15              | 0.044 |
|  |                  |                  |             |                    |           | C + A      | <b>22-331.514D</b>      | 1                   | 5                 | 15              | 0.040 |
|  |                  |                  |             |                    | ST        | A          | <b>22-331.111D</b>      | 1                   | 5                 | 15              | 0.051 |
|  |                  |                  |             |                    |           | C          | <b>22-331.311D</b>      | 1                   | 5                 | 15              | 0.044 |
|  |                  |                  |             |                    |           | C + A      | <b>22-331.511D</b>      | 1                   | 5                 | 15              | 0.044 |
| 2 NO   | MA               | PT 6.3           | A           | <b>22-333.114D</b> | 1         | 5          | 17                      | 0.046               |                   |                 |       |
|  |                  |                  | C           | <b>22-333.314D</b> | 1         | 5          | 17                      | 0.046               |                   |                 |       |
|  |                  |                  | C + A       | <b>22-333.514D</b> | 1         | 5          | 17                      | 0.046               |                   |                 |       |
|  |                  | ST               | A           | <b>22-333.111D</b> | 1         | 5          | 17                      | 0.051               |                   |                 |       |
|  |                  |                  | C           | <b>22-333.311D</b> | 1         | 5          | 17                      | 0.051               |                   |                 |       |
|  |                  |                  | C + A       | <b>22-333.511D</b> | 1         | 5          | 17                      | 0.051               |                   |                 |       |
| Position A : Basic position<br>Position C : Momentary action<br>Standard lock 311<br>Front : Plastic black                                       | IP 65            | SA               | 1 NC + 1 NO | M                  | PT 6.3    | A          | <b>22-355.114D</b>      | 1                   | 5                 | 13              | 0.046 |
|  |                  |                  |             |                    | ST        | A          | <b>22-355.111D</b>      | 1                   | 5                 | 13              | 0.051 |
|  |                  |                  | 1 NO        | M                  | PT 6.3    | A          | <b>22-351.114D</b>      | 1                   | 5                 | 12              | 0.046 |
|  |                  |                  |             |                    | ST        | A          | <b>22-351.111D</b>      | 1                   | 5                 | 12              | 0.051 |
|  |                  |                  | 2 NO        | M                  | PT 6.3    | A          | <b>22-353.114D</b>      | 1                   | 5                 | 14              | 0.046 |
|  |                  |                  |             |                    | ST        | A          | <b>22-353.111D</b>      | 1                   | 5                 | 14              | 0.051 |

Other lock numbers on request

Switching system: SA = Snap-action switching element

Contacts: NC = Normally closed, NO = Normally open


Switching action: MA = Maintained action, M = Momentary action

Terminals: PT 6.3 = Plug-in terminal 6.3 mm, ST = Screw terminal

Mounting dimensions from page 17, Technical drawing from page 17, Circuit drawing from page 19

## Front


### Lens plastic

|   | Lens                   | ∅ 24 x 36 mm<br>Typ-Nr. |  kg |
|---|------------------------|-------------------------|--|
| <b>Lens plastic illuminative</b>  | blue transparent       | <b>22-903.6</b>         | 0.003  |
|   | colourless transparent | <b>22-903.7</b>         | 0.003  |
|   | green transparent      | <b>22-903.5</b>         | 0.003  |
|   | orange transparent     | <b>22-903.3</b>         | 0.003  |
|   | red transparent        | <b>22-903.2</b>         | 0.003  |
|   | smoked transparent     | <b>22-903.1</b>         | 0.003  |
|   | yellow transparent     | <b>22-903.4</b>         | 0.003  |
| illuminative<br>(not recommended for film insert)                           | colourless transparent | <b>22-905.7</b>         | 0.003  |
|   | green transparent      | <b>22-905.5</b>         | 0.003  |
|   | red transparent        | <b>22-905.2</b>         | 0.003  |
|   | yellow transparent     | <b>22-905.4</b>         | 0.003  |
| illuminative<br>(not recommended for film insert, bright LED's are visible) | blue translucent       | <b>22-901.6</b>         | 0.003  |
|   | green translucent      | <b>22-901.5</b>         | 0.003  |
|   | orange translucent     | <b>22-901.3</b>         | 0.003  |
|   | red translucent        | <b>22-901.2</b>         | 0.003  |
|   | white translucent      | <b>22-901.9</b>         | 0.003  |
|   | yellow translucent     | <b>22-901.4</b>         | 0.003  |
| non-illuminative  | black opaque           | <b>22-901.0</b>         | 0.003  |
|   | grey opaque            | <b>22-901.8</b>         | 0.003  |




### Mushroom-head cap

use Front bezel flush

|   | Mushroom had cap      | ∅ 24 x 36 mm<br>Typ-Nr. |  kg |
|---|-----------------------|-------------------------|--|
| <b>Mushroom-head cap non-illuminative</b> | Plastic black opaque  | <b>22-930.0</b>         | 0.006  |
|   | Plastic green opaque  | <b>22-930.5</b>         | 0.006  |
|   | Plastic red opaque    | <b>22-930.2</b>         | 0.006  |
|   | Plastic yellow opaque | <b>22-930.4</b>         | 0.006  |




### Front bezel flush

|                          | Front bezel   | ∅ 24 x 36 mm<br>Typ-Nr. |  kg |
|--------------------------|---------------|-------------------------|--|
| <b>Front bezel flush</b> | Plastic black | <b>02-965.0</b>         | 0.001  |



### Front bezel raised

Lens only removable with lens remover 98-969

|                           | Front bezel   | ∅ 24 x 36 mm<br>Typ-Nr. |  kg |
|---------------------------|---------------|-------------------------|--|
| <b>Front bezel raised</b> | Plastic black | <b>02-967.0</b>         | 0.001  |





## Protective cover

use Front bezel flush



|  |  |                         |                   |   |   |
|--|--|-------------------------|-------------------|---|---|
|  |  | □ 24 x 36 mm<br>Typ-Nr. | Technical drawing |  |  |
| <b>Protective cover</b><br>hinged, transparent, with means for sealing |  | <b>22-925</b>           | 1                 | 0.004   |   |

Technical drawing from page 17



## Blind plug

|  |                             |                         |   |   |
|--|-----------------------------|-------------------------|---|---|
|  |                             | □ 24 x 36 mm<br>Typ-Nr. |  |  |
| <b>Blind plug</b><br>Mounting hole size 16 mm dia. | Blind plug<br>Plastic black | <b>22-949.0</b>         |   | 0.005   |

## Master key

|   |  |                   |  |  |
|---|--|-------------------|--|--|
|   |  | Typ-Nr.           |  |  |
| <b>Master key</b><br>Lock numbers 311 ... 445 (DOM) |  | <b>31-989.300</b> |  | 0.006  |


## Spare key

|  |  |                   |   |   |
|--|--|-------------------|---|---|
|  |  | Typ-Nr.           |  |  |
| <b>Spare key</b><br>Key lock switch, standard lock 311 (DOM) |  | <b>31-989.311</b> |   | 0.006   |

Other lock numbers on request


## Illumination

## Filament lamp

|               | Socket    | Operating voltage/-current | Typ-Nr.             |  |
|---------------|-----------|----------------------------|---------------------|---|
| Filament lamp | T1 3/4 MG | 12 VAC/DC, 75 mA           | <b>10-1309.1309</b> | 0.001   |
|               |           | 14 VAC/DC, 80 mA           | <b>10-1310.1319</b> | 0.001   |
|               |           | 18 VAC/DC, 40 mA           | <b>10-1311.1249</b> | 0.001   |
|               |           | 24 VAC/DC, 35 mA           | <b>10-1312.1229</b> | 0.001   |
|               |           | 28 VAC/DC, 30 mA           | <b>10-1313.1209</b> | 0.001   |
|               |           | 28 VAC/DC, 40 mA           | <b>10-1313.1249</b> | 0.001   |
|               |           | 36 VAC/DC, 20 mA           | <b>10-1316.1179</b> | 0.001   |
|               |           | 36 VAC/DC, 30 mA           | <b>10-1316.1209</b> | 0.001   |
|               |           | 48 VAC/DC, 20 mA           | <b>10-1319.1179</b> | 0.001   |
|               |           | 48 VAC/DC, 25 mA           | <b>10-1319.1199</b> | 0.001   |
|               |           | 6 VAC/DC, 120 mA           | <b>10-1306.1349</b> | 0.001   |
|               |           | 6.3 VAC/DC, 200 mA         | <b>10-1307.1369</b> | 0.001   |



## Single-LED

|            | Socket    | Light colour  | Operating voltage/-current | Typ-Nr.             |  |
|------------|-----------|---------------|----------------------------|---------------------|---|
| Single-LED | T1 3/4 MG | blue          | 12 VAC/DC, 7/14 mA         | <b>10-2J09.1066</b> | 0.002   |
|            |           |               | 24 VAC/DC, 7/14 mA         | <b>10-2J12.1066</b> | 0.002   |
|            |           |               | 28 VAC/DC, 7/14 mA         | <b>10-2J13.1066</b> | 0.002   |
|            |           |               | 48 VAC/DC, 4/8 mA          | <b>10-2J19.1046</b> | 0.002   |
|            |           |               | 6 VDC, 15 mA               | <b>10-2J06.3146</b> | 0.002   |
|            |           | green         | 12 VAC/DC, 4/7 mA          | <b>10-2J09.1065</b> | 0.002   |
|            |           |               | 24 VAC/DC, 4/7 mA          | <b>10-2J12.1065</b> | 0.002   |
|            |           |               | 28 VAC/DC, 4/7 mA          | <b>10-2J13.1065</b> | 0.002   |
|            |           |               | 48 VAC/DC, 2/4 mA          | <b>10-2J19.1045</b> | 0.002   |
|            |           |               | 6 VDC, 7 mA                | <b>10-2J06.3145</b> | 0.002   |
|            |           | red           | 12 VAC/DC, 7/14 mA         | <b>10-2J09.1062</b> | 0.002   |
|            |           |               | 24 VAC/DC, 7/14 mA         | <b>10-2J12.1062</b> | 0.002   |
|            |           |               | 28 VAC/DC, 7/14 mA         | <b>10-2J13.1062</b> | 0.002   |
|            |           |               | 48 VAC/DC, 4/8 mA          | <b>10-2J19.1042</b> | 0.002   |
|            |           |               | 6 VDC, 15 mA               | <b>10-2J06.3142</b> | 0.002   |
|            |           | white diffuse | 12 VAC/DC, 7/14 mA         | <b>10-2J09.1069</b> | 0.002   |
|            |           |               | 24 VAC/DC, 7/14 mA         | <b>10-2J12.1069</b> | 0.002   |
|            |           |               | 28 VAC/DC, 7/14 mA         | <b>10-2J13.1069</b> | 0.002   |
|            |           |               | 48 VAC/DC, 4/8 mA          | <b>10-2J19.1049</b> | 0.002   |
|            |           |               | 6 VDC, 15 mA               | <b>10-2J06.3149</b> | 0.002   |
|            |           | yellow        | 12 VAC/DC, 7/14 mA         | <b>10-2J09.1064</b> | 0.002   |
|            |           |               | 24 VAC/DC, 7/14 mA         | <b>10-2J12.1064</b> | 0.002   |
|            |           |               | 28 VAC/DC, 7/14 mA         | <b>10-2J13.1064</b> | 0.002   |
|            |           |               | 48 VAC/DC, 4/8 mA          | <b>10-2J19.1044</b> | 0.002   |
|            |           |               | 6 VDC, 15 mA               | <b>10-2J06.3144</b> | 0.002   |




Note:

AC operation through halve-wave rectifier possible, slight flickering can occur.

## Series resistor

for lamp voltage reduction


|  | Operating voltage | Typ-Nr.         |  |
|--|-------------------|-----------------|---|
| <b>Series resistor</b><br>10 kΩ, for filament lamp 48 VAC, 25 mA | 230/240 V         | <b>02-904.7</b> | 0.003   |
| 2.7 kΩ, for filament lamp 48 VAC, 25 mA                          | 110 V             | <b>02-904.0</b> | 0.003   |
| 3.3 kΩ, for filament lamp 48 VAC, 25 mA                          | 125 V             | <b>02-904.1</b> | 0.003   |
| 4.7 kΩ, for filament lamp 48 VAC, 25 mA                          | 145 V             | <b>02-904.3</b> | 0.003   |



Please keep to the country specific security rules.

## Terminal plate empty

for fitting with series resistors

|   | Typ-Nr.         |  |
|---|-----------------|---|
| <b>Terminal plate empty</b><br>10 spaces 125 x 60 x 15 mm | <b>02-912.2</b> | 0.045   |
| 15 spaces 187.5 x 60 x 15 mm                              | <b>02-912.3</b> | 0.090   |
| 20 spaces 250 x 60 x 15 mm                                | <b>02-912.4</b> | 0.095   |
| 5 spaces 62.5 x 60 x 15 mm                                | <b>02-912.1</b> | 0.025   |




## Assembling

### Lens remover

|  | Typ-Nr.       |  |
|--|---------------|---|
| <b>Lens remover</b><br>for flush front bezel | <b>02-905</b> | 0.011   |
| for raised front bezel                       | <b>98-968</b> | 0.004   |



### Lamp remover

|                     | Typ-Nr.          |  |
|---------------------|------------------|---|
| <b>Lamp remover</b> | <b>61-9740.0</b> | 0.003   |




CAUTION

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

### Dismantling tool

for dismantling the lens from the holder

|                         | Typ-Nr.       |  |
|-------------------------|---------------|---|
| <b>Dismantling tool</b> | <b>22-938</b> | 0.030   |



## Actuator with snap-action switching element

### Switching system

Self-cleaning, double-break, snap-action switching system (with contact gap 2 x 1.5 mm).  
Max. 2 normally closed or 2 normally open contacts, or one of each.

### Material

#### Lens

Polymethylmethacrylate PMMA, as per UL 94 HB, Polycarbonate (PC), as per UL 94 V0

#### Front bezel

Polyphenylenoxide (PPO)

#### Material of contact

Hard silver

#### Actuator housing

Polyamide (PA), Polytherimide (PEI)

### Mechanical characteristics

#### Terminals

Screw terminal (with self-lifting clip):  
Max. wire cross-section 2 x 2.5 mm<sup>2</sup>  
Max. wire cross-section of stranded cable 2 x 1.5 mm<sup>2</sup>

Plug-in terminal 6.3 x 0.8 mm

#### Actuating force

with 1 switching element 3.6 N ±0.3 N  
with 2 switching elements 6.8 N ±0.3 N

#### Actuating travel

5.5 mm ±0.2 mm

#### Travel

3 mm

#### Rebound time

≤3 ms

#### Mechanical lifetime

Illuminated pushbutton 1 million operations  
Keylock switch 40 000 operations

### Electrical characteristics

#### Contact resistance

Starting value ≤50 mΩ, as per IEC 60512-2-4

#### Isolation resistance

≥100M Ω between all contacts at 100 VDC, as per IEC 60512-2-10

#### Switch rating

Power rating  
min. 12 VAC, 50 mA  
max. 400 VAC, 10 A

Switch rating AC (cosφ 0,7), service category AC-11

|            |          |         |         |
|------------|----------|---------|---------|
| Voltage    | 125 VAC  | 250 VAC | 380 VAC |
| Current    | 8 A      | 5 A     | 3 A     |
| Operations | ≥100 000 |         |         |

Switch rating DC (inductive) L:R = 30 ms, service categorie DC-11

|            |          |       |       |       |
|------------|----------|-------|-------|-------|
| Voltage    | 24 V     | 60 V  | 110 V | 220 V |
| Current    | 6 A      | 1.5 A | 0.4 A | 0.2 A |
| Operations | ≥100 000 |       |       |       |

#### 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 ... +95 °C

#### Service temperature

-25 °C ... +85 °C

#### Protection degree

Terminal/case IP 20  
Front IP 65 as per IEC 60529

#### Shock resistance

50 g for 11 ms, as per IEC 60512-4-3

#### Vibration resistance

(sinusoidal)  
10 g at 10 Hz ... 2000 Hz, amplitude 0.75 mm, as per IEC 60512-4-4

### Approvals

#### Approbations

CB (IEC 61058)  
CSA  
ENEC (EN 61058)  
UL  
VDE

#### Declaration of conformity

CE



## 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 ( $V_R$ ) of the free-wheeling diode can be found in the datasheet of a diode. The forward current should be equal or greater than the maximum current flowing through the load.

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

Switching with inductive load  
Fig. 1



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



## General notes

### 1. Engraving

In addition to the most commonly used world languages, in DIN 1451-3 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 be 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 advisable to use transparent lenses.

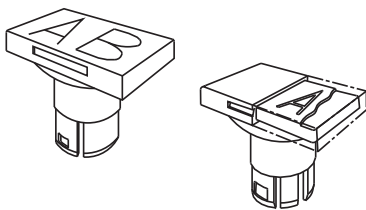
In the case of use of a smoke-black lens the fitted film becomes readable only if the lamp is on.

The film thickness is 0.2 mm.

**Important :** Consider pushbutton mounting orientation before specifying engraving characters !

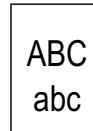
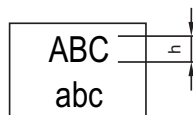
All dimensions in mm

| Film insert max. size | Height of letters h | Number of lines | Number of (target value) capital letters per line | Number of (target value) small letters per line | 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 |
|                       | 5                   | 2               | 5 - 6   | 6 - 7   | B1    |
|                       |                     |                 | 3   | 3 - 4   | 4     |
|                       | 6                   | 1               | 5   | 6   | B1    |
|                       |                     |                 | 2   | 3   | 4     |
|                       | 8                   | 1               | 3   | 4   | B1    |
|                       |                     |                 | 2   | 2   | B2    |



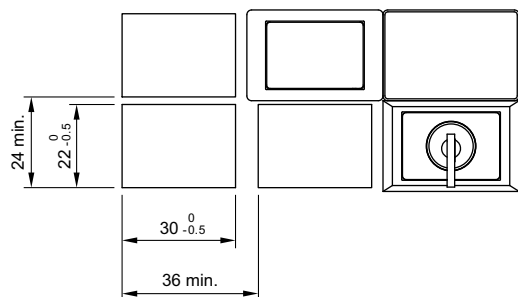
B1

B2



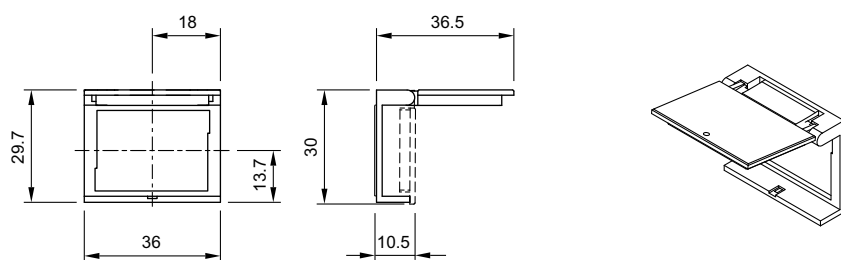
## Mounting dimensions

1 Indicator actuator page 6 | Illuminated pushbutton actuator page 7 | Mushroom-head pushbutton actuator page 8 | Keylock switch 2 positions page 9

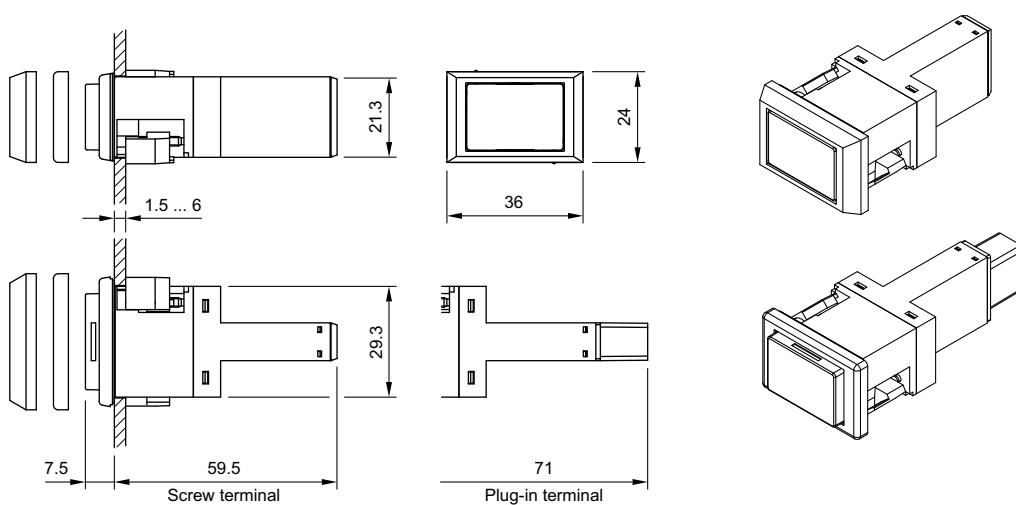


## Technical drawing

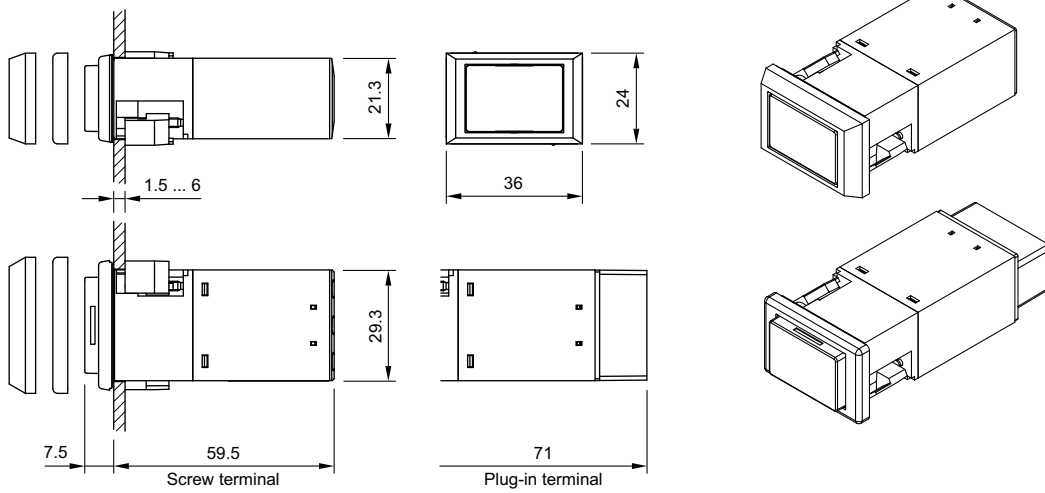
1 Protective cover page 11



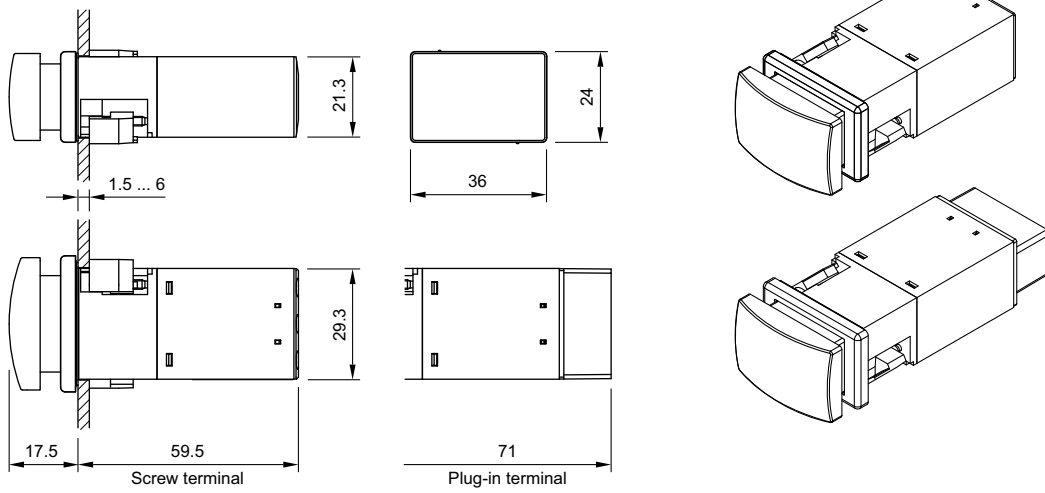
2 Indicator actuator page 6



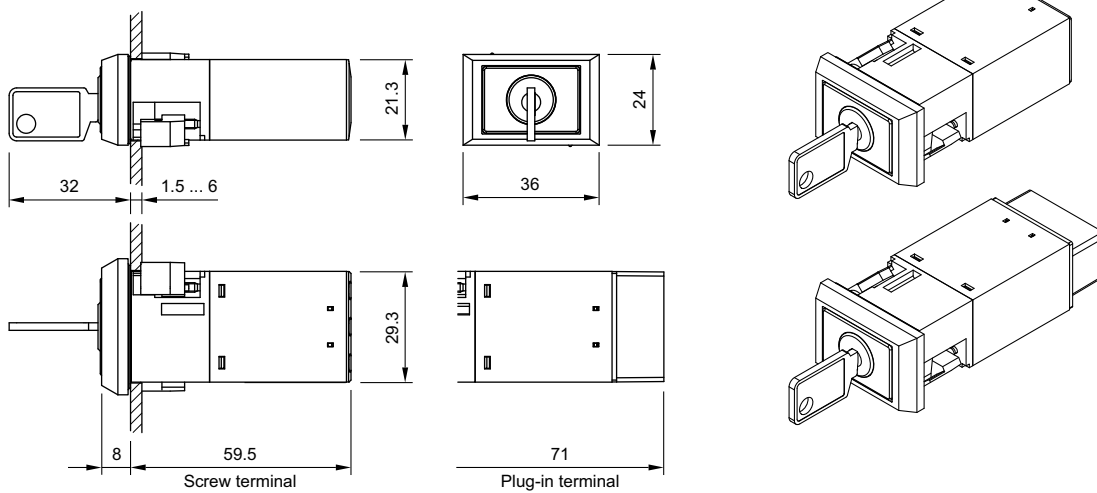
### 3 Illuminated pushbutton actuator page 7



### 4 Mushroom-head pushbutton actuator page 8



### 5 Keylock switch 2 positions page 9

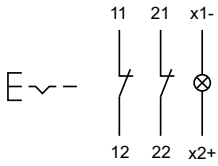


## Circuit drawing

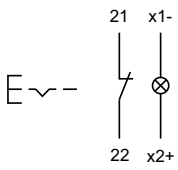
1 Indicator actuator page 6



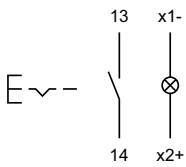
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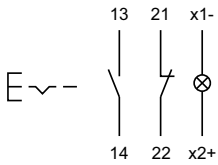
3 Illuminated pushbutton actuator page 7 | Mushroom-head pushbutton actuator page 8



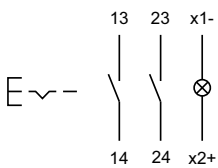
4 Illuminated pushbutton actuator page 7 | Mushroom-head pushbutton actuator page 8



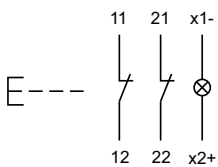
5 Illuminated pushbutton actuator page 7 | Mushroom-head pushbutton actuator page 8



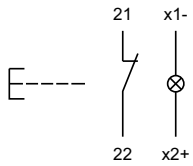
6 Illuminated pushbutton actuator page 7 | Mushroom-head pushbutton actuator page 8



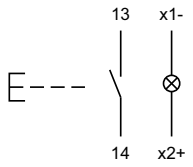
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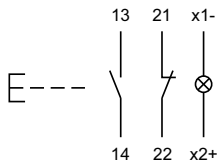
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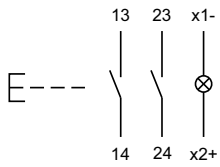
**9 Illuminated pushbutton actuator page 7 | Mushroom-head pushbutton actuator page 8**



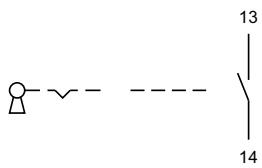
**10 Illuminated pushbutton actuator page 7 | Mushroom-head pushbutton actuator page 8**



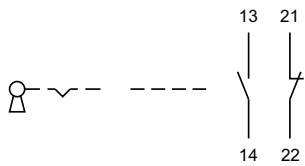
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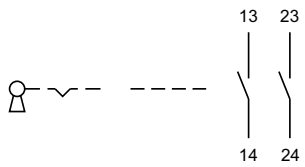
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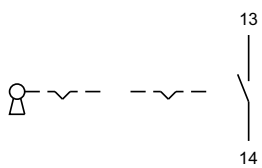
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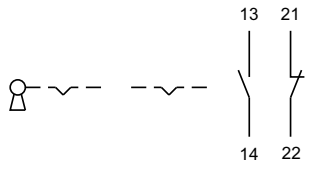
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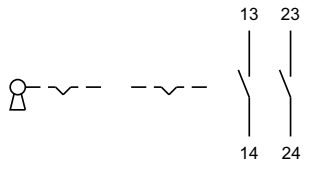
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|                |   |
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| Fax            | +1 203 877 3694                               |
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|                | <b>Other Countries</b>                        |
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| Fax            | +41 62 296 21 62                              |
| E-mail         | info@eao.com                                  |



Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



#### Как с нами связаться

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