

## Index

### Series 22

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# Description

## 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 front bezel of keylock switches and mushroom pushbuttons is fixed (type 02-965.0).

## 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. 25 Ncm).

## Lenses

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

## Marking

For engravings, hot stamping and film inserts, see under "Marking" on page 253.

## Illumination

Perfect illumination of the different coloured lenses is assured by mid-grooved incandescent lamps T 1 3/4 (6-60 V).

For supply voltages above 60V, it is necessary to use a voltage reduction element (external series resistor, capacitor or transformer).

Multi-LED mid-grooved lamps T 1 3/4 (6, 12, 24, 48 V) are available in the colours white, red, yellow and green.

## Position Indication

When a switch with maintained action is actuated, the lens remains in the depressed position mechanically. The state of the switch is apparent at all times from the position of the lens.

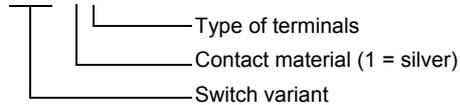
## Keylock switches

Standard lock (Index D).

1 Standard number 311. If the lock number is not specified, we will supply No. 311. An additional 134 special locks (Index X) are available on request. By ordering special locks for lockable compartment systems please note on your order suitable for lockable compartment systems. Master keys for locks No. 311-445 may be ordered by quoting No. 31-989.300. Two keys are supplied with each keylock switch. Spare keys for DOM standard locks may be ordered by quoting No. 31-989 (please state the lock number).

## Number structure

22-XXX.0XX



22-9XX.X

Lens

02-9XX.X

Front bezel

Example:

-Illuminated pushbutton with screw terminals, momentary action; 1 normally open contact  
22-211.011

-Lens, red, translucent  
22-901.2

-Front bezel, black  
02-967.0

## Specimen order

### Indicator

- indicator, plug-in terminal 22-040.004

### Recommended accessories

- lens, plastic red 22-903.2

- front bezel flat, grey 02-965.8

- LED, 1 chip, 24 VDC 10-2312.3139

All dimensions in mm.

We reserve the right to modify technical data.

## illuminated-/pushbutton



- 1 lens
- 2 front bezel
- 3 switch housing

## indicator



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- 🛒 front bezel flat page 243
- 🛒 front bezel raised on all sides page 243
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- 🛒 LED page 245

	connection method	24 x 36 mm Typ-Nr.	circuit drawing	technical drawing	mounting dimensions	
<b>indicator</b>	PT	<b>22-040.004</b>	1	1	1	0,019
	ST	<b>22-040.001</b>	1	1	1	0,022

connection method : screw terminal = ST, plug-in terminal = PT

circuit drawings from page 249, technical drawings from page 248, mounting dimensions from page 249

## illuminated-/pushbutton



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illuminated-/pushbutton	switching system	contacts	switching action	connection method	□ 24 x 36 mm Typ-Nr.	circuit drawing			technical drawing mounting dimensions	☞
illuminated-/pushbutton	SA	1 NO	M	PT	<b>22-211.014</b>	2	2	1	0,032	
				ST	<b>22-211.011</b>	2	2	1	0,037	
			MA	PT	<b>22-221.014</b>	7	2	1	0,032	
				ST	<b>22-221.011</b>	7	2	1	0,037	
		1 NC	M	PT	<b>22-212.014</b>	3	2	1	0,032	
				ST	<b>22-212.011</b>	3	2	1	0,037	
			MA	PT	<b>22-222.014</b>	8	2	1	0,037	
				ST	<b>22-222.011</b>	8	2	1	0,037	
		1 NC + 1 NO	M	PT	<b>22-215.014</b>	6	2	1	0,034	
				ST	<b>22-215.011</b>	6	2	1	0,044	
			MA	PT	<b>22-225.014</b>	11	2	1	0,034	
				ST	<b>22-225.011</b>	11	2	1	0,044	
		2 NO	M	PT	<b>22-213.014</b>	4	2	1	0,034	
				ST	<b>22-213.011</b>	4	2	1	0,044	
			MA	PT	<b>22-223.014</b>	9	2	1	0,044	
				ST	<b>22-223.011</b>	9	2	1	0,044	
		2 NC	M	PT	<b>22-214.014</b>	5	2	1	0,034	
				ST	<b>22-214.011</b>	5	2	1	0,044	
MA	PT		<b>22-224.014</b>	10	2	1	0,034			
	ST		<b>22-224.011</b>	10	2	1	0,044			

switching system : snap-action switching element = SA

contacts : 1 normally open = 1 NO, 1 normally closed = 1 NC, normally open = NO, normally closed = NC

switching action : momentary action = M, maintained action = MA

connection method : screw terminal = ST, plug-in terminal = PT

circuit drawings from page 249, technical drawings from page 248, mounting dimensions from page 249

## pushbutton with mushroom-head cap



🛒 mushroom-head cap page 243

🛒 front bezel flat page 243

	switching system	contacts	switching action	connection method	24 x 36 mm Typ-Nr.	circuit drawing	technical drawing	mounting dimensions	
<b>pushbutton with mushroom-head cap</b>	SA	1 NO	M	PT	<b>22-211.014</b>	2	3	1	0,032
				ST	<b>22-211.011</b>	2	3	1	0,037
			MA	PT	<b>22-221.014</b>	7	3	1	0,032
				ST	<b>22-221.011</b>	7	3	1	0,037
		1 NC	M	PT	<b>22-212.014</b>	3	3	1	0,032
				ST	<b>22-212.011</b>	3	3	1	0,037
			MA	PT	<b>22-222.014</b>	8	3	1	0,032
				ST	<b>22-222.011</b>	8	3	1	0,037
		1 NC + 1 NO	M	PT	<b>22-215.014</b>	6	3	1	0,034
				ST	<b>22-215.011</b>	6	3	1	0,044
			MA	PT	<b>22-225.014</b>	11	3	1	0,034
				ST	<b>22-225.011</b>	11	3	1	0,044
		2 NO	M	PT	<b>22-213.014</b>	4	3	1	0,034
				ST	<b>22-213.011</b>	4	3	1	0,044
			MA	PT	<b>22-223.014</b>	9	3	1	0,044
				ST	<b>22-223.011</b>	9	3	1	0,044
		2 NC	M	PT	<b>22-214.014</b>	5	3	1	0,034
				ST	<b>22-214.011</b>	5	3	1	0,044
			MA	PT	<b>22-224.014</b>	10	3	1	0,034
				ST	<b>22-224.011</b>	10	3	1	0,044

switching system : snap-action switching element = SA

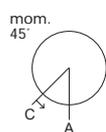
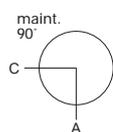
contacts : 1 normally open = 1 NO, 1 normally closed = 1 NC, normally open = NO, normally closed = NC

switching action : momentary action = M, maintained action = MA

connection method : screw terminal = ST, plug-in terminal = PT

circuit drawings from page 249, technical drawings from page 248, mounting dimensions from page 249

## keylock switch 2 positions



keylock switch 2 positions	switching system	contacts	switching action	connection method	key removable in	□ 24 x 36 mm Typ-Nr.	circuit drawing	technical drawing	mounting dimensions	DIN
keylock switch 2 positions	SA	1 NO	M	PT	A	<b>22-351.114D</b>	15	4	1	0,046
				ST	A	<b>22-351.111D</b>	15	4	1	0,051
			MA	PT	A	<b>22-331.114D</b>	12	4	1	0,046
					A+C	<b>22-331.514D</b>	12	4	1	0,040
					C	<b>22-331.314D</b>	12	4	1	0,044
				ST	A	<b>22-331.111D</b>	12	4	1	0,051
			A+C	<b>22-331.511D</b>	12	4	1	0,044		
			C	<b>22-331.311D</b>	12	4	1	0,044		
		1 NC + 1 NO	M	PT	A	<b>22-355.114D</b>	17	4	1	0,046
				ST	A	<b>22-355.111D</b>	17	4	1	0,051
			MA	PT	A	<b>22-335.114D</b>	14	4	1	0,046
					A+C	<b>22-335.514D</b>	14	4	1	0,046
				C	<b>22-335.314D</b>	14	4	1	0,046	
	ST			A	<b>22-335.111D</b>	14	4	1	0,051	
		A+C	<b>22-335.511D</b>	14	4	1	0,051			
		C	<b>22-335.311D</b>	14	4	1	0,051			
	2 NO	M	PT	A	<b>22-353.114D</b>	16	4	1	0,046	
				A	<b>22-353.111D</b>	16	4	1	0,051	
			MA	PT	A	<b>22-333.114D</b>	13	4	1	0,046
					A+C	<b>22-333.514D</b>	13	4	1	0,046
ST			C	<b>22-333.314D</b>	13	4	1	0,046		
		A	<b>22-333.111D</b>	13	4	1	0,051			
		A+C	<b>22-333.511D</b>	13	4	1	0,051			
		C	<b>22-333.311D</b>	13	4	1	0,051			

switching system : snap-action switching element = SA

contacts : 1 normally open = 1 NO, normally open = NO, normally closed = NC

switching action : maintained action = MA, momentary action = M

connection method : screw terminal = ST, plug-in terminal = PT

circuit drawings from page 249, technical drawings from page 248, mounting dimensions from page 249



**at front**

**lens**

	shape	lens/support	colour	☐ 24 x 36 mm Typ-Nr.	Ⓜ 0,003
<b>lens</b> of plastic	flat	transparent/translucent	blue	<b>22-903.6</b>	0,003
			yellow	<b>22-903.4</b>	0,003
			green	<b>22-903.5</b>	0,003
			clear	<b>22-903.7</b>	0,003
			orange	<b>22-903.3</b>	0,003
			smoked	<b>22-903.1</b>	0,003
			red	<b>22-903.2</b>	0,003
of plastic (not for film insert and illumination)	flat	opaque/translucent	grey	<b>22-901.8</b>	0,003
			black	<b>22-901.0</b>	0,003
of plastic (not for film insert and LED)	flat	translucent/translucent	blue	<b>22-901.6</b>	0,003
			yellow	<b>22-901.4</b>	0,003
			green	<b>22-901.5</b>	0,003
			orange	<b>22-901.3</b>	0,003
			red	<b>22-901.2</b>	0,003
			white	<b>22-901.9</b>	0,003
of plastic (not recommended for film insert)	flat	transparent/transparent	yellow	<b>22-905.4</b>	0,003
			green	<b>22-905.5</b>	0,003
			clear	<b>22-905.7</b>	0,003
			red	<b>22-905.2</b>	0,003



**mushroom-head cap**

use flat front bezel

	mushroom	colour	☐ 22 x 35 mm Typ-Nr.	Ⓜ 0,006
<b>mushroom-head cap</b> (not for illumination)	opaque	yellow	<b>22-930.4</b>	0,006
		green	<b>22-930.5</b>	0,006
		red	<b>22-930.2</b>	0,006
		black	<b>22-930.0</b>	0,006



**front bezel flat**

	material	colour	☐ 24 x 36 mm Typ-Nr.	Ⓜ 0,001
<b>front bezel flat</b> actuator	plastic	black	<b>02-965.0</b>	0,001



**front bezel raised on all sides**

	material	colour	☐ 24 x 36 mm Typ-Nr.	Ⓜ 0,001
<b>front bezel raised on all sides</b> lens only removable with lens remover 98-969	plastic	black	<b>02-967.0</b>	0,001



## protective cover

use flat front bezel

		technical drawing	
<b>protective cover</b> hinged, transparent, with means for sealing	24 x 36 mm Typ-Nr. <b>22-925</b>	5	0,004



technical drawings from page 248

## blind plug

	colour	24 x 36 mm Typ-Nr.	
<b>blind plug</b>	black	<b>22-949.0</b>	0,005



## spare key

	part no.	
<b>spare key</b> for standard lock 311, other lock numbers on request	<b>31-989.311</b>	0,006



## master key

	part no.	
<b>master key</b> for lock numbers 311-445	<b>31-989.300</b>	0,006



## for illumination

### filament lamp

	voltage/current	part no.	
<b>filament lamp</b> base T 1 3/4 MG	6 VAC/VDC/125 mA	<b>10-1306.1349</b>	0,001
	6.3 VAC/VDC/200 mA	<b>10-1307.1369</b>	0,001
	12 VAC/VDC/75 mA	<b>10-1309.1309</b>	0,001
	14 VAC/VDC/80 mA	<b>10-1310.1319</b>	0,001
	18 VAC/VDC/40 mA	<b>10-1311.1249</b>	0,001
	24 VAC/VDC/35 mA	<b>10-1312.1229</b>	0,001
	28 VAC/VDC/30 mA	<b>10-1313.1209</b>	0,001
	28 VAC/VDC/40 mA	<b>10-1313.1249</b>	0,001
	36 VAC/VDC/20 mA	<b>10-1316.1179</b>	0,001
	36 VAC/VDC/30 mA	<b>10-1316.1209</b>	0,001
	48 VAC/VDC/20 mA	<b>10-1319.1179</b>	0,001
	48 VAC/VDC/25 mA	<b>10-1319.1199</b>	0,001
	60 VAC/VDC/20 mA	<b>10-1320.1179</b>	0,001



**LED**

	number of chips	voltage/current	colour	part no.	
<b>LED</b> base MG T 1 3/4  <b>Note:</b> For optimal illumination we strongly recommend using our new single-chip LEDs.  For new designs, only the new single-chip LEDs should be chosen. They can be found on page 669.	1 chip	24 VDC/14 mA	white	<b>10-2312.3139</b>	0,001
		28 VDC/14 mA	white	<b>10-2313.3139</b>	0,001
	6 chips	6 VDC/45 mA	yellow	<b>10-5306.3254</b>	0,001
			green	<b>10-5306.3255</b>	0,001
			red	<b>10-5306.3252</b>	0,001
		12 VDC/30 mA	yellow	<b>10-5309.3204</b>	0,001
			green	<b>10-5309.3205</b>	0,001
			red	<b>10-5309.3202</b>	0,001
		24 VAC/DC/12.5 mA	yellow	<b>10-5312.1114</b>	0,001
			green	<b>10-5312.1115</b>	0,001
			red	<b>10-5312.1112</b>	0,001
		24 VDC/14 mA	yellow	<b>10-5312.3134</b>	0,001
			green	<b>10-5312.3135</b>	0,001
			red	<b>10-5312.3132</b>	0,001
		28 VAC/DC/12.5 mA	yellow	<b>10-5313.1114</b>	0,001
			green	<b>10-5313.1115</b>	0,001
			red	<b>10-5313.1112</b>	0,001
		28 VDC/14 mA	yellow	<b>10-5313.3134</b>	0,001
			green	<b>10-5313.3135</b>	0,001
			red	<b>10-5313.3132</b>	0,001
	48 VDC/12 mA	yellow	<b>10-5319.3104</b>	0,001	
		green	<b>10-5319.3105</b>	0,001	
		red	<b>10-5319.3102</b>	0,001	
	8 chips	6 VDC/48 mA	yellow	<b>10-6306.3264</b>	0,001
			green	<b>10-6306.3265</b>	0,001
			red	<b>10-6306.3262</b>	0,001
		12 VDC/24 mA	yellow	<b>10-6309.3184</b>	0,001
			green	<b>10-6309.3185</b>	0,001
			red	<b>10-6309.3182</b>	0,001
		24 VDC/12 mA	yellow	<b>10-6312.3104</b>	0,001
green			<b>10-6312.3105</b>	0,001	
red			<b>10-6312.3102</b>	0,001	
28 VDC/12 mA		yellow	<b>10-6313.3104</b>	0,001	
		green	<b>10-6313.3105</b>	0,001	
		red	<b>10-6313.3102</b>	0,001	



**capacitor**

for lamp voltage reduction

	value	part no.	
<b>capacitor</b> use with 60 VAC/20 mA, 50 Hz lamp voltage	230 VAC/0.27 μF	<b>02-917.0</b>	0,004

Please keep to the country specific security rules.



**series resistor**

for lamp voltage reduction

	value	part no.	
<b>series resistor</b> use with 60 VAC/20 mA lamp rating	110 V/2.7 kΩ	<b>02-904.0</b>	0,003
	125 V/3.3 kΩ	<b>02-904.1</b>	0,003
	145 V/4.7 kΩ	<b>02-904.3</b>	0,003
	230-240 V/10 kΩ	<b>02-904.7</b>	0,003

Please keep to the country specific security rules.



## terminal plate empty

for fitting with series resistors and capacitors

	no. of spaces	part no.	 kg
terminal plate empty	5 spaces	<b>02-912.1</b>	0,025
	10 spaces	<b>02-912.2</b>	0,045
	15 spaces	<b>02-912.3</b>	0,090
	20 spaces	<b>02-912.4</b>	0,095



## terminal plate with capacitor

	value	no. of components	part no.	 kg
terminal plate with capacitor use with 60 VAC/20 mA lamp rating	0.27 $\mu$ F/230 VAC/60 VAC	5 spaces	<b>02-914.10</b>	0,045
		10 spaces	<b>02-914.20</b>	0,090
		15 spaces	<b>02-914.30</b>	0,135
		20 spaces	<b>02-914.40</b>	0,180



Please keep to the country specific security rules.

## assembling

### lens remover

	use	part no.	 kg
lens remover	Standard	<b>02-905</b>	0,011
	for front bezel 4-full face raised	<b>98-968</b>	0,004



### lamp remover

	part no.	 kg
lamp remover	<b>02-906</b>	0,002

CAUTION  
A switching process might be released when replacing the lamp!



### LED remover

	part no.	 kg
LED remover	<b>51-996</b>	0,024

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



### dismantling tool

	part no.	 kg
dismantling tool for dismantling the lens off the holder	<b>22-938</b>	0,030



## actuator with snap-action switching element

### switching system

#### 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

polymethylmethacrylat PMMA, polycarbonate PC

#### front bezel

polyphenylenoxide PPO

#### material of contacts

hard silver

#### actuator case

polyamide PA, polytherimide PEI

### mechanical characteristics

#### connection method

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 ± 0.3 N  
with 2 switching elements 6.8 ± 0.3 N

#### actuating travel

5.5 ± 0.2 mm

#### storage temperature

-40°C to + 95°C  
(as per DIN IEC 68-)

#### mechanical life

as per IEC 163-1  
illuminated pushbuttons: 2 million operations  
keylock switch: 40.000 operations

#### rebound time

≤ 3 ms

#### travel

3 mm

#### resistance to shock

50 g for 11 ms as per IEC 512-4-3

#### degree of protection

terminal/case: IP 20  
front as per IEC 529: IP 65

#### resistance to vibration

(sinusoidal)  
10 g at 10-2000 Hz, amplitude 0.75 mm as per IEC 512-4-4

#### ambient air temperature

-25°C to + 85°C  
(as per DIN IEC 68-)

### electrical characteristics

#### contact resistance

starting value ≤ 50 mΩ as per IEC 512-2-4

#### insulation resistance

≥ 100M Ω between all contacts at 100 VDC as per IEC 512-2-10

#### switch rating

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

switch rating AC, cos φ 0.7 as per AC 11 (IEC 337):

voltage	125 V	250 V	380 V
current	8 A	5 A	3 A
operations	> 100.000		

switch rating DC (inductive), L:R=30 ms as per DC 11 (IEC 337):

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 512-2-11.

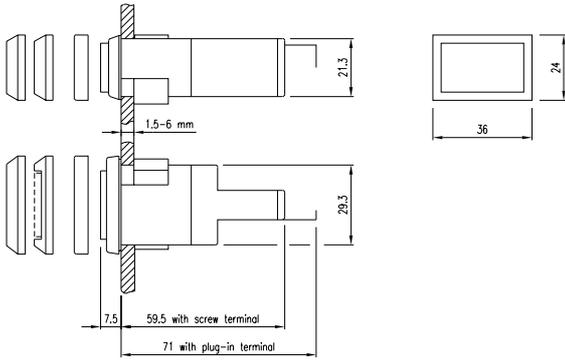
### approvals

#### approvals

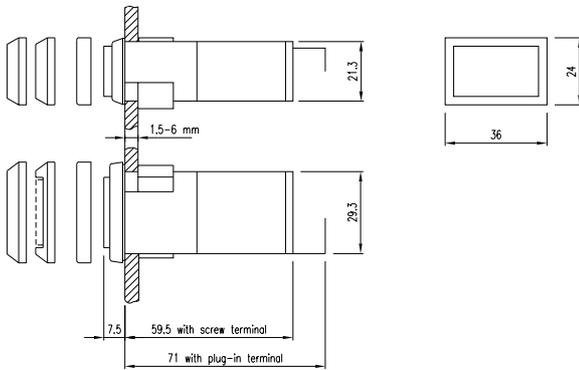
- CSA 300 VAC
- CE (declaration of conformity)
- UL
- CB
- ENEC

## technical drawings

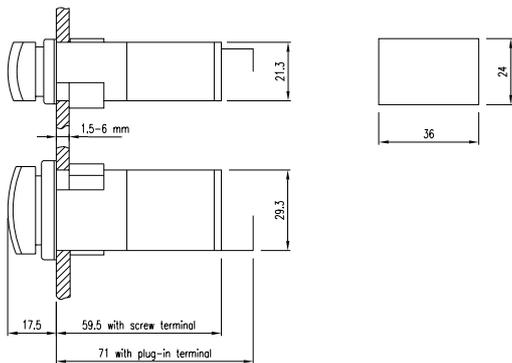
### 1 indicator page 239



### 2 illuminated-/pushbutton page 240

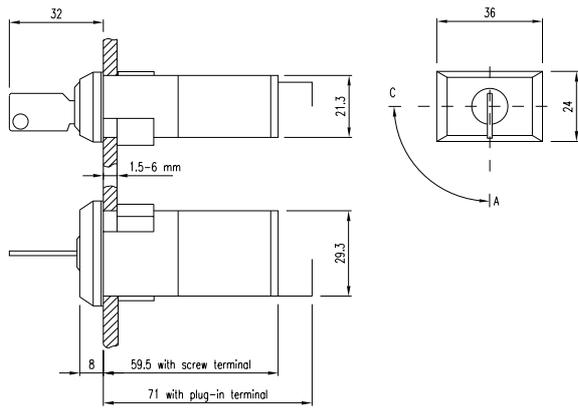


### 3 pushbutton with mushroom-head cap page 241



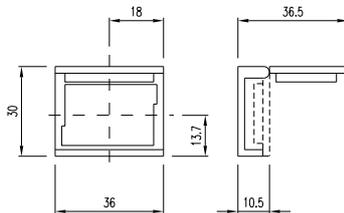
## 4 keylock switch 2 positions

page 242



## 5 protective cover

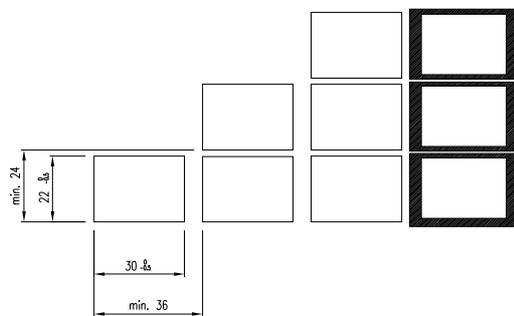
page 244



## mounting dimensions

### 1 indicator, illuminated-/pushbutton, pushbutton with mushroom-head cap, keylock switch 2 positions

page 239, 240, 241, 242



## circuit drawings

### 1 indicator

page 239

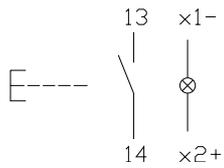
×1-



×2+

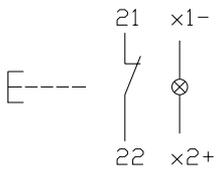
## 2 illuminated-/pushbutton, pushbutton with mushroom-head cap

page 240, 241



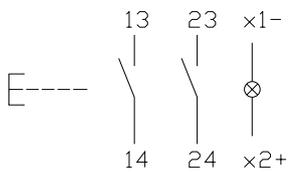
## 3 illuminated-/pushbutton, pushbutton with mushroom-head cap

page 240, 241



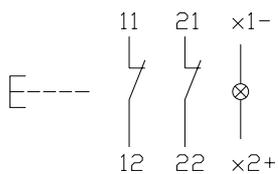
## 4 illuminated-/pushbutton, pushbutton with mushroom-head cap

page 240, 241



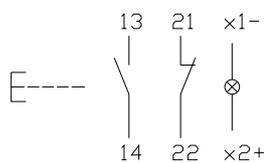
## 5 illuminated-/pushbutton, pushbutton with mushroom-head cap

page 240, 241



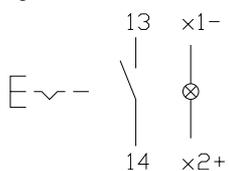
## 6 illuminated-/pushbutton, pushbutton with mushroom-head cap

page 240, 241



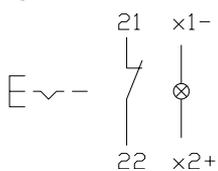
## 7 illuminated-/pushbutton, pushbutton with mushroom-head cap

page 240, 241



## 8 illuminated-/pushbutton, pushbutton with mushroom-head cap

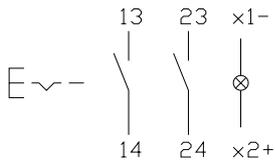
page 240, 241





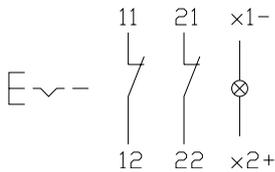
### 9 illuminated-/pushbutton, pushbutton with mushroom-head cap

page 240, 241



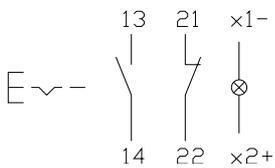
### 10 illuminated-/pushbutton, pushbutton with mushroom-head cap

page 240, 241



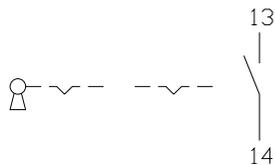
### 11 illuminated-/pushbutton, pushbutton with mushroom-head cap

page 240, 241



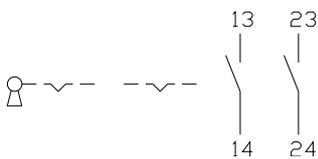
### 12 keylock switch 2 positions

page 242



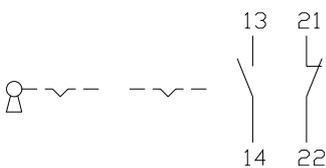
### 13 keylock switch 2 positions

page 242



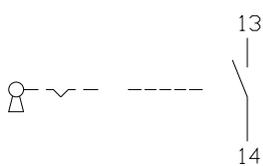
### 14 keylock switch 2 positions

page 242



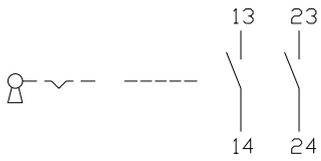
### 15 keylock switch 2 positions

page 242



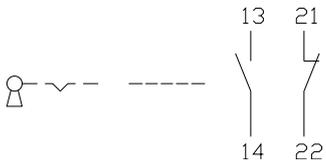
## 16 keylock switch 2 positions

page 242



## 17 keylock switch 2 positions

page 242



## 1. Engraving

### Typefaces

In addition to the most commonly used world languages (see DIN 1451) with close spacing, the following typefaces are available: Scandinavian, Slavian, Greek, Russian.

### Coloured filling of engraving

Specify whether engraving should be on the diffuser, or on the lens.

Specify the infill colour, character height and the text or symbol orientation.

### Symbols

A list of the symbols available can be supplied on request.

## 2. Hot stamping

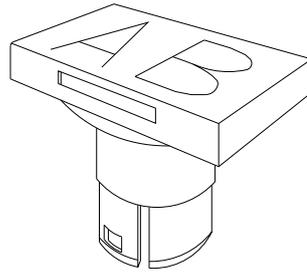
For large batches it is worth while to have the lettering produced by hot stamping.

### Typefaces

For letters and figures, typefaces with 2,5 mm, 3 mm and 4 mm are available.

### Symbols

A list of the symbols available can be supplied on request.



## 3. Film inserts

Instead of using engraving, the lenses can be fitted with transparent film inserts.

For this purpose, though, it is advisable to use transparent lenses. When a smoked lens is used, the lettering does not become visible until the lamp lights.

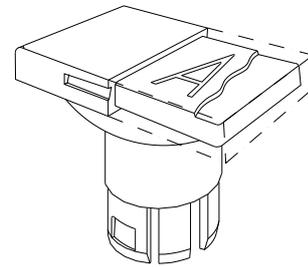
### Film dimensions

max. 22,4 x 14,3 mm

### Film thickness 0,2 mm

### Important!

Before engraving, check the position of the illuminated pushbuttons or indicator.



Height of letters mm	Thickness of letters mm	Engraving			Film insert		
		Number of lines	Number of letters per line	Number of letters per line	Number of lines	Number of letters per line	Number of letters per line
h	s		(caps)	(small)		(caps)	(small)
3	0,4	4	11	13	4	7-8	8-9
4	0,5	2	7	9	4	5	5-6
5	0,5	2	5-6	6-7	3	3-4	4
6	0,6	1	5	6	2	3	4
8	0,6	1	3	4	1	2	2