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Series 01

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General Notes

The Series 01 illuminated pushbuttons are equipped with snap-action, low level switching elements.
 In addition to the standard contacts (gold-plated silver), on request silver contacts for switching elements 2.8 mm plug-in terminals are available. The front dimensions of these units are 18 x 24 mm, 18 x 18 mm or 18 mm dia.
 In addition to a number of illuminated pushbuttons, the customer can choose from a wide range of other units and accessories having the same front and mounting dimensions.

Mounting

Mount from the front through the mounting hole.
 The universal terminals of the low-level switching elements permit them to be mounted on printed circuit boards (PCB).
 These terminals are also suitable for dip soldering. For these terminals we can also supply a plug-in base which, when soldered on to the board, enables the switch to be plugged in. All rectangular switches are secured against rotation.

Lenses

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

Marking

For engraving, hot stamping and film inserts, see under "Marking" on page 33.

Illumination

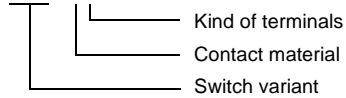
Perfect illumination of the different coloured lenses is assured by lamps T 5,5 (6-60 V).
 For supply voltages above 60 V, it is necessary to use a voltage reduction element (external series resistor, capacitor, or transformer).
 Do not solder the terminals directly, because of the high surface temperature. Multi-LED lamps T 5,5 (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.

Number structure

01-XXX.0XX



01-9XX.X

Example:

Kind of terminals

Contact material

Switch variant

Lens

-Illuminated pushbutton, circular;
 momentary action, gold-plated silver
 contact;
 soldered terminals, 1 switching element
 01-131.025

-Lens red

01-983.2

Specimen orderIndicator:

- indicator, soldering terminals,
 18 x 24 mm

01-040.005

Recommended accessories:

- lens, blue, 18 x 24 mm

01-982.6

- LED, 1 chip, 12 VDC, white

10-2109.3139

All dimensions in mm.

We reserve the right to modify technical data.

illuminated-/pushbutton



- 1 lens
- 2 switch housing
- 3 fixing nut

indicator



recommended accessories:

lens → 19

incandescent lamp → 21; LED → 22

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	diode (1N 4007)	connection method	18 x 24 mm part no.	18 x 18 mm part no.	18 mm dia. part no.	circuit drawing	technical drawing	mounting dimension	components layout	
indicator	-	PT	01-040.002	01-050.002	01-030.002	1	1	1	1	0,006
		ST	01-040.005	01-050.005	01-030.005	2	1	1	1	0,006
		UT	01-041.006	01-051.006	01-031.006	1	3	1	1	0,006
	1	UT	01-701.006	01-703.006	01-741.006	3	2	1	1	0,008
	2	UT	01-702.006	01-704.006	01-742.006	4	2	1	1	0,008

connection method: ST = soldering terminal; PT = plug-in terminal; UT = universal terminal; PCB plug-in base page 20

marking see page 33

technical drawing as of page 27. mounting dimensions. components layouts as of page 29. circuit drawing as of page 31

illuminated-/pushbutton



recommended accessories:

lens → 19

incandescent lamp → 21; LED → 22

	switching system	contacts	diode (1N 4007)	switching action	connection method				circuit drawing	technical drawing	mounting dimension	components layout			
								18 mm dia. part no.							
illuminated-/pushbutton	LL	1NC	-	main	UT	01-466.036	01-486.036	01-476.036	14	3	1	1	0,009		
				mom	UT	01-426.036	01-456.036	01-436.036	28	3	1	1	0,009		
		1NC + 1NO	-	main	UT	01-463.036	01-483.036	01-473.036	17	3	1	1	0,009		
				mom	UT	01-423.036	01-453.036	01-433.036	31	3	1	1	0,009		
		1NO	-	main	UT	01-465.036	01-485.036	01-475.036	16	3	1	1	0,009		
				mom	UT	01-425.036	01-455.036	01-435.036	30	3	1	1	0,009		
		2NC	-	main	UT	01-462.036	01-482.036	01-472.036	15	3	1	1	0,009		
				mom	UT	01-422.036	01-452.036	01-432.036	29	3	1	1	0,009		
		2NO	-	main	UT	01-461.036	01-481.036	01-471.036	18	3	1	1	0,009		
				mom	UT	01-421.036	01-451.036	01-431.036	32	3	1	1	0,009		
		SA	1NC + 1NO	-	main	ST/PT		01-261.022	01-281.022	01-271.022	10	4	1	-	0,008
						ST		01-261.025	01-281.025	01-271.025	13	4	1	-	0,008
	ST/PT						01-121.022	01-151.022	01-131.022	24	4	1	-	0,008	
	1			main	UT		01-713.029	01-717.029	01-747.029	11	5	1	1	0,010	
					UT		01-705.029	01-709.029	01-743.029	25	5	1	1	0,010	
					UT		01-714.029	01-718.029	01-748.029	12	5	1	1	0,010	
	2			mom	UT		01-706.029	01-710.029	01-744.029	26	5	1	1	0,010	
					ST		01-262.025	01-282.025	01-272.025	9	4	1	-	0,010	
					ST		01-122.025	01-152.025	01-132.025	23	4	1	-	0,010	
	1			main	UT		01-715.029	01-719.029	01-749.029	7	5	1	1	0,012	
					UT		01-707.029	01-711.029	01-745.029	21	5	1	1	0,012	
					UT		01-716.029	01-720.029	01-750.029	8	5	1	1	0,012	
	2	mom	UT		01-708.029	01-712.029	01-746.029	22	5	1	1	0,012			
			ST		01-263.025	01-283.025	01-273.025	6	4	1	-	0,012			
ST				01-123.025	01-153.025	01-133.025	20	4	1	-	0,012				
3NC + 3NO	-	main	ST		01-264.025	01-284.025	01-274.025	5	4	1	-	0,014			
		mom	ST		01-124.025	01-154.025	01-134.025	19	4	1	-	0,014			

switching system: LL = Low Level switching element, SA = snap-action switching element

switching action: main = maintained action, mom = momentary action

connection method: ST = soldering terminal; PT = plug-in terminal; UT = universal terminal; PCB plug-in base page 20

contacts: NC = normally closed, NO = normally open


power rating: Low Level switching element: 42 V/100 mA, snap-action switching element: 250 V/5 A

[marking see page 33](#)


[technical drawing as of page 27](#), [mounting dimensions](#), [components layouts as of page 29](#), [circuit drawing as of page 31](#)

at front

lens

	shape	lens/support	colour	□ 18 x 24 mm part no.	⌀ 18 x 18 mm part no.	18 mm dia. part no.	□ 0,001	
lens 12,8 x 18,8 mm, of plastic	flat	transparent/trans- lucent	blue	01-982.6	01-985.6	01-983.6	0,001	
			colourless, clear	01-982.7	01-985.7	01-983.7	0,001	
			green	01-982.5	01-985.5	01-983.5	0,001	
			orange	01-982.3	01-985.3	01-983.3	0,001	
			red	01-982.2	01-985.2	01-983.2	0,001	
yellow	01-982.4	01-985.4	01-983.4	0,001				
of plastic (not for film insert and LED)	flat	translucent/translu- cent	blue	01-901.6	01-951.6	01-931.6	0,001	
			green	01-901.5	01-951.5	01-931.5	0,001	
			orange	01-901.3	01-951.3	01-931.3	0,001	
			red	01-901.2	01-951.2	01-931.2	0,001	
			white	01-901.9	01-951.9	01-931.9	0,001	
yellow	01-901.4	01-951.4	01-931.4	0,001				
of plastic (not for film insert and illumination)	flat	opaque/translucent	black	01-901.0	01-951.0	01-931.0	0,001	
			grey	01-901.8	01-951.8	01-931.8	0,001	
of plastic (not recommended for film insert)	flat	transparent/trans- parent	colourless, clear	01-972.7	01-975.7	01-973.7	0,001	
			green	01-972.5	01-975.5	01-973.5	0,001	
			red	01-972.2	01-975.2	01-973.2	0,001	
			yellow	01-972.4	01-975.4	01-973.4	0,001	


protective cover

	□ 18 x 24 mm part no.	⌀ 18 x 18 mm part no.	technical drawing	□ 0,002	
protective cover hinged, transparent, cover to prevent accidental operation	01-925		6	0,002	
		31-920	7	0,002	

[technical drawing as of page 27](#)



sprayproof cover

front protection IP 67

	front shape	material	part no.	technical drawing	mounting dimension	□ 0,003	
sprayproof cover two-part	rectangular	made of silicone	31-924.2	8	2	0,003	
	square	made of PVC	31-923	8	2	0,003	





[technical drawing as of page 27](#), [mounting dimensions as of page 29](#)

protective guard

	construction	part no.	technical drawing		
protective guard matt chromium-plated	broad sides bent upwards	01-927	10	0,011	
	narrow ends bent upwards	01-926	9	0,011	

[technical drawing as of page 27](#)



blind plug

	colour	 18 x 24 mm part no.	 18 x 18 mm part no.	18 mm dia. part no.	mounting dimension		
blind plug	black	01-947.0	01-948.0	01-949.0	1	0,001	

[mounting dimensions as of page 29](#)



at back

PCB plug-in base

	for	pin orientation	part no.	components layout		
PCB plug-in base 16.4 mm dia. x 9.8 mm high 17.8 mm dia. x 9.8 mm high 17.9 x 8.4 mm high	Low Level switching element	axial	31-940	2	0,002	
	snap-action switching element 2.8 mm	axial	31-942	4	0,002	
	Low Level switching element With the extendable mounting the distance between PCB plug-in base and PCB can be varied up to 3mm.	right-angled	31-941	3	0,004	



[components layouts as of page 29](#)

cable shoe



	connection method	part no.	 kg	
cable shoe	plug-in terminal 2.8 x 0.5 mm	31-946	0,001	
	universal terminal 2.0 x 0.5 mm	31-945	0,001	

connection method: PT = plug-in terminal, UT = universal terminal

insulation socket



	part no.	 kg	
insulation socket for connector 31-945	31-928	0,001	
for connector 31-946	31-929	0,001	
for snap-action switching element 2.8 mm to cover the plug-in terminals	01-928	0,001	

terminal cover



	part no.	 kg	
terminal cover	01-929	0,010	

for illumination

incandescent lamp



	voltage/current	part no.	 kg	
incandescent lamp base T 5.5	6 AC/DC/200 mA	10-1106.1369 (01-903.0)	0,001	
	12 AC/DC/100 mA	10-1109.1329 (01-903.1)	0,001	
	12 AC/DC/50 mA	10-1109.1279 (01-913.12)	0,001	
	24 AC/DC/25 mA	10-1112.1199 (01-913.24)	0,001	
	24 AC/DC/50 mA	10-1112.1279 (01-903.2)	0,001	
	28 AC/DC/40 mA	10-1113.1249 (01-903.28)	0,001	
	30 AC/DC/40 mA	10-1114.1249 (01-903.3)	0,001	
	36 AC/DC/35 mA	10-1116.1229 (01-903.4)	0,001	
	48 AC/DC/25 mA	10-1119.1199 (01-903.5)	0,001	
	60 AC/DC/20 mA	10-1120.1179 (01-903.6)	0,001	

LED

	number of chips	voltage/current	colour	part no.		
LED base T 5.5	1 chip	12 VDC/14 mA	white	10-2109.3139	0,001	
		24 VDC/14 mA	white	10-2112.3139	0,001	
		28 VDC/14 mA	white	10-2113.3139	0,001	
	6 chips	6 VDC/45 mA	green	10-5106.3255 (01-968.05)	0,001	
			red	10-5106.3252 (01-968.02)	0,001	
			yellow	10-5106.3254 (01-968.04)	0,001	
		12 VDC/30 mA	green	10-5109.3205 (01-968.15)	0,001	
			red	10-5109.3202 (01-968.12)	0,001	
			yellow	10-5109.3204 (01-968.14)	0,001	
		24 VDC/15 mA	green	10-5112.3145 (01-968.25)	0,001	
			red	10-5112.3142 (01-968.22)	0,001	
			yellow	10-5112.3144 (01-968.24)	0,001	
		28 VDC/15 mA	green	10-5113.3145 (01-968.35)	0,001	
			red	10-5113.3142 (01-968.32)	0,001	
			yellow	10-5113.3144 (01-968.34)	0,001	
		48 VDC/14 mA	green	10-5119.3135 (01-968.45)	0,001	
red	10-5119.3132 (01-968.42)		0,001			
yellow	10-5119.3134 (01-968.44)		0,001			

capacitor


for lamp voltage reduction

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

Wire in accordance with local electrical safety regulations.

series resistor


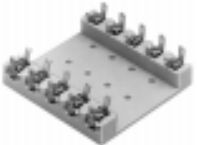
for lamp voltage reduction

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


Wire in accordance with local electrical safety regulations.

terminal plate empty

for fitting with series resistors and capacitors


	no. of spaces	part no.		
terminal plate empty	5 spaces	02-912.1	0,015	
	10 spaces	02-912.2	0,045	
	15 spaces	02-912.3	0,040	
	20 spaces	02-912.4	0,045	

terminal plate with capacitor

	value	no. of components	part no.	$\frac{SP}{kg}$	
terminal plate with capacitor use with 60 VAC/20 mA lamp rating	0,27 μ F/230 VAC/60 VAC	5 spaces	02-914.10	0,045	
		10 spaces	02-914.20	0,090	
		15 spaces	02-914.30	0,135	
		20 spaces	02-914.40	0,180	

Wire in accordance with local electrical safety regulations.


terminal plate with series resistor

	value	no. of components	part no.	$\frac{SP}{kg}$	
terminal plate with series resistor use with 60 VAC/20 mA lamp rating	2.7 kOhm/110/60 V	5 spaces	02-913.10	0,040	
		10 spaces	02-913.20	0,075	
		15 spaces	02-913.30	0,115	
		20 spaces	02-913.40	0,155	
	3.3 kOhm/125/60 V	5 spaces	02-913.11	0,040	
		10 spaces	02-913.21	0,075	
		15 spaces	02-913.31	0,115	
		20 spaces	02-913.41	0,155	
	10 kOhm/230-240/60 V	5 spaces	02-913.17	0,040	
		10 spaces	02-913.27	0,075	
		15 spaces	02-913.37	0,115	
		20 spaces	02-913.47	0,155	


Wire in accordance with local electrical safety regulations.

assembling


lens remover

	part no.	$\frac{SP}{kg}$	
lens remover	02-905	0,011	



lamp remover

	part no.	$\frac{SP}{kg}$	
lamp remover	02-906	0,002	



LED remover

	part no.	$\frac{SP}{kg}$	
LED remover	51-996	0,024	

dressng tool

	part no.		
dressng tool for alignng buttons	01-906	0,030	

mountng tool

	part no.		
mountng tool for tightennng (or loosennng) fixng nuts	01-907	0,020	

actuator with snap-action switching element**switching system**

Self-cleaning, double-break, snap action switching system. (with contact gap 2 x 0.5 mm).

1 normally closed or 1 normally open contact per element.
snap-action switching elements with soldering terminals at the sides: up to 4 switching element can be on a pushbutton (max. 4 normally closed and 4 normally open contacts).

snap-action switching element with axial plug-in terminals 2,8 mm not stachable, only 1 switching element can be on a pushbutton.

material**actuator case**

polyphenylene PPO, self-extinguishing

material of contacts

gold-plated silver

switching element

axial plug-in-/soldering terminal 2.8 mm:
diallyl phthalate DAP, polyamide 66, polysulfone, heat-resistant and self-extinguishing
soldering terminal: PA 6.6 Ultramid

mechanical characteristics**actuating force**

2-5.5 N, depending on the number of switching elements

actuating travel

3 mm

ambient air temperature

-25°C to +55°C

for indicators and illuminated pushbuttons mounted as a block , make sure the heat can escape freely
(as per DIN IEC 68-)

connection method

snap-action switching element with tinned soldering terminals at the sides:

max. wire diameter: 2 wires of 1.2 mm

max. wire cross-section of stranded cable: 1x 1 mm².

snap-action switching element with axial plug-in terminals, which can also be used as soldering terminals:

plug-in terminal: 2.8 x 0.5 mm

soldering terminal:

max. wire diameter: 2 wires of 1 mm²

max. wire cross-section of stranded cable: 2 x 0.75 mm² or 1 x 1.0 mm²

degree of protection

front as per IEC 529:

IP 40

IP 67 with spray cover

mechanical life

momentary action 2 million cycles of operation

maintained action 1 million cycles of operation

rebound time

<= 5ms

resistance to climate

standard condition as per IEC 68-2-3 and 2-30

changing condition as per IEC 68-2-14 and 2-33

resistance to shock

(single impacts, semi-sinusoidal)

15 g for 11 ms as per IEC 512-4-3, IEC 68-2-27

resistance to vibration

(sinusoidal)

10 g at 0-2000 Hz, amplitude 1.5 mm as per IEC 512-4-4, IEC 68-2-6

storage temperature

-40°C to + 85°C

(as per DIN IEC 68-)

electrical characteristics**continuous thermal current I_{th2}**

5 A

The maximum current in continuous operation and at ambient temperature not exceeding the quoted maximum values.

electric strength

2500 VAC, 50 Hz, 1 min. between all terminals and earth, as per IEC 512-2-11.

protection class

II

rated current

5 A

rated voltage

250 VAC/VDC

switch rating

250 VAC/5 A (cos φ 1)

250 VAC/3 A (cos φ 0.3)

switch rating AC, cos φ 0,7:

voltage 125 V 250 V

current 3 A 2 A

switch rating DC (inductive), L:R = 30 ms:

voltage 24 V 60 V 110 V 220 V

current 2 A 0,7 A 0,2 A 0,1 A

volume resistance

starting value (initial) <= 50 mΩ

rules

IEC 1058 EN 61 058

approvals

- SEV 250 VAC/5A

- CSA 300 VAC

- UL

actuator with Low Level switching element**switching system**

This low level switching element was designed for switching low powers in electronic circuits. The mechanism assures reliable switching of loads ranging from a few μA/μV up to 100 mA/42 VAC/VDC.

Single-break momentary contact, as normally open or normally closed with 4 independent points of contact. 2 momentary contacts per switching element; combination of normally open and normally closed is possible.

Special features are the long life, extremely short rebound time and stable contact resistance.

material**actuator case**

polyphenylene PPO, self-extinguishing

material of contacts

gold-plated

switching element

polysulfone, heat-resistant and self-extinguishing

mechanical characteristics

actuating force

3-3.5 N

actuating travel

3 mm

ambient air temperature

-25°C to +55°C

for indicators and illuminated pushbuttons mounted as a block ,
make sure the heat can escape freely
(as per DIN IEC 68-)

connection method

The universal terminals permit these units to be mounted on printed
circuit boards (PCB). These terminals can also be used as solder-
ing or plug-in terminals.

For these terminals we can also supply a plug-in base which, when
soldered on to the board, enables the switch to be plugged in.

soldering terminal:

max. wire diameter: 2 wires à 0.8 mm

max. wire cross-section of stranded cable: 1x 0.75 mm²

plug-in terminal:

2.0 x 0.5 mm

degree of protection

front as per IEC 529:

IP 40

IP 67 with spray cover

mechanical life

momentary action 5 mio. cycles of operation

maintained action 1 mio. cycles of operation

rebound time

Typ. < 100 µs

resistance to climate

standard condition as per IEC 68-2-3 and 2-30

changing condition as per IEC 68-2-14 and 2-33

resistance to shock

(single impacts, semi-sinusoidal)

15 g for 11 ms as per IEC 512-4-3, IEC 68-2-27

storage temperature

-40°C to + 85°C

(as per DIN IEC 68-)

electrical characteristics

electric strength

2500 VAC, 50 Hz, 1 min. between all terminals and earth, as per IC
512-2-11.

protection class

II

switch rating

10 µA/100 µV to 100 mA at 42 VAC/VDC

volume resistance

starting value (initial) <= 50 mΩ

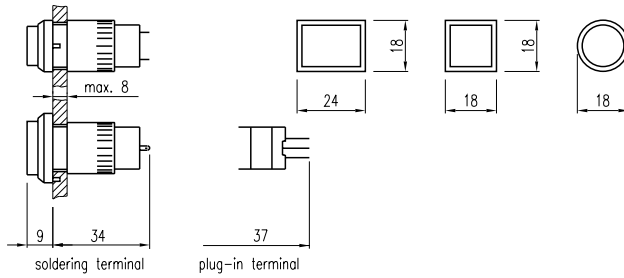
rules

EN 61 058

technical drawing

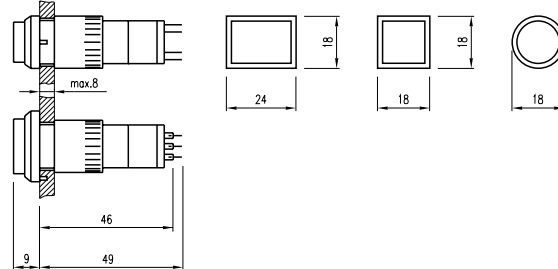
1 indicator

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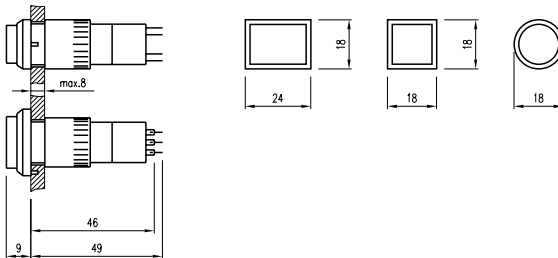
2 indicator

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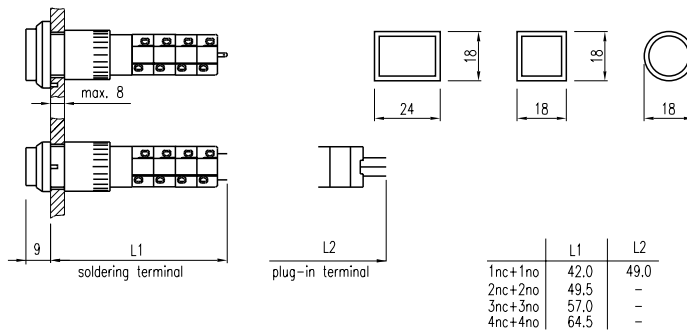
3 indicator, illuminated-/pushbutton

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4 illuminated-/pushbutton

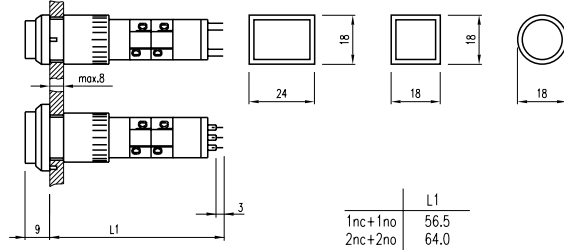
page 18



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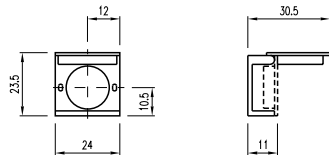
5 illuminated-pushbutton

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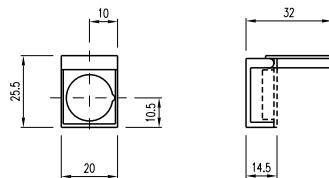
6 protective cover

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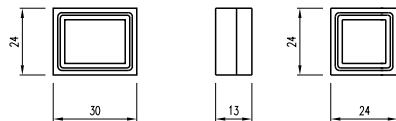
7 protective cover

page 19



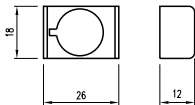
8 sprayproof cover

page 19



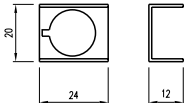
9 protective guard

page 20



10 protective guard

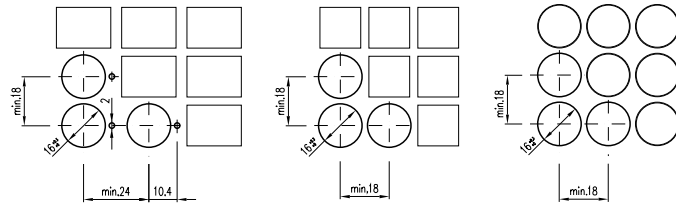
page 20



mounting dimension

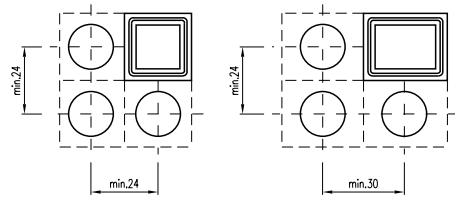
1 indicator, illuminated-/pushbutton, blind plug

page 17, 18, 20



2 sprayproof cover

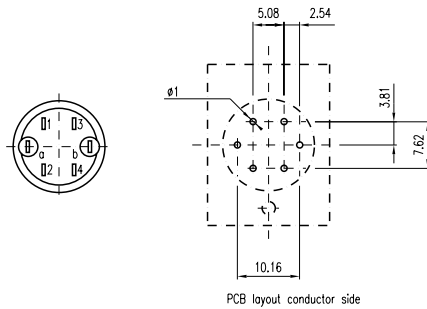
page 19



components layouts

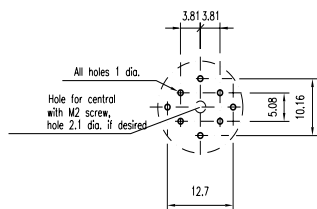
1 indicator, illuminated-/pushbutton

page 17, 18



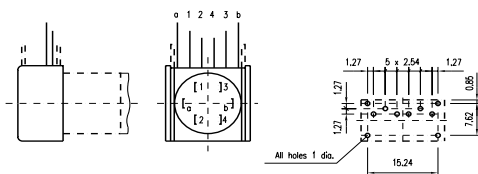
2 PCB plug-in base

page 20



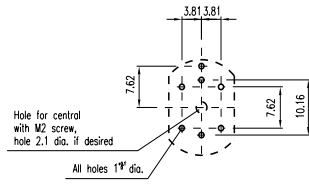
3 PCB plug-in base

page 20



4 PCB plug-in base

page 20

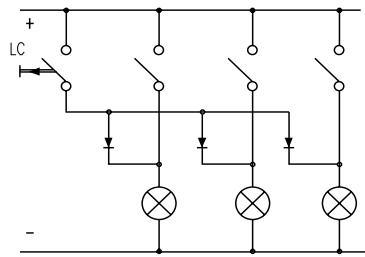


	circuit drawing		circuit drawing
1		21	
2		22	
3		23	
4		24	
5		25	
6		26	
7		27	
8		28	
9		29	
10		30	
11		31	
12		32	
13			
14			
15			
16			
17			
18			
19			
20			

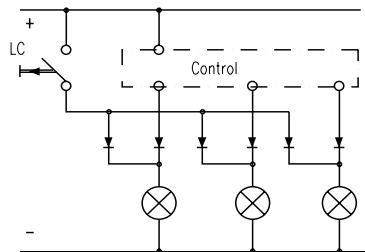
0

With indicators and illuminated pushbuttons equipped with diodes, the user is able to perform a lamp check or wire an alarm circuit simply with a considerable saving of space.

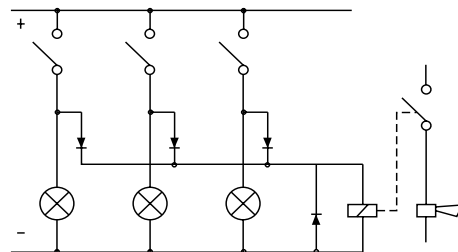
lamp check



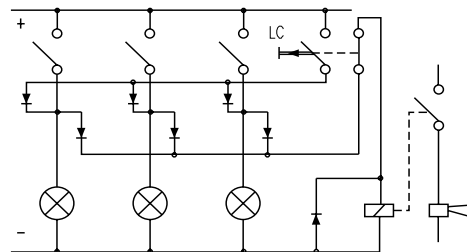
lamp check with blocking diodes



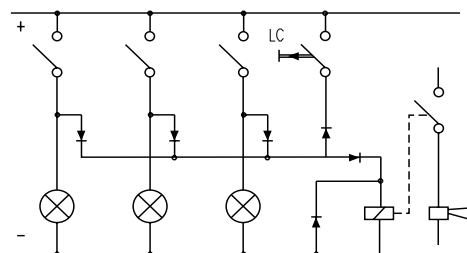
alarm circuit from fault annunciating system



lamp check and alarm circuit



lamp check and alarm circuit with only one diode and AC voltage



LC = lamp check

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

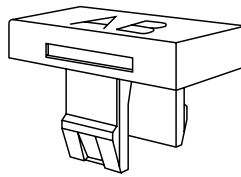
For large batches it is worth while to have the lettering produced by hot stamping.

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.

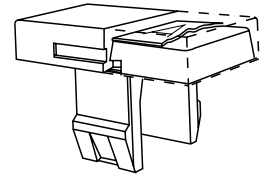
For this purpose, though, it is advisable to use transparent lenses. When a smoked lens is used, the lettering does not become visible until the lens lights.

To insert the film, the feet of the lens support have to be pushed together far enough to enable the lens to be lifted off easily.

Film dimensions

max. 10,2 x 16,2 mm
10,2 x 10,2 mm
12,8 mm

Film thickness 0,2 mm



Important!

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

Height of letters	Thickness of letters	Horizontal mounting			Vertical mounting			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
		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)		(caps)	(small)		(caps)	(small)
2,5	0,4	3	10	10-11	4	6-7	7	3	6	6	3	6-7	7
3	0,4	2	8-9	9	4	5-6	6	2	5	6	2	5-6	6
4	0,5	2	6	6-7	3	4	4	2	3	4	2	4	4
5	0,5	1	5	5-6	2	3	3-4	1	2	3	1	3	3-4
6	0,6	1	4	4-5	1	2-3	3	1	2	2	1	2-3	3
8	0,6	1	3	3-4	1	2	2	1	2	2	1	2	2