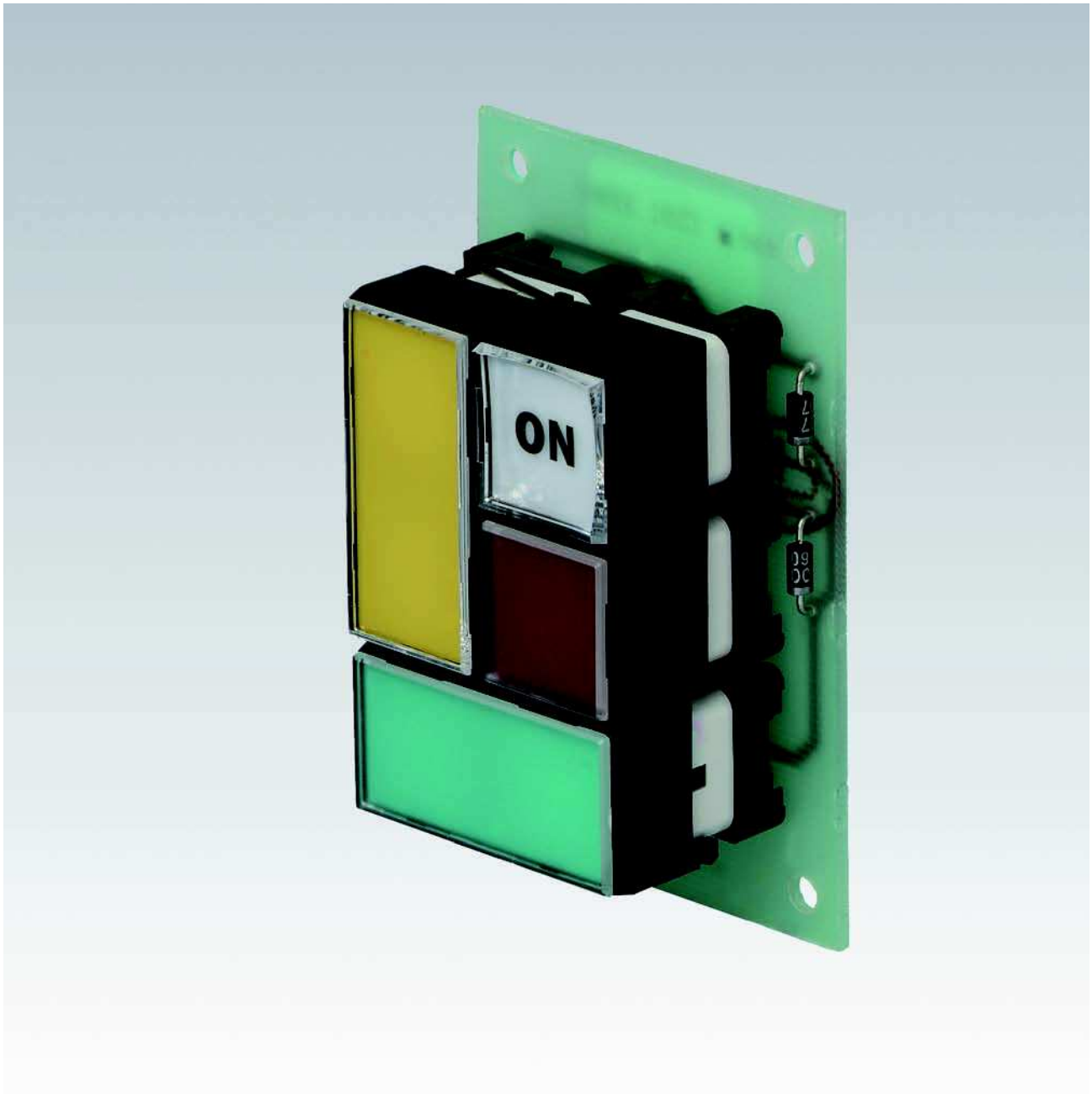
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Contents 99

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Product Information

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 M1.2 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.

Cleaning of soldered PCB
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 flush or concave.

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

Illumination
Illumination of the different coloured lenses is by lamps Bi-Pin T1 longlife (6 ... 36 V) or LED Bi-Pin T1.
Luminosity and wave length scattering caused by the technology used in the LED manufacturing processes may lead to visual differences in our products.

Position indication
The status of a maintained action switch can be determinded by the position of the lens.

Keylock switch
Standard lock (Index D). 10 different locks with 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).

Specimen order

Indicator :

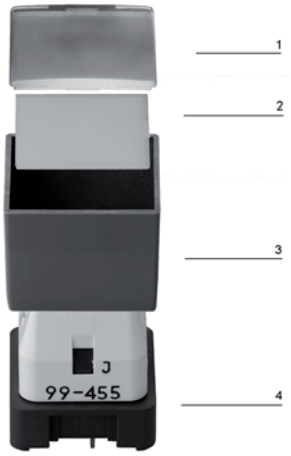
- Indicator actuator single, 18.6 x 18.6 mm	99-050.807

Essential accessories :

- Lens single complete, plastic colourless transparent flush, 18.6 x 18.6 mm	99-901.9
- Single-LED T1 Bi-Pin, 2.2 VDC, 20 mA, yellow	10-2602.3174C

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

Pushbutton illuminative



1 Lens plate
2 Marking plate
3 Lens bezel
4 Switching element

Indicator actuator single

Essential Accessories:

- Lens single, complete page 40
- Single-LED page 43

	Front protection	Terminals	中 18.6 x 18.6 Typ-Nr.	Component layout	Mounting dimensions	Technical drawing	Circuit drawing	g
Indicator actuator single	IP 40	P	**99-050.807**	1	1	1	1	0.006

Terminals: P = PCB terminal
Component layout from page 46, Mounting dimensions from page 47, Technical drawing from page 48, Circuit drawing from page 49

Indicator actuator double

Essential Accessories:

- Lens plate double page 41
- Marking plate double page 41
- Single-LED page 43

	Front protection	Terminals	中 18.6 x 37.8 mm Typ-Nr.	Component layout	Mounting dimensions	Technical drawing	Circuit drawing	g
Indicator actuator double	IP 40	P	**99-052.807**	2	1	2	22	0.011

Terminals: P = PCB terminal
Component layout from page 46, Mounting dimensions from page 47, Technical drawing from page 48, Circuit drawing from page 49

Indicator actutor triple

Essential Accessories:

- Lens plate triple page 41
- Marking plate triple page 41
- Single-LED page 43

	Front protection	Terminals	18.6 x 56.9 mm Typ-Nr.	Component layout	Mounting dimensions	Technical drawing	Circuit drawing	kg
Indicator actutor triple	IP 40	P	**99-053.807**	3	1	3	23	0.017

Terminals: P = PCB terminal

Component layout from page 46, Mounting dimensions from page 47, Technical drawing from page 48, Circuit drawing from page 49

Illuminated pushbutton actuator single

Essential Accessories:

- Lens single, complete page 40
- Single-LED page 43

	Front protection	Contacts	Switching action	point of pressure	Terminals	⍁ 18.6 x 18.6 mm Typ-Nr.	Component layout	Mounting dimensions	Technical drawing	Circuit drawing	kg
Illuminated pushbutton actuator single	IP 40	1 NC	MA	with	P	**99-482.837**	1	1	1	2	0.008
				without	P	**99-487.837**	1	1	1	2	0.008
			M	with	P	**99-452.837**	1	1	1	10	0.008
				without	P	**99-457.837**	1	1	1	10	0.008
		1 NC + 1 NO	MA	with	P	**99-483.837**	1	1	1	4	0.008
				without	P	**99-488.837**	1	1	1	4	0.008
			M	with	P	**99-453.837**	1	1	1	12	0.008
				without	P	**99-458.837**	1	1	1	12	0.008
		1 NO	MA	with	P	**99-480.837**	1	1	1	3	0.008
				without	P	**99-485.837**	1	1	1	3	0.008
			M	with	P	**99-450.837**	1	1	1	11	0.008
				without	P	**99-455.837**	1	1	1	11	0.008
		2 NO	MA	with	P	**99-481.837**	1	1	1	7	0.008
				without	P	**99-486.837**	1	1	1	7	0.008
			M	with	P	**99-451.837**	1	1	1	15	0.008
				without	P	**99-456.837**	1	1	1	15	0.008

Contacts: NC = Normally closed, NO = Normally open
Switching action: MA = Maintained action, M = Momentary action
Terminals: P = PCB terminal
Component layout from page 46, Mounting dimensions from page 47, Technical drawing from page 48, Circuit drawing from page 49

Illuminated pushbutton actuator double

Essential Accessories:

- Lens plate double page 41
- Marking plate double page 41
- Single-LED page 43

	Front protection	Contacts	Switching action	Terminals	18.6 x 37.8 Typ-Nr.	Component layout	Mounting dimensions	Technical drawing	Circuit drawing	kg
Illuminated pushbutton actuator double	IP 40	1 NC + 1 NO	MA	P	**99-418.837**	2	1	2	5	0.013
			M	P	**99-408.837**	2	1	2	13	0.013
		2 NO	MA	P	**99-416.837**	2	1	2	8	0.013
			M	P	**99-406.837**	2	1	2	16	0.013

Contacts: NC = Normally closed, NO = Normally open
Switching action: MA = Maintained action, M = Momentary action
Terminals: P = PCB terminal
Component layout from page 46, Mounting dimensions from page 47, Technical drawing from page 48, Circuit drawing from page 49

Illuminated pushbutton actuator triple

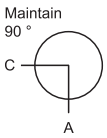
Essential Accessories:

- Lens plate triple page 41
- Marking plate triple page 41
- Single-LED page 43

	Front protection	Contacts	Switching action	Terminals	18.6 x 56.9 Typ-Nr.	Component layout	Mounting dimensions	Technical drawing	Circuit drawing	kg
Illuminated pushbutton actuator triple	IP 40	1 NC + 1 NO	MA	P	**99-448.837**	3	1	3	6	0.019
			M	P	**99-438.837**	3	1	3	14	0.019
		2 NO	MA	P	**99-446.837**	3	1	3	9	0.019
			M	P	**99-436.837**	3	1	3	17	0.019

Contacts: NC = Normally closed, NO = Normally open
Switching action: MA = Maintained action, M = Momentary action
Terminals: P = PCB terminal
Component layout from page 46, Mounting dimensions from page 47, Technical drawing from page 48, Circuit drawing from page 49

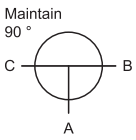
Keylock switch 2 positions



	Front protection	Contacts	Switching action	Terminals	Key remove	⌗ 18.8 x 18.8 mm Typ-Nr.	Component layout	Mounting dimensions	Technical drawing	Circuit drawing	kg
Keylock switch 2 positions Position A: Basic position Position C: Maintained action Standard lock 311	IP 40	1 NC + 1 NO	MA	P	A	**99-213.837D**	1	2	4	20	0.017
					C	**99-233.837D**	1	2	4	20	0.017
					C + A	**99-253.837D**	1	2	4	20	0.017
		1 NO	MA	P	A	**99-210.837D**	1	2	4	18	0.017
					C	**99-230.837D**	1	2	4	18	0.017
					C + A	**99-250.837D**	1	2	4	18	0.017
		2 NO	MA	P	A	**99-211.837D**	1	2	4	21	0.017
					C	**99-231.837D**	1	2	4	21	0.017
					C + A	**99-251.837D**	1	2	4	21	0.017

Other lock numbers on request
Contacts: NC = Normally closed, NO = Normally open
Switching action: MA = Maintained action
Terminals: P = PCB terminal
Component layout from page 46, Mounting dimensions from page 47, Technical drawing from page 48, Circuit drawing from page 49

Keylock switch 3 positions



	Front protection	Contacts	Switching action	Terminals	Key remove	⌗ 18.8 x 18.8 mm Typ-Nr.	Component layout	Mounting dimensions	Technical drawing	Circuit drawing	kg
Keylock switch 3 positions Position C: Maintained action Position A: Basic position Position B: Maintained action Standard lock 311	IP 40	2 NO	MA-0-MA	P	A	**99-311.837D**	1	2	4	19	0.017
					A + B	**99-341.837D**	1	2	4	19	0.017
					B	**99-321.837D**	1	2	4	19	0.017
					C	**99-331.837D**	1	2	4	19	0.017
					C + A	**99-351.837D**	1	2	4	19	0.017
					C + A + B	**99-371.837D**	1	2	4	19	0.017
					C + B	**99-361.837D**	1	2	4	19	0.017

Other lock numbers on request
Contacts: NO = Normally open
Switching action: MA = Maintained action
Terminals: P = PCB terminal
Component layout from page 46, Mounting dimensions from page 47, Technical drawing from page 48, Circuit drawing from page 49

Front

Lens single, complete

for single pushbutton

	Pressure plate	⍞ 18.6 x 18.6 mm Typ-Nr.	
Lens single, complete concave	Plastic colourless transparent	**99-902.9**	0.002
flush	Plastic colourless transparent	**99-901.9**	0.002

Lens plate single

for single pushbutton

	Pressure plate	⍞ 18.6 x 18.6 mm Typ-Nr.	
Lens plate single concave	Plastic colourless transparent	**99-922.7**	0.001
	Plastic grey opaque	**99-924.8**	0.001
concave, mat	Plastic colourless transparent	**99-928.7**	0.001
convex	Plastic colourless transparent	**99-929.7A**	0.001
convex with recess	Plastic colourless transparent	**99-928.7A**	0.001
flush	Plastic colourless transparent	**99-921.7**	0.001
flush, mat	Plastic colourless transparent	**99-927.7**	0.001

Marking plate single

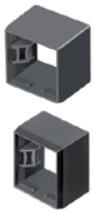
for lens single

	Marking plate	⍞ 18.6 x 18.6 mm Typ-Nr.	
Marking plate single can be engraved or hot stamped	Plastic black translucent	**99-908.0**	0.001
	Plastic white translucent	**99-908.9**	0.001
for LED	Plastic beige translucent	**99-918.A**	0.001

Lens bezel single

for single pushbutton

	Lens bezel	Typ-Nr.	
Lens bezel single rounded	Plastic grey	**99-920.82**	0.001
with edges	Plastic beige	**99-920.9B**	0.001
	Plastic black	**99-920.0**	0.001
	Plastic brown	**99-920.9C**	0.001
	Plastic grey	**99-920.8**	0.001
	Plastic white	**99-920.9A**	0.001



Lens plate double

for pushbutton double

	Pressure plate	18.6 x 37.8 mm Typ-Nr.	kg
Lens plate double concave	Plastic colourless transparent	**99-962.7**	0.001
concave, mat	Plastic colourless transparent	**99-974.7**	0.001
flush	Plastic colourless transparent	**99-961.7**	0.001
	Plastic white transparent	**99-961.9**	0.001
flush, mat	Plastic colourless transparent	**99-973.7**	0.001

Marking plate double

for lens double

	Marking plate	18.6 x 37.8 mm Typ-Nr.	kg
Marking plate double can be engraved or hot stamped	Plastic black translucent	**99-963.0**	0.001
	Plastic white translucent	**99-963.9**	0.001

Lens plate triple

for pushbutton triple

	Pressure plate	18.6 x 56.9 mm Typ-Nr.	kg
Lens plate triple concave	Plastic colourless transparent	**99-967.7**	0.002
concave, mat	Plastic colourless transparent	**99-979.7**	0.002
flush	Plastic colourless transparent	**99-966.7**	0.002
flush, mat	Plastic colourless transparent	**99-978.7**	0.002

Marking plate triple

for pushbutton triple

	Marking plate	18.6 x 56.9 mm Typ-Nr.	kg
Marking plate triple can be engraved or hot stamped	Plastic black translucent	**99-968.0**	0.001
	Plastic white translucent	**99-968.9**	0.001

Colour foil single

for lens single

	Colour foil	18.6 x 18.6 mm Typ-Nr.	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 foil	18.6 x 37.8 mm Typ-Nr.	
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 foil	18.6 x 56.9 mm Typ-Nr.	
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

	Blind plug	19 x 19 mm Typ-Nr.	
Blind plug H = 16 mm	Plastic grey	**99-948.81**	0.003
H = 17.5 mm	Plastic grey	**99-948.82**	0.003
H = 19 mm	Plastic grey	**99-948.83**	0.004

Spare key

	Typ-Nr.	
Spare key Key lock switch, standard lock 311 (DOM)	**31-989.311**	0.006

Other lock numbers on request

Illumination

Filament lamp

up to pushbutton order 1, 2 or 3 pcs.

	Socket	Operating voltage/-current	Typ-Nr.	
Filament lamp	T1 Bi-Pin	12 VAC/DC, 25 mA	**10-1609.1199**	0.001
		24 VAC/DC, 20 mA	**10-1612.1179**	0.001
		28 VAC/DC, 24 mA	**10-1613.1189**	0.001
		36 VAC/DC, 20 mA	**10-1616.1179**	0.001
		6 VAC/DC, 70 mA	**10-1606.1309**	0.001

Single-LED

up to pushbutton order 1, 2 or 3 pcs.

	Socket	Light colour	Operating voltage/-current	Typ-Nr.	kg
Single-LED	T1 Bi-Pin	green	2.2 VDC, 20 mA	**10-2602.3175C**	0.001
		red	2.2 VDC, 20 mA	**10-2602.3172C**	0.001
		white	3.6 VDC, 20 mA	**10-2603.3179C**	0.001
		yellow	2.2 VDC, 20 mA	**10-2602.3174C**	0.001

Multi-LED

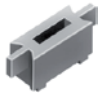
up to pushbutton order 1, 2 or 3 pcs.

	Socket	Light colour	Operating voltage/-current	Typ-Nr.	kg
Multi-LED	T1 Bi-Pin	green	28 VDC, 12 mA	**10-4613.3105B**	0.001
		orange	28 VDC, 12 mA	**10-4613.3103B**	0.001
		red	28 VDC, 12 mA	**10-4613.3102B**	0.001
		yellow	28 VDC, 12 mA	**10-4613.3104B**	0.001

Assembling

Coupling section

for mounting pushbuttons in rows or blocks



	Typ-Nr.	kg
Coupling section grey	**99-910**	0.001

Fixing screw

	Typ-Nr.	kg
Fixing screw M 1.2 x 5 mm (DIN)	**99-990**	0.001

Lamp remover

	Typ-Nr.	kg
Lamp remover	**11-906**	0.003

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

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 contact
Gold plated

Switching element
Polycarbonate (PC)

Mechanical characteristics

Rebound time
≤100 µs typical

Mechanical lifetime

Illuminated pushbutton	5 million operations
PCB keylock switch	50 000 operations

Electrical characteristics

Contact resistance
Starting value (initial) ≤50 mΩ as per IEC 60512-2-2b

Isolation resistance
10^{12} Ω between contacts at 100 VDC, as per IEC 60512-2-3a

Switch rating
min. 100 µVDC/AC, 10 µA
max. 42 VDC/AC, 100 mA

Electric strength
2500 VAC, 50 Hz, 1 min. between all terminals and earth, as per IC 60512-2-11

Environmental conditions

Storage temperature
-40 °C ... +85 °C

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

Shock resistance
(single impacts, semi-sinusoidal)
15 g for 11 ms as per IEC 6068-2-27

Actuator

Material

Lens plate
Polymethylmethacrylate (PMMA), heat-resistant

Lens bezel
Polycarbonate (PC), heat-resistant

Mechanical characteristics

Actuating torque
4.7 Ncm ... 6.0 Ncm (measured at the key)

Actuating force

Pushbutton with tactile point	2.0 ±0.3 N
Pushbutton without tactile point	1.3 ±0.4 N

Actuating 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

Angle of rotation for print keylock switch
Keylock switch with 2 positions 90°
Keylock switch with 3 positions 2 x 90°

Mechanical lifetime

Illuminated pushbutton	5 million operations
PCB keylock switch	50 000 operations

Electrical characteristics

Electrostatic discharge (ESD)
10 kV

Environmental conditions

Storage temperature
-40 °C ... +85 °C

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

Protection degree
frontside IP 40, PCB keylock switch, illuminated pushbutton

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.
Unless requested otherwise by customer, the lettering on white and black marking plates will be in black or white.
Standard height of letters is 2 mm. If the height is not specified, we will supply 2 mm engraved letters.

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

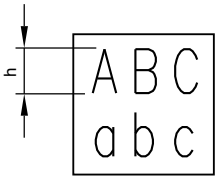
3. Film inserts
Instead of using engraving the lenses can be fitted with transparent film inserts, possibilly backed by a colour foil placed between the lens plate and the marking plate, as an a lternative.
The film thickness is 0.2 mm.
Maximum film size:
for single pushbutton 16 x 16 mm
for double pushbutton 16 x 34.7 mm
for triple pushbutton 16 x 53.8 mm.

Lenses for Indicators | Illuminated pushbuttons

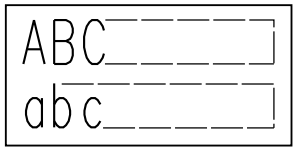
All dimensions in mm

Front size	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
18.6 x 18.6	16 x 16	2	4	7	8	B1
		3	3	6	7	B1
		4	2	4	5	B1
		5	2	3	4	B1
		6	1	3	4	B1
		8	1	2	3	B1
18.6 x 37.8	16 x 34.7	2	4	19	20	B2
		3	3	16	18	B2
		4	2	11	13	B2
		5	2	9	10	B2
		6	1	7	8	B2
		8	1	5	6	B2
18.6 x 56.9	16 x 53.8	2	4	30	32	B3
		3	3	25	28	B3
		4	2	18	20	B3
		5	2	14	16	B3
		6	1	12	13	B3
		8	1	9	10	B3

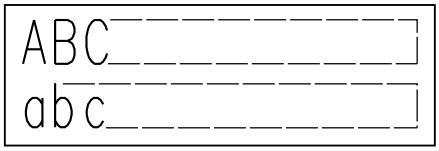
B1



B2

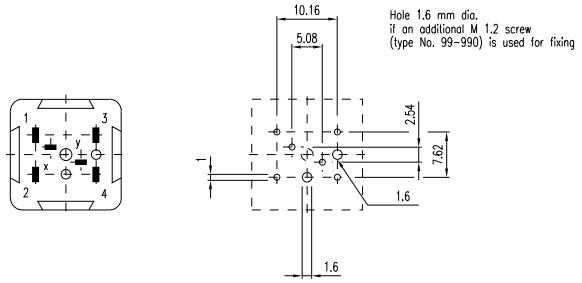


B3



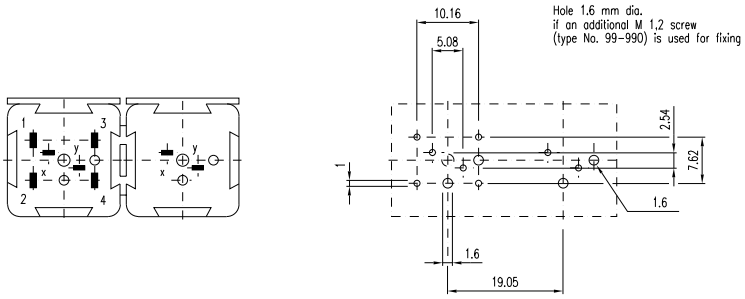
Component layout

1 Indicator actuator single page 35 **| Illuminated pushbutton actuator single** page 37 **| Keylock switch 2 positions** page 39 **| Keylock switch 3 positions** page 39



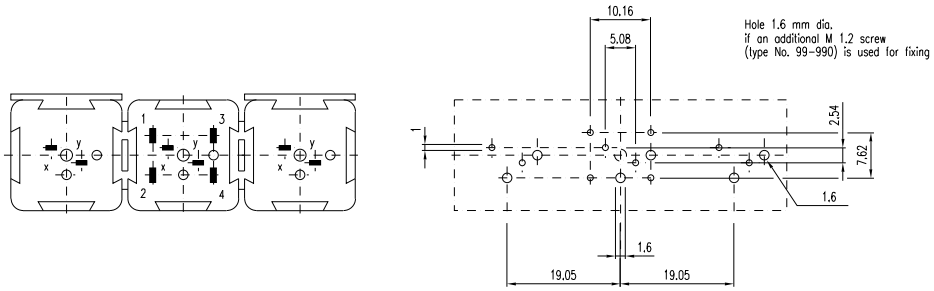
Libraries for the PCB layout-system p-cad 200X see : www.pcad.com/resources/libraries Third-party Libraries

2 Indicator actuator double page 35 **| Illuminated pushbutton actuator double** page 38



Libraries for the PCB layout-system p-cad 200X see : www.pcad.com/resources/libraries Third-party Libraries

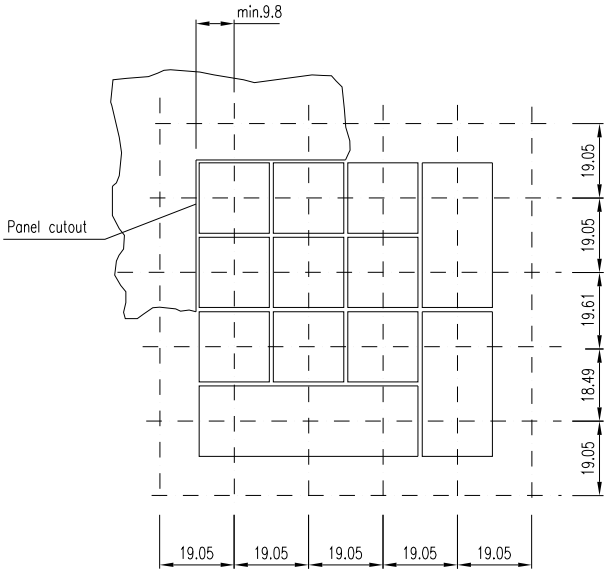
3 Indicator actutor triple page 36 **| Illuminated pushbutton actuator triple** page 38



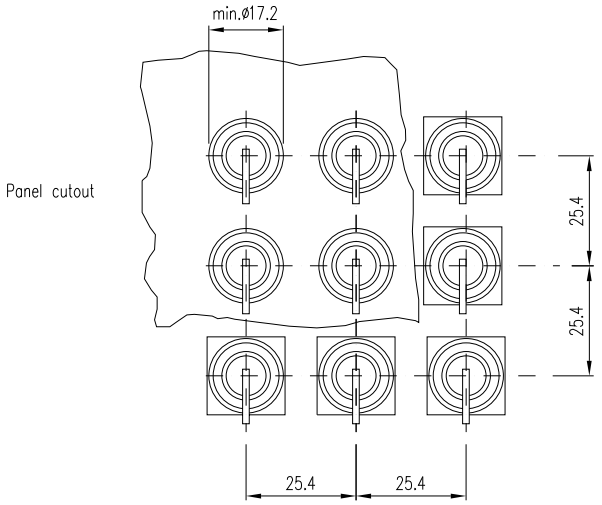
Libraries for the PCB layout-system p-cad 200X see : www.pcad.com/resources/libraries Third-party Libraries

Mounting dimensions

1 Indicator actuator single page 35 | **Indicator actuator double** page 35 | **Indicator actutor triple** page 36 | **Illuminated pushbutton actuator single** page 37 | **Illuminated pushbutton actuator double** page 38 | **Illuminated pushbutton actuator triple** page 38



2 Keylock switch 2 positions page 39 | **Keylock switch 3 positions** page 39



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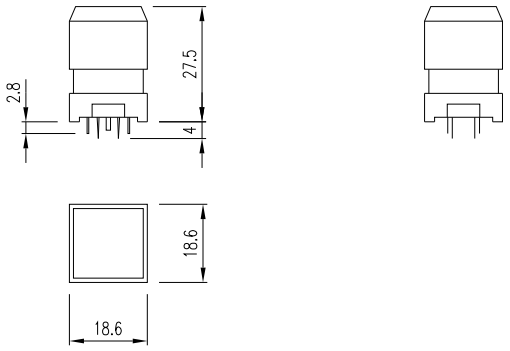
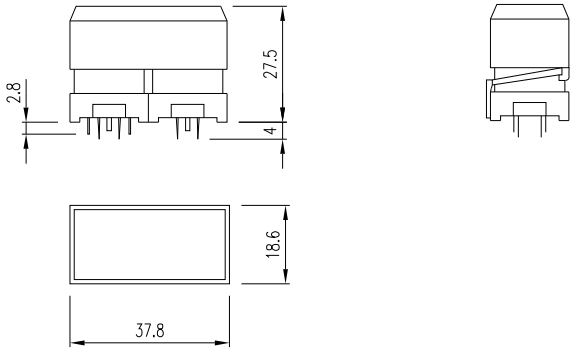
Technical drawing

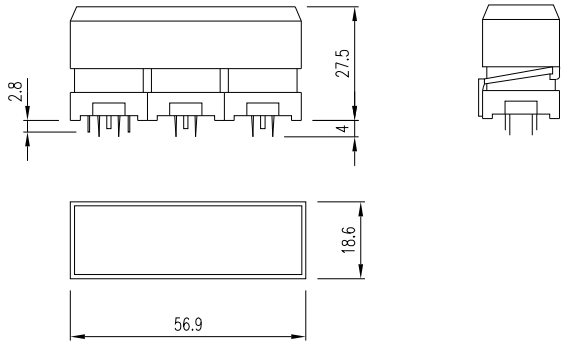
1 Indicator actuator single page 35 **| Illuminated pushbutton actuator single** page 37



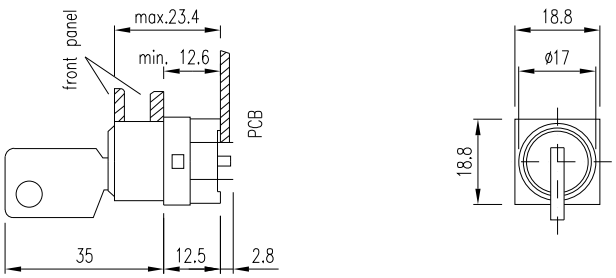
2 Indicator actuator double page 35 **| Illuminated pushbutton actuator double** page 38



3 Indicator actutor triple page 36 **| Illuminated pushbutton actuator triple** page 38



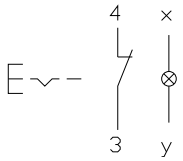
4 Keylock switch 2 positions page 39 **| Keylock switch 3 positions** page 39



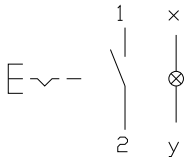
Circuit drawing

1 Indicator actuator single page 35

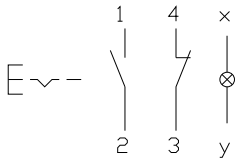
2 Illuminated pushbutton actuator single page 37



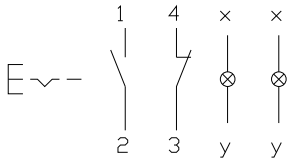
3 Illuminated pushbutton actuator single page 37



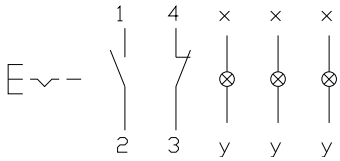
4 Illuminated pushbutton actuator single page 37



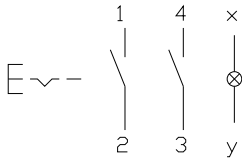
5 Illuminated pushbutton actuator double page 38



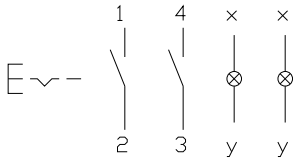
6 Illuminated pushbutton actuator triple page 38



7 Illuminated pushbutton actuator single page 37

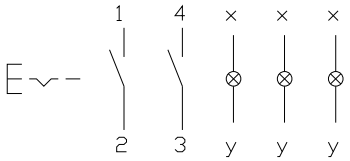


8 Illuminated pushbutton actuator double page 38

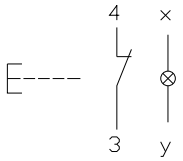


Drawings 99

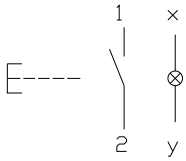
9 Illuminated pushbutton actuator triple page 38



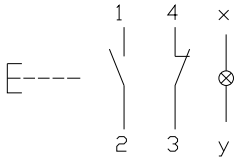
10 Illuminated pushbutton actuator single page 37



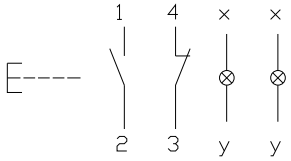
11 Illuminated pushbutton actuator single page 37



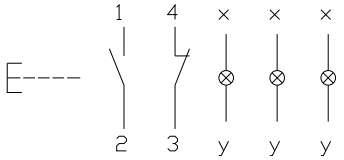
12 Illuminated pushbutton actuator single page 37



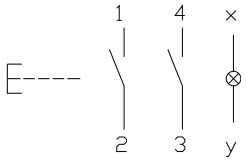
13 Illuminated pushbutton actuator double page 38



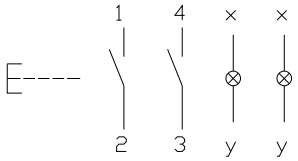
14 Illuminated pushbutton actuator triple page 38



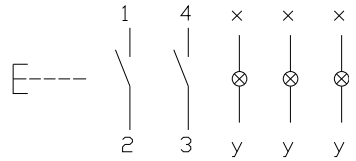
15 Illuminated pushbutton actuator single page 37



16 Illuminated pushbutton actuator double page 38

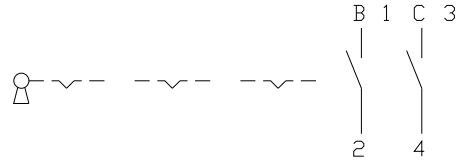


17 Illuminated pushbutton actuator triple page 38

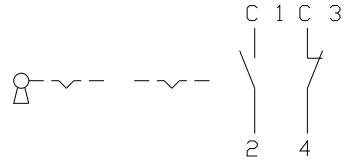


18 Keylock switch 2 positions page 39

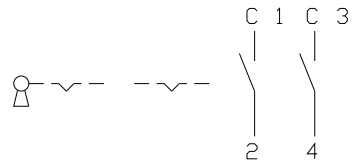
19 Keylock switch 3 positions page 39



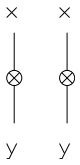
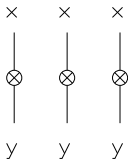
20 Keylock switch 2 positions page 39



21 Keylock switch 2 positions page 39



22 Indicator actuator double page 35



23 Indicator actutor triple page 36