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Series 99

General Notes

The series 99 contains indicators and illuminated pushbuttons with maintained and momentary action with one or two contacts which may be either normally open or normally closed or a combination of the two. The illuminated pushbuttons are equipped with the low-level switching system.
The series 99 PCB keylock switch with a spacing of 19.05 mm completes the existing range of indicators and illuminated pushbuttons. The PCB keylock switch is available with two and three positions, with maintained action, and with either one or two normally open contacts as well as with one normally open and one normally closed one.

Mounting

The illuminated pushbuttons of series 99 can be soldered to a printed circuit board. The contact layout conforms to the module of 2.54 mm (1/10“). A centering pin ensures dimensionally exact mounting in rows or blocks.
With an M 1.2 screw the pushbuttons can also be fixed to a printed circuit board. (This screw must be ordered separately.) The pushbuttons can be joined together easily with a coupling piece to form rows or blocks.
The layout of the PCB keylock switch conforms to the module of 2.54 mm (1/10“).
Two centering pins ensure a dimensionally exact mounting. The contact layout corresponds to that of series 99 switches.

Rules for cleaning soldered PC boards

In many cases the boards are cleaned following mechanical soldering. In this case it is essential to prevent the cleaning fluid containing dirt, grease and flux from entering the switch.

Lenses

The lens consists of a bezel, a marking plate and a transparent lens plate, which may be either flat or concave.

Marking

For engraving, hot stamping and film inserts, see under “Markings” on page 546.

Illumination

Illumination of the different coloured lenses is by lamps bipin T 1 longlife (6-36 V) or LED bipin T 1.

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 switch

standard lock (Index D)
10 different locks wit standard nos. 311-320. If the lock number is not specified, we supply no. 311. Additional 125 locks, no. 321 - 445, are available on request. 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 standard DOM locks may be ordered by quoting no. 31-989 (please state the lock number).

Number structure

99-XXX.8X7

- Contact material
- Switch variant

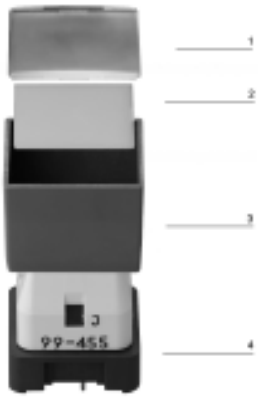
99-9XX.X	Lens
99-9XX.X	Other accessories
Example:	-Illuminated pushbutton, single, with momentary action; gold contact; soldering terminals 99-455.837
	-Lens, complette, flat 99-901.9

Specimen order

Indicator single	
- indicator single	99-050.807
Recommended accessories:	
- lens single complete, flat	99-901.9
- LED, 1 chip, yellow	10-2602.3174C

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

illuminated-/pushbutton



1 lens plate
2 marking plate
3 lens bezel
4 switching element

indicator single

recommended accessories:

lens single complete → 537

lens plate single → 537

marking plate single → 537

lens bezel single → 537

incandescent lamp → 539; LED → 540

	connection method	中 18.6 x 18.6 mm part no.	circuit drawing	technical drawing	mounting dimension	components layout	kg
indicator single	P	**99-050.807**	1	1	1	1	0,006

connection method: P = PCB terminal

marking see page 546

technical drawing as of page 542, mounting dimensions as of page 543, components layouts as of page 544, circuit drawing as of page 545

indicator double

recommended accessories:

lens plate double → 538

marking plate double → 538

incandescent lamp → 539; LED → 540

	connection method	中 18.6 x 37.8 mm part no.	circuit drawing	technical drawing	mounting dimension	components layout	kg
indicator double	P	**99-052.807**	2	2	1	2	0,011

connection method: P = PCB terminal

marking see page 546

technical drawing as of page 542, mounting dimensions as of page 543, components layouts as of page 544, circuit drawing as of page 545

indicator triple

recommended accessories:

lens plate triple → 538

marking plate triple → 538

incandescent lamp → 539; LED → 540

	connection method	18.6 x 56.9 mm part no.	circuit drawing	technical drawing	mounting dimension	components layout	kg
indicator triple	P	**99-053.807**	3	3	1	3	0,017

connection method: P = PCB terminal

marking see page 546

technical drawing as of page 542, mounting dimensions as of page 543, components layouts as of page 544, circuit drawing as of page 545

illuminated/-pushbutton single

recommended accessories:

lens single complete → 537

lens plate single → 537

marking plate single → 537

lens bezel single → 537

incandescent lamp → 539; LED → 540

	switching system	contacts	switching action	point of pressure	connection method	18.6 x 18.6 mm part no.	circuit drawing	technical drawing	mounting dimension	components layout	kg
illuminated/-pushbutton single	LL	1NC	main	with	P	**99-482.837**	4	1	1	1	0,008
				without	P	**99-487.837**	4	1	1	1	0,008
			mom	with	P	**99-452.837**	8	1	1	1	0,008
				without	P	**99-457.837**	8	1	1	1	0,008
		1NC + 1NO	main	with	P	**99-483.837**	6	1	1	1	0,008
				without	P	**99-488.837**	6	1	1	1	0,008
			mom	with	P	**99-453.837**	10	1	1	1	0,008
				without	P	**99-458.837**	10	1	1	1	0,008
		1NO	main	with	P	**99-480.837**	5	1	1	1	0,008
				without	P	**99-485.837**	5	1	1	1	0,008
			mom	with	P	**99-450.837**	9	1	1	1	0,008
				without	P	**99-455.837**	9	1	1	1	0,008
		2NO	main	with	P	**99-481.837**	7	1	1	1	0,008
				without	P	**99-486.837**	7	1	1	1	0,008
			mom	with	P	**99-451.837**	11	1	1	1	0,008
				without	P	**99-456.837**	11	1	1	1	0,008

switching system: LL = Low Level switching element
switching action: main = maintained action, mom = momentary action
connection method: P = PCB terminal
contacts: NC = normally closed, NO = normally open
marking see page 546
technical drawing as of page 542, mounting dimensions as of page 543, components layouts as of page 544, circuit drawing as of page 545

illuminated-/pushbutton double

recommended accessories:

lens plate double → 538

marking plate double → 538

incandescent lamp → 539; LED → 540

	switching system	contacts	switching action	connection method	18.6 x 37.8 mm part no.	circuit drawing	technical drawing	mounting dimension	components layout	kg
illuminated-/pushbutton double	LL	1NC + 1NO	main	P	**99-418.837**	12	2	1	2	0,013
			mom	P	**99-408.837**	14	2	1	2	0,013
		2NO	main	P	**99-416.837**	13	2	1	2	0,013
			mom	P	**99-406.837**	15	2	1	2	0,013

switching system: LL = Low Level switching element
switching action: main = maintained action, mom = momentary action
connection method: P = PCB terminal
contacts: NC = normally closed, NO = normally open
marking see page 546
technical drawing as of page 542, mounting dimensions see page 543, components layouts as of page 544, circuit drawing as of page 545

illuminated-/pushbutton triple

recommended accessories:

lens plate triple → 538

marking plate triple → 538

incandescent lamp → 539; LED → 540

	switching system	contacts	switching action	connection method	18.6 x 56.9 mm part no.	circuit drawing	technical drawing	mounting dimension	components layout	kg
illuminated-/pushbutton triple	LL	1NC + 1NO	main	P	**99-448.837**	16	3	1	3	0,019
			mom	P	**99-438.837**	18	3	1	3	0,019
		2NO	main	P	**99-446.837**	17	3	1	3	0,019
			mom	P	**99-436.837**	19	3	1	3	0,019

switching system: LL = Low Level switching element
switching action: main = maintained action, mom = momentary action
connection method: P = PCB terminal
contacts: NC = normally closed, NO = normally open
marking see page 546
technical drawing as of page 542, mounting dimensions as of page 543, components layouts as of page 544, circuit drawing as of page 545

keylock switch 2 positions

recommended accessories:
-

maint. 90° C A	switching system	contacts	switching action	connection method	key removable in	⌀ 18.8 x 18.8 mm part no.	circuit drawing	technical drawing	mounting dimension	components layout	kg
keylock switch 2 positions pos. A: basic position pos. C: maintained action standard lock 311, other lock numbers on request	LL	1NC + 1NO	main	P	A	**99-213.837D**	21	4	2	1	0,017
					A+C	**99-253.837D**	21	4	2	1	0,017
					C	**99-233.837D**	21	4	2	1	0,017
		1NO	main	P	A	**99-210.837D**	20	4	2	1	0,017
					A+C	**99-250.837D**	20	4	2	1	0,017
					C	**99-230.837D**	20	4	2	1	0,017
		2NO	main	P	A	**99-211.837D**	22	4	2	1	0,017
					A+C	**99-251.837D**	22	4	2	1	0,017
					C	**99-231.837D**	22	4	2	1	0,017

switching system: LL = Low Level switching element
switching action: main = maintained action
connection method: P = PCB terminal
contacts: NC = normally closed, NO = normally open
description see page 529
technical drawing as of page 542, mounting dimensions as of page 543, components layouts as of page 544, circuit drawing as of page 545

keylock switch 3 positions

recommended accessories:
-

maint. 90° C B A	switching system	contacts	switching action	connection method	key removable in	⌀ 18.8 x 18.8 mm part no.	circuit drawing	technical drawing	mounting dimension	components layout	kg
keylock switch 3 positions pos. A: basic position pos. B: maintained position pos. C: maintained position standard lock 311, other lock numbers on request	LL	2NO	main-0-main	P	A	**99-311.837D**	23	4	2	1	0,017
					A+B	**99-341.837D**	23	4	2	1	0,017
					A+B+C	**99-371.837D**	23	4	2	1	0,017
					A+C	**99-351.837D**	23	4	2	1	0,017
					B	**99-321.837D**	23	4	2	1	0,017
					B+C	**99-361.837D**	23	4	2	1	0,017
					C	**99-331.837D**	23	4	2	1	0,017

switching system: LL = Low Level switching element
connection method: P = PCB terminal
contacts: NC = normally closed, NO = normally open
switching action: main = maintained action, 0 =basic position
description see page 529
technical drawing as of page 542, mounting dimensions as of page 543, components layouts as of page 544, circuit drawing as of page 545

at front

lens single complete

for single pushbutton

	shape	lens plate	colour	18.6 x 18.6 mm part no.	kg	
lens single complete plastic	concave	transparent	clear	**99-902.9**	0,002	
	flat	transparent	clear	**99-901.9**	0,002	

marking see page 546

lens plate single

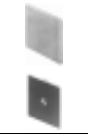
for single pushbutton

	shape	lens plate	colour	18.6 x 18.6 mm part no.	kg	
lens plate single plastic	concave	opaque	grey	**99-924.8**	0,001	
		transparent	clear	**99-922.7**	0,001	
		transparent matt	clear	**99-928.7**	0,001	
	convex	transparent	clear	**99-929.7A**	0,001	
	convex with recess	transparent	clear	**99-928.7A**	0,001	
	flat	transparent	clear	**99-921.7**	0,001	
		transparent matt	clear	**99-927.7**	0,001	

marking see page 546

marking plate single

for lens single

	marking plate	colour	18.6 x 18.6 mm part no.	kg	
marking plate single can be engraved or hot stamped	translucent	black	**99-908.0**	0,001	
		white	**99-908.9**	0,001	
for LED	translucent	beige	**99-918.A**	0,001	

lens bezel single

for single pushbutton

	construction	colour	part no.	kg	
lens bezel single	rounded	grey	**99-920.82**	0,001	
	with edges	beige	**99-920.9B**	0,001	
		black	**99-920.0**	0,001	
		brown	**99-920.9C**	0,001	
		grey	**99-920.8**	0,001	
		white	**99-920.9A**	0,001	

lens plate double

for pushbutton double

	shape	lens plate	colour	18.6 x 37.8 mm part no.	kg	
lens plate double plastic	concave	transparent	clear	**99-962.7**	0,001	
		transparent matt	clear	**99-974.7**	0,001	
	flat	transparent	clear	**99-961.7**	0,001	
			white	**99-961.9**	0,001	
		transparent matt	clear	**99-973.7**	0,001	

marking see page 546

marking plate double

for lens double

	marking plate	colour	18.6 x 37.8 mm part no.	kg	
marking plate double can be engraved or hot stamped	translucent	black	**99-963.0**	0,001	
		white	**99-963.9**	0,001	

lens plate triple

for pushbutton triple

	shape	lens plate	colour	18.6 x 56.9 mm part no.	kg	
lens plate triple plastic	concave	transparent	clear	**99-967.7**	0,002	
		transparent matt	clear	**99-979.7**	0,002	
	flat	transparent	clear	**99-966.7**	0,002	
		transparent matt	clear	**99-978.7**	0,002	

marking see page 546

marking plate triple

for pushbutton triple

	marking plate	colour	18.6 x 56.9 mm part no.	kg	
marking plate triple can be engraved or hot stamped	translucent	black	**99-968.0**	0,001	
		white	**99-968.9**	0,001	

colour foil single

for lens single

	colour	18.6 x 18.6 mm part no.	kg	
colour foil single	blue	**99-909.6**	1,001	
	green	**99-909.5**	1,001	
	orange	**99-909.3**	1,001	
	red	**99-909.2**	1,001	
	yellow	**99-909.4**	1,001	

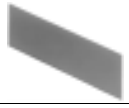
colour foil double

for lens double

	colour	18.6 x 37.8 mm part no.	kg	
colour foil double	blue	**99-964.6**	0,001	
	green	**99-964.5**	0,001	
	red	**99-964.2**	0,001	
	yellow	**99-964.4**	0,001	

colour foil triple

for lens triple

	colour	18.6 x 56.9 mm part no.	kg	
colour foil triple	blue	**99-969.6**	0,001	
	green	**99-969.5**	0,001	
	red	**99-969.2**	0,001	
	yellow	**99-969.4**	0,001	

blind plug

	height	colour	19 x 19 mm part no.	kg	
blind plug	16 mm	grey	**99-948.81**	0,003	
	17.5 mm	grey	**99-948.82**	0,003	
	19 mm	grey	**99-948.83**	0,004	

spare key

	part no.	kg	
spare key for standard lock 311, other lock numbers on request	**31-989.311**	0,006	

description see page 529

for illumination

incandescent lamp

up to pushbutton order 1, 2 or 3 pcs.

	voltage/current	part no.	kg	
incandescent lamp base T 1 Bi-Pin	6 AC/DC/70mA	**10-1606.1309 (19-903.00)**	0,001	
	12 AC/DC/25 mA	**10-1609.1199 (19-903.10)**	0,001	
	24 AC/DC/20 mA	**10-1612.1179 (19-903.30)**	0,001	
	28 AC/DC/24 mA	**10-1613.1189 (11-903.4)**	0,001	
	36 AC/DC/20 mA	**10-1616.1179 (11-903.5)**	0,001	

LED

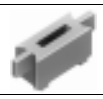
up to pushbutton order 1, 2 or 3 pcs.

	number of chips	voltage/current	colour	part no.	kg	
LED base T 1 Bi-Pin	1 chip	2,2 VDC/20 mA	green	**10-2602.3175C (19-943.05)**	0,001	
			red	**10-2602.3172C (19-943.02)**	0,001	
			yellow	**10-2602.3174C (19-943.04)**	0,001	
		3.6 VDC/20 mA	white	**10-2603.3179C**	0,001	
	4 chips	28 VDC/12 mA	green	**10-4613.3105B (11-968.35)**	0,001	
			orange	**10-4613.3103B (11-968.33)**	0,001	
			red	**10-4613.3102B (11-968.32)**	0,001	
			yellow	**10-4613.3104B (11-968.34)**	0,001	

assembling

coupling section

for mounting pushbuttons in rows or blocks

	part no.	kg	
coupling section grey	**99-910**	0,001	

fixing screw

	part no.	kg	
fixing screw M 1.2 x 5 mm (DIN)	**99-990**	0,001	

lamp remover

	part no.	kg	
lamp remover	**11-906**	0,003	

Low Level switching element

switching system

This low-level switching system was designed for switching low powers in electronic circuits. The switching system assures reliable switching of loads.
Single-break momentary contact, as normally open or normally closed with 4 independent points of contact.
Special features are the long life, extremely short rebound time and stable contact resistance.
Contact combinations: 1 normally open contact, 2 normally open contacts, 1 normally closed/1 normally open contact, 1 normally closed contact

material

material of contacts
gold-plated

switching element
polycarbonate PC

mechanical characteristics

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-)

mechanical life

illuminated pushbuttons	5 million operations
PCB keylock switches	50000 operations

rebound time
typ. <= 100 µs

resistance to shock
(single impacts, semi-sinusoidal)
15 g for 11 ms as per 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.

insulation resistance
10^{12} Ω between contacts at 100 VDC, as per IEC 512-2, test 3a

volume resistance
starting value (initial) <= 50 mΩ as per IEC 512-2, test 2b

actuator

material

lens bezel
polycarbonate PC, heat-resistant

lens plate
polymethylmethacrylate PMMA, heat-resistant

mechanical characteristics

actuating force

pushbuttons with tactile point:	2.0 ± 0.3 N
pushbuttons without tactile point:	1.3 ± 0.4 N

actuating torque
4.7-6.0 Ncm (measured at the key)

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-)

angle of rotation for print keylock switch
keylock switch with 2 positions: 90°
keylock switch with 3 positions: 2 x 90°

degree of protection
front as per IEC 529:
IP 40, PCB keylock switch, illuminated pushbutton

mechanical life

illuminated pushbuttons	5 million operations
PCB keylock switches	50000 operations

storage temperature
-40°C to +85°C
(as per DIN IEC 68-)

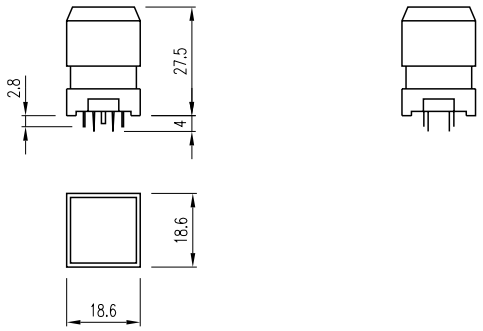
travel
lead distance NC contact: 1.1 ± 0.2 mm;
lead distance NO contact: 2.1 ± 0.2 mm;
total distance: 3.6 ± 0.2 mm

electrical characteristics

electrostatic breakdown value
10 kV as per IEC 65 (Co) 28.

technical drawing

1 indicator single, illuminated/-pushbutton single
page 531, 533



2 indicator double, illuminated-/pushbutton double
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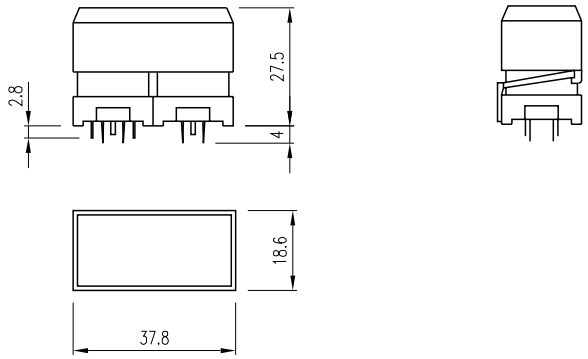

3 indicator triple, illuminated-/pushbutton triple
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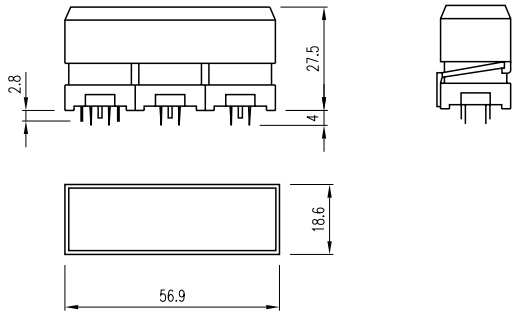

4 keylock switch 2 positions, keylock switch 3 positions
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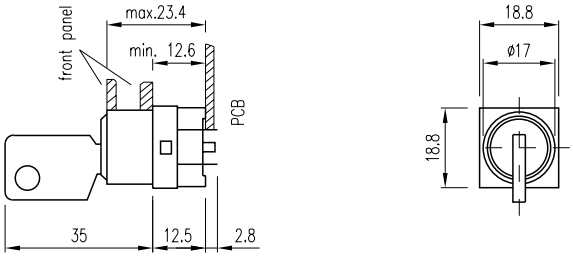

mounting dimension

1 indicator single, indicator double, indicator triple, illuminated/-pushbutton single, illuminated-/pushbutton double, illuminated-/pushbutton triple
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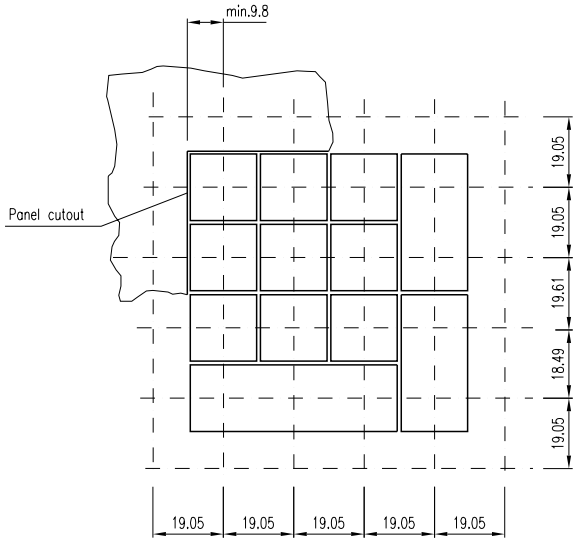

2 keylock switch 2 positions, keylock switch 3 positions
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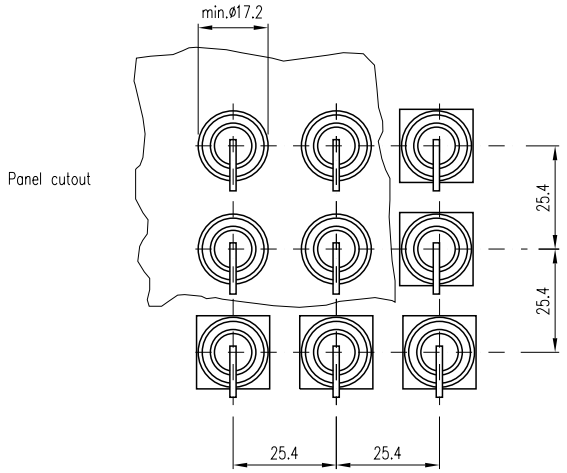

components layouts

1 indicator single, illuminated/-pushbutton single, keylock switch 2 positions, keylock switch 3 positions
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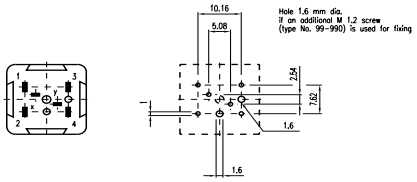

2 indicator double, illuminated-/pushbutton double
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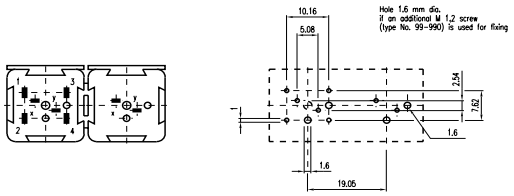
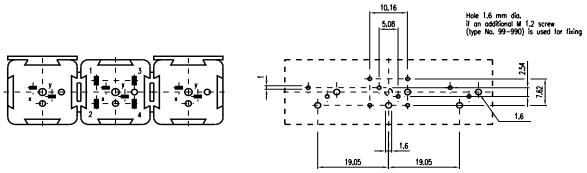
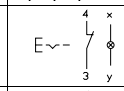
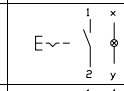
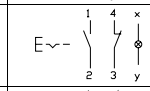
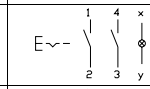
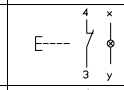
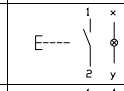
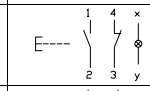
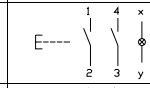
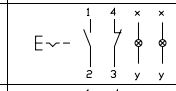
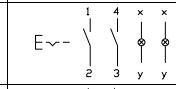
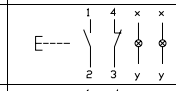
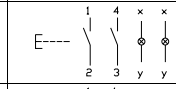
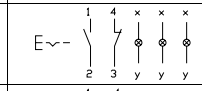
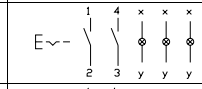
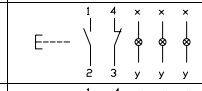
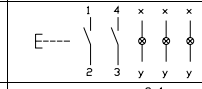
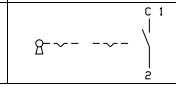
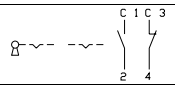
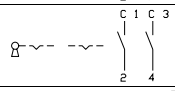
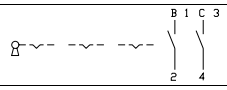


3 indicator triple, illuminated-/pushbutton triple
page 532, 534



	circuit drawing
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	

	circuit drawing
21	
22	
23	

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

Unless requested otherwise by the customer, the lettering on white and black marking plates will be in black and white.

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.

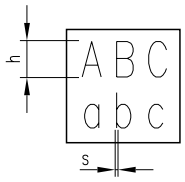
3. Film inserts

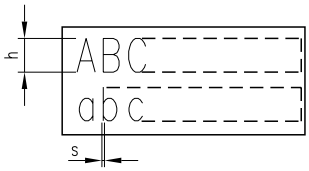
Instead of being engraved, the lenses can have a film inserted, possiblly backed by a colour foil, placed between the lens plate and the marking plate.

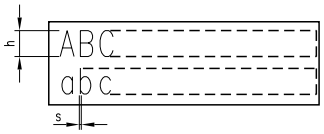
Film dimensions

for single button: 16 x 16 mm
for double button: 16 x 34,7 mm
for triple button: 16 x 53,8 mm

Film thickness 0,2 mm







Height of letters mm	Thickness of letters mm	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)
2,5	0,4	4	7	8	4	19	20	4	30	32
3	0,4	3	6	7	3	16	18	3	25	28
4	0,5	2	4	5	2	11	13	2	18	20
5	0,5	2	3	4	2	9	10	2	14	16
6	0,6	1	3	4	1	7	8	1	12	13
8	0,6	1	2	3	1	5	6	1	9	10