EAO – Your Expert Partner for
Human Machine Interfaces

EAO Product Information

Audio Video

www.eao.com/av_en

eao

Bringing pictures, sounds and stages to live

For more than 60 years, EAO has been one of the leading suppliers of switches and indicators for audio/video, lighting and production equipment. No wonder many of the world's best manufacturers use our products in their systems. Our customers not only appreciate the longevity and high quality but also the fair price policy. This has made us the No. 1 A/V switch supplier worldwide.

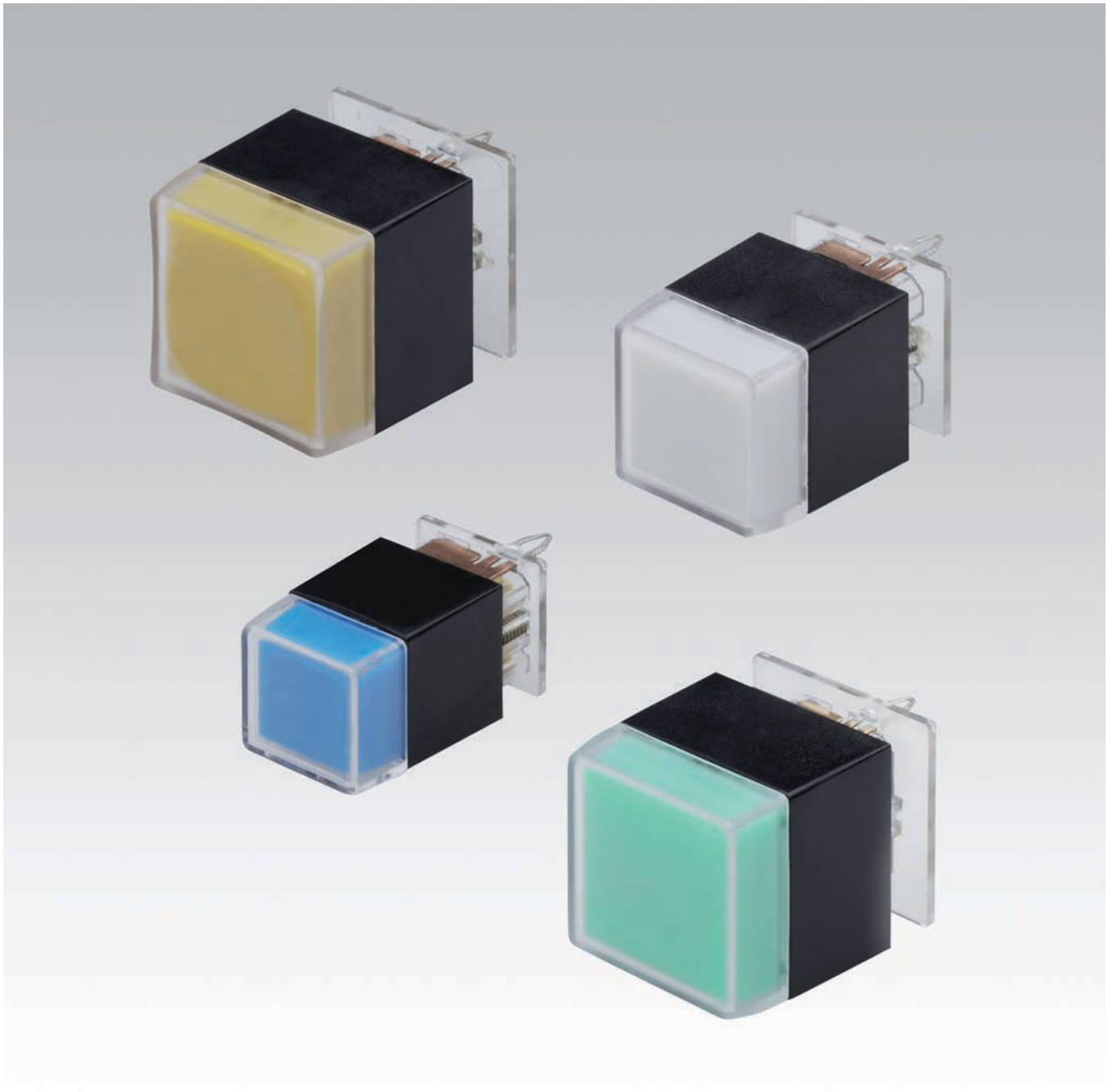
EAO is relied on to help millions of listeners, viewers and audiences enjoy broadcasts of the F1 World Championship, Grand Slam finals and Olympic Games as well as some of the greatest performances in the world's most prestigious locations – Sydney Opera House, Madison Square Garden and Wembley Stadium to name just a few.

Major film and production studios use EAO products to help capture that perfect moment, so do the many outside broadcasting vehicles as they bring you the news.

Smaller theatres and venues also benefit from EAO switches in their semi-professional audio/video mixers and public address systems, lighting rigs and control panels. Wherever there is entertainment, there is EAO.

Upgrade your Human Machine Interfaces with the unique design of EAO audio/video equipment!

Switches and Indicators



Contents 95

Product Information

General notes
The Series 95 is a high quality switch range containing illuminated and non-illuminated pushbuttons for professional Audio and Video applications. According to the switch version, the pushbuttons may be equipped with 2 or 3 SMD LED's with PLCC housing (height 2.1 mm) with a radiation angle of approx. 120 ° and thus generate up to 3 different colors on one pushbutton. The lenses are available matt translucent or clear transparent in flat, concave or convex form.

Fitting
The pushbutton should be plugged-in to the mounting hole and soldered onto the printed circuit board (PCB), after the soldering of the SMD LED's.

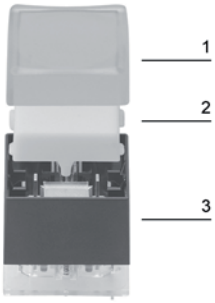
Mounting
Suitable for mounting on PCB's with thickness of 1.5 to 2.5 mm. The separated spring clip contact holds the switch in place during the assembly and soldering process. The soldered joint makes the electrical contact and fixes the switch in the PCB. Maximum soldering-temperature is 260 °C for 5 seconds. There is a solder stop between the SMD-LED's and the contact mounting areas. The PCB layout and mounting details are shown in the dimensional drawings. The switch must be used in a front panel.

Marking
The diffuser can either be printed or engraved, or a film insert can be fitted between the diffuser and the lens.

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

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

Pushbutton illuminative



1 Lens
2 Diffuser
3 Switching element

Illuminated pushbutton



	Front protection	Contacts	Switching action	Terminals	Lens	⍁ 19.05 x 19.05 mm Typ-Nr.	⍁ 15.88 x 15.88 mm Typ-Nr.	⍁ 12.7 x 12.7 mm Typ-Nr.	Component layout	Technical drawing	⚖
Illuminated pushbutton high gloss finished	IP 40	1 NO	M	P	Plastic colourless transparent concave	**95-414.770**			3	3	0.004
					Plastic colourless transparent flush	**95-414.750**			3	3	0.004
mat	IP 40	1 NO	M	P	Plastic colourless transparent concave	**95-414.740**			3	3	0.004
					Plastic colourless transparent convex	**95-414.730**			3	3	0.004
high gloss finished	IP 40	1 NO	M	P	Plastic colourless transparent concave		**95-515.770**		2	2	0.004
					Plastic colourless transparent flush		**95-515.750**		2	2	0.004
mat	IP 40	1 NO	M	P	Plastic colourless transparent concave		**95-515.740**		2	2	0.004
					Plastic colourless transparent flush		**95-515.720**		2	2	0.004
high gloss finished	IP 40	1 NO	M	P	Plastic colourless transparent flush			**95-313.750**	1	1	0.003
mat	IP 40	1 NO	M	P	Plastic colourless transparent flush			**95-313.720**	1	1	0.003

Contacts: NO = Normally open
Switching action: M = Momentary action
Terminals: P = PCB terminal
Component layout from page 13, Technical drawing from page 14

Front

Lens

	Lens	⍞ 19.05 x 19.05 mm Typ-Nr.	⍞ 15.88 x 15.88 mm Typ-Nr.	⍞ 12.7 x 12.7 mm Typ-Nr.	kg
Lens high gloss finished	Plastic colourless transparent concave	**95-704.770**	**95-705.770**		0.001
	Plastic colourless transparent convex	**95-704.760**			0.001
	Plastic colourless transparent flush	**95-704.750**		**95-703.750**	0.001
mat	Plastic colourless transparent concave	**95-704.740**	**95-705.740**		0.001
	Plastic colourless transparent convex	**95-704.730**	**95-705.730**		0.001
	Plastic colourless transparent flush	**95-704.720**	**95-705.720**	**95-703.720**	0.001

Diffuser

	Diffuser	⍞ 19.05 x 19.05 mm Typ-Nr.	⍞ 15.88 x 15.88 mm Typ-Nr.	⍞ 12.7 x 12.7 mm Typ-Nr.	kg
Diffuser	Plastic blue translucent	**95-804.620**		**95-803.620**	0.001
	Plastic colourless transparent	**95-804.720**		**95-803.720**	0.001
	Plastic green translucent	**95-804.520**		**95-803.520**	0.001
	Plastic orange translucent	**95-804.320**		**95-803.320**	0.001
	Plastic red translucent	**95-804.220**		**95-803.220**	0.001
	Plastic white translucent	**95-804.920**	**95-805.920**	**95-803.920**	0.001
	Plastic yellow translucent	**95-804.420**		**95-803.420**	0.001

Backside

Switching element

	Switching action	Contacts	⍞ 19.05 x 19.05 mm Typ-Nr.	⍞ 15.88 x 15.88 mm Typ-Nr.	⍞ 12.7 x 12.7 mm Typ-Nr.	Component layout	kg
Switching element without Lens and Diffuser	M	1 NO	**95-414.000**			3	0.003
				95-515.000		2	0.002
					95-313.000	1	0.002

for combining with Lens and Diffuser
Switching action: M = Momentary action
Contacts: NO = Normally open
Component layout from page 13

Assembling

Lens remover

	Typ-Nr.	[kg]
Lens remover	**95-900.005**	0.003

Owing to possible mechanical damage removed lens must be replaced by a new part

Mounting tool

	Typ-Nr.	[kg]
Mounting tool	**95-900.009**	0.003

Pushbutton- and Illuminated pushbutton

Switching system
Gold plated momentary contact, 1 normally open, self-cleaning

Material

Plastic parts
PC, as per UL 94 HB, Cd-free

Material of contacts
CuSn, contact gold-plated, soldering terminal tinned

Mechanical characteristics

Actuating travel
4.5 mm

Actuating force
3 N to end position

Switching point
2.3 mm ±0.8 mm at operation

Life time
>5 million operations, as per IEC 60512-5-9a

Electrical characteristics

Illumination
recommended SMD-LED types:
P-LCC package or similar, radiation angle approx. 120 °;
use of smaller SMD-LED is possible.

SMD-LED configurations size:
max. 2 SMD-LEDs for switch size 12.70 mm
max. 3 SMD-LEDs for switch size 15.88 mm and 19.05 mm, single colour or multi-colour.

Height of SMD-LED:
max. 2.1 mm

Electric strength
≤50 mΩ, as per IEC 60512-2-2b at new state

Isolation resistance
>1 TΩ, as per IEC 60512-2-3a between contacts

Switch rating
min. 1 mVDC, 100 µA
max. 48 VDC, 50 mA

Electric strength
2.5 kVAC, as per IEC 60512-2-11

Environmental conditions

Front protection
IP 40 before front plate for complete switch

Operating temperature
-25 °C ... +70 °C

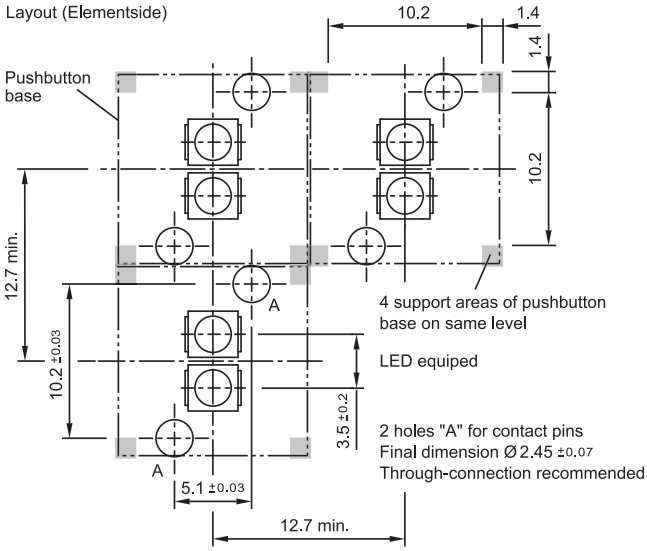
Storage temperature
-40 °C ... +80 °C

Vibration resistance
10 g, at 10 - 2000 Hz, 0.75 mm, as per IEC 60512-4-4

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

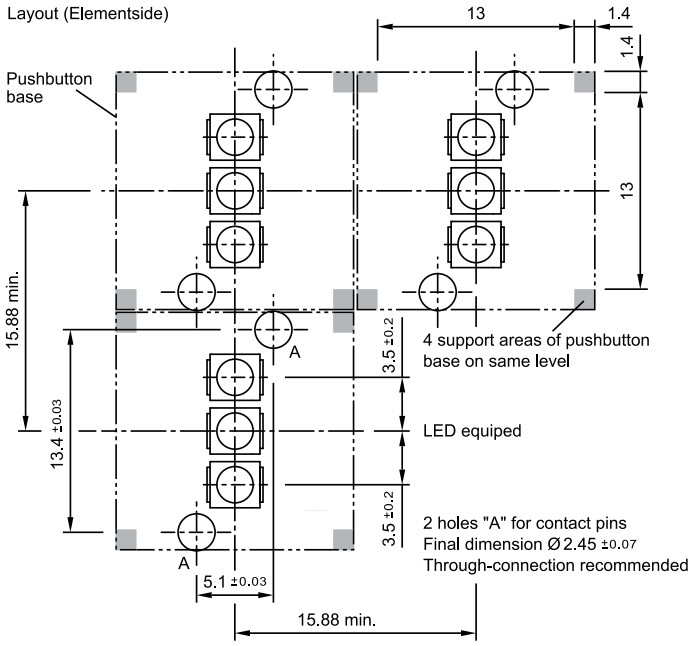
Component layout

1 Illuminated pushbutton page 9 | **Switching element** page 10



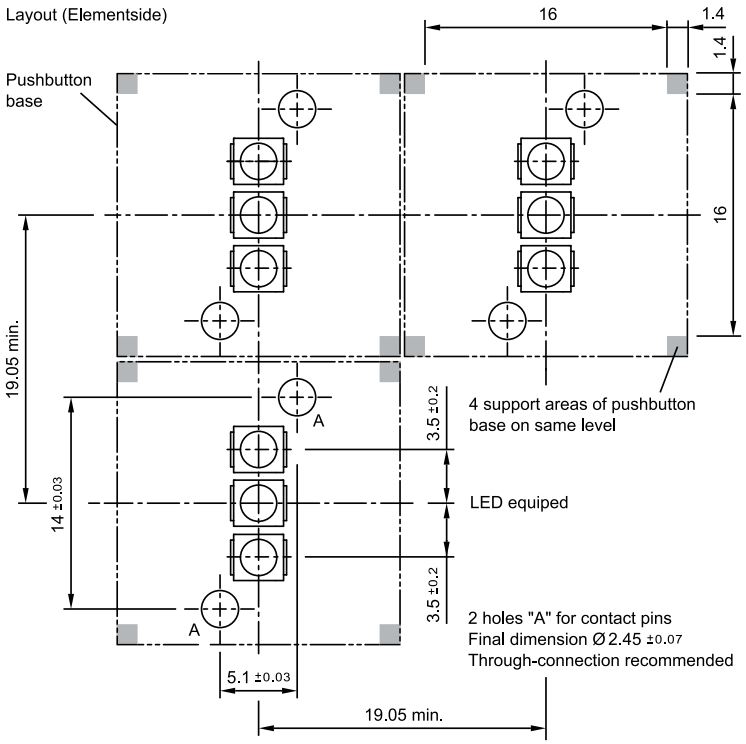
Libraries for the PCB layout-system p-cad 200X see : www.pcad.com/recources/libraries Third-party Libraries

2 Illuminated pushbutton page 9 | **Switching element** page 10



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

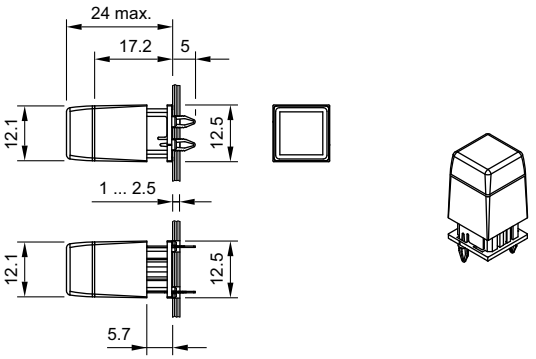
3 Illuminated pushbutton page 9 | **Switching element** page 10



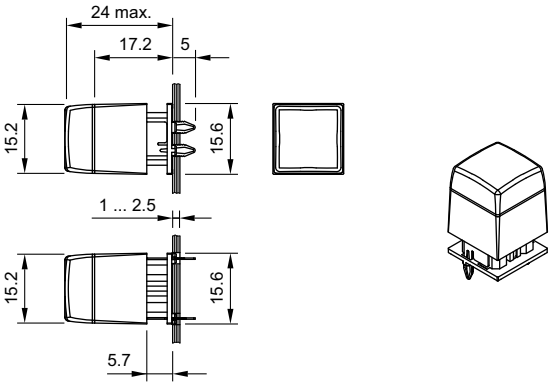
Libraries for the PCB layout-system p-cad 200X see : www.pcad.com/recources/libraries Third-party Libraries

Technical drawing

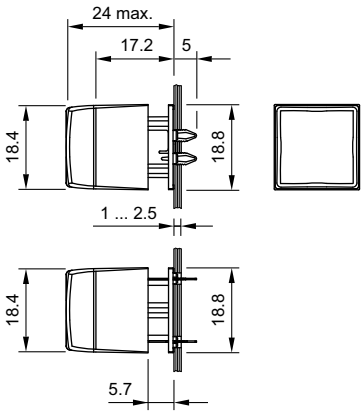
1 Illuminated pushbutton page 9

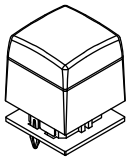


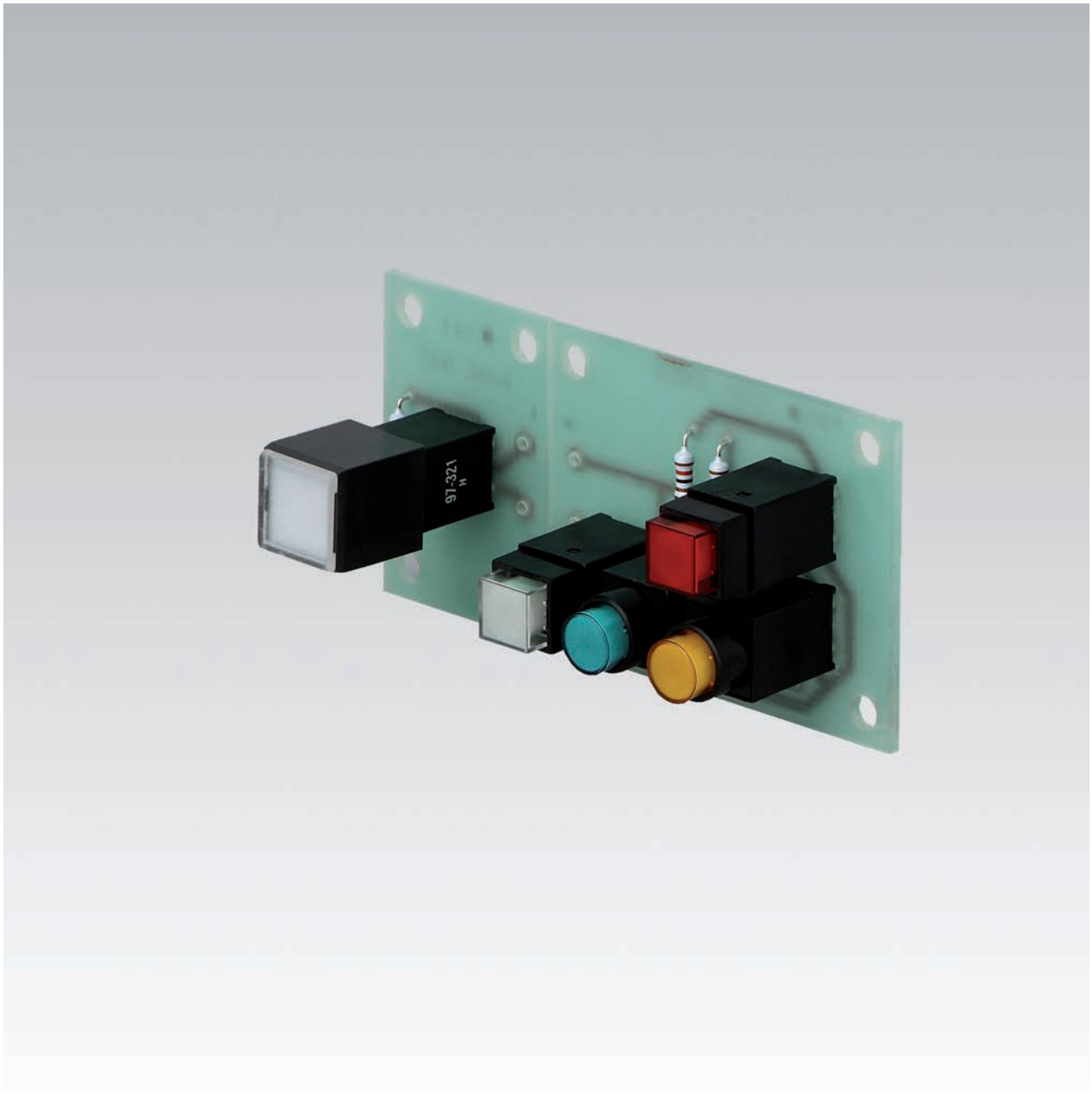
2 Illuminated pushbutton page 9



3 Illuminated pushbutton page 9






97-32

Contents 97

Product Information

General notes
The series 97 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 front dimensions are 9 x 9 mm or 9 mm dia.; or with overhanging lens 12.2 x 12.2 mm.

Mounting
The illuminated pushbuttons of series 97 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 and prevents the button from lifting when being soldered.

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 flat lenses, made of polycarbonate, are obtainable in various colours. The transparent lens is available with translucent or transparent support.
The overhanging lenses consist of a lens bezel, a text plate and a mat transparent lens plate, obtainable in flat form.

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

Illumination
Perfect illumination of the different coloured lenses is assured by LED Bi-Pin T 1 lamps. The LEDs are soldered through the pushbutton housing direct onto the PC boards.
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.

Specimen order

Indicator :

- Indicator actuator, 9 mm dia.	97-061.007

Essential accessories :

- Lens, plastic blue transparent flush, 9 mm dia.	97-932.6
- Single-LED T1 Bi-Pin, 2.2 VDC, 20 mA, yellow	10-2602.3174F

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

Essential Accessories:

- Lens page 24
- Single-LED page 25

	Front protection	Terminals	⊡ 9 x 9 mm Typ-Nr.	Ø 9 mm Typ-Nr.	Component layout	Mounting dimensions	Technical drawing	Circuit drawing	⚖
Indicator actuator	IP 40	P	**97-081.007**	**97-061.007**	1	1	1	1	0.002

Terminals: P = PCB terminal
Component layout from page 28, Mounting dimensions from page 28, Technical drawing from page 29, Circuit drawing from page 29

Indicator actuator overhanging

Essential Accessories:

- Lens overhanging complete page 24
- Single-LED for overhanging version page 25

	Front protection	Terminals	⊡ 12.2 x 12.2 mm Typ-Nr.	Component layout	Mounting dimensions	Technical drawing	Circuit drawing	⚖
Indicator actuator overhanging	IP 40	P	**97-041.007**	1	2	2	1	0.002

Terminals: P = PCB terminal
Component layout from page 28, Mounting dimensions from page 28, Technical drawing from page 29, Circuit drawing from page 29

Illuminated pushbutton actuator

Essential Accessories:

Lens page 24

Single-LED page 25

	Front protection	Contacts	Switching action	Terminals	□ 9 x 9 mm Typ-Nr.	Ø 9 mm Typ-Nr.	Component layout	Mounting dimensions	Technical drawing	Circuit drawing	kg
Illuminated pushbutton actuator	IP 40	1 NC	MA	P	**97-382.037**	**97-372.037**	2	1	1	2	0.002
			M	P	**97-352.037**	**97-332.037**	2	1	1	6	0.002
		1 NC + 1 NO	MA	P	**97-383.037**	**97-373.037**	2	1	1	3	0.002
			M	P	**97-353.037**	**97-333.037**	2	1	1	7	0.002
		1 NO	MA	P	**97-380.037**	**97-370.037**	2	1	1	5	0.002
			M	P	**97-350.037**	**97-330.037**	2	1	1	9	0.002
		2 NO	MA	P	**97-381.037**	**97-371.037**	2	1	1	4	0.002
			M	P	**97-351.037**	**97-331.037**	2	1	1	8	0.002

Contacts: NC = Normally closed, NO = Normally open
Switching action: MA = Maintained action, M = Momentary action
Terminals: P = PCB terminal
Component layout from page 28, Mounting dimensions from page 28, Technical drawing from page 29, Circuit drawing from page 29

Illuminated pushbutton actuator overhanging

Essential Accessories:

- Lens overhanging complete page 24
- Single-LED for overhanging version page 25

	Front protection	Contacts	Switching action	Terminals	⊞ 12.2 x 12.2 mm Typ-Nr.	Component layout	Mounting dimensions	Technical drawing	Circuit drawing	kg
Illuminated pushbutton actuator overhanging	IP 40	1 NC	MA	P	**97-362.037**	2	2	2	2	0.002
			M	P	**97-322.037**	2	2	2	6	0.002
		1 NC + 1 NO	MA	P	**97-363.037**	2	2	2	3	0.002
			M	P	**97-323.037**	2	2	2	7	0.002
		1 NO	MA	P	**97-360.037**	2	2	2	5	0.002
			M	P	**97-320.037**	2	2	2	9	0.002
		2 NO	MA	P	**97-361.037**	2	2	2	4	0.002
			M	P	**97-321.037**	2	2	2	8	0.002

Contacts: NC = Normally closed, NO = Normally open
Switching action: MA = Maintained action, M = Momentary action
Terminals: P = PCB terminal
Component layout from page 28, Mounting dimensions from page 28, Technical drawing from page 29, Circuit drawing from page 29

Front

Lens

	Lens	Lens holder	⍈ 9 x 9 mm Typ-Nr.	Ø 9 mm Typ-Nr.	kg
Lens Plastic (not for film insert and LED)	black opaque flush	translucent	**97-951.0**	**97-931.0**	0.001
	blue translucent flush	translucent	**97-951.6**	**97-931.6**	0.001
	green translucent flush	translucent	**97-951.5**	**97-931.5**	0.001
	grey opaque flush	translucent	**97-951.8**	**97-931.8**	0.001
	red translucent flush	translucent	**97-951.2**	**97-931.2**	0.001
	white translucent flush	translucent	**97-951.9**	**97-931.9**	0.001
	yellow translucent flush	translucent	**97-951.4**	**97-931.4**	0.001
Plastic (not recommanded for film insert)	blue transparent flush	transparent	**97-952.6**	**97-932.6**	0.001
	colourless transparent flush	transparent	**97-952.7**	**97-932.7**	0.001
	green transparent flush	transparent	**97-952.5**	**97-932.5**	0.001
	red transparent flush	transparent	**97-952.2**	**97-932.2**	0.001
	yellow transparent flush	transparent	**97-952.4**	**97-932.4**	0.001

Lens overhanging complete

for indicator and illuminated pushbutton overhanging

	Lens plate	⍈ 12.2 x 12.2 mm Typ-Nr.	kg
Lens overhanging complete flush, mat	Plastic colourless transparent	**97-910.9**	0.001

Lens plate

for lens overhanging

	Lens plate	⍈ 12.2 x 12.2 mm Typ-Nr.	kg
Lens plate convex for film insert or marking plate	Plastic colourless transparent	**97-929.7A**	0.001
flush, mat	Plastic blue transparent	**97-927.6**	0.001
	Plastic colourless transparent	**97-927.7**	0.001
	Plastic green transparent	**97-927.5**	0.001
	Plastic red transparent	**97-927.2**	0.001
	Plastic yellow transparent	**97-927.4**	0.001
flush for film insert or marking plate	Plastic blue transparent	**97-921.6**	0.001
	Plastic colourless transparent	**97-921.7**	0.001
	Plastic green transparent	**97-921.5**	0.001
	Plastic red transparent	**97-921.2**	0.001
	Plastic yellow transparent	**97-921.4**	0.001

Marking plate

for lens overhanging

	Marking plate	⏍ 12.2 x 12.2 mm Typ-Nr.	kg
Marking plate	Plastic white translucent	**97-908.9**	0.001

Marking foil

for lens overhanging

	Marking foil	Typ-Nr.	kg
Marking foil	colourless	**97-909.7**	0.001

Lens bezel

for lens overhanging

	Lens bezel	Typ-Nr.	kg
Lens bezel rounded edges	Plastic grey	**97-920.83**	0.001
with edges	Plastic grey	**97-920.8**	0.001

Illumination

Single-LED

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

Single-LED for overhanging version

	Socket	Light colour	Operating voltage/-current	Typ-Nr.	kg
Single-LED for overhanging version	T1 Bi-Pin	green	2.2 VDC, 20 mA	**10-2602.3175G**	0.001
		red	2.2 VDC, 20 mA	**10-2602.3172G**	0.001
		yellow	2.2 VDC, 20 mA	**10-2602.3174G**	0.001

Assembling

Lens remover

for lens standard

	Typ-Nr.	kg
Lens remover	**19-910**	0.002

Actuator with 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

Lens
Polycarbonate (PC)

Switch housing
Polyester, self-extinguishing

Material of contact
Gold plated

Mechanical characteristics

Actuating force
3.4 N ±0.3 N (130 g)

Actuating travel
Lead distance NC contact: 0.6 mm ±0.2 mm
Lead distance NO contact: 1.6 mm ±0.2 mm
Total distance: 3 mm ±0.2 mm

Rebound time
typ. ≤200 µs

Mechanical lifetime
≤5 million operations, as per IEC 60512-5-9a

Electrical characteristics

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

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

Electrical life
≥2 million operations at 30 VDC/100 mA, as per IEC 60512-5-9c

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

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

Environmental conditions

Storage temperature
-40 °C ... +85 °C

Service temperature
-25 °C ... +65 °C

Front protection
IP 40 front side, as per IEC 60529

Shock resistance
(single impacts, semi-sinusoidal)
≥50 g for 11 ms, as per IEC 60512-4-3

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

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 marking plates will be in black.
Standard height of letters is 2 mm. If the height is not specified, we will supply 2 mm engraved letters.

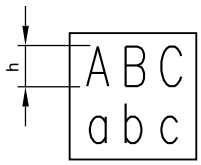
2. Hot stamping
For larger series it is worth considering markings by means of hot stamping or laser engraving. We will pleased to advise you.
For letters and figures, typefaces with 2.5 mm, 3 mm and 4 mm are available.

3. Film inserts for overhanging lens
Instead of using engraving the lenses can be fitted with transparent film inserts, placed between the lens plate and the marking plate.
The film thickness is 0.2 mm.
Maximum film size 10 x 10 mm.

Lenses for Indicators | Illuminated pushbuttons

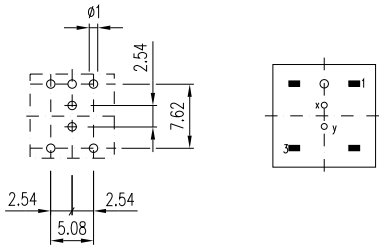
All dimensions in mm

Height of letters h	Number of lines	Number of (target value) capital letters per line	Number of (target value) small letters per line
2	3	6	7
3	2	5	6
4	2	4	4
5	1	3	3
6	1	2	3
8	1	1	1

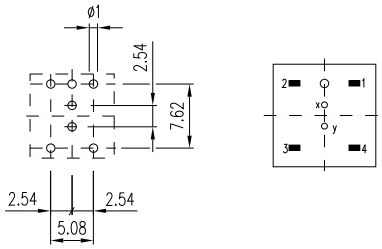


Component layout

1 Indicator actuator page 21 **| Indicator actuator overhanging** page 21

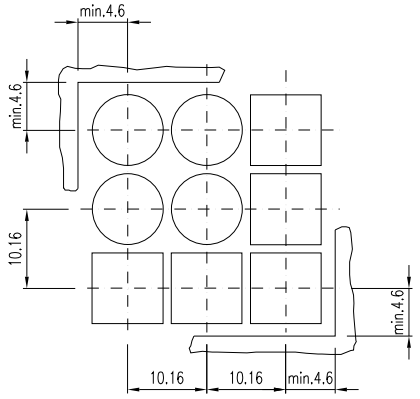


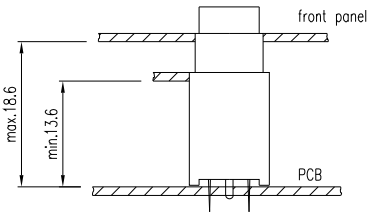
2 Illuminated pushbutton actuator page 22 **| Illuminated pushbutton actuator overhanging** page 23



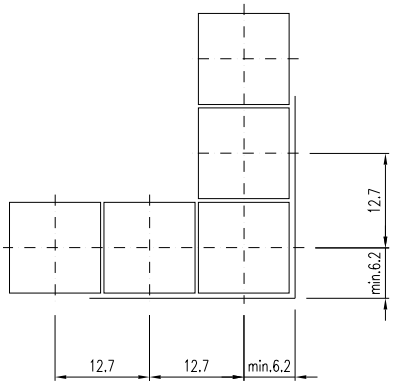
Mounting dimensions

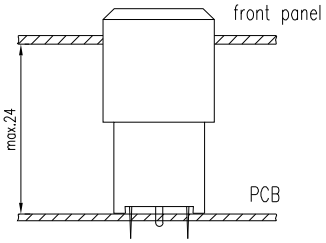
1 Indicator actuator page 21 **| Illuminated pushbutton actuator** page 22





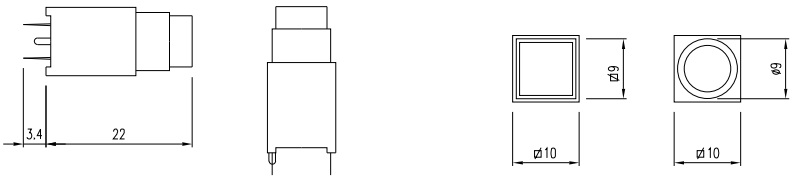
2 Indicator actuator overhanging page 21 **| Illuminated pushbutton actuator overhanging** page 23



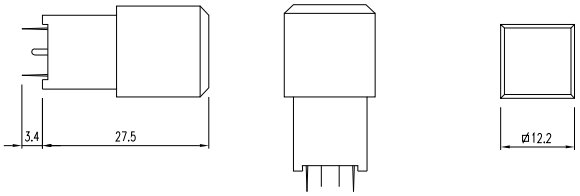


Technical drawing

1 Indicator actuator page 21 **| Illuminated pushbutton actuator** page 22



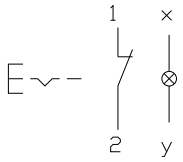
2 Indicator actuator overhanging page 21 **| Illuminated pushbutton actuator overhanging** page 23



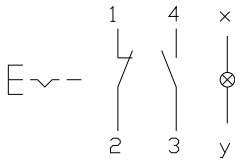
Circuit drawing

1 Indicator actuator page 21 **| Indicator actuator overhanging** page 21

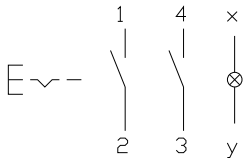
2 Illuminated pushbutton actuator page 22 **| Illuminated pushbutton actuator overhanging** page 23



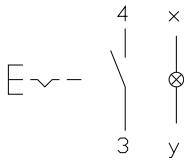
3 Illuminated pushbutton actuator page 22 **| Illuminated pushbutton actuator overhanging** page 23



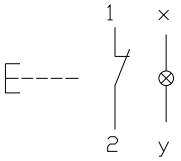
4 Illuminated pushbutton actuator page 22 **| Illuminated pushbutton actuator overhanging** page 23



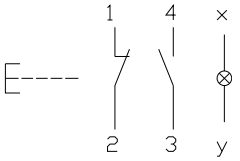
5 Illuminated pushbutton actuator page 22 **| Illuminated pushbutton actuator overhanging** page 23



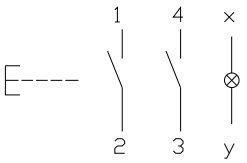
6 Illuminated pushbutton actuator page 22 | **Illuminated pushbutton actuator overhanging** page 23



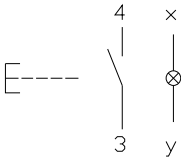
7 Illuminated pushbutton actuator page 22 | **Illuminated pushbutton actuator overhanging** page 23

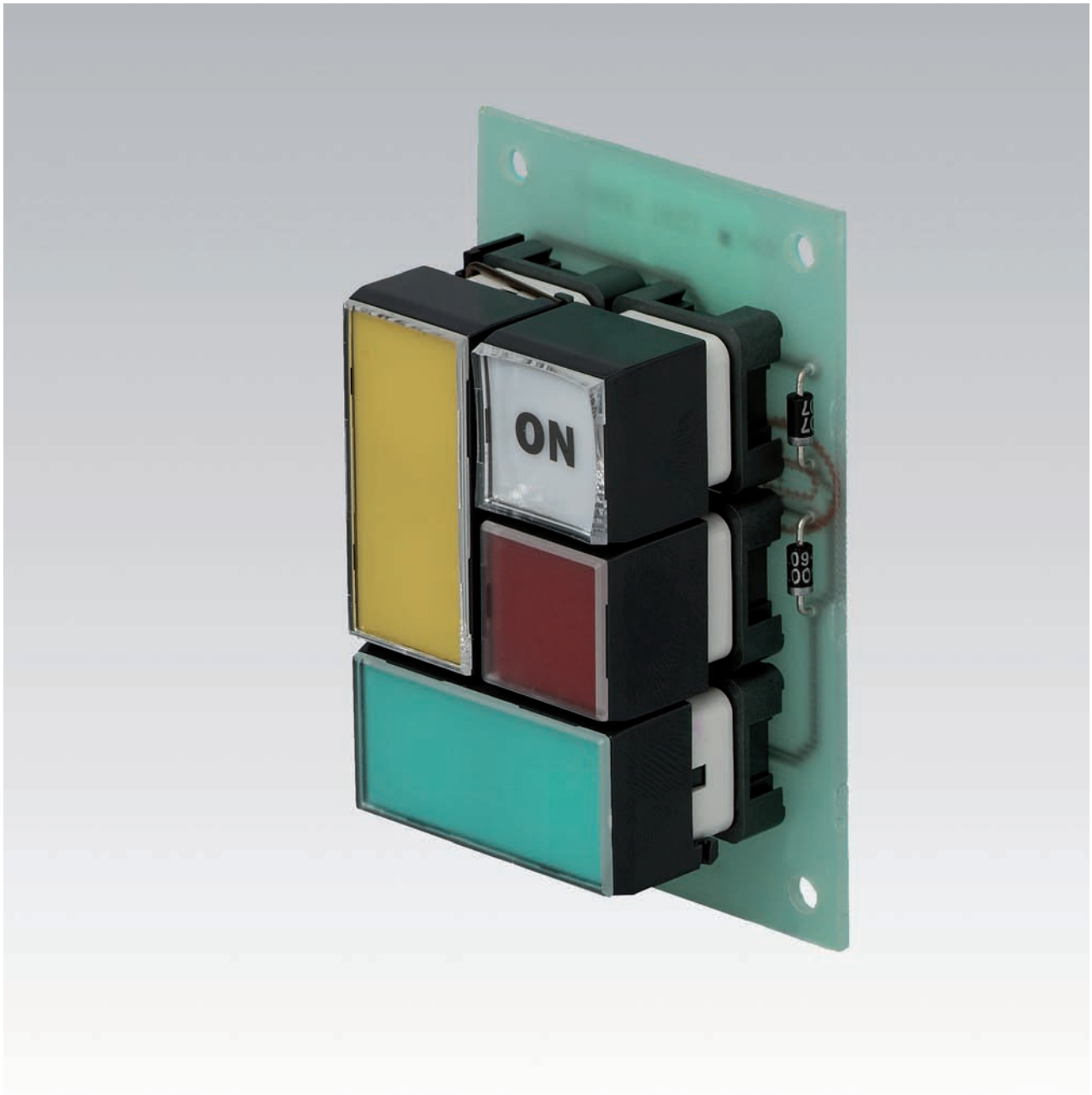


8 Illuminated pushbutton actuator page 22 | **Illuminated pushbutton actuator overhanging** page 23



9 Illuminated pushbutton actuator page 22 | **Illuminated pushbutton actuator overhanging** page 23




ON

Contents 99

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 :

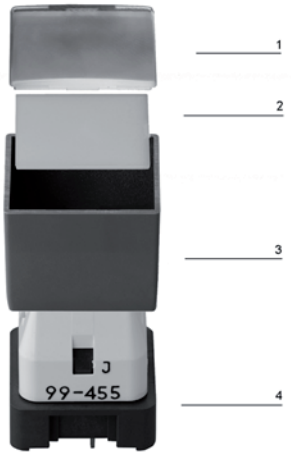
- Indicator actuator single, 18.6 x 18.6 mm	99-050.807

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	kg
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	kg
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	⚖
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

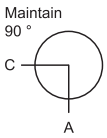
Essential Accessories:

- 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

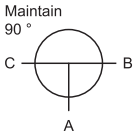
Keylock switch 2 positions



	Front protection	Contacts	Switching action	Terminals	Key remove	中 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	中 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.	kg
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.	kg
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

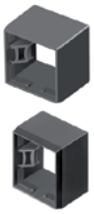
for lens single

	Marking plate	⍈ 18.6 x 18.6 mm Typ-Nr.	kg
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.	kg
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.	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 foil	⍈ 18.6 x 56.9 mm Typ-Nr.	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

	Blind plug	⍈ 19 x 19 mm Typ-Nr.	kg
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.	kg
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.	kg
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.

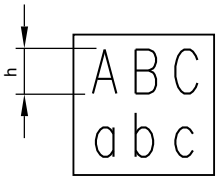
3. Film inserts
Instead of using engraving the lenses can be fitted with transparent film inserts, possibilly backed by a colour foil placed between the lens plate and the marking plate, as an a lternative.
The film thickness is 0.2 mm.
Maximum film size:
for single pushbutton 16 x 16 mm
for double pushbutton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

Lenses for Indicators | Illuminated pushbuttons

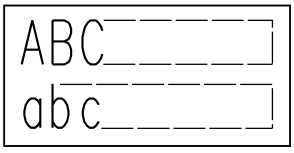
All dimensions in mm

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

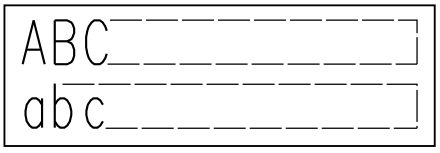
B1



B2

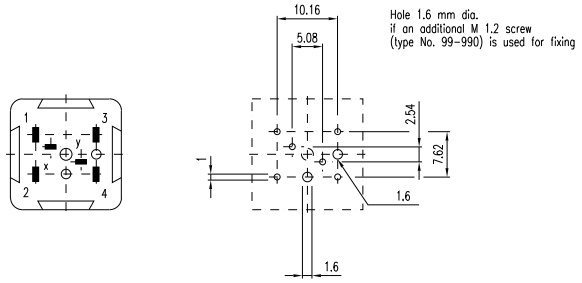


B3



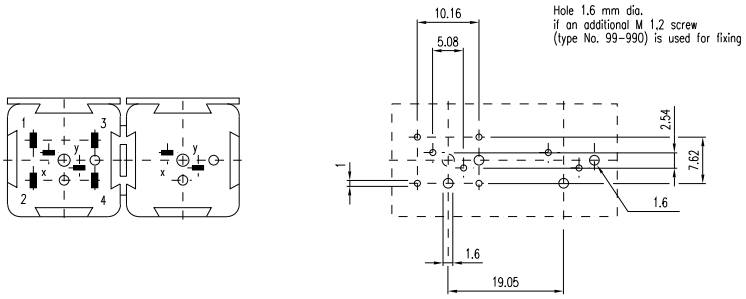
Component layout

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



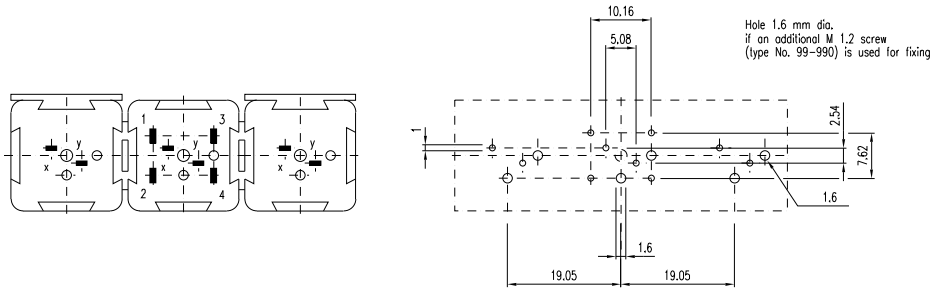
Libraries for the PCB layout-system p-cad 200X see : www.pcad.com/resources/libraries Third-party Libraries

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

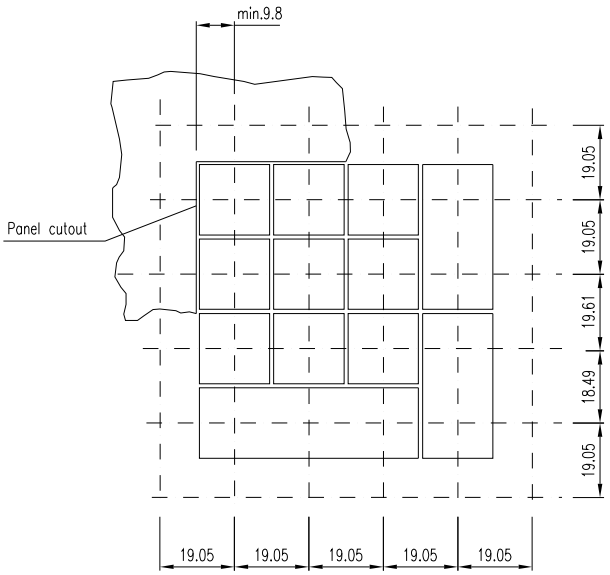
3 Indicator actutor triple page 36 **| Illuminated pushbutton actuator triple** page 38



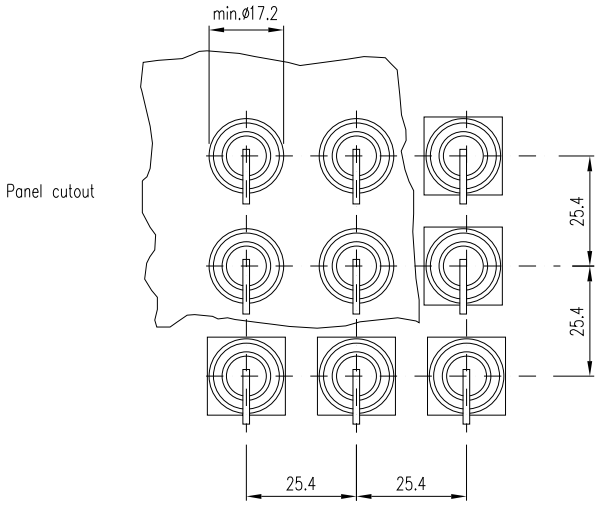
Libraries for the PCB layout-system p-cad 200X see : www.pcad.com/resources/libraries Third-party Libraries

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



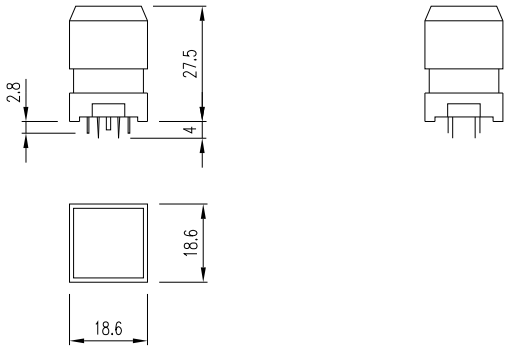
2 Keylock switch 2 positions page 39 | **Keylock switch 3 positions** page 39



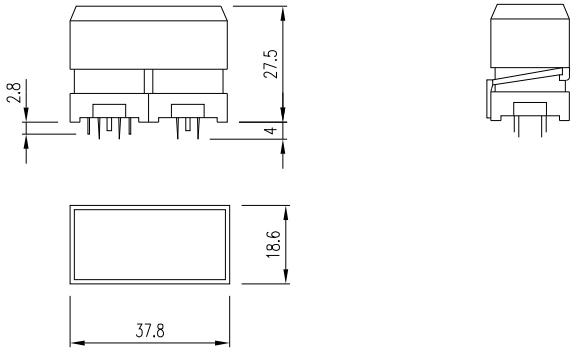
Drawings 99

Technical drawing

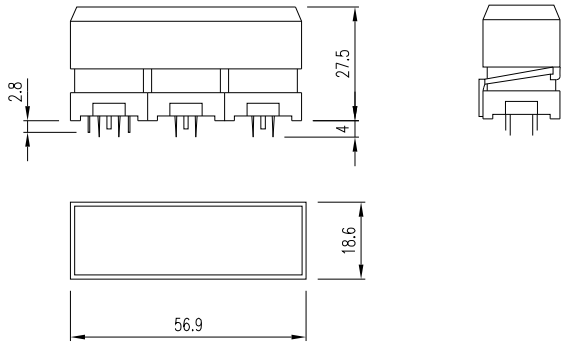
1 Indicator actuator single page 35 **| Illuminated pushbutton actuator single** page 37



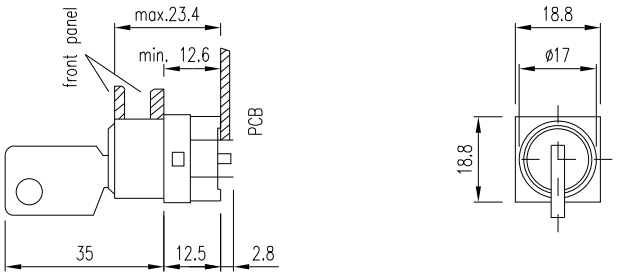
2 Indicator actuator double page 35 **| Illuminated pushbutton actuator double** page 38



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



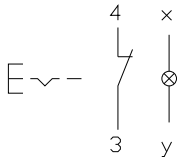
4 Keylock switch 2 positions page 39 **| Keylock switch 3 positions** page 39



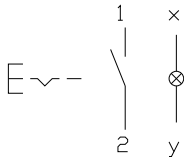
Circuit drawing

1 Indicator actuator single page 35

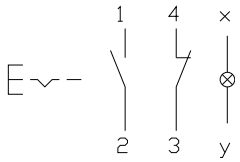
2 Illuminated pushbutton actuator single page 37



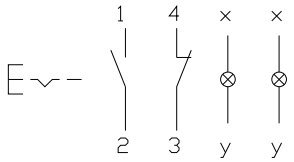
3 Illuminated pushbutton actuator single page 37



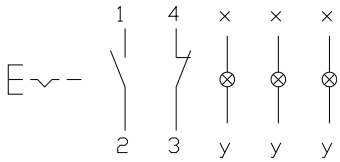
4 Illuminated pushbutton actuator single page 37



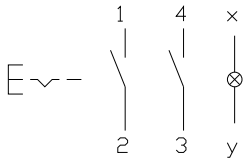
5 Illuminated pushbutton actuator double page 38



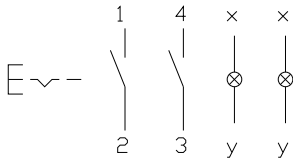
6 Illuminated pushbutton actuator triple page 38



7 Illuminated pushbutton actuator single page 37

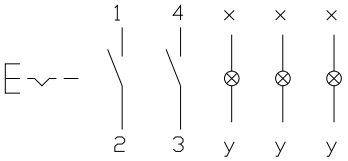


8 Illuminated pushbutton actuator double page 38

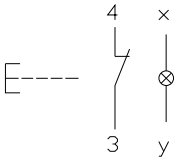


Drawings 99

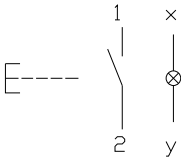
9 Illuminated pushbutton actuator triple page 38



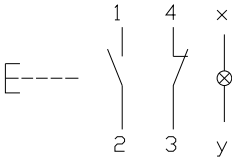
10 Illuminated pushbutton actuator single page 37



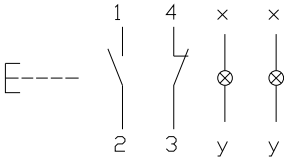
11 Illuminated pushbutton actuator single page 37



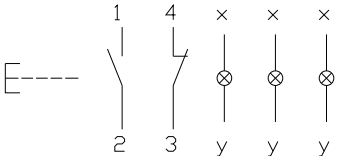
12 Illuminated pushbutton actuator single page 37



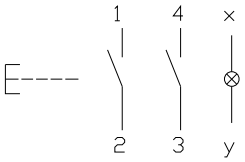
13 Illuminated pushbutton actuator double page 38



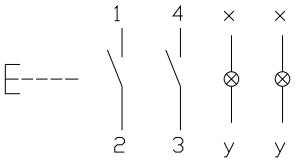
14 Illuminated pushbutton actuator triple page 38



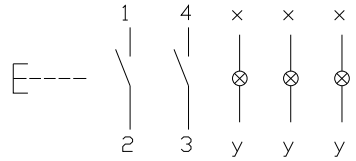
15 Illuminated pushbutton actuator single page 37



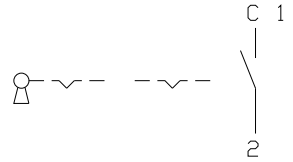
16 Illuminated pushbutton actuator double page 38



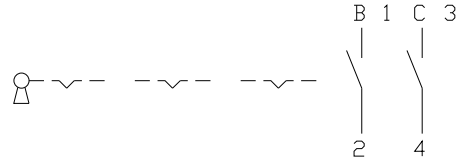
17 Illuminated pushbutton actuator triple page 38



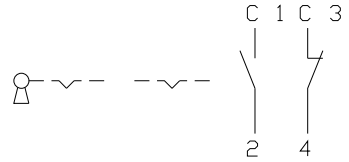
18 Keylock switch 2 positions page 39



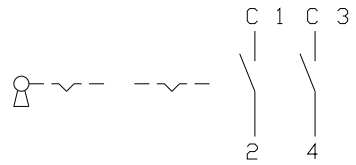
19 Keylock switch 3 positions page 39



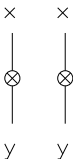
20 Keylock switch 2 positions page 39



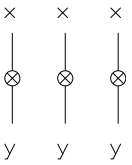
21 Keylock switch 2 positions page 39

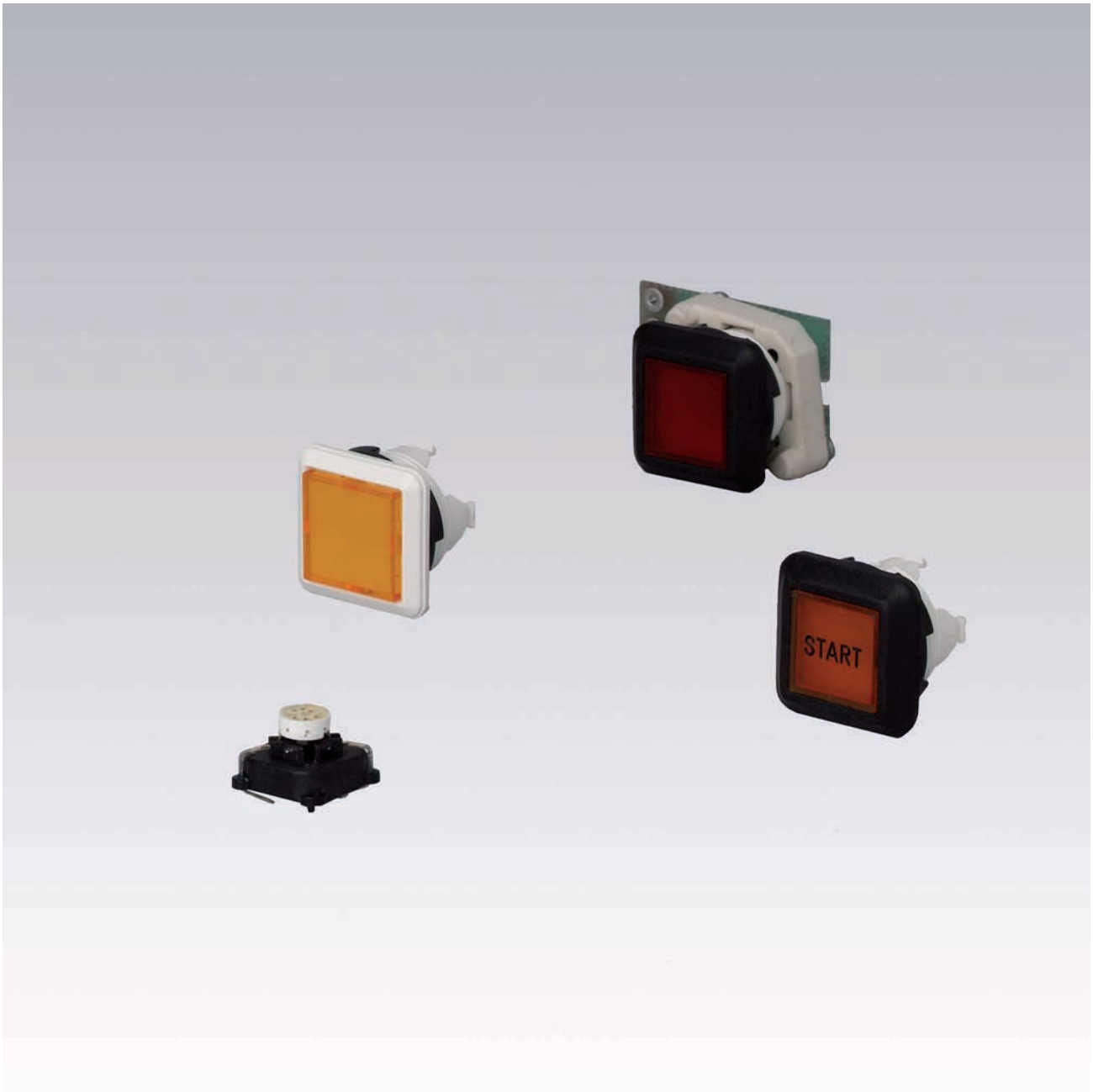


22 Indicator actuator double page 35



23 Indicator actutor triple page 36




START

Contents 92

Product Information

General notes
With the series 92, users have a comprehensive range of applications at their disposal in the PCB key range. In particular, this series is an interesting alternative to the membrane switching system, because it offers convincing advantages, such as: Saving on initial costs, short manufacturing times, all-over illumination and a reliable and nevertheless removable PCB fastening technology.
With the series 92, many different applications are possible even as a discrete switch.
Thanks to front sealing IP 67, and the use of chemical-resistant materials, the elements of this series are suited for industrial use.
The actuator, measuring 18.8 x 18.8 mm at the front (18.8 x 18.4 mm IP 40), is available as an indicator, pushbutton or illuminated pushbutton in marked or unmarked versions.
In order to have matching colours, the actuator element can be supplied with different colours. The switching element complies with international protection level IP 40 and is solder-proof on the connection side. The specially formed connection legs prevent it from falling out when using flow soldering.

Mounting
The actuators of the series 92 are made for the standard 16 mm dia. mounting hole and fastened tightly to the front panel by means of a fixing nut. Mounting torque max. 50 Ncm.
The switching element is mounted on the printed board independently of the actuator. The arrangement of contacts is based on the matrix dimension 2.54 mm (1/10"). By means of the mounting flange, the PCB can be snapped on the pre-assembed actuator. Later adjustment is no longer necessary. The mounting flange is fastened to the PCB with two 1.8 mm dia. screws, also independent of the actuator. The positioning and the number of flanges is determined by the size of the front panel or PCB.
The actuators are protected against distortion.

Lenses
The flat front bezel with integrated pressure plate, made of UV resistant TPE has a black finish (standard). Colour variations enable the manufacture of transparent pressure plates of different colours.

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

Illumination
Perfect illumination of the touch surfaces available in various colours is assured by the LEDs Bi-Pin T1 in the colours blue, yellow, green, orange, red and white.
Luminosity and wave length scattering caused by the technology used in the LED manufacturing processes may lead to visual differences in our products.

Cleaning of soldered PCB
PCBs are often cleaned after machine soldering. When doing this, care must be taken to prevent the "cleaning fluid" polluted with dirt, grease and flux from penetrating the switch.

Specimen order

Illuminated pushbutton :

- Illuminated pushbutton actuator, IP 40, frontring black, lens yellow	92-458.400

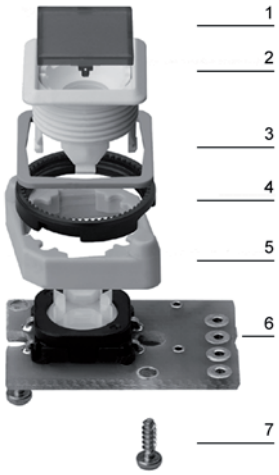
Essential accessories :

- Switching element illuminative	92-851.342
- Single-LED T1 Bi-Pin, yellow	10-2602.3174D
- Mounting flange	92-960.0

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

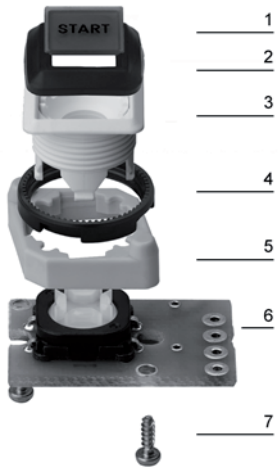
Product Assembly 92

Pushbutton illuminative, IP 40



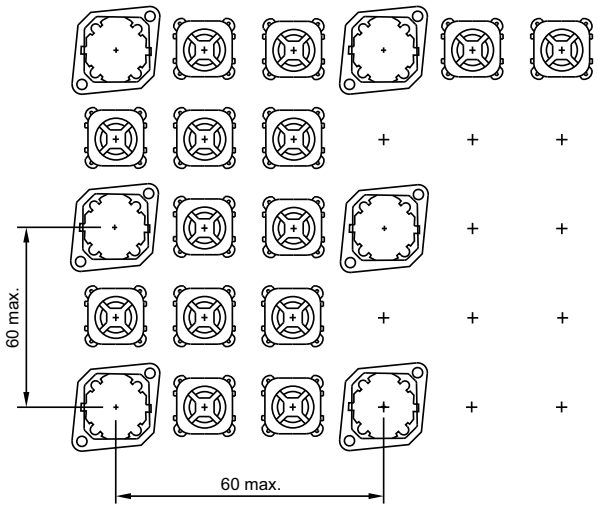
1 Lens
2 Actuator housing
3 Bezel
4 Fixing nut
5 Mounting flange
6 Switching element
7 Fixing screws

Pushbutton illuminative, IP 67



1 Lens
2 Front bezel
3 Actuator housing
4 Fixing nut
5 Mounting flange
6 Switching element
7 Fixing screws

Arrangement mounting flange



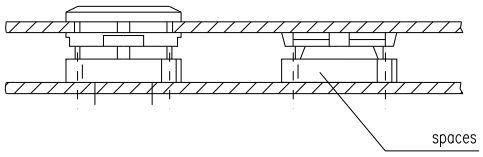
The arrangement of the mounting flanges and their number is determined by the size of the front panel or PCB. To ensure uniform, tactile switching, we recommend a layout of the flanges as per adjacent sketch.

For large PCBs with several switching elements we recommend the following procedure :

1. Fit the actuator to the front panel.
2. Clip the mounting flange to the rear of the intended actuator.
3. Screw the PCB with the components soldered to it to the assembled mounting flange.

This arrangement applies to PCBs 1.6 mm thick.

Dismantling mounting flange



The tool 92-971.0 must be used for removing the mounting flange from the actuator. Before removing the flange, the PCB fixing screws must be loosened.
If the number of actuators is insufficient, use the spacer 92-965.0 which can be attached to the front panel.
The spacer can be adjusted to the following front panel thicknesses: 1.5/2/2.2/3/3.5/4 mm and can be stuck to the back of the panel free of dirt and grease.

Indicator actuator

Essential Accessories:

- Illumination element PCB mounting page 61
- Mounting flange page 63
- Single-LED page 62

	Front protection	Front bezel	Lens	⍁ 18.8 x 18.8 mm Typ-Nr.	⍁ 18.4 x 18.4 mm Typ-Nr.	Mounting dimensions	Technical drawing	kg
Indicator actuator	IP 67	Plastic black	Plastic blue transparent	**92-143.600**		1	3	0.003
			Plastic colourless transparent	**92-143.700**		1	3	0.003
			Plastic green transparent	**92-143.500**		1	3	0.003
			Plastic orange transparent	**92-143.300**		1	3	0.003
			Plastic red transparent	**92-143.200**		1	3	0.003
			Plastic yellow transparent	**92-143.400**		1	3	0.003
		Plastic white	Plastic blue transparent	**92-043.600**		1	3	0.003
			Plastic colourless transparent	**92-043.700**		1	3	0.003
			Plastic green transparent	**92-043.500**		1	3	0.003
			Plastic orange transparent	**92-043.300**		1	3	0.003
			Plastic red transparent	**92-043.200**		1	3	0.003
			Plastic yellow transparent	**92-043.400**		1	3	0.003
	IP 40	Plastic black	Plastic blue transparent		**92-158.600**	1	4	0.003
			Plastic colourless transparent		**92-158.700**	1	4	0.003
			Plastic green transparent		**92-158.500**	1	4	0.003
			Plastic orange transparent		**92-158.300**	1	4	0.003
			Plastic red transparent		**92-158.200**	1	4	0.003
			Plastic smoked transparent		**92-158.100**	1	4	0.003
			Plastic yellow transparent		**92-158.400**	1	4	0.003
		Plastic white	Plastic blue transparent		**92-058.600**	1	4	0.003
			Plastic colourless transparent		**92-058.700**	1	4	0.003
			Plastic green transparent		**92-058.500**	1	4	0.003
			Plastic orange transparent		**92-058.300**	1	4	0.003
			Plastic red transparent		**92-058.200**	1	4	0.003
			Plastic smoked transparent		**92-058.100**	1	4	0.003
			Plastic yellow transparent		**92-058.400**	1	4	0.003

Mounting dimensions from page 70, Technical drawing from page 70

Pushbutton actuator

Essential Accessories:

Mounting flange page 63

Switching element PCB mounting illuminative page 61

	Front protection	Front bezel	Lens	⍁ 18.8 x 18.8 mm Typ-Nr.	⍁ 18.4 x 18.4 mm Typ-Nr.	Mounting dimensions	Technical drawing	Circuit drawing	kg
Pushbutton actuator	IP 67	Plastic black	Plastic black opaque	**92-441.000**		1	3	1	0.002
			Plastic grey opaque	**92-441.800**		1	3	1	0.002
		Plastic white	Plastic black opaque	**92-341.000**		1	3	1	0.002
			Plastic grey opaque	**92-341.800**		1	3	1	0.002
	IP 40	Plastic black	Plastic black opaque		**92-456.000**	1	4	1	0.002
			Plastic grey opaque		**92-456.800**	1	4	1	0.002
			Plastic white opaque		**92-456.900**	1	4	1	0.002
		Plastic white	Plastic black opaque		**92-356.000**	1	4	1	0.002
			Plastic grey opaque		**92-356.800**	1	4	1	0.002
			Plastic white opaque		**92-356.900**	1	4	1	0.002

Mounting dimensions from page 70, Technical drawing from page 70, Circuit drawing from page 71

Illuminated pushbutton actuator

Essential Accessories:

- Mounting flange page 63
- Single-LED page 62
- Switching element PCB mounting illuminative page 61

	Front protection	Front bezel	Lens	⍞ 18.8 x 18.8 mm Typ-Nr.	⍞ 18.4 x 18.4 mm Typ-Nr.	Mounting dimensions	Technical drawing	Circuit drawing	kg
Illuminated pushbutton actuator	IP 67	Plastic black	Plastic blue transparent	**92-443.600**		1	3	1	0.003
			Plastic colourless transparent	**92-443.700**		1	3	1	0.003
			Plastic green transparent	**92-443.500**		1	3	1	0.003
			Plastic orange transparent	**92-443.300**		1	3	1	0.003
			Plastic red transparent	**92-443.200**		1	3	1	0.003
			Plastic yellow transparent	**92-443.400**		1	3	1	0.003
		Plastic white	Plastic blue transparent	**92-343.600**		1	3	1	0.003
			Plastic colourless transparent	**92-343.700**		1	3	1	0.003
			Plastic green transparent	**92-343.500**		1	3	1	0.003
			Plastic orange transparent	**92-343.300**		1	3	1	0.003
			Plastic red transparent	**92-343.200**		1	3	1	0.003
			Plastic yellow transparent	**92-343.400**		1	3	1	0.003
	IP 40	Plastic black	Plastic blue transparent		**92-458.600**	1	4	1	0.003
			Plastic colourless transparent		**92-458.700**	1	4	1	0.003
			Plastic green transparent		**92-458.500**	1	4	1	0.003
			Plastic orange transparent		**92-458.300**	1	4	1	0.003
			Plastic red transparent		**92-458.200**	1	4	1	0.003
			Plastic smoked transparent		**92-458.100**	1	4	1	0.003
			Plastic yellow transparent		**92-458.400**	1	4	1	0.003
		Plastic white	Plastic blue transparent		**92-358.600**	1	4	1	0.003
			Plastic colourless transparent		**92-358.700**	1	4	1	0.003
			Plastic green transparent		**92-358.500**	1	4	1	0.003
			Plastic orange transparent		**92-358.300**	1	4	1	0.003
			Plastic red transparent		**92-358.200**	1	4	1	0.003
			Plastic smoked transparent		**92-358.100**	1	4	1	0.003
			Plastic yellow transparent		**92-358.400**	1	4	1	0.003

Mounting dimensions from page 70, Technical drawing from page 70, Circuit drawing from page 71

Front

Blind plug

	Blind plug	⍁ 18 x 18 mm Typ-Nr.	Mounting dimensions	kg
Blind plug	Plastic black	**51-948.0**	1	0.003

Mounting dimensions from page 70

Backside

Illumination element PCB mounting

The customer has to decide what series resistor shall be used to the LED

	Terminals	Typ-Nr.	Component layout	Technical drawing	kg
Illumination element PCB mounting	P	**92-800.042**	1	1	0.001

Illumination and mounting flange to be ordered separately.
Terminals: P = PCB terminal
Component layout from page 69, Technical drawing from page 70

Switching element PCB mounting illuminative

The customer has to decide what series resistor shall be used to the LED

	Terminals	Typ-Nr.	Component layout	Technical drawing	Circuit drawing	kg
Switching element PCB mounting illuminative	P	**92-851.342**	2	5	2	0.001

Illumination and mounting flange to be ordered separately.
Terminals: P = PCB terminal
Component layout from page 69, Technical drawing from page 70, Circuit drawing from page 71

Spacer

	Typ-Nr.	kg
Spacer	**92-965.0**	0.003

When fitting, ensure that back of panel is free of grease and dirt

PCB assembled

	Typ-Nr.	kg
PCB assembled for discrete switching applications including switching element and mounting flange, soldering terminal (assembled PCB incl. series resistor and LED on request)	**92-981.0**	0.003

Illumination

Single-LED

The customer has to decide what series resistor shall be used to the LED

	Socket	Operating voltage/-current	Light colour	Typ-Nr.	kg
Single-LED	T1 Bi-Pin	2.1 VDC, 20 mA	orange	**10-2602.3203L**	0.001
			red	**10-2602.3202L**	0.001
		2.2 VDC, 20 mA	yellow	**10-2602.3174D**	0.001
		3.5 VDC, 20 mA	blue	**10-2602.3206L**	0.001
			green	**10-2602.3205L**	0.001
			white	**10-2602.3209L**	0.001

Bi-colour LED

The customer has to decide what series resistor shall be used to the LED

	Socket	Light colour	Operating voltage/-current	Typ-Nr.	kg
Bi-colour LED	T1 Bi-Pin	red/green	1.9/3.5 VDC, 20 mA	**10-2603.320AL**	0.001
		yellow/green	2.0/3.2 VDC, 20 mA	**10-2603.320CL**	0.001

Multi-LED

The customer has to decide what series resistor shall be used to the LED

	Socket	Operating voltage/-current	Light colour	Typ-Nr.	kg
Multi-LED	T1 Bi-Pin	12 VDC, 40 mA	yellow	**10-5609.3174D**	0.001

Assembling

Anti-twist ring

for front panel thickness max. 2 mm

	Typ-Nr.	kg
Anti-twist ring Mounting hole size 16 mm dia.	**51-910**	0.001

Mounting flange

	Typ-Nr.	Technical drawing	kg
Mounting flange	**92-960.0**	2	0.001

Technical drawing from page 70

Lens remover

	Typ-Nr.	kg
Lens remover for lens plate IP 40 only	**18-910**	0.002

Mounting tool

	Typ-Nr.	kg
Mounting tool for Indicator 16 mm dia.	**01-907**	0.020

Dismantling tool

	Typ-Nr.	kg
Dismantling tool for actuator dismantling of switching- and illumination element and mounting flange	**92-971.0**	0.002

Pushbutton- and Illuminated pushbutton actuator IP 40

Pushbutton- and Illuminated pushbutton actuator IP 40

Lens and Front bezel order separately

	Front ring	⍞ 18.4 x 18.4 mm Typ-Nr.	
Pushbutton- and Illuminated pushbutton actuator IP 40	Plastic black	**92-450.000**	0.003
	Plastic white	**92-350.000**	0.003

Lens for pushbuttons and indicators IP 40

	Lens	⍞ 18.4 x 18.4 mm Typ-Nr.	
Lens for pushbuttons and indicators IP 40 13.2 x 13.2 mm with white Marking plate	Plastic black opaque	**92-956.000**	0.001
	Plastic blue translucent	**92-956.600**	0.001
	Plastic blue transparent	**92-958.600**	0.001
	Plastic colourless transparent	**92-958.700**	0.001
	Plastic green translucent	**92-956.500**	0.001
	Plastic green transparent	**92-958.500**	0.001
	Plastic grey opaque	**92-956.800**	0.001
	Plastic orange translucent	**92-956.300**	0.001
	Plastic orange transparent	**92-958.300**	0.001
	Plastic red translucent	**92-956.200**	0.001
	Plastic red transparent	**92-958.200**	0.001
	Plastic smoked transparent	**92-958.100**	0.001
	Plastic white opaque	**92-956.900**	0.001
	Plastic yellow translucent	**92-956.400**	0.001
	Plastic yellow transparent	**92-958.400**	0.001

Front bezel for pushbuttons and indicators IP 40

	Front ring	⍞ 18.4 x 18.4 mm Typ-Nr.	
Front bezel for pushbuttons and indicators IP 40	Plastic black	**92-912.0**	0.001
	Plastic white	**92-912.9**	0.001

Pushbutton- and Illuminated pushbutton actuator IP 67

Pushbutton- and Illuminated pushbutton actuator IP 67

Lens order separately

	Front ring	⍞ 18.8 x 18.8 mm Typ-Nr.	
Pushbutton- and Illuminated pushbutton actuator IP 67	Plastic black	**92-440.000**	0.003
		92-340.000	0.003

Indicator actuator IP 67

Lens plate order separately

	Front ring	⏍ 18.8 x 18.8 mm Typ-Nr.	kg
Indicator actuator IP 67	Plastic black	**92-140.000**	0.003

Lens for pushbuttons and indicators IP 67

	Lens plate	⏍ 18.8 x 18.8 mm Typ-Nr.	kg
Lens for pushbuttons and indicators IP 67 12 x 12 mm	Plastic black flush opaque	**92-941.000**	0.001
	Plastic blue flush transparent	**92-941.600**	0.001
	Plastic colourless flush transparent	**92-941.700**	0.001
	Plastic green flush transparent	**92-941.500**	0.001
	Plastic grey flush opaque	**92-941.800**	0.001
	Plastic orange flush transparent	**92-941.300**	0.001
	Plastic red flush transparent	**92-941.200**	0.001
	Plastic yellow flush transparent	**92-941.400**	0.001

Pushbutton- and Illuminated pushbutton

Switching system

Short-travel switching system with 2 independent contact points and tactile operation.
Guarantees reliable switching even of very light loads.
Fitted with 1 normally open contact.

Material

Lens
Polycarbonate (PC)

Front bezel
Thermoplastic Elastomer (TPE)

Frame
Thermoplastic Polyester (PBT)

Material of contact
Gold (Au)

Switching element
Thermoplastic Polyester (PET, PBT) and Polyacetale (POM)

Actuator housing
Thermoplastic Polyester (PBT)

Mechanical characteristics

Tightening torque
Fixing screw 40 Ncm recommended
Fixing nut max. 50 Ncm

Actuating force
2.7 N ±1 N measured at the switching element
5 N measured at the lens

Actuating travel
Switching element 0.4 mm

Rebound time
≤1 ms

Resistance to heat of soldering
260 °C, 5 s, as per IEC 60068-2-20

Mechanical lifetime
≥1 Million operations as per IEC 60512-5-9a

Electrical characteristics

Contact resistance
Starting value (initial) ≤100 mΩ as per IEC 60512-2-2b

Isolation resistance
$\geq 10^9$ Ω between all terminals at 100 VDC, as per IEC 60512-2-3a

Electrical life
≥500 000 operations at 42 VDC, 50 mA as per IEC 60512-5-9c.
When attention is paid to the direction of current flow from terminal 3/4 to 1/2 the electrical life can be prolonged.

Electrostatic discharge (ESD)
15 kV

Switch rating

Switching voltage	min. 50 mV AC/DC
	max. 42 V AC/DC
Switching current	min. 10 μA AC/DC
	max. 100 mA AC/DC
Power rating	max. 2 W

Electric strength
500 VAC, 50 Hz, 1 min, as per IEC 60512-2-4a

Environmental conditions

Storage temperature
-40 °C ... +80 °C

Operating temperature
-25 °C ... +70 °C

Front protection
Switching element IP 40 (fluxproof to DIN 41640 Part 84)
front IP 67 or IP 40

Shock resistance
≤50 g for 11 ms as per IEC 60512-4-6c

Vibration resistance
(sinusoidal)
10 g at 10-2000 Hz, amplitude 0.75 mm as per IEC 60512-4-6d

Suppressor circuits

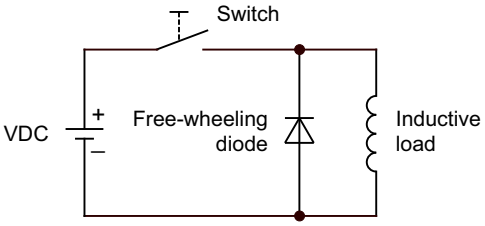
When switching inductive loads such as relays, DC motors, and DC solenoids, it is always important to absorb surges (e.g. with a diode) to protect the contacts. When these inductive loads are switched off, a counter emf can severely damage switch contacts and greatly shorten lifetime.

Fig. 1 shows an inductive load with a free-wheeling diode connected in parallel. This free-wheeling diode provides a path for the inductor current to flow when the current is interrupted by the switch. Without this free-wheeling diode, the voltage across the coil will be limited only by dielectric breakdown voltages of the circuit or parasitic elements of the coil. This voltage can be kilovolts in amplitude even when nominal circuit voltages are low (e.g. 12 VDC) see Fig. 2.

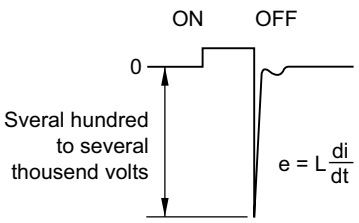
The free-wheeling diode should be chosen so that the reverse breakdown voltage is greater than the voltage driving the inductive load. The DC blocking voltage (VR) of the free-wheeling diode can be found in the datasheet of a diode. The forward current should be equal or greater than the maximum current flowing through the load.

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

Switching with inductive load
Fig. 1



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



General notes

If desired, the actuators of the series 92 can be supplied ready marked. With your order please enclose a list of the desired markings or a drawing, showing the type or size of script or the symbols desired.

1. Laser engraving (Fig. 1)
In addition to the most commonly used world languages, in DIN 1451-3 close spacing, other typefaces are available as Scandinavian, Slavic, Greek, Russian and Polish.
Red, blue and black lenses are filled with white colour. Other colour lenses are filled in black.
Standard height of letters is 2 mm. If the height is not specified, we will supply 2 mm engraved letters.

2. Hot stamping (Fig. 1)
For larger series it is worth considering markings by means of hot stamping. We will pleased to advise you.
For letters and figures, typefaces with 2.5 mm, 3 mm and 4 mm are available.

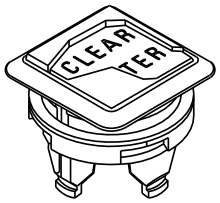
3. Film inserts (Fig. 2)
Instead of using engraving, the actuator can be fitted with transparent film inserts. However, for this purpose the use of transparent lens caps is recommended. If smoked lens caps are used the lettering does not become visible until the LED is alight.
Max. size of film insert
11.4 x 11.4 mm for IP 40
10.4 x 10.4 mm for IP 67
Film thickness 0.2 mm.

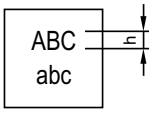
All dimensions in mm

Height of letters h	Number of lines	Number of (target value) capital letters per line	Number of (target value) small letters per line
3	2	5 - 6	6
4	2	4	4
5	1	3	3 - 4
6	1	2 - 3	3
8	1	2	2

Fig. 1

Fig. 2





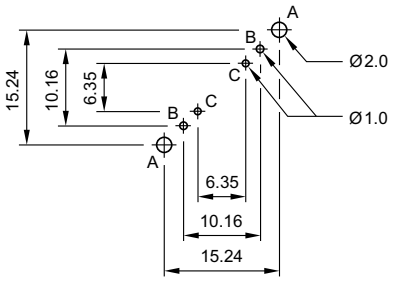
Component layout

1 Illumination element PCB mounting page 61

Single-LED

Drilling plan (Elementside)

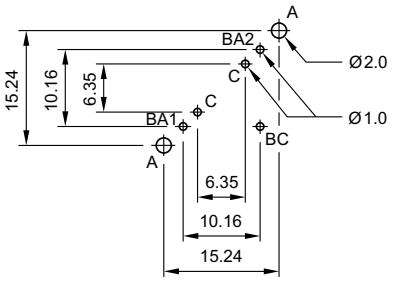
A Fixing holes for mounting flange (92-960.0)
B Holes for LED
C Holes for centering pins



Bi-colour-LED

Drilling plan (Elementside)

A Fixing holes for mounting flange (92-960.0)
B Holes for Bi-colour LED:
BA1 (green) + BA2 (yellow or red) = Anodes, BC = Cathode
C Holes for centering pins



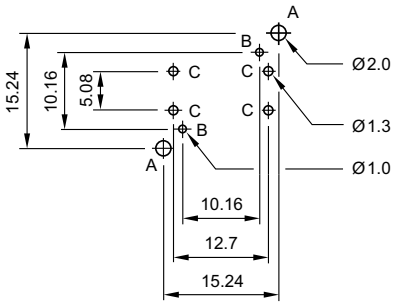
Libraries for the PCB layout-system p-cad 200X see : www.pcad.com/en/library Third-party Libraries

2 Switching element PCB mounting illuminative page 61

Single-LED

Drilling plan (Elementside)

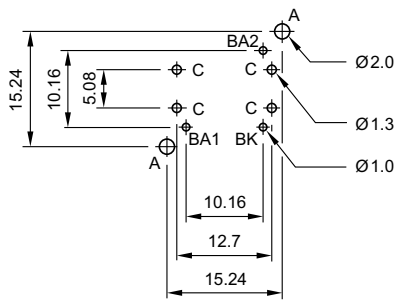
A Fixing holes for mounting flange (92-960.0)
B Holes for LED
C Holes for contact pins
Pad max. Ø 2.5 mm
Through-connection recommended



Bi-colour-LED

Drilling plan (Elementside)

A Fixing holes for mounting flange (92-960.0)
B Holes for Bi-colour LED:
BA1 (green) + BA2 (yellow or red) = Anodes, BK = Cathode
C Holes for contact pins
Pad max. Ø 2.5 mm
Through-connection recommended

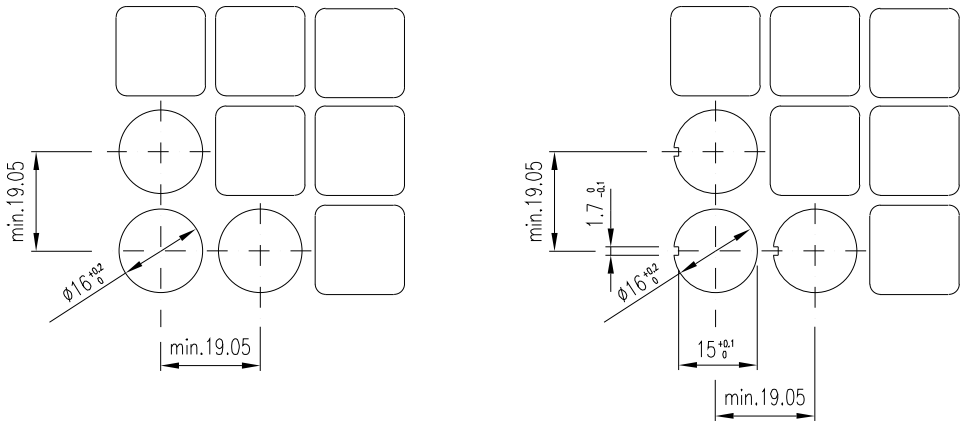


Libraries for the PCB layout-system p-cad 200X see : www.pcad.com/en/library Third-party Libraries

Drawings 92

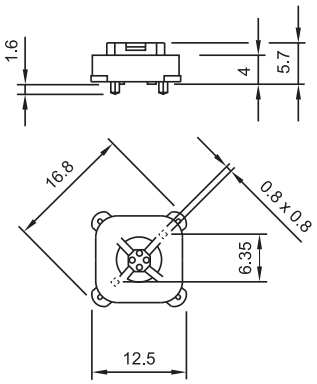
Mounting dimensions

1 Indicator actuator page 58 **| Pushbutton actuator** page 59 **| Illuminated pushbutton actuator** page 60 **| Blind plug** page 61

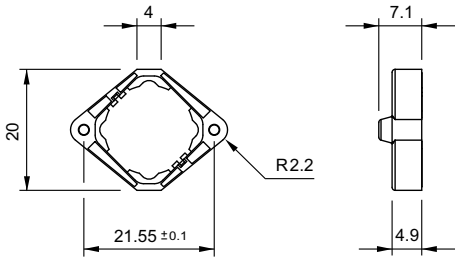


Technical drawing

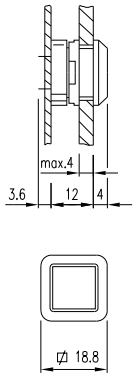
1 Illumination element PCB mounting page 61



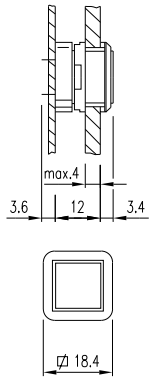
2 Mounting flange page 63



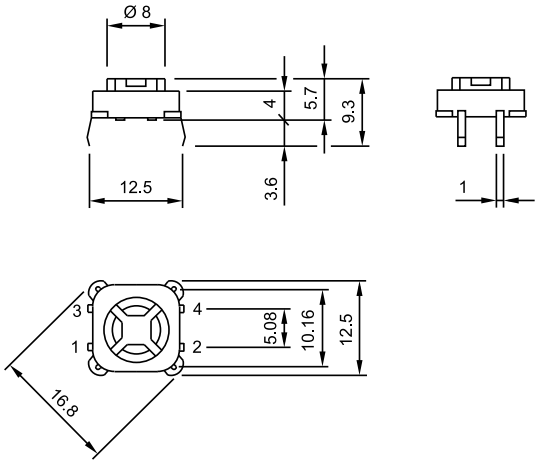
3 Indicator actuator page 58 | **Pushbutton actuator** page 59 | **Illuminated pushbutton actuator** page 60



4 Indicator actuator page 58 | **Pushbutton actuator** page 59 | **Illuminated pushbutton actuator** page 60



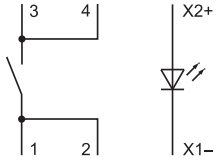
5 Switching element PCB mounting illuminative page 61

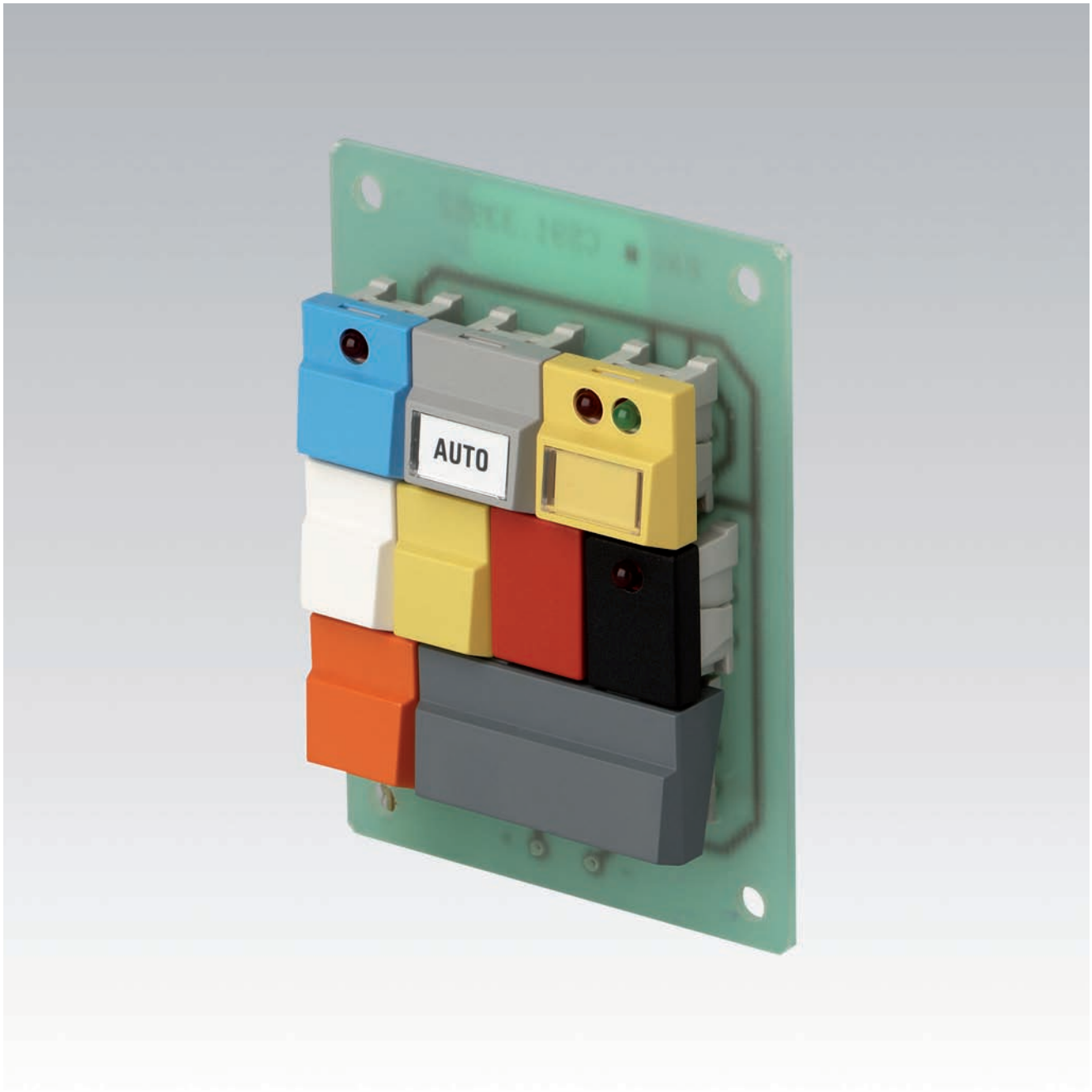


Circuit drawing

1 Pushbutton actuator page 59 | **Illuminated pushbutton actuator** page 60

2 Switching element PCB mounting illuminative page 61




AUTO

Contents 96

Product Information

General notes
The input button of series 96 is a component specially designed for the requirements of modern electronic control systems. Since there is a choice of different lens shapes and colours, the panel can be arranged to suit the needs of the particular application.

Mounting
The input button is intended for mounting on printed circuit boards. Its dimensions and the arrangement of its contacts comply with a module of 2.54 mm (1/10 "). Two centering pins ensure that rows or blocks are assembled without gaps, true to drawing. The input button is dust and sprayproof and suitable for machine soldering and cleaning.

Lenses
Lenses can be pressed singly on to the input button. Depending on requirements, the user can employ lenses having either a momentary or maintained action, with various standard widths and colours.

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

Illumination
For illumination, indication or functional check the input button can be equipped with one or two light-emmiting diodes (LED) 3 mm dia. For illumination some lenses are provided with recesses for LEDs. Luminosity and wave length scattering caused by the technology used in the LED manufacturing processes may lead to visual differences in our products.

Specimen order

Indicator :

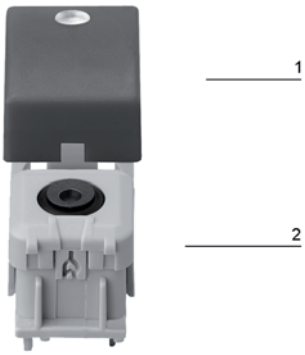
- Indicator element	96-302.807

Essential accessories :

- Cap for Indicator, Plastic grey, 1 LED, 12.4 x 17.4 mm	96-909.8
- Single-LED T1 Bi-Pin, 2.2 VDC, 20 mA, yellow	10-2602.3174E

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

Illuminated pushbutton



1 Lens
2 Switching element

Indicator

for Indicator and Blind plug
usable for Caps 17.4 x 17.4 mm | 12.4 x 17.4 mm | 14.8 x 17.4 mm

Essential Accessories:

- Cap for Indicator page 78
- Single LED standard page 84

	Front protection	Terminals	Typ-Nr.	Component layout	Technical drawing	kg
Indicator	IP 67	P	**96-302.807**	1	2	0.001

Terminals: P = PCB terminal
Component layout from page 87, Technical drawing from page 87

Illuminated pushbutton

Switching element usable for lenses 17.4 x 17.4 mm | 12.4 x 17.4 mm | 14.8 x 17.4 mm

Essential Accessories:

- Lens standard single page 79
- Single LED standard page 84

	Front protection	Contacts	Terminals	Typ-Nr.	Component layout	Technical drawing	Circuit drawing	kg
Illuminated pushbutton	IP 67	1 C	P	**96-323.837**	2	3	1	0.002

Contacts: C = Changeover
Terminals: P = PCB terminal
Component layout from page 87, Technical drawing from page 87, Circuit drawing from page 89

Front

Cap for Indicator

	Recess for LED	Cap	Colour	⍞ 17.4 x 17.4 mm Typ-Nr.	⍈ 14.8 x 17.4 mm Typ-Nr.	⍈ 12.4 x 17.4 mm Typ-Nr.	Technical drawing	kg
Cap for Indicator Plastic	1	black	RAL 9011	**96-939.0**	**96-929.0**	**96-909.0**	2	0.001
		green	RAL 6005	**96-939.5**	**96-929.5**	**96-909.5**	2	0.001
		grey	RAL 7012	**96-939.8**	**96-929.8**	**96-909.8**	2	0.001
		red	RAL 3016	**96-939.2**	**96-929.2**	**96-909.2**	2	0.001
	2.2	black	RAL 9011	**96-940.0**	**96-930.0**	**96-910.0**	2	0.001
		green	RAL 6005	**96-940.5**	**96-930.5**	**96-910.5**	2	0.001
		grey	RAL 7012	**96-940.8**	**96-930.8**	**96-910.8**	2	0.001
		red	RAL 3016	**96-940.2**	**96-930.2**	**96-910.2**	2	0.001

Technical drawing from page 87

Lens standard single

	Switching action	Recess for LED	Lens	Colour	⧠ 17.4 x 17.4 mm Typ-Nr.	⧠ 14.8 x 17.4 mm Typ-Nr.	⧠ 12.4 x 17.4 mm Typ-Nr.	Technical drawing	kg
Lens standard single Plastic	MA	0	black	RAL 9011	**96-935.0**	**96-925.0**	**96-905.0**	1	0.001
			blue	-	**98-935.6**	**98-925.6**	**98-905.6**	1	0.001
			green	-	**98-935.5**	**98-925.5**	**98-905.5**	1	0.001
				RAL 6005	**96-935.5**	**96-925.5**	**96-905.5**	1	0.001
			grey	-	**98-935.8**	**98-925.8**	**98-905.8**	1	0.001
				RAL 7012	**96-935.8**	**96-925.8**	**96-905.8**	1	0.001
			orange	-	**98-935.3**	**98-925.3**	**98-905.3**	1	0.001
			red	-	**98-935.2**	**98-925.2**	**98-905.2**	1	0.001
				RAL 3016	**96-935.2**	**96-925.2**	**96-905.2**	1	0.001
			white	-	**98-935.9**	**98-925.9**	**98-905.9**	1	0.001
			yellow	-	**98-935.4**	**98-925.4**	**98-905.4**	1	0.001
		1	black	RAL 9011	**96-936.0**	**96-926.0**	**96-906.0**	1	0.001
			blue	-	**98-936.6**	**98-926.6**	**98-906.6**	1	0.001
			green	-	**98-936.5**	**98-926.5**	**98-906.5**	1	0.001
				RAL 6005	**96-936.5**	**96-926.5**	**96-906.5**	1	0.001
			grey	-	**98-936.8**	**98-926.8**	**98-906.8**	1	0.001
				RAL 7012	**96-936.8**	**96-926.8**	**96-906.8**	1	0.001
			orange	-	**98-936.3**	**98-926.3**	**98-906.3**	1	0.001
			red	-	**98-936.2**	**98-926.2**	**98-906.2**	1	0.001
				RAL 3016	**96-936.2**	**96-926.2**	**96-906.2**	1	0.001
			white	-	**98-936.9**	**98-926.9**	**98-906.9**	1	0.001
			yellow	-	**98-936.4**	**98-926.4**	**98-906.4**	1	0.001
		2	black	RAL 9011	**96-937.0**	**96-927.0**	**96-907.0**	1	0.001
			blue	-	**98-937.6**	**98-927.6**	**98-907.6**	1	0.001
			green	-	**98-937.5**	**98-927.5**	**98-907.5**	1	0.001
				RAL 6005	**96-937.5**	**96-927.5**	**96-907.5**	1	0.001
			grey	-	**98-937.8**	**98-927.8**	**98-907.8**	1	0.001
				RAL 7012	**96-937.8**	**96-927.8**	**96-907.8**	1	0.001
			orange	-	**98-937.3**	**98-927.3**	**98-907.3**	1	0.001
			red	-	**98-937.2**	**98-927.2**	**98-907.2**	1	0.001
				RAL 3016	**96-937.2**	**96-927.2**	**96-907.2**	1	0.001
			white	-	**98-937.9**	**98-927.9**	**98-907.9**	1	0.001
			yellow	-	**98-937.4**	**98-927.4**	**98-907.4**	1	0.001

Continuation see ı

Continued from previous page

	Switching action	Recess for LED	Lens	Colour	⍞ 17.4 x 17.4 mm Typ-Nr.	⍈ 14.8 x 17.4 mm Typ-Nr.	⍈ 12.4 x 17.4 mm Typ-Nr.	Technical drawing	kg
Lens standard single Plastic	M	0	black	RAL 9011	**96-931.0**	**96-921.0**	**96-901.0**	1	0.001
			blue	-	**98-931.6**	**98-921.6**	**98-901.6**	1	0.001
			green	-	**98-931.5**	**98-921.5**	**98-901.5**	1	0.001
				RAL 6005	**96-931.5**	**96-921.5**	**96-901.5**	1	0.001
			grey	-	**98-931.8**	**98-921.8**	**98-901.8**	1	0.001
				RAL 7012	**96-931.8**	**96-921.8**	**96-901.8**	1	0.001
			orange	-	**98-931.3**	**98-921.3**	**98-901.3**	1	0.001
			red	-	**98-931.2**	**98-921.2**	**98-901.2**	1	0.001
				RAL 3016	**96-931.2**	**96-921.2**	**96-901.2**	1	0.001
			white	-	**98-931.9**	**98-921.9**	**98-901.9**	1	0.001
			yellow	-	**98-931.4**	**98-921.4**	**98-901.4**	1	0.001
		1	black	RAL 9011	**96-932.0**	**96-922.0**	**96-902.0**	1	0.001
			blue	-	**98-932.6**	**98-922.6**	**98-902.6**	1	0.001
			green	-	**98-932.5**	**98-922.5**	**98-902.5**	1	0.001
				RAL 6005	**96-932.5**	**96-922.5**	**96-902.5**	1	0.001
			grey	-	**98-932.8**	**98-922.8**	**98-902.8**	1	0.001
				RAL 7012	**96-932.8**	**96-922.8**	**96-902.8**	1	0.001
			orange	-	**98-932.3**	**98-922.3**	**98-902.3**	1	0.001
			red	-	**98-932.2**	**98-922.2**	**98-902.2**	1	0.001
				RAL 3016	**96-932.2**	**96-922.2**	**96-902.2**	1	0.001
			white	-	**98-932.9**	**98-922.9**	**98-902.9**	1	0.001
			yellow	-	**98-932.4**	**98-922.4**	**98-902.4**	1	0.001
		2	black	RAL 9011	**96-933.0**	**96-923.0**	**96-903.0**	1	0.001
			blue	-	**98-933.6**	**98-923.6**	**98-903.6**	1	0.001
			green	-	**98-933.5**	**98-923.5**	**98-903.5**	1	0.001
				RAL 6005	**96-933.5**	**96-923.5**	**96-903.5**	1	0.001
			grey	-	**98-933.8**	**98-923.8**	**98-903.8**	1	0.001
				RAL 7012	**96-933.8**	**96-923.8**	**96-903.8**	1	0.001
			orange	-	**98-933.3**	**98-923.3**	**98-903.3**	1	0.001
			red	-	**98-933.2**	**98-923.2**	**98-903.2**	1	0.001
				RAL 3016	**96-933.2**	**96-923.2**	**96-903.2**	1	0.001
			white	-	**98-933.9**	**98-923.9**	**98-903.9**	1	0.001
			yellow	-	**98-933.4**	**98-923.4**	**98-903.4**	1	0.001

Switching action: MA = Maintained action, M = Momentary action
Technical drawing from page 87

Lens standard single for film insert

	Switching action	Recess for LED	Lens	Colour	⌖ 17.4 x 17.4 mm Typ-Nr.	Technical drawing	⚖
Lens standard single for film insert	MA	0	Plastic black	RAL 9011	**96-945.0**	4	0.001
			Plastic blue	-	**98-945.6**	4	0.001
			Plastic green	-	**98-945.5**	4	0.001
				RAL 6005	**96-945.5**	4	0.001
			Plastic grey	-	**98-945.8**	4	0.001
				RAL 7012	**96-945.8**	4	0.001
			Plastic orange	-	**98-945.3**	4	0.001
			Plastic red	-	**98-945.2**	4	0.001
				RAL 3016	**96-945.2**	4	0.001
			Plastic white	-	**98-945.9**	4	0.001
			Plastic yellow	-	**98-945.4**	4	0.001
		1	Plastic black	RAL 9011	**96-946.0**	4	0.001
			Plastic blue	-	**98-946.6**	4	0.001
			Plastic green	-	**98-946.5**	4	0.001
				RAL 6005	**96-946.5**	4	0.001
			Plastic grey	-	**98-946.8**	4	0.001
				RAL 7012	**96-946.8**	4	0.001
			Plastic orange	-	**98-946.3**	4	0.001
			Plastic red	-	**98-946.2**	4	0.001
				RAL 3016	**96-946.2**	4	0.001
			Plastic white	-	**98-946.9**	4	0.001
			Plastic yellow	-	**98-946.4**	4	0.001
		2	Plastic black	RAL 9011	**96-947.0**	4	0.001
			Plastic blue	-	**98-947.6**	4	0.001
			Plastic green	-	**98-947.5**	4	0.001
				RAL 6005	**96-947.5**	4	0.001
			Plastic grey	-	**98-947.8**	4	0.001
				RAL 7012	**96-947.8**	4	0.001
			Plastic orange	-	**98-947.3**	4	0.001
			Plastic red	-	**98-947.2**	4	0.001
				RAL 3016	**96-947.2**	4	0.001
			Plastic white	-	**98-947.9**	4	0.001
			Plastic yellow	-	**98-947.4**	4	0.001

Continuation see ı

Continued from previous page

	Switching action	Recess for LED	Lens	Colour	⍞ 17.4 x 17.4 mm Typ-Nr.	Technical drawing	⚖ kg
Lens standard single for film insert	M	0	Plastic black	RAL 9011	**96-941.0**	4	0.001
			Plastic blue	-	**98-941.6**	4	0.001
			Plastic green	-	**98-941.5**	4	0.001
				RAL 6005	**96-941.5**	4	0.001
			Plastic grey	-	**98-941.8**	4	0.001
				RAL 7012	**96-941.8**	4	0.001
			Plastic orange	-	**98-941.3**	4	0.001
			Plastic red	-	**98-941.2**	4	0.001
				RAL 3016	**96-941.2**	4	0.001
			Plastic white	-	**98-941.9**	4	0.001
			Plastic yellow	-	**98-941.4**	4	0.001
		1	Plastic black	RAL 9011	**96-942.0**	4	0.001
			Plastic blue	-	**98-942.6**	4	0.001
			Plastic green	-	**98-942.5**	4	0.001
				RAL 6005	**96-942.5**	4	0.001
			Plastic grey	-	**98-942.8**	4	0.001
				RAL 7012	**96-942.8**	4	0.001
			Plastic orange	-	**98-942.3**	4	0.001
			Plastic red	-	**98-942.2**	4	0.001
				RAL 3016	**96-942.2**	4	0.001
			Plastic white	-	**98-942.9**	4	0.001
			Plastic yellow	-	**98-942.4**	4	0.001
		2	Plastic black	RAL 9011	**96-943.0**	4	0.001
			Plastic blue	-	**98-943.6**	4	0.001
			Plastic green	-	**98-943.5**	4	0.001
				RAL 6005	**96-943.5**	4	0.001
			Plastic grey	-	**98-943.8**	4	0.001
				RAL 7012	**96-943.8**	4	0.001
			Plastic orange	-	**98-943.3**	4	0.001
			Plastic red	-	**98-943.2**	4	0.001
				RAL 3016	**96-943.2**	4	0.001
			Plastic white	-	**98-943.9**	4	0.001
			Plastic yellow	-	**98-943.4**	4	0.001

Switching action: MA = Maintained action, M = Momentary action
Technical drawing from page 87

Lens Euro-Style single

	Switching action	Recess for LED	Lens	Colour	◫ 12.4 x 17.4 mm Typ-Nr.	Technical drawing	⚖
Lens Euro-Style single	MA	0	Plastic black	RAL 9011	**96-905.01**	5	0.001
			Plastic green	RAL 6005	**96-905.51**	5	0.001
			Plastic grey	RAL 7012	**96-905.81**	5	0.001
			Plastic red	RAL 3016	**96-905.21**	5	0.001
		1	Plastic black	RAL 9011	**96-906.01**	5	0.001
			Plastic green	RAL 6005	**96-906.51**	5	0.001
			Plastic grey	RAL 7012	**96-906.81**	5	0.001
			Plastic red	RAL 3016	**96-906.21**	5	0.001
		2	Plastic black	RAL 9011	**96-907.01**	5	0.001
			Plastic green	RAL 6005	**96-907.51**	5	0.001
			Plastic grey	RAL 7012	**96-907.81**	5	0.001
			Plastic red	RAL 3016	**96-907.21**	5	0.001
	M	0	Plastic black	RAL 9011	**96-901.01**	5	0.001
			Plastic green	RAL 6005	**96-901.51**	5	0.001
			Plastic grey	RAL 7012	**96-901.81**	5	0.001
			Plastic red	RAL 3016	**96-901.21**	5	0.001
		1	Plastic black	RAL 9011	**96-902.01**	5	0.001
			Plastic green	RAL 6005	**96-902.51**	5	0.001
			Plastic grey	RAL 7012	**96-902.81**	5	0.001
			Plastic red	RAL 3016	**96-902.21**	5	0.001
		2	Plastic black	RAL 9011	**96-903.01**	5	0.001
			Plastic green	RAL 6005	**96-903.51**	5	0.001
			Plastic grey	RAL 7012	**96-903.81**	5	0.001
			Plastic red	RAL 3016	**96-903.21**	5	0.001

Switching action: MA = Maintained action, M = Momentary action
Technical drawing from page 87

Lens standard double

for two switching elements

	Switching action	Recess for LED	Lens	Colour	◫ 17.4 x 35.2 mm Typ-Nr.	Technical drawing	⚖
Lens standard double	M	0	Plastic black	RAL 9011	**96-951.0**	6	0.002
			Plastic green	RAL 6005	**96-951.5**	6	0.002
			Plastic grey	RAL 7012	**96-951.8**	6	0.002
			Plastic red	RAL 3016	**96-951.2**	6	0.002

Switching action: M = Momentary action
Technical drawing from page 87

Blind plug

	Blind plug	Colour	⧠ 17.4 x 17.4 mm Typ-Nr.	⧠ 14.8 x 17.4 mm Typ-Nr.	⧠ 12.4 x 17.4 mm Typ-Nr.	kg
Blind plug	Plastic black	RAL 9011	**96-938.0**	**96-928.0**	**96-908.0**	0.001
	Plastic green	RAL 6005	**96-938.5**	**96-928.5**	**96-908.5**	0.001
	Plastic grey	RAL 7012	**96-938.8**	**96-928.8**	**96-908.8**	0.001
	Plastic red	RAL 3016	**96-938.2**	**96-928.2**	**96-908.2**	0.001

Illumination

Single LED standard

	Socket	Light colour	Operating voltage/-current	Typ-Nr.	kg
Single LED standard without serie resistor, with special pin crank	T1 Bi-Pin	gelb	2.2 VDC, 20 mA	**10-2602.3174E**	0.001
		grün	2.2 VDC, 20 mA	**10-2602.3175E**	0.001
		rot	2.2 VDC, 20 mA	**10-2602.3172E**	0.001

Single LED Euro Style

	Socket	Light colour	Operating voltage/-current	Typ-Nr.	kg
Single LED Euro Style without serie resistor, with special pin crank	T1 Bi-Pin	green	2.2 VDC, 20 mA	**10-2602.3175J**	0.001
		red	2.2 VDC, 20 mA	**10-2602.3172J**	0.001
		yellow	2.2 VDC, 20 mA	**10-2602.3174J**	0.001

Assembling

Lens remover

	Typ-Nr.	kg
Lens remover	**98-968**	0.004

Snap-action switching element

Switching system

Single-break, self-cleaning, snap-action switching element with tactile feel of operation.

Material

lens Euro-Style
ABS/PC or ABS, self-extinguishing

Housing
Polyester, self-extinguishing

Material of contact
Gold-plated on nickel

Mechanical characteristics

Terminals
PCB terminal

Actuating force
Actuating force 1.4 N ±0.3 N

Actuating travel
Lead distance 1.0 mm ±0.3 mm
Total distance 1.7 mm ±0.5 mm

Mechanical lifetime
≥5 million operations, as per IEC 60512-5-9a

Rebound time
≤2.5 ms

Electrical characteristics

Contact resistance
Starting value (initial) ≤100 mΩ, as per IEC 60512-2-2b

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

Capacity
Between contacts ≤1 pF

Electrical life
≥5 x 100.000 operations at 30 VDC, 100 mA, as per IEC 60512-5, test 9c

Conventional free air thermal current I_{th2}
100 mA

Switch rating

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

Environmental conditions

Storage temperature
-40 °C ... +85 °C

Service temperature
-25 °C ... +85 °C

Front protection
IP 67, as per IEC 60529

Shock resistance
(single impacts, semi-sinusoidal)
≥30 g for 11 ms as per IEC 60512-4-3

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

General notes

1. Engraving
In addition to the most commonly used world languages, in DIN 1451-3 close spacing, other typefaces are available as Scandinavian, Slavic, Greek, Russian and Polish.
Red, blue and black lenses are filled with white colour. Other colour lenses are filled in black.
Standard height of letters is 2 mm. If the height is not specified, we will supply 2 mm engraved letters.

2. Hot stamping
On request. We will pleased to advise you.

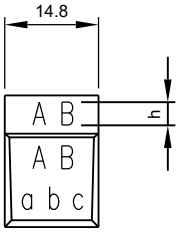
3. Film inserts
A speciallens, 17.4 x 17.4 mm, available for insertion of a colour foil or film.
The film thickness is 0.2 mm.

Lenses standard

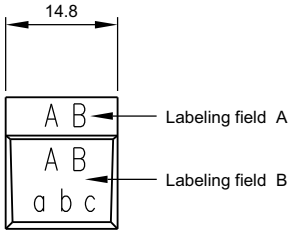
All dimensions in mm

Front size	Film insert max. size	Height of letters h	Labeling field - A -			Labeling field - B -			Image
			Number of lines	Number of (target value) capital letters per line	Number of (target value) small letters per line	Number of lines	Number of (target value) capital letters per line	Number of (target value) small letters per line	
12.4 x 17.4	-	2	1	6	6 - 7	2	5	6 - 7	B1
	-	3	1	4	5	2	4	4 - 5	B1
	-	4	1	3 - 4	4	1	3 - 4	4	B1
	-	5	-	-	-	1	2 - 3	3	B1
	-	6	-	-	-	1	2	2	B1
	-	8	-	-	-	1	1	1	B1
14.8 x 17.4	-	2	1	7	7 - 8	2	6	7 - 8	B2
	-	3	1	5 - 6	6 - 7	2	5	6	B2
	-	4	1	4	4 - 5	1	4	4	B2
	-	5	-	-	-	1	3	3 - 4	B2
	-	6	-	-	-	1	2 - 3	3	B2
	-	8	-	-	-	1	1 - 3	2	B2
17.4 x 17.4	-	2	1	8 - 9	9 - 10	2	7 - 8	8 - 9	B3
	7 x 12	2	1	8 - 9	9 - 10	-	-	-	B4
	-	3	1	7 - 8	8 - 9	2	6 - 7	7 - 8	B3
	7 x 12	3	1	7 - 8	8 - 9	-	-	-	B4
	-	4	1	5	5 - 6	1	4 - 5	5 - 6	B3
	7 x 12	4	1	5	5 - 6	-	-	-	B4
	-	5	-	-	-	1	3 - 4	4	B3
	7 x 12	5	-	-	-	-	-	-	B4
	-	6	-	-	-	1	2 - 3	3	B3
	7 x 12	6	-	-	-	-	-	-	B4
	-	8	-	-	-	1	2	2 - 3	B3
	7 x 12	8	-	-	-	-	-	-	B4

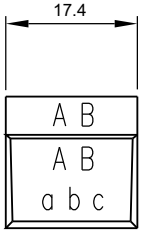
B1



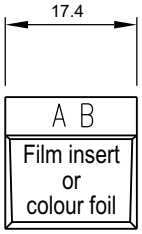
B2



B3

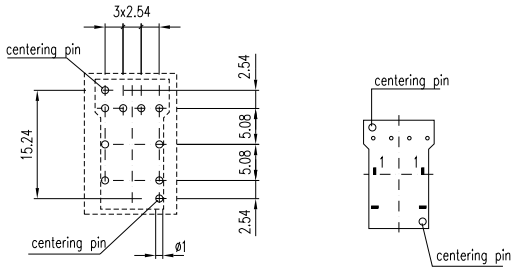


B4

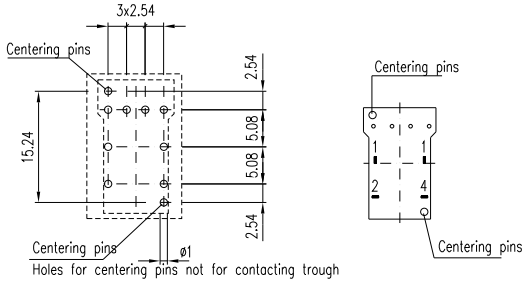


Component layout

1 Indicator page 77

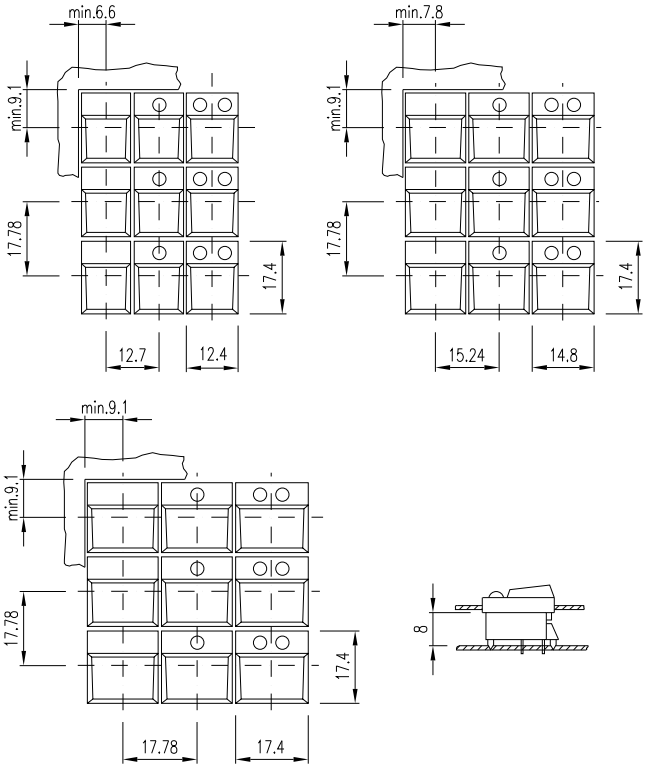


2 Illuminated pushbutton page 77



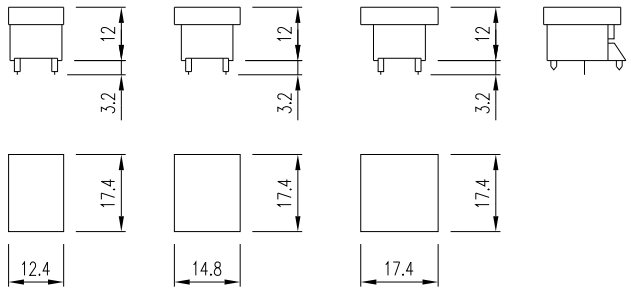
Technical drawing

1 Lens standard single page 79

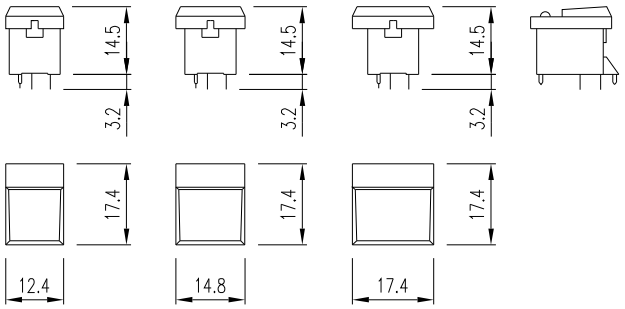


Drawings

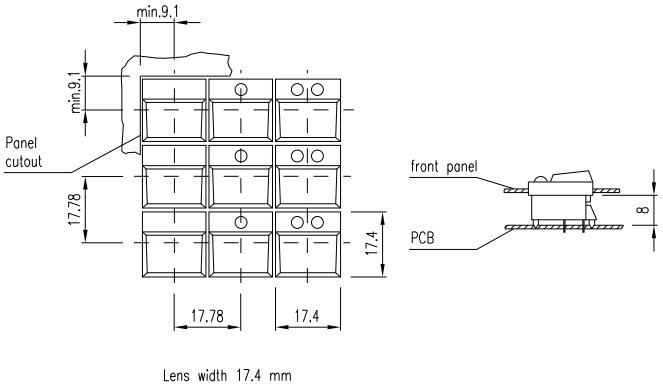
2 Indicator page 77 | **Cap for Indicator** page 78



3 Illuminated pushbutton page 77

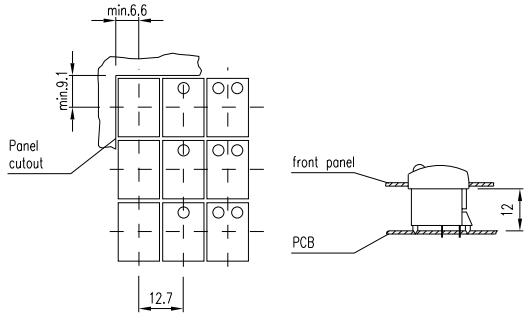


4 Lens standard single for film insert page 81



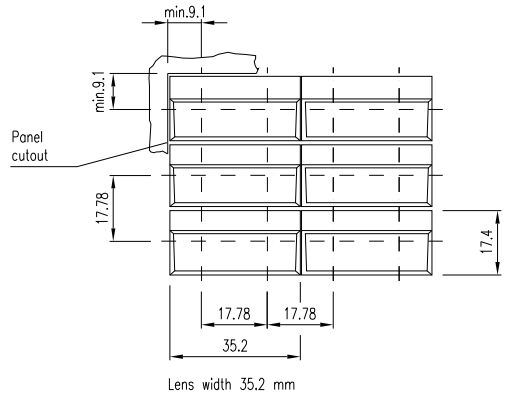
Lens width 17.4 mm

5 Lens Euro-Style single page 83



Lens width 12.4 mm

6 Lens standard double page 83



Circuit drawing

1 Illuminated pushbutton page 77

Contents 18

Product Information

General notes
The series 18 comprises compact indicators for direct connection to 2.2, 12 or 24 VDC and illuminated pushbuttons with maintained or momentary action.
The illuminated pushbutons are equipped with a snap-action switching system with normally open or normally closed contacts.
The dimensions of the front are 9 x 14 mm, 9 x 9 mm or 9 mm dia.
Indicators and illuminated pushbuttons for use with overhanging lenses 14 x 14 mm or 14 mm dia. are also available for flush mounting.

Mounting
Mounting from the front through the mounting hole 8 mm dia.
(15.8 x 15.8 mm resp. 16 mm dia. for flush mounting) is assured even with the wiring already attached.
The units are provided with soldering terminals.

Lenses
The flat lenses are available in various colours and a transparent version. The surface is nonreflecting (matt).

Illumination
Perfect illumination of the lenses, which can be supplied in various colours, is assured by Bi-Pin T1 LEDs (2.2 VDC) in the colours red, yellow and green.
(Compact indicators for connection to 12 or 24 VDC.) The Bi-Pin T1 LED are already integrated in the lenses.
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.

Specimen order

Illuminated pushbutton :

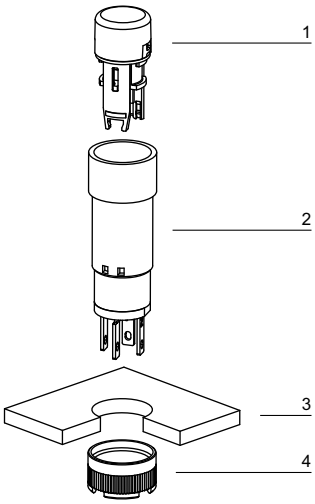
- Illuminated pushbutton actuator, 9 x14 mm, momentary action, 1 normally open, soldering terminal — 18-147.035

Essential accessories :

- Lens with LED plastic yellow, transparent, flush, 9 x 14 mm — 18-941.4

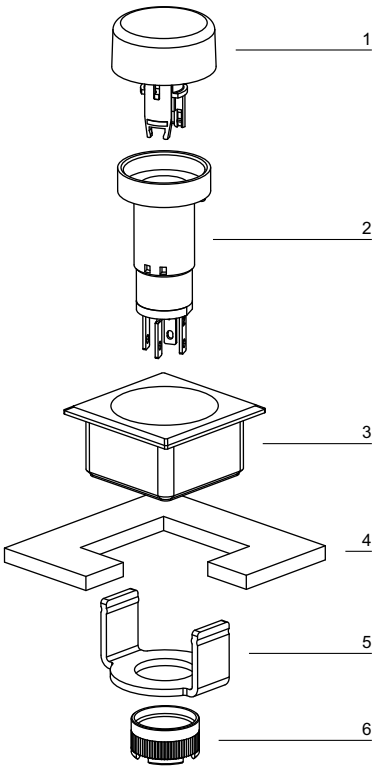
We reserve the right to modify technical data
All dimensions in mm

Pushbutton illuminative, raised mounting



1 Lens
2 Switch housing
3 Front planel
4 Fixing nut

Pushbutton illuminative, flush mounting



1 Lens
2 Switch housing
3 Front bezel set (upper part)
4 Front panel
5 Front bezel set (lower part)
6 Fixing nut

Indicator



	Front protection	Operating voltage/-current	Lens	Terminals	□ 9 x 9 mm Typ-Nr.	□ 9 x 14 mm Typ-Nr.	Ø 9 mm Typ-Nr.	Component layout	Mounting dimensions	Technical drawing	Circuit drawing	kg
Indicator	IP 40	12 VDC, 20 mA	Plastic green	S	**18-051.0055**	**18-041.0055**	**18-031.0055**	1	1	1	1	0.002
			Plastic red	S	**18-051.0052**	**18-041.0052**	**18-031.0052**	1	1	1	1	0.002
			Plastic yellow	S	**18-051.0054**	**18-041.0054**	**18-031.0054**	1	1	1	1	0.002
		2.2 VDC, 20 mA	Plastic green	S	**18-050.0055**	**18-040.0055**	**18-030.0055**	1	1	1	1	0.002
			Plastic red	S	**18-050.0052**	**18-040.0052**	**18-030.0052**	1	1	1	1	0.002
			Plastic yellow	S	**18-050.0054**	**18-040.0054**	**18-030.0054**	1	1	1	1	0.002
		24 VDC, 20 mA	Plastic green	S	**18-052.0055**	**18-042.0055**	**18-032.0055**	1	1	1	1	0.002
			Plastic red	S	**18-052.0052**	**18-042.0052**	**18-032.0052**	1	1	1	1	0.002
			Plastic yellow	S	**18-052.0054**	**18-042.0054**	**18-032.0054**	1	1	1	1	0.002

Terminals: S = Soldering terminal
Component layout from page 101, Mounting dimensions from page 102, Technical drawing from page 102, Circuit drawing from page 103

Illuminated pushbutton actuator



Essential Accessories:
Lens with LED page 97

	Front protection	Switching system	Contacts	Switching action	Terminals	□ 9 x 9 mm Typ-Nr.	□ 9 x 14 mm Typ-Nr.	Ø 9 mm Typ-Nr.	Component layout	Mounting dimensions	Technical drawing	Circuit drawing	kg
Illuminated pushbutton actuator	IP 40	SA	1 NC	MA	S	**18-258.035**	**18-248.035**	**18-238.035**	2	1	2	2	0.002
				M	S	**18-158.035**	**18-148.035**	**18-138.035**	2	1	2	4	0.002
			1 NO	MA	S	**18-257.035**	**18-247.035**	**18-237.035**	2	1	2	3	0.002
				M	S	**18-157.035**	**18-147.035**	**18-137.035**	2	1	2	5	0.002

Switching system: SA = Snap-action switching element
Contacts: NC = Normally closed, NO = Normally open
Switching action: MA = Maintained action, M = Momentary action
Terminals: S = Soldering terminal
Component layout from page 101, Mounting dimensions from page 102, Technical drawing from page 102, Circuit drawing from page 103

Indicator actuator, flush mounting


Essential Accessories:

Front bezel set, flush mounting page 98

	Front protection	Operating voltage/-current	Lens	Terminals	⍈ 19 x 19 mm Typ-Nr.	Ø 19 mm Typ-Nr.	Component layout	Mounting dimensions	Technical drawing	Circuit drawing	kg
Indicator actuator, flush mounting	IP 40	12 VDC, 20 mA	Plastic green	S	**18-081.0055**	**18-061.0055**	2	2	3	1	0.003
			Plastic red	S	**18-081.0052**	**18-061.0052**	2	2	3	1	0.003
			Plastic yellow	S	**18-081.0054**	**18-061.0054**	2	2	3	1	0.003
		2.2 VDC, 20 mA	Plastic green	S	**18-080.0055**	**18-060.0055**	2	2	3	1	0.002
			Plastic red	S	**18-080.0052**	**18-060.0052**	2	2	3	1	0.002
			Plastic yellow	S	**18-080.0054**	**18-060.0054**	2	2	3	1	0.002
		24 VDC, 20 mA	Plastic green	S	**18-082.0055**	**18-062.0055**	2	2	3	1	0.003
			Plastic red	S	**18-082.0052**	**18-062.0052**	2	2	3	1	0.003
			Plastic yellow	S	**18-082.0054**	**18-062.0054**	2	2	3	1	0.003

Terminals: S = Soldering terminal
Component layout from page 101, Mounting dimensions from page 102, Technical drawing from page 102, Circuit drawing from page 103

Illuminated pushbutton actuator, flush mounting


Essential Accessories:

Front bezel set, flush mounting page 98

Lens with LED, flush mounting page 97

	Front protection	Switching system	Contacts	Switching action	Terminals	⍈ 19 x 19 mm Typ-Nr.	Ø 19 mm Typ-Nr.	Component layout	Mounting dimensions	Technical drawing	Circuit drawing	kg
Illuminated pushbutton actuator, flush mounting	IP 40	SA	1 NC	MA	S	**18-288.035**	**18-268.035**	2	2	4	2	0.002
				M	S	**18-188.035**	**18-168.035**	2	2	4	4	0.002
			1 NO	MA	S	**18-287.035**	**18-267.035**	2	2	4	3	0.002
				M	S	**18-187.035**	**18-167.035**	2	2	4	5	0.002

Switching system: SA = Snap-action switching element
Contacts: NC = Normally closed, NO = Normally open
Switching action: MA = Maintained action, M = Momentary action
Terminals: S = Soldering terminal
Component layout from page 101, Mounting dimensions from page 102, Technical drawing from page 102, Circuit drawing from page 103

Front

Lens without LED

	Lens	⍁ 9 x 9 mm Typ-Nr.	⍁ 9 x 14 mm Typ-Nr.	Ø 9 mm Typ-Nr.	kg
Lens without LED illuminative	Plastic green translucent flush	**18-952.5**	**18-942.5**	**18-932.5**	0.001
	Plastic red translucent flush	**18-952.2**	**18-942.2**	**18-932.2**	0.001
	Plastic white translucent flush	**18-952.9**	**18-942.9**	**18-932.9**	0.001
	Plastic yellow translucent flush	**18-952.4**	**18-942.4**	**18-932.4**	0.001
non-illuminative	Plastic black opaque flush	**18-952.0**	**18-942.0**	**18-932.0**	0.001
	Plastic grey opaque flush	**18-952.8**	**18-942.8**	**18-932.8**	0.001

Lens with LED

	Lens	⍁ 9 x 9 mm Typ-Nr.	⍁ 9 x 14 mm Typ-Nr.	Ø 9 mm Typ-Nr.	kg
Lens with LED without built-in series resistor, typ. forward voltage 2.2 VDC, 20 mA	Plastic green translucent flush	**18-951.5**	**18-941.5**	**18-931.5**	0.001
	Plastic red translucent flush	**18-951.2**	**18-941.2**	**18-931.2**	0.001
	Plastic yellow translucent flush	**18-951.4**	**18-941.4**	**18-931.4**	0.001

Lens without LED, flush mounting

	Lens	⍁ 19 x 19 mm Typ-Nr.	Ø 19 mm Typ-Nr.	kg
Lens without LED, flush mounting illuminative	Plastic green translucent flush	**18-982.5**	**18-962.5**	0.001
	Plastic red translucent flush	**18-982.2**	**18-962.2**	0.001
	Plastic white translucent flush	**18-982.9**	**18-962.9**	0.001
	Plastic yellow translucent flush	**18-982.4**	**18-962.4**	0.001
non-illuminative	Plastic black opaque flush	**18-982.0**	**18-962.0**	0.001
	Plastic grey opaque flush	**18-982.8**	**18-962.8**	0.001

Lens with LED, flush mounting

	Lens	⍁ 19 x 19 mm Typ-Nr.	Ø 19 mm Typ-Nr.	kg
Lens with LED, flush mounting without built-in series resistor, typ. forward voltage 2.2 VDC, 20 mA	Plastic green translucent flush	**18-981.5**	**18-961.5**	0.001
	Plastic red translucent flush	**18-981.2**	**18-961.2**	0.001
	Plastic yellow translucent flush	**18-981.4**	**18-961.4**	0.001

Front bezel set, flush mounting

	Front bezel	⍞ 19 x 19 mm Typ-Nr.	Ø 19 mm Typ-Nr.	Mounting dimensions	kg
Front bezel set, flush mounting for Lens round	Plastic black	**18-920.2**	**18-920.3**	2	0.006
for Lens square	Plastic black	**18-920.1**		2	0.006

Mounting dimensions from page 102

Blind plug

	⍞ 9 x 9 mm Typ-Nr.	Ø 9 mm Typ-Nr.	Mounting dimensions	kg
Blind plug	**19-948.0**	**19-949.0**	3	0.001

Mounting dimensions from page 102

Backside

PCB plug-in base

	Terminals	Typ-Nr.	Component layout	Technical drawing	kg
PCB plug-in base Pins axial	P	**18-945**	3	5	0.001
Pins bent at right-angles	P	**18-946**	4	6	0.001

Terminals: P = PCB terminal
Component layout from page 101, Technical drawing from page 102

Assembling

Lens remover

	Typ-Nr.	kg
Lens remover	**18-910**	0.002

Mounting tool

	Typ-Nr.	kg
Mounting tool for Fixing nut long 19-991	**19-905**	0.011

Actuator with snap-action switching element

Switching system

The snap-action switching system was designed for switching low powers in electronic circuits.
Single-break snap-action contact.

Material

Lens
Polymethylacrylate (PMMA), Polycarbonate (PC)

Material of contact
Gold contact on nickel plating

Actuator housing
Polyamide, colour black

Mechanical characteristics

Terminals
The terminals can be used as soldering terminals.
Max.wire diameter: 2 x 0.5 mm²
Max.wire ccross-section of stranded cable 1 x 0.75 mm²
Wire cross-section of terminal 1.6 x 0.4 mm

Tightening torque
for fixing nut max. 20 Ncm

Actuating force
1.4 N

Actuating travel
2.2 mm ±0.2 mm

Rebound time
≤2.5 ms

Mechanical lifetime
Momentary action 2 million cycles of operation
Maintained action 1 million cycles of operation,
as per IEC 60512-5-9a

Electrical characteristics

Contact resistance
≤100 mΩ starting value (initial), as per IEC 60512-2-2b

Electrical life
≥500 000 cycles of operation at 30 VDC, 100 mA, as per IEC 60512-5-9c

Power consumption LED
20 mA

Switch rating
min. 10 μA at 100 μV
max. 100 mA at 42 VAC/VDC

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

Environmental conditions

Storage temperature
-40 °C ... +80 °C

Service temperature
-25 °C ... +65 °C

Protection degree
IP 40 front side, as per IEC 60529

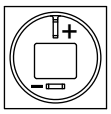
Shock resistance
(Single impacts, semi-sinusodial)
50 g for 11 ms, as per IEC 60068-2-27

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

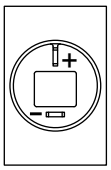
Component layout

1 Indicator page 95

9 x 9 mm



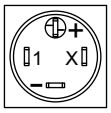
9 x 14 mm



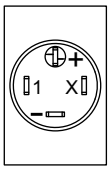
Ø9 mm

2 Illuminated pushbutton actuator page 95 | **Indicator actuator, flush mounting** page 96 | **Illuminated pushbutton actuator, flush mounting** page 96

9 x 9 mm



9 x 14 mm

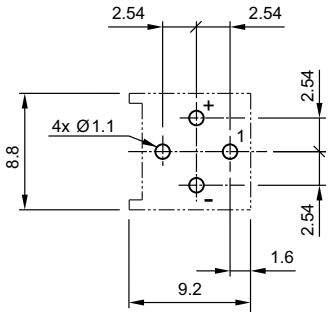


Ø9 mm

X contact-nr.
2 = NO
4 = NC

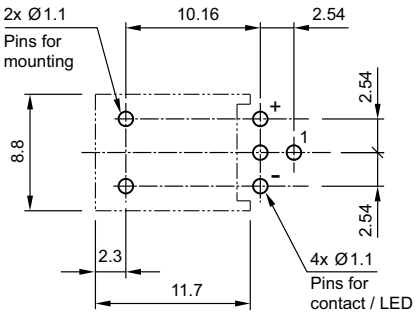
3 PCB plug-in base page 98

Drilling plan (element side)
Through-connection recommended



4 PCB plug-in base page 98

Drilling plan (element side)
Through-connection recommended

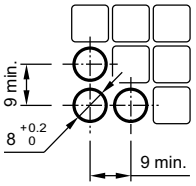


Drawings 18

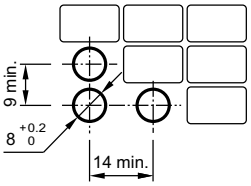
Mounting dimensions

1 Indicator page 95 **| Illuminated pushbutton actuator** page 95

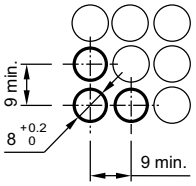
9 x 9 mm



9 x 14 mm

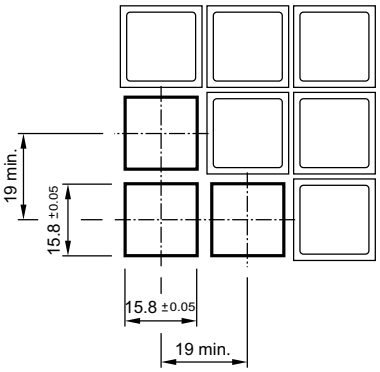


Ø9 mm

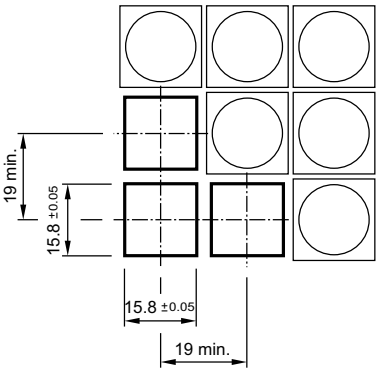


2 Indicator actuator, flush mounting page 96 **| Illuminated pushbutton actuator, flush mounting** page 96 **| Front bezel set, flush mounting** page 98

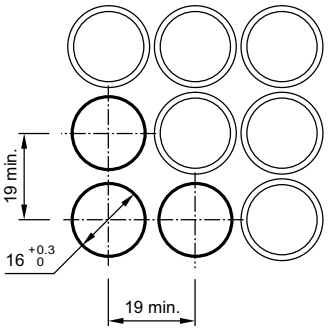
19 x 19 mm



19 x 19 mm

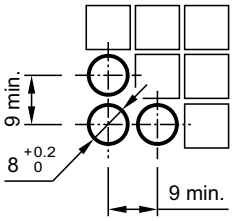


Ø19 mm

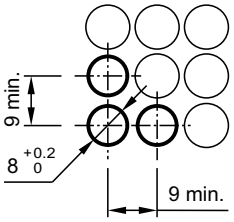


3 Blind plug page 98

9 x 9 mm

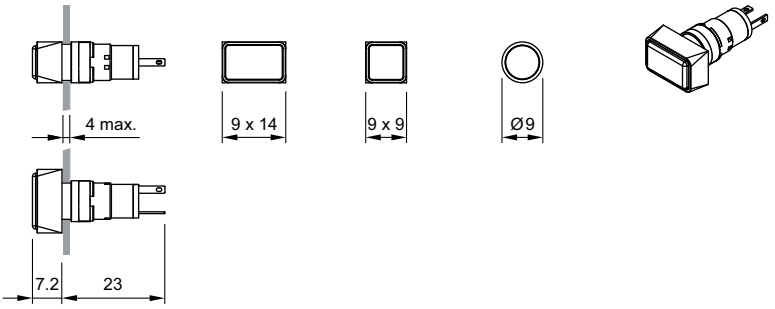


Ø9 mm



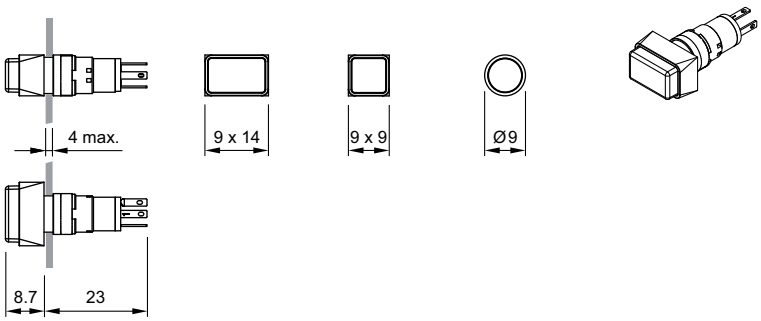
Technical drawing

1 Indicator page 95

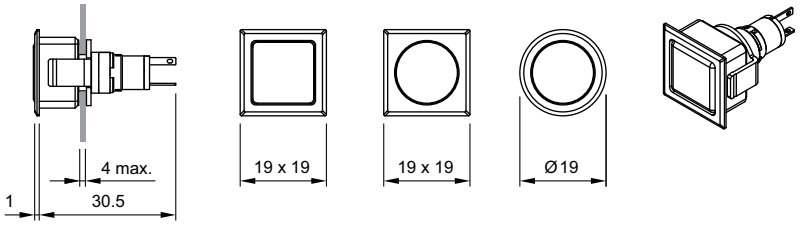


Drawings

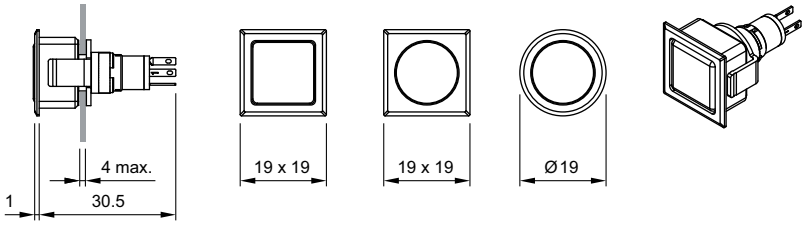
2 Illuminated pushbutton actuator page 95



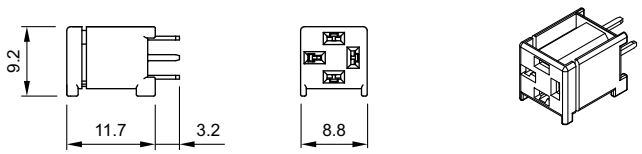
3 Indicator actuator, flush mounting page 96



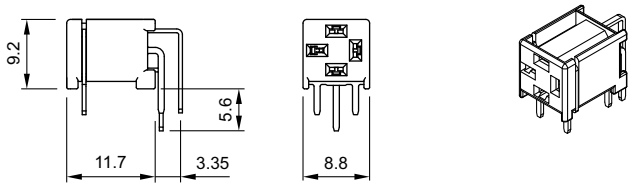
4 Illuminated pushbutton actuator, flush mounting page 96



5 PCB plug-in base page 98



6 PCB plug-in base page 98

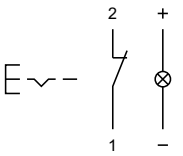


Circuit drawing

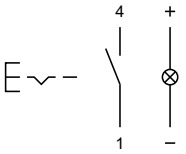
1 Indicator page 95 **| Indicator actuator, flush mounting** page 96

Drawings 18

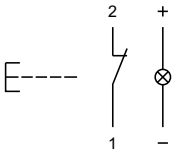
2 Illuminated pushbutton actuator page 95 **| Illuminated pushbutton actuator, flush mounting** page 96



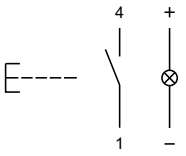
3 Illuminated pushbutton actuator page 95 **| Illuminated pushbutton actuator, flush mounting** page 96



4 Illuminated pushbutton actuator page 95 **| Illuminated pushbutton actuator, flush mounting** page 96



5 Illuminated pushbutton actuator page 95 **| Illuminated pushbutton actuator, flush mounting** page 96



Contents 19

Product Information

General notes
The series contains indicators and illuminated pushbuttons with maintained and momentary action and one contact which may be normally closed or normally open (snap-action element for closing). The illuminated pushbuttons are fitted with snap-action or low-level switching systems.
The front dimensions are 9 x 9 mm or 9 mm dia.

Mounting
Mounting from the front through the mounting hole is assured even when the wiring has already been attached.
The units are equipped with soldering/plug-in terminals.

Lenses
The flat lenses, made of polycarbonate, are obtainable in various colours. The transparent lens is available with translucent or transparent support.

Marking
A limited amount of marking can be provided.

Illumination
Perfect illumination of the different coloured lenses is assured by filament lamps Bi-Pin T1 longlife (6 ... 24 V) or LED Bi-Pin T1. LED are available in the colours white, red, yellow, orange and green. 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.

Specimen order

Indicator :

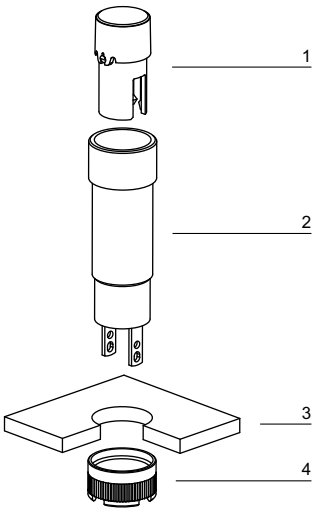
- Indicator actuator, 9 mm dia., soldering terminal	19-030.005

Essential accessories :

- Lens plastic blue, transparent, flush, 9 mm dia.	19-931.6
- Single-LED, T1 Bi-Pin, 3.6 VDC, weiss	10-2603.3179C

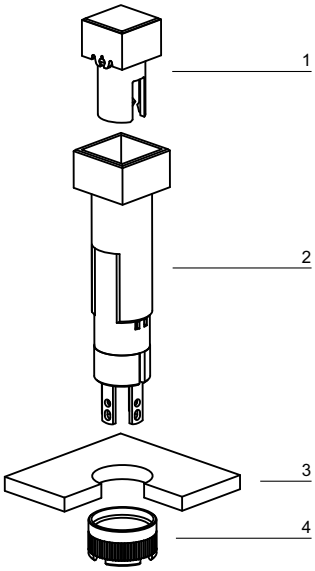
We reserve the right to modify technical data
All dimensions in mm

Indicator, raised mounting



1 Lens
2 Switch housing
3 Front plate
4 Fixing nut

Pushbutton illuminative, raised mounting



1 Lens
2 Switch housing
3 Front plate
4 Fixing nut

Indicator actuator


Essential Accessories:

- Lens page 110
- Single-LED page 111

	Front protection	Terminals	□ 9 x 9 mm Typ-Nr.	Ø 9 mm Typ-Nr.	Component layout	Mounting dimensions	Technical drawing	Circuit drawing	kg
Indicator actuator Mounting depth : 25 mm	IP 40	S2	**19-050.005**	**19-030.005**	1	1	1	1	0.001
Mounting depth : 33 mm	IP 40	S2	**19-051.005**	**19-031.005**	1	1	3	1	0.002

Terminals: S2 = Soldering terminal (also pluggable 2.0 x 0.5 mm)
Component layout from page 115, Mounting dimensions from page 115, Technical drawing from page 116, Circuit drawing from page 117

Illuminated pushbutton actuator


Essential Accessories:

- Lens page 110
- Single-LED page 111

	Front protection	Switching system	Contact material	Contacts	Switching action	Terminals	□ 9 x 9 mm Typ-Nr.	Ø 9 mm Typ-Nr.	Component layout	Mounting dimensions	Technical drawing	Circuit drawing	kg
Illuminated pushbutton actuator	IP 40	LL	Au	1 NC	MA	S2	**19-482.035**	**19-472.035**	2	1	2	2	0.002
					M	S2	**19-452.035**	**19-432.035**	2	1	2	4	0.002
				1 NO	MA	S2	**19-481.035**	**19-471.035**	2	1	2	3	0.002
					M	S2	**19-451.035**	**19-431.035**	2	1	2	5	0.002
		SA	Au	1 NO	MA	S2	**19-289.035**	**19-279.035**	2	1	2	3	0.002
					M	S2	**19-159.035**	**19-139.035**	2	1	2	5	0.002
			Ag	1 NO	MA	S2	**19-289.015**	**19-279.015**	2	1	2	3	0.002
					M	S2	**19-159.015**	**19-139.015**	2	1	2	5	0.002

Switching system: LL = Low level switching element, SA = Snap-action switching element
Contact material: Au = Gold, Ag = Silver
Contacts: NC = Normally closed, NO = Normally open
Switching action: MA = Maintained action, M = Momentary action
Terminals: S2 = Soldering terminal (also pluggable 2.0 x 0.5 mm)
Component layout from page 115, Mounting dimensions from page 115, Technical drawing from page 116, Circuit drawing from page 117

Front

Lens

	Lens	⍁ 9 x 9 mm Typ-Nr.	Ø 9 mm Typ-Nr.	kg
Lens illuminative, holder translucent	Plastic flush transparent blue	**19-951.6**	**19-931.6**	0.001
	Plastic flush transparent green	**19-951.5**	**19-931.5**	0.001
	Plastic flush transparent red	**19-951.2**	**19-931.2**	0.001
	Plastic flush transparent white	**19-951.9**	**19-931.9**	0.001
	Plastic flush transparent yellow	**19-951.4**	**19-931.4**	0.001
illuminative (not recommended for film insert), holder transparent	Plastic flush transparent blue	**19-952.6**	**19-932.6**	0.001
	Plastic flush transparent colourless	**19-952.7**	**19-932.7**	0.001
	Plastic flush transparent green	**19-952.5**	**19-932.5**	0.001
	Plastic flush transparent red	**19-952.2**	**19-932.2**	0.001
	Plastic flush transparent yellow	**19-952.4**	**19-932.4**	0.001
non-illuminative	Plastic flush opaque black	**19-951.0**	**19-931.0**	0.001
	Plastic flush opaque grey	**19-951.8**	**19-931.8**	0.001

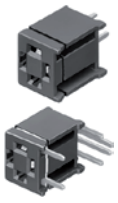
Blind plug

	Blind plug	⍁ 9 x 9 mm Typ-Nr.	Ø 9 mm Typ-Nr.	Mounting dimensions	kg
Blind plug	Plastic black	**19-948.0**	**19-949.0**	1	0.001

Mounting dimensions from page 115

Backside

PCB plug-in base



	Terminals	Typ-Nr.	Component layout	Technical drawing	kg
PCB plug-in base Pins axial	P	**19-940**	3	4	0.001
Pins bent at right-angles	P	**19-941**	4	5	0.001

Terminals: P = PCB terminal

Component layout from page 115, Technical drawing from page 116

Flat receptacle

	Typ-Nr.	kg
Flat receptacle 2.0 x 0.5 mm	**31-945**	0.001

Insulation sleeve

	Typ-Nr.	kg
Insulation sleeve for Flat receptacle 31-945	**31-928**	0.001

Illumination

Filament lamp

	Socket	Operating voltage/-current	Typ-Nr.	kg
Filament lamp max. PIN length 5 mm	T1 Bi-Pin	12 VAC/DC, 25 mA	**10-1609.1199**	0.001
		24 VAC/DC, 20 mA	**10-1612.1179**	0.001
		6 VAC/DC, 70 mA	**10-1606.1309**	0.001

Single-LED

	Socket	Light colour	Operating voltage/-current	Typ-Nr.	kg
Single-LED max. PIN length 8 mm	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

	Socket	Light colour	Operating voltage/-current	Typ-Nr.	kg
Multi-LED max. PIN length 5 mm	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

Fixing nut

	Typ-Nr.	kg
Fixing nut Ø 9/M8 x 13 mm	**19-991**	0.001

Dressing tool

	Typ-Nr.	kg
Dressing tool for aligning buttons	**19-906**	0.011

Lens remover

	Typ-Nr.	kg
Lens remover	**19-910**	0.002

Lamp remover

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

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

Mounting tool

	Typ-Nr.	kg
Mounting tool for Fixing nut long 19-991	**19-905**	0.011

Actuator with snap-action switching element

Switching system

Single-break, snap-action switching system.
1 normally open contact

Material

Material of contact
Gold plated Silver, Silver plated

Switch housing
Polyetherimide (PEI), self-extinguishing

Actuator housing
Polyphenyleneoxide (PPO), self-extinguishing, colour black

Mechanical characteristics

Terminals
Universal terminal:
Max. wire diameter 2 x 0.8 mm
Max. wire cross-section of stranded cable 1 x 0.75 mm²

Plug-in terminal: 2.0 x 0.5 mm
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.

Tightening torque
for fixing nut max. 20 Ncm

Actuating force
1.6 N

Actuating travel
2.8 mm ±0.2 mm

Mechanical lifetime
2 million operations

Electrical characteristics

Switch rating
Silver plated:
Max. 50 VAC / 72 VDC, 0.8 A or 50 W
Min. 20 V, 10 mA
Gold plated:
Max. 50 VAC / 72 VDC, 100 mA or 5 W
Min. 100 µV, 50 µA

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

Environmental conditions

Storage temperature
-40 °C ... +85 °C

Service temperature
without illumination -25 °C ... +65 °C
with incandescent lamp -25 °C ... +45 °C
with LED -25 °C ... +65 °C
for indicators and illuminated pushbuttons mounted as a block, make sure the heat can escape freely

Protection degree
IP 40 front side, as per IEC 60529

Actuator with 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.
1 normally open or 1 normally closed contact.

Material

Material of contact
Gold plated

Actuator housing
Polyphenyleneoxide (PPO), self-extinguishing, colour black

Mechanical characteristics

Terminals
Universal terminal:
Max. wire diameter 2 x 0.8 mm
Max. wire cross-section of stranded cable 1 x 0.75 mm²

Plug-in terminal: 2.0 x 0.5 mm
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.

Tightening torque
for fixing nut max. 20 Ncm

Actuating force
1.8 N ±0.3 N

Actuating travel
2.8 mm ±0.2 mm

Rebound time
Typ. <100 µs

Mechanical lifetime
5 million operations

Electrical characteristics

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

Switch rating
10 µA, 100 µV to 100 mA at 42 VAC/VDC

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

Environmental conditions

Storage temperature
-40 °C ... +85 °C

Service temperature
without illumination -25 °C ... +65 °C
with incandescent lamp -25 °C ... +45 °C
with LED -25 °C ... +65 °C

for indicators and illuminated pushbuttons mounted as a block,
make sure the heat can escape freely

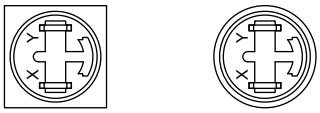
Protection degree
IP 40 front side, as per IEC 60529

Shock resistance
(Single impacts, semi-sinusoidal)
15 g for 11 ms, as per IEC 60512-4-3, IEC 60068-2-27

Component layout

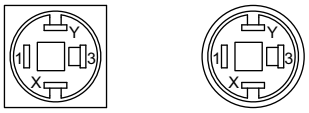
1 Indicator actuator page 109

9 x 9 mm Ø9 mm



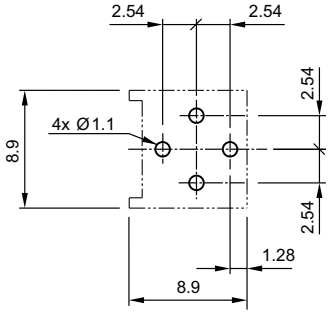
2 Illuminated pushbutton actuator page 109

9 x 9 mm Ø9 mm



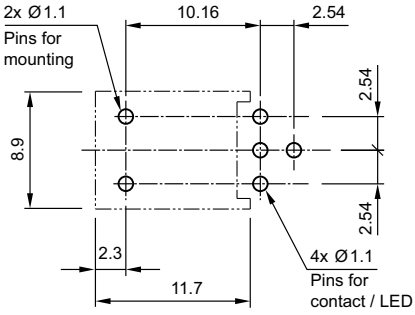
3 PCB plug-in base page 110

Drilling plan (element side)
Through-connection recommended



4 PCB plug-in base page 110

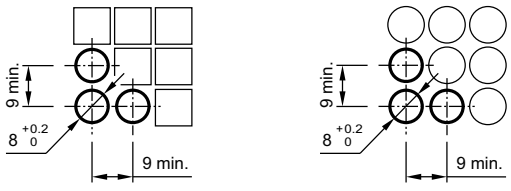
Drilling plan (element side)
Through-connection recommended



Mounting dimensions

1 Indicator actuator page 109 **| Illuminated pushbutton actuator** page 109 **| Blind plug** page 110

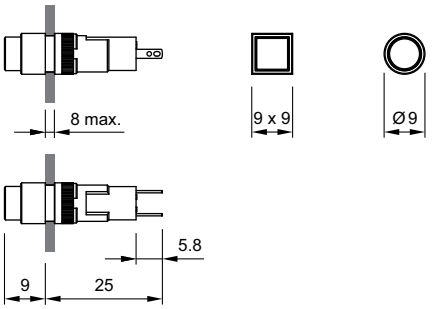
9 x 9 mm Ø9 mm

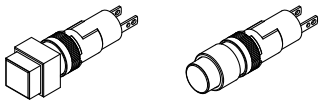


Drawings 19

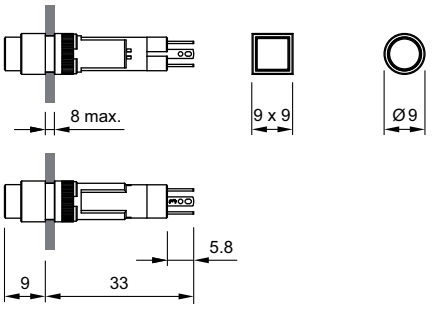
Technical drawing

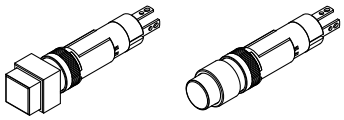
1 Indicator actuator page 109



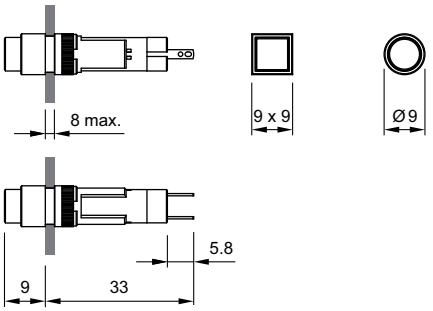


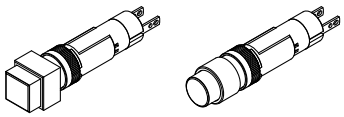
2 Illuminated pushbutton actuator page 109



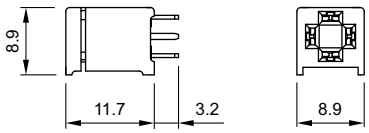


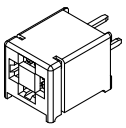
3 Indicator actuator page 109



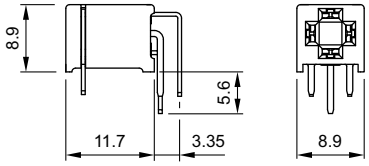


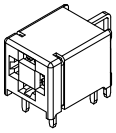
4 PCB plug-in base page 110





5 PCB plug-in base page 110

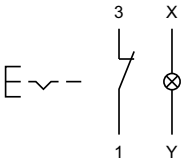




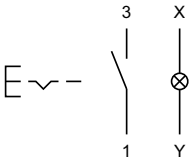
Circuit drawing

1 Indicator actuator page 109

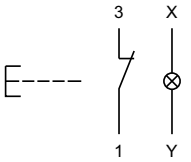
2 Illuminated pushbutton actuator page 109



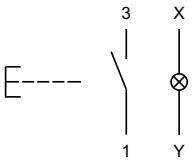
3 Illuminated pushbutton actuator page 109



4 Illuminated pushbutton actuator page 109



5 Illuminated pushbutton actuator page 109



Contents 84

Product Information

General notes
The Series 84 consists of indicators, pushbuttons and emergency-stop switches. The indicators and pushbuttons are a modular system of lens, actuator, switching element and a variety of means of connection and mounting. Different front protection of IP 67, IP 65 or IP 40 ensure that the pushbuttons are suited for industrial use.
Anodized aluminium parts can have visible variations due production-technical reasons.

Mounting
The actuators of the Series 84 are inserted in a 22.5 mm diameter mounting hole and the switching units are clipped on to the rear of the actuators. The pushbutton system can be mounted as a complete unit (actuator and switching unit). Mounting from the front with the wiring already attached is also possible.
When mounted on printed circuit boards the actuators are inserted in the mounting hole 22.5 mm dia. and the switching elements are fixed on the board. The printed circuit board is connected to the preassembled actuator by means of the mounting flange. There is no need for subsequent adjustment or spacing studs.

Lenses
The lenses are available in various colours and made either from plastic or anodized aluminium.

Marking
The marking plates of the Series 84 can be marked by engraving or hot stamping.
Specific symbols and markings are available on request.
The lenses are without holder not engravable, since by mounting no accurate position of the engraving text is reached.

Illumination
To ensure full illumination, the switching elements can be supplied with integrated single LEDs in the colours red, orange, yellow, green, blue or white. The series resistor is integrated.
Luminosity and wave length scattering caused by the technology used in the LED manufacturing processes may lead to visual differences in our products.

Emergency-stop pushbutton, foolproof
The E-stop pushbutton can be mounted in front panels with a thickness between 1 and 4 mm. It has a low behind-panel depth of 13.5 mm (max.) respectively 18.5 mm with plug-in terminlas and can be safely and easily adapted to PCBs of different heights. The front protection degree is IP 65.
Importantly, the Series 84 emergency-stop requires no additional assembly because of its single-piece 'monoblock' design.
The switch's status is clearly indicated by a black or green colour ring on the shaft, and the foolproof actuator design conforms to DIN EN ISO 13850 and EN IEC 60947.
It can be supplied with LED illumination that is visible even from the side.

Specimen order

Indicator :

- Indicator actuator, IP67	84-0100.0

Essential accessories :

- Lens plastic blue	84-7111.600
- Illumination element Single-LED blue 24VDC, plug-in terminal	84-8001.6620

or

Indicator with PCB terminal :

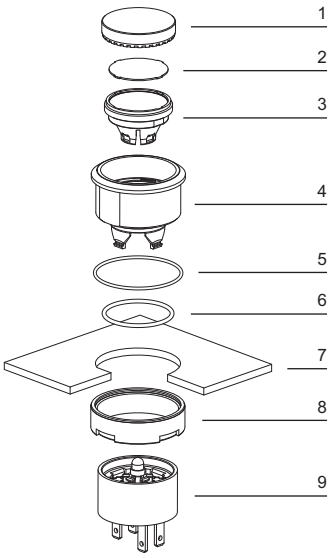
- Indicator actuator, IP67	84-3100.1

Essential accessories :

- Lens plastic red	84-7111.200
- Illumination element with PCB terminal	92-800.042
- Single-LED red 2.1VDC	10-2602.3202L
- Mounting flange	92-960.0

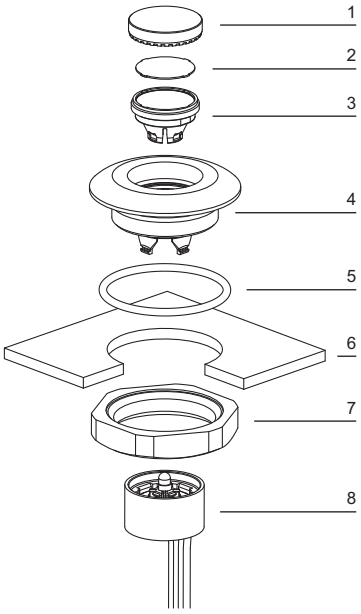
We reserve the right to modify technical data
All dimensions in mm

Indicator and pushbutton illuminative, 25 mm dia.



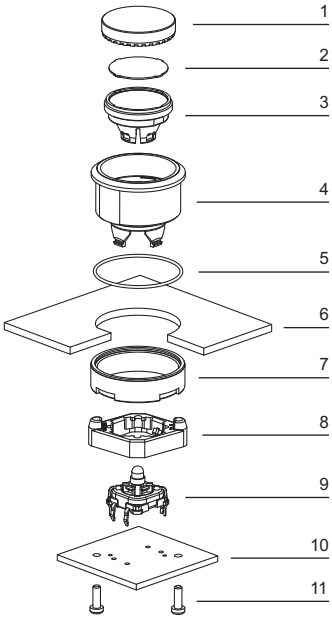
1 Lens
2 Marking plate
3 Lens holder
4 Actuator housing
5 Outer sealing
6 Inner sealing
7 Front panel
8 Fixing nut
9 Switching-/Illumination element with plug-in terminal (solderable)

Indicator and pushbutton illuminative, 40 mm dia.



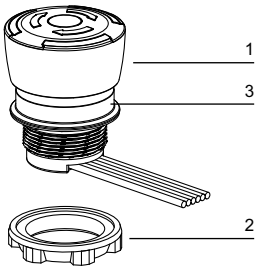
1 Lens
2 Marking plate
3 Lens holder
4 Actuator housing
5 Sealing
6 Front panel
7 Fixing nut
8 Switching-/Illumination element with flat ribbon cable

Indicator and pushbutton illuminative, 25 mm dia., PCB version



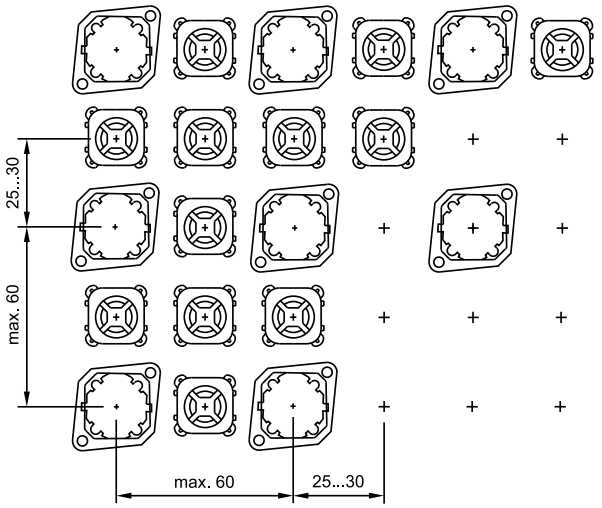
1 Lens
2 Marking plate
3 Lens holder
4 Actuator housing
5 Sealing
6 Front panel
7 Fixing nut
8 Mounting flange
9 Switching-/Illumination element with PCB terminal
10 PCB
11 Fixing screws

Emergency-stop pushbutton



1 Emergency-stop pushbutton
2 Fixing nut
3 Position indication ring green or black

Arrangement mounting flange for switching- and illumination element, PCB mounting



The arrangement of the mounting flanges and their number is determined by the size of the front panel or PCB. To ensure uniform, tactile switching, we recommend a layout of the flanges as per adjacent sketch.

For large PCBs with several switching elements we recommend the following procedure :

1. Fit the actuator to the front panel.
2. Clip the mounting flange to the rear of the intended actuator.
3. Screw the PCB with the components soldered to it to the assembled mounting flange.

This arrangement applies to PCBs 1.6 mm thick.

Dismantling mounting flange

The tool 84-998 must be used for removing the mounting flange from the actuator. Before removing the flange, the PCB fixing srews must be loosened.

Emergency-stop pushbutton, foolproof EN IEC 60947-5-5, complete

Application as per DIN EN ISO 13850 and EN 60204-1

	Front protection	Switching action	Mushroom had cap	Illumination	Terminals	Contacts	Ø 32 mm Typ-Nr.	Component layout	Mounting dimensions	Technical drawing	Circuit drawing	kg
Emergency-stop pushbutton, foolproof EN IEC 60947-5-5, complete Position indication ring black Twist to unlock clockwise	IP 65	MA	Plastic red	without	FR	1 NC	**84-5020.0040**	2	2	17	8	0.036
						1 NC + 1 NO	**84-5030.0040**	2	2	17	9	0.036
						2 NC	**84-5040.0040**	2	2	17	10	0.036
					PT 2.8 s	1 NC	**84-5020.0020**	1	2	17	8	0.028
						1 NC + 1 NO	**84-5030.0020**	1	2	17	9	0.028
						2 NC	**84-5040.0020**	1	2	17	10	0.028
Position indication ring black Twist to unlock clockwise LED operating voltage: 5 ... 30 VDC Current consumption: 9.7 ...12.4 mA	IP 65	MA	Plastic red	LED red	FR	1 NC	**84-5021.2B40**	2	2	17	11	0.036
						1 NC + 1 NO	**84-5031.2B40**	2	2	17	12	0.036
						2 NC	**84-5041.2B40**	2	2	17	13	0.036
					PT 2.8 s	1 NC	**84-5021.2B20**	1	2	17	11	0.028
						1 NC + 1 NO	**84-5031.2B20**	1	2	17	12	0.028
						2 NC	**84-5041.2B20**	1	2	17	13	0.028
Position indication ring green Twist to unlock clockwise	IP 65	MA	Plastic red	without	FR	1 NC	**84-5120.0040**	2	2	17	8	0.036
						1 NC + 1 NO	**84-5130.0040**	2	2	17	9	0.036
						2 NC	**84-5140.0040**	2	2	17	10	0.036
					PT 2.8 s	1 NC	**84-5120.0020**	1	2	17	8	0.028
						1 NC + 1 NO	**84-5130.0020**	1	2	17	9	0.028
						2 NC	**84-5140.0020**	1	2	17	10	0.028
Position indication ring green Twist to unlock clockwise LED operating voltage: 5 ... 30 VDC Current consumption: 9.7 ... 12.4 mA	IP 65	MA	Plastic red	LED red	FR	1 NC	**84-5121.2B40**	2	2	17	11	0.036
						1 NC + 1 NO	**84-5131.2B40**	2	2	17	12	0.036
						2 NC	**84-5141.2B40**	2	2	17	13	0.036
					PT 2.8 s	1 NC	**84-5121.2B20**	1	2	17	10	0.028
						1 NC + 1 NO	**84-5131.2B20**	1	2	17	12	0.028
						2 NC	**84-5141.2B20**	1	2	17	13	0.028

Standard version:
Flat ribbon-cable length 300 mm; Plug-in terminal 2.8 x 0.5 mm.
Other options on request:
Customisation of flat ribbon-cable and connectors.
Switching action: MA = Maintained action
Terminals: FR = Flat ribbon cable, PT 2.8 s = Plug-in terminal 2.8 mm (solderable)
Contacts: NC = Normally closed, NO = Normally open
Component layout from page 147, Mounting dimensions from page 150, Technical drawing from page 151, Circuit drawing from page 155

Stop pushbutton grey, complete


	Front protection	Switching action	Mushroom had cap	Illumination	Terminals	Contacts	Ø 32 mm Typ-Nr.	Component layout	Mounting dimensions	Technical drawing	Circuit drawing	kg
Stop pushbutton grey, complete Position indication ring black Twist to unlock clockwise	IP 65	MA	Plastic grey	without	FR	1 NC	**84-6020.0040**	2	2	17	8	0.036
						1 NC + 1 NO	**84-6030.0040**	2	2	17	9	0.036
						2 NC	**84-6040.0040**	2	2	17	10	0.036
					PT 2.8 s	1 NC	**84-6020.0020**	1	2	17	8	0.028
						1 NC + 1 NO	**84-6030.0020**	1	2	17	9	0.028
						2 NC	**84-6040.0020**	1	2	17	10	0.028
Position indication ring black Twist to unlock clockwise LED operating voltage: 5 ... 30 VDC Current consumption: 9.7 ...12.4 mA	IP 65	MA	Plastic grey	LED red	FR	1 NC	**84-6021.2B40**	2	2	17	11	0.036
						1 NC + 1 NO	**84-6031.2B40**	2	2	17	12	0.036
						2 NC	**84-6041.2B40**	2	2	17	13	0.036
					PT 2.8 s	1 NC	**84-6021.2B20**	1	2	17	11	0.028
						1 NC + 1 NO	**84-6031.2B20**	1	2	17	12	0.028
						2 NC	**84-6041.2B20**	1	2	17	13	0.028

Standard version:
Flat ribbon-cable length 300 mm; Plug-in terminal 2.8 x 0.5 mm.
Other options on request:
Customisation of flat ribbon-cable and connectors.
Switching action: MA = Maintained action
Terminals: FR = Flat ribbon cable, PT 2.8 s = Plug-in terminal 2.8 mm (solderable)
Contacts: NC = Normally closed, NO = Normally open
Component layout from page 147, Mounting dimensions from page 150, Technical drawing from page 151, Circuit drawing from page 155

Indicator actuator

Illuminated lens, non-illuminated bezel


Essential Accessories:

- Illumination element page 135
- Lens plastic page 131

	Front protection	Front ring	Ø 25 mm Typ-Nr.	Mounting dimensions	Technical drawing	[kg]
Indicator actuator	IP 40	Plastic black	**84-3100.0**	1	16	0.004
	IP 67	Aluminium natural	**84-0200.7**	1	16	0.008
		Plastic black	**84-0100.0**	1	16	0.003

Mounting dimensions from page 150, Technical drawing from page 151

Illuminated pushbutton actuator

Illuminated lens, non-illuminated bezel



Essential Accessories:

- Lens plastic page 131
- Switching element illuminated page 137

	Switching action	Front protection	Front ring	Ø 40 mm Typ-Nr.	Ø 25 mm Typ-Nr.	Mounting dimensions	Technical drawing	Circuit drawing	[kg]
Illuminated pushbutton actuator	M	IP 67	Aluminium natural	**84-1221.7**		3	18	4	0.022
		IP 40	Plastic black		**84-2101.0**	1	16	4	0.004
		IP 67	Aluminium black		**84-1201.0**	1	16	4	0.008
			Aluminium blue		**84-1201.6**	1	16	4	0.008
			Aluminium gold		**84-1201.4**	1	16	4	0.008
			Aluminium natural		**84-1201.7**	1	16	4	0.008
			Aluminium olive-green		**84-1201.5**	1	16	4	0.008
			Aluminium red		**84-1201.2**	1	16	4	0.008
			Plastic black		**84-1101.0**	1	16	4	0.003

Switching action: M = Momentary action
Mounting dimensions from page 150, Technical drawing from page 151, Circuit drawing from page 155

Pushbutton actuator

Non-illuminated lens and bezel



Essential Accessories:

Lens metal page 132

Switching element non-illuminated page 138

	Front protection	Switching action	Front ring	Ø 40 mm Typ-Nr.	Ø 25 mm Typ-Nr.	Mounting dimensions	Technical drawing	Circuit drawing	kg
Pushbutton actuator	IP 67	M	Aluminium natural	**84-1221.7**		3	18	4	0.022
	IP 40	M	Plastic black		**84-2101.0**	1	16	4	0.004
	IP 67	M	Aluminium black		**84-1201.0**	1	16	4	0.008
			Aluminium blue		**84-1201.6**	1	16	4	0.008
			Aluminium gold		**84-1201.4**	1	16	4	0.008
			Aluminium natural		**84-1201.7**	1	16	4	0.008
			Aluminium olive-green		**84-1201.5**	1	16	4	0.008
			Aluminium red		**84-1201.2**	1	16	4	0.008
			Plastic black		**84-1101.0**	1	16	4	0.003

Switching action: M = Momentary action

Mounting dimensions from page 150, Technical drawing from page 151, Circuit drawing from page 155

Indicator actuator with ring illumination (illuminated bezel)

Essential Accessories:

Illumination element page 135

Lens metal for Ring illumination page 132

	Front protection	Front ring	Ø 25 mm Typ-Nr.	Mounting dimensions	Technical drawing	kg
Indicator actuator with ring illumination (illuminated bezel)	IP 67	Plastic translucent	**84-0090.7**	1	16	0.006

Accessories for ring illumination:

Essential lenses Typ-Nr. 84-7202.x00A and 84-7205.x00A

Bi-colour illumination elements are not recommended.

Mounting dimensions from page 150, Technical drawing from page 151

Pushbutton actuator with ring illumination (illuminated bezel)

Essential Accessories:

- Lens metal for Ring illumination page 132
- Switching element illuminated page 137

	Switching action	Front protection	Front ring	Ø 25 mm Typ-Nr.	Mounting dimensions	Technical drawing	Circuit drawing	kg
Pushbutton actuator with ring illumination (illuminated bezel)	M	IP 67	Plastic translucent	**84-1091.7**	1	16	4	0.006

Accessories for ring illumination:
Essential lenses Typ-Nr. 84-7202.x00A and 84-7205.x00A
Bi-colour switching elements are not recommended.
Switching action: M = Momentary action
Mounting dimensions from page 150, Technical drawing from page 151, Circuit drawing from page 155

Indicator actuator with ring illumination (illuminated multi-colour bezel)

Essential Accessories:

- Illumination element PCB mounting page 139
- Lens plastic page 131
- Mounting flange page 139
- Single-LED page 140

	Front protection	Front ring	Ø 25 mm Typ-Nr.	Mounting dimensions	Technical drawing	kg
Indicator actuator with ring illumination (illuminated multi-colour bezel)	IP 67	Plastic transparent	**84-0080.7**	1	16	0.006

Mounting dimensions from page 150, Technical drawing from page 151

Pushbutton actuator with ring illumination (illuminated multi-colour bezel)

Essential Accessories:

- Lens plastic page 131
- Mounting flange page 139
- Single-LED page 140
- Switching element PCB mounting illuminative page 139

	Switching action	Front protection	Front ring	Ø 25 mm Typ-Nr.	Mounting dimensions	Technical drawing	Circuit drawing	kg
Pushbutton actuator with ring illumination (illuminated multi-colour bezel)	M	IP 67	Plastic transparent	**84-1081.7**	1	16	4	0.006

Switching action: M = Momentary action
Mounting dimensions from page 150, Technical drawing from page 151, Circuit drawing from page 155

Front

Lens plastic

	Mounting type	Lens	Ø 25 mm Typ-Nr.	
Lens plastic flush - level, illuminative	level with bezel	blue transparent	**84-7111.600**	0.001
		colourless transparent	**84-7111.700**	0.001
		green transparent	**84-7111.500**	0.001
		orange transparent	**84-7111.300**	0.001
		red transparent	**84-7111.200**	0.001
		yellow transparent	**84-7111.400**	0.001
flush - level, non-illuminative	level with bezel	black opaque	**84-7121.000**	0.001
	level with bezel	grey opaque	**84-7121.800**	0.001
flush - raised, illuminative	raised above bezel	blue transparent	**84-7115.600**	0.001
		colourless transparent	**84-7115.700**	0.001
		green transparent	**84-7115.500**	0.001
		orange transparent	**84-7115.300**	0.001
		red transparent	**84-7115.200**	0.001
		yellow transparent	**84-7115.400**	0.001
flush - raised, non-illuminative	raised above bezel	black opaque	**84-7125.000**	0.001
		grey opaque	**84-7125.800**	0.001

Marking plate for lens plastic

can be hot stamped

	Marking plate	Typ-Nr.	
Marking plate for lens plastic	Plastic colourless transparent	**61-9707.7**	0.001

Lens plastic with symbol

	Mounting type	Symbol	Lens	Ø 25 mm Typ-Nr.	
Lens plastic with symbol flush - level, illuminative	level with bezel	ON/OFF	blue transparent	**84-7111.602**	0.002
			colourless transparent	**84-7111.702**	0.002
			green transparent	**84-7111.502**	0.002
			red transparent	**84-7111.202**	0.002
		Ring	blue transparent	**84-7111.601**	0.002
			colourless transparent	**84-7111.701**	0.002
			green transparent	**84-7111.501**	0.002
			orange transparent	**84-7111.301**	0.002
			red transparent	**84-7111.201**	0.002
			yellow transparent	**84-7111.401**	0.002
		Stand by	blue transparent	**84-7111.603**	0.002
			colourless transparent	**84-7111.703**	0.002
			green transparent	**84-7111.503**	0.002
			red transparent	**84-7111.203**	0.002

The silvery coat is being applied on the lens (screen print) with an additional protective lacquer.

Lens metal

	Mounting type	Lens	Ø 25 mm Typ-Nr.	kg
Lens metal convex - level, non-illuminative	level with bezel	Aluminium black	**84-7202.000**	0.003
		Aluminium blue	**84-7202.600**	0.003
		Aluminium gold	**84-7202.400**	0.003
		Aluminium natural	**84-7202.800**	0.003
		Aluminium olive-green	**84-7202.500**	0.003
		Aluminium red	**84-7202.200**	0.003
flush - level, non-illuminative	level with bezel	Aluminium black	**84-7201.000**	0.003
		Aluminium blue	**84-7201.600**	0.003
		Aluminium gold	**84-7201.400**	0.003
		Aluminium natural	**84-7201.800**	0.003
		Aluminium olive-green	**84-7201.500**	0.003
		Aluminium red	**84-7201.200**	0.003
flush - raised, non-illuminative	raised above bezel	Aluminium black	**84-7205.000**	0.003
		Aluminium blue	**84-7205.600**	0.003
		Aluminium gold	**84-7205.400**	0.003
		Aluminium natural	**84-7205.800**	0.003
		Aluminium olive-green	**84-7205.500**	0.003
		Aluminium red	**84-7205.200**	0.003

Lens metal for Ring illumination

	Mounting type	Lens	Ø 25 mm Typ-Nr.	kg
Lens metal for Ring illumination convex - raised, non-illuminative	raised above bezel	Aluminium black	**84-7202.000A**	0.004
		Aluminium blue	**84-7202.600A**	0.004
		Aluminium gold	**84-7202.400A**	0.004
		Aluminium natural	**84-7202.800A**	0.004
		Aluminium olive-green	**84-7202.500B**	0.004
		Aluminium red	**84-7202.200A**	0.004
flush - raised, non-illuminative	raised above bezel	Aluminium black	**84-7205.000A**	0.003
		Aluminium blue	**84-7205.600A**	0.003
		Aluminium gold	**84-7205.400A**	0.003
		Aluminium natural	**84-7205.800A**	0.003
		Aluminium olive-green	**84-7205.500A**	0.003
		Aluminium red	**84-7205.200A**	0.003

Lens metal with spot

	Mounting type	Lens	Ø 25 mm Typ-Nr.	kg
Lens metal with spot flush - level, illuminative	level with bezel	Aluminium black	**84-7211.000**	0.002
		Aluminium blue	**84-7211.600**	0.002
		Aluminium gold	**84-7211.400**	0.002
		Aluminium natural	**84-7211.800**	0.002
		Aluminium olive-green	**84-7211.500**	0.002
		Aluminium red	**84-7211.200**	0.002
flush - raised, illuminative	raised above bezel	Aluminium black	**84-7215.000**	0.002
		Aluminium blue	**84-7215.600**	0.002
		Aluminium gold	**84-7215.400**	0.002
		Aluminium natural	**84-7215.800**	0.002
		Aluminium olive-green	**84-7215.500**	0.002
		Aluminium red	**84-7215.200**	0.002

Mushroom-head cap

	Mushroom had cap	Ø 32 mm Typ-Nr.	kg
Mushroom-head cap	Plastic black opaque	**84-7124.000A**	0.004
	Plastic blue opaque	**84-7124.600A**	0.004
	Plastic blue transparent	**84-7114.600A**	0.004
	Plastic green opaque	**84-7124.500A**	0.004
	Plastic red opaque	**84-7124.200A**	0.004
	Plastic yellow opaque	**84-7124.400A**	0.004

Front protective cap

for flush - level lenses only for protection IP 68

	Front protective cap	Typ-Nr.	kg
Front protective cap	Silicone natural transparent	**84-9103.7**	0.001

ATTENTION
when using the front protection cover the external sealing in the actuator has to be removed !

Legend frame

for devices 25 mm dia.

	Typ-Nr.	Technical drawing	kg
Legend frame 30 x 50 mm, adhesive, Aluminium black	**61-9980.0**	7	0.001

Technical drawing from page 151

Legend plate insert

for Legend frame 61-9980.0

	Typ-Nr.	kg
Legend plate insert 14.5 x 23.5 mm, adhesive, Aluminium black	**704.968.1**	0.001
14.5 x 23.5 mm, adhesive, Aluminium natural	**704.968.0**	0.001

Blind plug

	Blind plug	Typ-Nr.	Technical drawing	kg
Blind plug Size 25 mm dia., for mounting hole 22.5 mm dia.	Plastic black	**61-9453.0**	8	0.006
Size 36 mm dia., for mounting hole 30.5 mm dia.	Plastic black	**704.964.8**	1	0.007

Technical drawing from page 151

Backside

Illumination element

	Protection degree	Illumination	Operating voltage/-current	Terminals	Typ-Nr.	Circuit drawing	⚖
Illumination element LED and built-in resistor included	IP 40	Single-LED blue	12 VDC, 10 mA	FR	**84-8001.6340**	5	0.010
				PT 2.8 s	**84-8001.6320**	5	0.005
			24 VDC, 10 mA	FR	**84-8001.6640**	5	0.010
				PT 2.8 s	**84-8001.6620**	5	0.005
		Single-LED green	12 VDC, 10 mA	FR	**84-8001.5340**	5	0.010
				PT 2.8 s	**84-8001.5320**	5	0.005
			24 VDC, 10 mA	FR	**84-8001.5640**	5	0.010
				PT 2.8 s	**84-8001.5620**	5	0.005
		Single-LED orange	12 VDC, 10 mA	FR	**84-8001.3340**	5	0.010
				PT 2.8 s	**84-8001.3320**	5	0.005
			24 VDC, 10 mA	FR	**84-8001.3640**	5	0.010
				PT 2.8 s	**84-8001.3620**	5	0.005
		Single-LED red	12 VDC, 10 mA	FR	**84-8001.2340**	5	0.010
				PT 2.8 s	**84-8001.2320**	5	0.005
			24 VDC, 10 mA	FR	**84-8001.2640**	5	0.010
				PT 2.8 s	**84-8001.2620**	5	0.005
		Single-LED white	12 VDC, 10 mA	FR	**84-8001.9340**	5	0.010
				PT 2.8 s	**84-8001.9320**	5	0.005
			24 VDC, 10 mA	FR	**84-8001.9640**	5	0.010
				PT 2.8 s	**84-8001.9620**	5	0.005
		Single-LED yellow	12 VDC, 10 mA	FR	**84-8001.4340**	5	0.010
				PT 2.8 s	**84-8001.4320**	5	0.005
			24 VDC, 10 mA	FR	**84-8001.4640**	5	0.010
				PT 2.8 s	**84-8001.4620**	5	0.005

Standard version:
Cable length 300 mm with insulated ferrule; Plug-in terminal 2.8 x 0.8 mm.
Other options on request:
Customisation of cable and connectors; Rear side fully sealed (IP 67).
Protection degree (rear side):
IP 40, upgrade to IP 67 with plug typ-Nr. 84-900 possible; With applications where strong vibrations occure, the plugs may become loose.
Terminals: FR = Flat ribbon cable, PT 2.8 s = Plug-in terminal 2.8 mm (solderable)
Circuit drawing from page 155

Illumination element with Bi-colour illumination

	Illumination	Operating voltage/-current	Protection degree	Terminals	Typ-Nr.	Circuit drawing	kg
Illumination element with Bi-colour illumination LED and built-in resistor included	Bi-colour LED red/green	24 VDC, 20 mA	IP 40	PT 2.8 s	**84-8005.8620**	1	0.005
			IP 67	FR	**84-8005.8640**	2	0.011
	Bi-colour LED yellow/green	24 VDC, 20 mA	IP 40	PT 2.8 s	**84-8005.7620**	1	0.005
			IP 67	FR	**84-8005.7640**	2	0.011

Standard version:
Cable length 300 mm with insulated ferrule; Plug-in terminal 2.8 x 0.8 mm.
Other options on request:
Customisation of cable and connectors; Rear side fully sealed (IP 67).
Best illumination level will be reached with Alu lens with window, Typ-Nr. 84-7215.x00 and 84-7211.x00.
Protection degree (rear side):
- Plug-in terminal IP 40, upgrade to IP 67 with plug typ-Nr. 84-900 possible. With applications where strong vibrations occure, the plugs may become loose.
- Cabel connection IP 67, rear side fully sealed. The illumination element of the cable version cannot be disconnected from the actuator any longer.

Terminals: PT 2.8 s = Plug-in terminal 2.8 mm (solderable), FR = Flat ribbon cable
Circuit drawing from page 155

Switching element illuminated

	Protection degree	Contacts	Illumination	Operating voltage/-current	Terminals	Typ-Nr.	Circuit drawing	⚖
Switching element illuminated LED and built-in resistor included	IP 40	1 NO	Single-LED blue	12 VDC, 10 mA	FR	**84-8511.6340**	7	0.015
					PT 2.8 s	**84-8511.6320**	7	0.006
				24 VDC, 10 mA	FR	**84-8511.6640**	7	0.015
					PT 2.8 s	**84-8511.6620**	7	0.006
			Single-LED green	12 VDC, 10 mA	FR	**84-8511.5340**	7	0.015
					PT 2.8 s	**84-8511.5320**	7	0.006
				24 VDC, 10 mA	FR	**84-8511.5640**	7	0.015
					PT 2.8 s	**84-8511.5620**	7	0.006
			Single-LED orange	12 VDC, 10 mA	FR	**84-8511.3340**	7	0.015
					PT 2.8 s	**84-8511.3320**	7	0.006
				24 VDC, 10 mA	FR	**84-8511.3640**	7	0.015
					PT 2.8 s	**84-8511.3620**	7	0.006
			Single-LED red	12 VDC, 10 mA	FR	**84-8511.2340**	7	0.015
					PT 2.8 s	**84-8511.2320**	7	0.006
				24 VDC, 10 mA	FR	**84-8511.2640**	7	0.015
					PT 2.8 s	**84-8511.2620**	7	0.006
			Single-LED white	12 VDC, 10 mA	FR	**84-8511.9340**	7	0.015
					PT 2.8 s	**84-8511.9320**	7	0.006
				24 VDC, 10 mA	FR	**84-8511.9640**	7	0.015
					PT 2.8 s	**84-8511.9620**	7	0.006
			Single-LED yellow	12 VDC, 10 mA	FR	**84-8511.4340**	7	0.015
					PT 2.8 s	**84-8511.4320**	7	0.006
				24 VDC, 10 mA	FR	**84-8511.4640**	7	0.015
					PT 2.8 s	**84-8511.4620**	7	0.006

Standard version:
Cable length 300 mm with insulated ferrule; Plug-in terminal 2.8 x 0.8 mm.
Other options on request:
Customisation of cable and connectors; Rear side fully sealed (IP 67).
Protection degree (rear side):
IP 40, upgrade to IP 67 with plug typ-Nr. 84-900 possible; With applications where strong vibrations occure, the plugs may become loose.
Contacts: NO = Normally open
Terminals: FR = Flat ribbon cable, PT 2.8 s = Plug-in terminal 2.8 mm (solderable)
Circuit drawing from page 155

Switching element with Bi-colour illumination

	Protection degree	Contacts	Illumination	Operating voltage/-current	Terminals	Typ-Nr.	Circuit drawing	kg
Switching element with Bi-colour illumination LED and built-in resistor included	IP 67	1 NO	Bi-colour LED red/green	24 VDC, 20 mA	FR	**84-8515.8640**	3	0.015
			Bi-colour LED yellow/green	24 VDC, 20 mA	FR	**84-8515.7640**	3	0.015

Protection degree IP 67, rear side fully sealed. The switching element cannot be disconnected from the actuator any longer.
Best illumination level will be reached with Alu lens with window, Typ-Nr. 84-7215.x00 and 84-7211.x00.
Standard version:
Cable length 300 mm with insulated ferrule.
Other options on request:
Customisation of cable and connectors.
Contacts: NO = Normally open
Terminals: FR = Flat ribbon cable
Circuit drawing from page 155

Switching element non-illuminated

	Protection degree	Contacts	Terminals	Typ-Nr.	Circuit drawing	kg
Switching element non-illuminated	IP 40	1 NO	FR	**84-8510.0040**	6	0.010
			PT 2.8 s	**84-8510.0020**	6	0.005

Standard version:
Cable length 300 mm with insulated ferrule; Plug-in terminal 2.8 x 0.8 mm (solderable).
Other options on request:
Customisation of cable and connectors; Rear side fully sealed (IP 67).
Protection degree (rear side):
IP 40, upgrade to IP 67 with plug typ-Nr. 84-900 possible; With applications where strong vibrations occure, the plugs may become loose.
Contacts: NO = Normally open
Terminals: FR = Flat ribbon cable, PT 2.8 s = Plug-in terminal 2.8 mm (solderable)
Circuit drawing from page 155

Switching element PCB mounting illuminative

The customer has to decide what series resistor shall be used to the LED

	Contacts	Terminals	Typ-Nr.	Component layout	Technical drawing	Circuit drawing	kg
Switching element PCB mounting illuminative	1 NO	P	**92-851.342**	4	15	14	0.001

Illumination and mounting flange to be ordered separately.
Contacts: NO = Normally open
Terminals: P = PCB terminal
Component layout from page 147, Technical drawing from page 151, Circuit drawing from page 155

Illumination element PCB mounting

The customer has to decide what series resistor shall be used to the LED

	Terminals	Typ-Nr.	Component layout	Technical drawing	kg
Illumination element PCB mounting	P	**92-800.042**	3	9	0.001

Illumination and mounting flange to be ordered separately.
Terminals: P = PCB terminal
Component layout from page 147, Technical drawing from page 151

Mounting flange

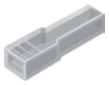
	Typ-Nr.	Technical drawing	kg
Mounting flange Ring illumination (illuminated multi-color bezel)	**84-960.0**	13	0.001
Standard version (non-illuminated)	**92-960.0**	10	0.001

Technical drawing from page 151

Flat receptacle

	Typ-Nr.	kg
Flat receptacle 2.8 x 0.8 mm	**84-9420**	0.001

Insulation sleeve



	Typ-Nr.	kg
Insulation sleeve for Flat receptacles 84-9420	**31-929**	0.001

Plug

	Typ-Nr.	kg
Plug	**84-900**	0.001

for back protection IP67 of switching elements and illumination elements.
Two plugs are nessecary per element.

Illumination

Single-LED

The customer has to decide what series resistor shall be used to the LED

	Socket	Light colour	Operating voltage/-current	Typ-Nr.	kg
Single-LED	T1 Bi-Pin	blue	3.5 VDC, 20 mA	**10-2602.3206L**	0.001
		green	3.5 VDC, 20 mA	**10-2602.3205L**	0.001
		orange	2.1 VDC, 20 mA	**10-2602.3203L**	0.001
		red	2.1 VDC, 20 mA	**10-2602.3202L**	0.001
		white	3.5 VDC, 20 mA	**10-2602.3209L**	0.001
		yellow	2.2 VDC, 20 mA	**10-2602.3174D**	0.001

Bi-colour LED

The customer has to decide what series resistor shall be used to the LED

	Socket	Light colour	Operating voltage/-current	Typ-Nr.	kg
Bi-colour LED	T1 Bi-Pin	red/green	1.9/3.5 VDC, 20 mA	**10-2603.320AL**	0.001
		yellow/green	2.0/3.2 VDC, 20 mA	**10-2603.320CL**	0.001

Multi-LED

The customer has to decide what series resistor shall be used to the LED

	Socket	Light colour	Operating voltage/-current	Typ-Nr.	kg
Multi-LED	T1 Bi-Pin	yellow	12 VDC, 40 mA	**10-5609.3174D**	0.001

Emergency-stop and Stop pushbutton

Emergency-stop label

front panel thickness 3 mm max.

	Marking	Typ-Nr.	kg
Emergency-stop label 60 mm dia., yellow, Mounting hole size 22.5 mm dia.	ARRET D'URGENCE	**704.963.7**	0.011
	EMERGENCY STOP	**704.963.6**	0.011
	NOT AUS	**704.963.5**	0.011
	NOT HALT	**704.963.8**	0.011
90 mm dia., yellow, Mounting hole size 22.5 mm dia.	ARRET D'URGENCE	**704.963.2**	0.011
	EMERGENCY STOP	**704.963.1**	0.011
	NOT AUS	**704.963.0**	0.011
	NOT HALT	**704.963.3**	0.011

Emergency-stop protective shroud

Front panel thickness 1 ... 3 mm

	Protective shroud	Marking	Typ-Nr.	Technical drawing	kg
Emergency-stop protective shroud 45 mm dia., IP 40, mounting hole 22.5 mm dia., with anti-twist device	Metal yellow RAL 1004	without	**84-909**	12	0.021
50 mm dia., IP 65, mounting hole 22.5 mm dia., with anti-twist device	Plastic yellow	EMERGENCY STOP	**84-902B**	14	0.006
		NOT - AUS	**84-902A**	14	0.006
		NOT - HALT	**84-902D**	14	0.006
		without	**84-902**	14	0.006

Please note: By using the protective shroud Typ-Nr. 84-909 the E-stop or Stop-Switch has to be mounted twisted by 180 °. Consult the dimensional drawing therfore.
Technical drawing from page 151

Fixing nut

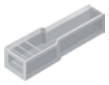
	Fixing nut	Typ-Nr.	kg
Fixing nut 28 mm dia., for limited-space applications	Plastic black	**84-905**	0.002
30 mm dia., standard delivery	Plastic black	**84-908**	0.002

Flat receptacle

	Typ-Nr.	kg
Flat receptacle 2.8 x 0.5 mm for Plug-in terminal	**31-946**	0.001

Insulation sleeve

	Typ-Nr.	
Insulation sleeve for Flat receptacles 31-946	**31-929**	0.001



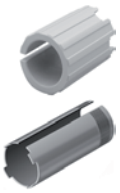
Assembling

Lens remover

	Typ-Nr.	
Lens remover	**61-9730.0**	0.011

Mounting tool

	Typ-Nr.	
Mounting tool for tightening or loosening of Emergency-stop and Stop-Switch fixing nut	**84-996**	0.014
for tightening or loosening of Fixing nut, Indicator and Pushbutton	**84-997**	0.027



Dismantling tool

	Typ-Nr.	
Dismantling tool for actuator dismantling of switching- and illumination element and mounting flange	**84-998**	0.002

Emergency-stop

Switching system

The double-break switching system can be supplied for the following switching functions:
1 Normally closed, 2 Normally closed, 1 Normally closed + 1 Normally open.
The Normally closed contacts have forced opening according to EN IEC 60947-5-1

Material

Connection cable
Polyvinylchloride (PVC), operating temperature up to +65 °C

Mushroom-head cap
Polybutylenterephthalate (PBT), as per UL 94 V0 (red items)

Actuator housing
Polyamide (PA 66), as per UL 94 V0, Flat ribbon cable-cover Polyamide (PA 6.6), as per UL 94 V0

Material of contact
Silver alloy gold plated

Mechanical characteristics

Front panel thickness
Standard 1 ... 4 mm
with E-stop protective shroud Typ-Nr. 84-902 1 ... 3 mm

Mounting hole
22.5 mm dia. as per EN IEC 60947-5-1 with anti-twist device

Terminals
Soldering terminals 2.8 x 0.5 mm (solderable), CuSn6 tin-plated
Flat ribbon cable 2-, 4-, or 6-poles 0.35 mm² (AWG 22)

Tightening torque
Fixing nut 80 Ncm

Actuating force
22 N ±4 N

Actuating travel
approx. 4 mm to release the internal operation part

Mechanical lifetime
≥50.000 cycles of operations

Electrical characteristics

Standards
The devices comply with : EN IEC 60947-5-1, EN IEC 60947-5-5 (Emergency-stop), DIN EN ISO 13850, EN IEC 60204

Illumination
LED red with pole reversal, constant current source

Operation Voltage	5 VDC ... 30 VDC
Current consumption	9.7 mA ... 12.4 mA

Rated Operational Voltage U_e
250 VAC, as per EN IEC 60947-1

Rated Insulation Voltage U_i
250 V, as per EN IEC 60947-1

Rated Impulse Withstand Voltage U_{imp}
2.5 kV, as per EN IEC 60947-1

Contact resistance
New state ≤ 50 mΩ, as per DIN IEC 60512-2-3

Isolation resistance
$>10^{11}$ Ω between the opend contats at 500 VDC, as per DIN IEC 60512-2-10

Electrical life
≥50 000 cycles of operations (inductive cosϕ 0.4), as per EN IEC 60947-5-1

Voltage	120 VAC	240 VAC	125 VDC	250 VDC
Current	3 A	1.5 A	0.55 A	0.27 A

Reduced load ≥50'000 cycles of operations (resistive)

Voltage	1 VAC/DC	42 VAC/DC
Current	100 mA	200 mA

Conventional free air thermal current I_{th}
5 A, as per EN IEC 60947-5-1
the maximum current in continuous operation and at ambient temperature must not exceed the quoted maximum values.

Switch rating
Switch rating AC with silver contact (gold plated), service category AC-15, as per EN IEC 60947-5-1

Voltage	120 VAC	240 VAC
Current	3 A	1.5 A

Switch rating DC for silver contact (gold plated), service category DC-13, as per EN IEC 60947-5-1 (inductive)

Voltage	12 VDC	24 VDC	48 VDC	60 VDC	125 VDC	250 VDC
Current $_{Plug}$	5 A	4 A	2.1 A	1.7 A	0.55 A	0.27 A
Current $_{Cable}$	3 A	3 A	2.1 A	1.7 A	0.55 A	0.27 A

Recommended minimum operational data
Silver contacts (gold plated)

Voltage	1 VAC/DC
Current	1 mA

Electric strength
500 VAC, 50 Hz, 1 min, as per DIN IEC 60512-2

Rated conditional short-circuit current
1000 A, type of short-circuit unit 6 A gG, as per EN IEC 60947-5-1

Protection class
Class II, as per EN IEC 60947-5

Overvoltage category
II, as per EN IEC 60947-1

Degree of pollution
3, as per EN IEC 60947-1

Environmental conditions

Storage temperature
-25 °C ... +80 °C

Operating temperature
-25 °C ... +65 °C

Front protection
IP 65, as per EN IEC 60529

Shock resistance
(semi-sinusoidal)
max. 150 m/s², pulse width 11 ms, 3-axis, as per EN IEC 60068-2-27

Vibration resistance
(sinusoidal)
max. 50 m/s² at 10 Hz ... 500 Hz, 10 cycles, 3-axis, as per EN IEC 60068-2-6

Climate resistance
Damp heat, cyclic
96 hours, +25 °C / 97 %, +55 °C / 93 % relative humidity, as per EN IEC 60068-2-30

Damp heat, steady
56 days, +40 °C / 93 % relative humidity, as per EN IEC 60068-2-78

Dry heat
96 hours, +70 °C, as per EN IEC 60068-2-2

Low temperature
96 hours, -40 °C, as per EN IEC 60068-2-1

Saline mist
96 Stunden, +35 °C in chemical solution NaCl, as per EN IEC 60068-2-11

Approvals

Approbations
SEV
UL

Declaration of conformity
CE

Switching element illuminated pushbutton

Switching system

Short-travel switching system with 2 independent contact points and tactile operation.
Guarantees reliable switching even of very light loads.
Fitted with 1 normally open contact.

Material

Connection cable
Polyvinylchloride (PVC), short-time heat-resistant up to 105 °C

Material of contact
Silver alloy gold plated

Switching element
Thermoplastic polyester (PET, PBT), as per UL 94 V0 and Polyacetale (POM), as per UL 94 HB

Mechanical characteristics

Terminals
Plug-in terminals 2.8 x 0.8 mm (solderable)
Flat ribbon cable 0.5 mm²
PCB terminal

Actuating force
4.0 N ±0.2 N (measured at the lens)

Actuating travel
~0.5 mm

Rebound time
≤1 ms

Resistance to heat of soldering
260 °C, 5 s (PCB assembly)
350 °C, 10 s (when using a soldering iron)
as per EN IEC 60068-2-20

Mechanical lifetime
≥1 million cycles of operations

Electrical characteristics

Illumination
Single-Chip or Multi-Chip LED, green, orange, red, yellow, white and blue

Operation Voltage	12 VDC	24 VDC
Current consumption	40 mA	20 mA

Contact resistance
Starting value (initial) ≤100 mΩ, as per DIN IEC 60512-2

Isolation resistance
≥1 G Ω between all terminals at 100 VDC, as per DIN IEC 60512-2

Electrical life
as per EN IEC 60512-5

5 million	cycles of operation	24 VAC, 50 mA at 480 Ω
5 million	cycles of operation	24 VAC, 100 mA at 240 Ω
2 million	cycles of operation	42 VAC, 50 mA at 840 Ω
2 million	cycles of operation	42 VAC, 100 mA at 420 Ω
300 000	cycles of operation	42 VAC, 100 mA at cosϕ 0,4
250 000	cycles of operation	42 VAC, 200 mA at cosϕ 0,395
1 million	cycles of operation	12 VDC, 250 mA at 48 Ω
1 million	cycles of operation	24 VDC, 50 mA at 480 Ω
1 million	cycles of operation	24 VDC, 100 mA at 240 Ω
5 million	cycles of operation	42 VDC, 25 mA at 1680 Ω
1.5 million	cycles of operation	42 VDC, 50 mA at 840 Ω
100 000	cycles of operation	42 VDC, 100 mA at 420 Ω
500 000	cycles of operation	24 VDC, 200 mA at L/R=30 ms
300 000	cycles of operation	42 VDC, 100 mA at L/R=30 ms
100 000	cycles of operation	42 VDC, 200 mA at L/R=30 ms

Switch rating

Voltage	50 mVAC/DC ... 42 VAC/DC
Current	10 uA ... 100 mA
Power	max. 2 W

Electric strength
500 VAC, 50 Hz, 1 min, as per DIN IEC 60512-2

Environmental conditions

Storage temperature
-40 °C ... +85 °C

Operating temperature
-25 °C ... +70 °C

Protection degree
Back protection:
IP 40, standard version
IP 67, fully sealed version, with mounted actuator only.

Shock resistance
(semi-sinusoidal)
max. 100 m/s², pulse width 11 ms, 3-axis, as per EN IEC 60068-2-27

Vibration resistance
(sinusoidal)
max. 50 m/s² at 10 Hz ... 500 Hz, 10 cycles, 3-axis, as per EN IEC 60068-2-6

Actuator

Material

Lens
Polycarbonate (PC), as per UL 94 V2 or Aluminium anodised

Actuator housing
Polyetherimid (PEI), as per UL 94 V0 or Aluminium anodised

Mechanical characteristics

Mounting hole
22.5 mm dia. and 30.5 mm dia.

Tightening torque
Fixing nut max. 80 Ncm

Actuating force
4.0 N ±0.2 N (measured at the lens)

Actuating travel
Total switching travel 1.2 mm

Mechanical lifetime
≥1 million cycles of operations

Electrical characteristics

Electrostatic breakdown value

Plastic case ≥15 kV
Aluminium case ≥5 kV
as per IEC 61000-4-2, mounted in plastic front panel

Environmental conditions

Storage temperature
-40 °C ... +85 °C

Operating temperature
-25 °C ... +70 °C

Front protection
IP 67, IP 65 and IP40, as per EN IEC 60529

Climate resistance
Damp heat, cyclic
96 hours, +25 °C / 97 %, +55 °C / 93 % relative humidity, as per EN IEC 60068-2-30

Damp heat, state
56 days, +40 °C / 93 % relative humidity, as per EN IEC 60068-2-78

Rapid change of temperature
100 cycles, -40 °C ... +80 °C, as per EN IEC 60068-2-14

Suppressor circuits

When switching inductive loads such as relays, DC motors, and DC solenoids, it is always important to absorb surges (e.g. with a diode) to protect the contacts. When these inductive loads are switched off, a counter emf can severely damage switch contacts and greatly shorten lifetime.

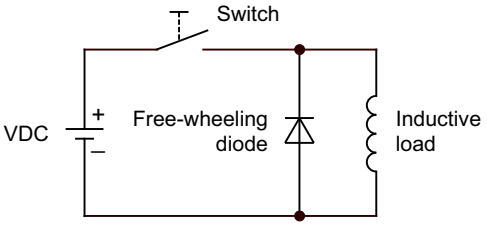
Fig. 1 shows an inductive load with a free-wheeling diode connected in parallel. This free-wheeling diode provides a path for the inductor current to flow when the current is interrupted by the switch. Without this free-wheeling diode, the voltage across the coil will be limited only by dielectric breakdown voltages of the circuit or parasitic elements of the coil. This voltage can be kilovolts in amplitude even when nominal circuit voltages are low (e.g. 12 VDC) see Fig. 2.

The free-wheeling diode should be chosen so that the reverse breakdown voltage is greater than the voltage driving the inductive load. The DC blocking voltage (VR) of the free-wheeling diode can be found in the datasheet of a diode. The forward current should be equal or greater than the maximum current flowing through the load.

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

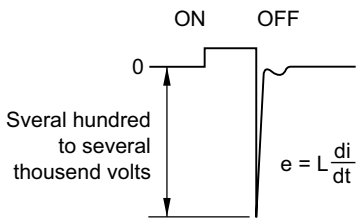
Switching with inductive load

Fig. 1



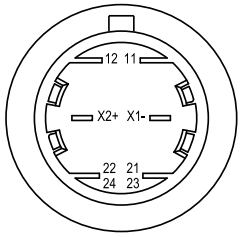
Counter emf
over load without free-wheeling diode

Fig. 2

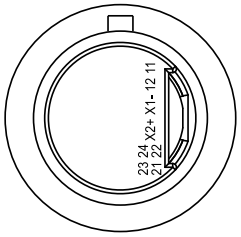


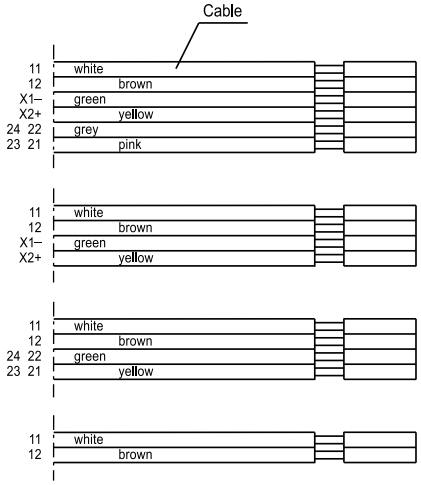
Component layout

1 Emergency-stop pushbutton, foolproof EN IEC 60947-5-5, complete page 125 **| Stop pushbutton grey, complete** page 126



2 Emergency-stop pushbutton, foolproof EN IEC 60947-5-5, complete page 125 **| Stop pushbutton grey, complete** page 126





	Terminals
1 NC + 1 NO	11 / 12 + 23 / 24
2 NC	11 / 12 + 21 / 22
Illumination	X1– / X2+

	Terminals
1 NC	11 / 12
Illumination	X1– / X2+

	Terminals
1 NC + 1 NO	11 / 12 + 23 / 24
2 NC	11 / 12 + 21 / 22

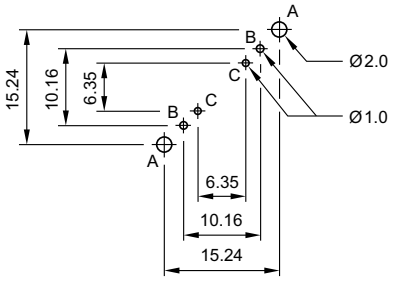
	Terminals
1 NC	11 / 12

3 Illumination element PCB mounting page 139

Single-LED

Drilling plan (Elementside)

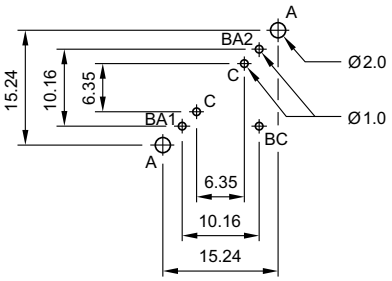
A Fixing holes for mounting flange (92-960.0)
B Holes for LED
C Holes for centering pins



Bi-colour-LED

Drilling plan (Elementside)

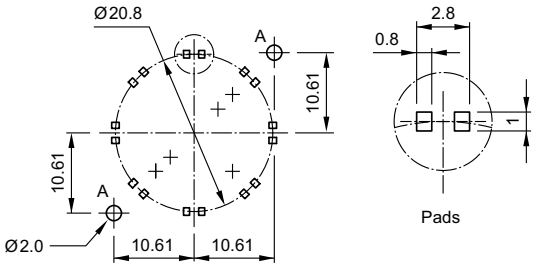
A Fixing holes for mounting flange (92-960.0)
B Holes for Bi-colour LED:
BA1 (green) + BA2 (yellow or red) = Anodes, BC = Cathode
C Holes for centering pins



Hyper mini SMD-LED

Drilling plan (Elementside)

A Fixing holes for mounting flange (84-960.0)



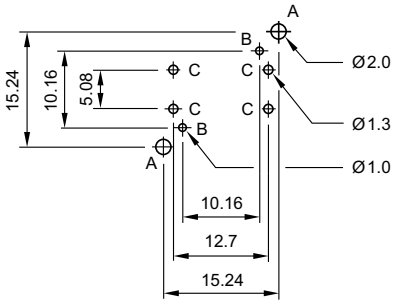
Libraries for the PCB layout-system p-cad 200X see : www.pcad.com/en/library Third-party Libraries

4 Switching element PCB mounting illuminative page 139

Single-LED

Drilling plan (Elementside)

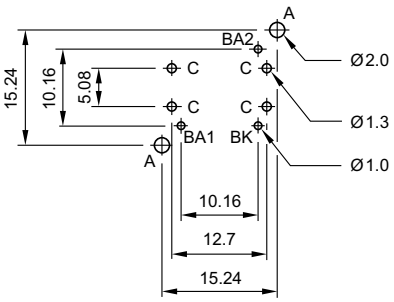
A Fixing holes for mounting flange (92-960.0)
B Holes for LED
C Holes for contact pins
Pad max. Ø 2.5 mm
Through-connection recommended



Bi-colour-LED

Drilling plan (Elementside)

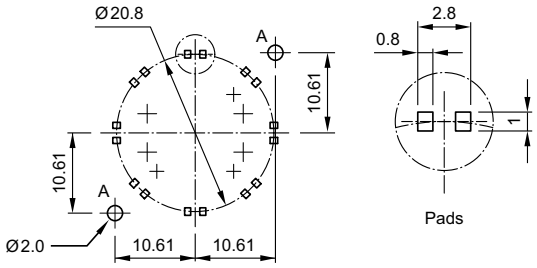
A Fixing holes for mounting flange (92-960.0)
B Holes for Bi-colour LED:
BA1 (green) + BA2 (yellow or red) = Anodes, BK = Cathode
C Holes for contact pins
Pad max. Ø 2.5 mm
Through-connection recommended



Hyper mini SMD-LED

Drilling plan (Elementside)

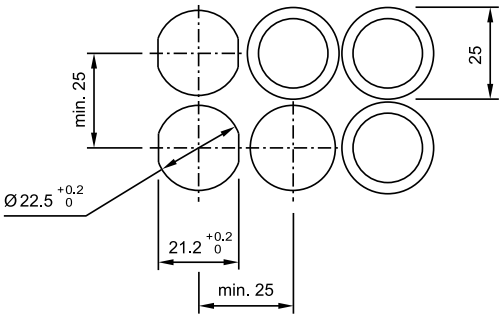
A Fixing holes for mounting flange (84-960.0)



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

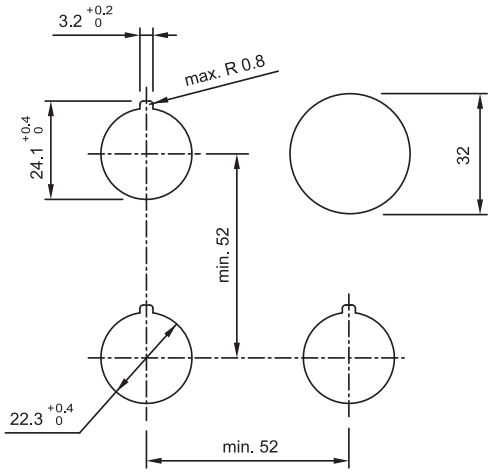
Mounting dimensions

1 Indicator actuator page 127 **| Illuminated pushbutton actuator** page 127 **| Pushbutton actuator** page 128 **| Indicator actuator with ring illumination (illuminated bezel)** page 128 **| Pushbutton actuator with ring illumination (illuminated bezel)** page 129 **| Indicator actuator with ring illumination (illuminated multi-colour bezel)** page 129 **| Pushbutton actuator with ring illumination (illuminated multi-colour bezel)** page 130

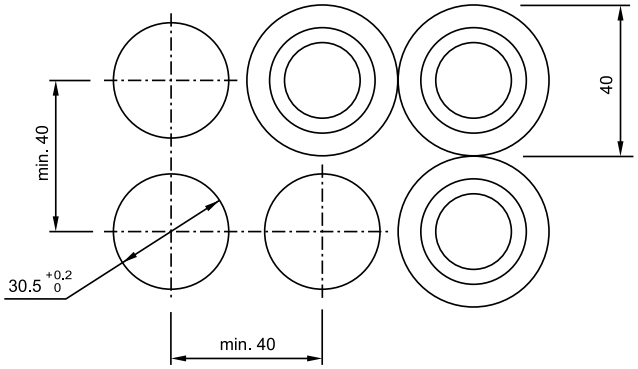


Hole spacing 31 mm min. by using blind plug 704.960.4

2 Emergency-stop pushbutton, foolproof EN IEC 60947-5-5, complete page 125 **| Stop pushbutton grey, complete** page 126

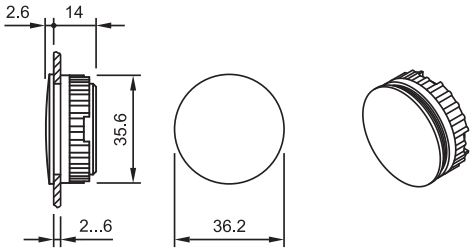


3 Illuminated pushbutton actuator page 127 **| Pushbutton actuator** page 128

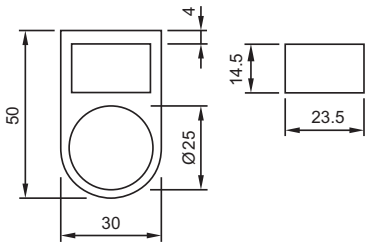


Technical drawing

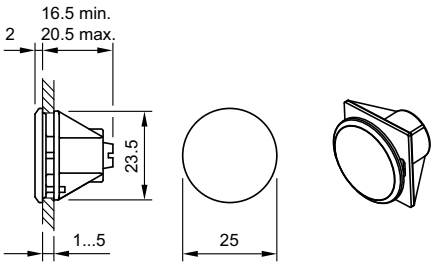
1 Blind plug page 134



7 Legend frame page 133

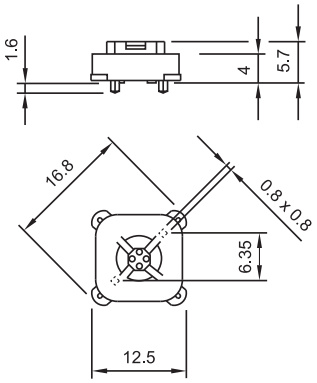


8 Blind plug page 134

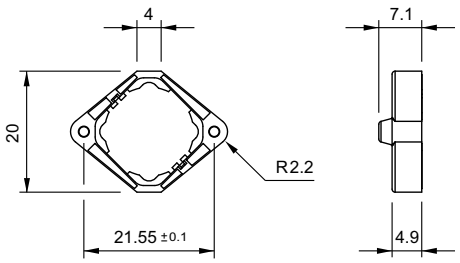


With this print version of the series 84, the panel thickness is reduced to 2.5 mm max.

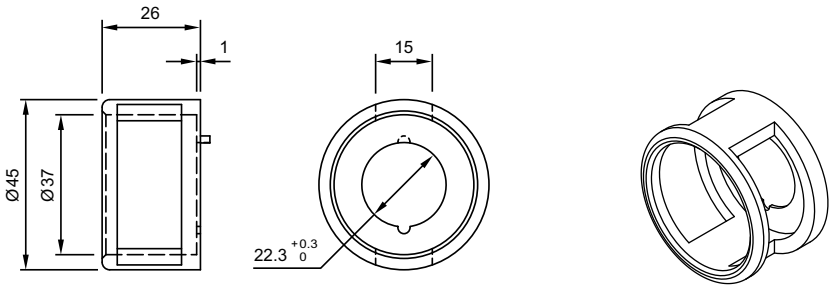
9 Illumination element PCB mounting page 139



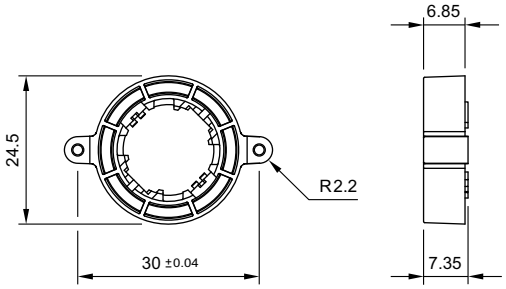
10 Mounting flange page 139



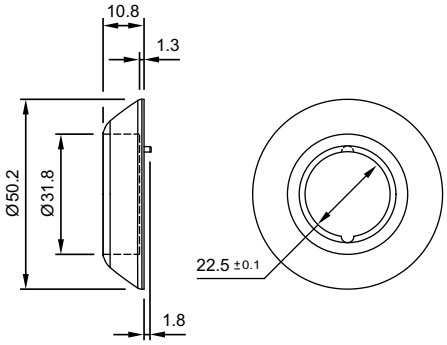
12 Emergency-stop protective shroud page 141

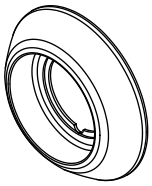


13 Mounting flange page 139

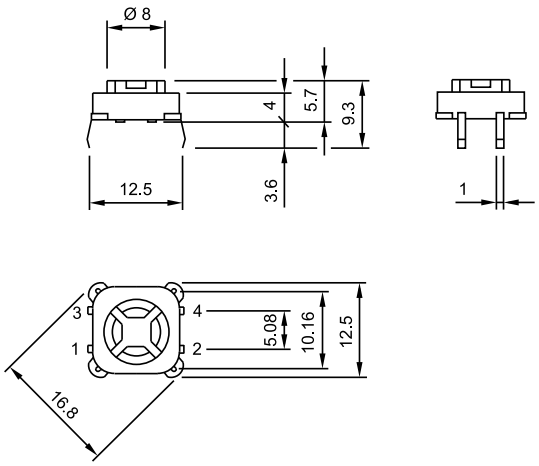


14 Emergency-stop protective shroud page 141



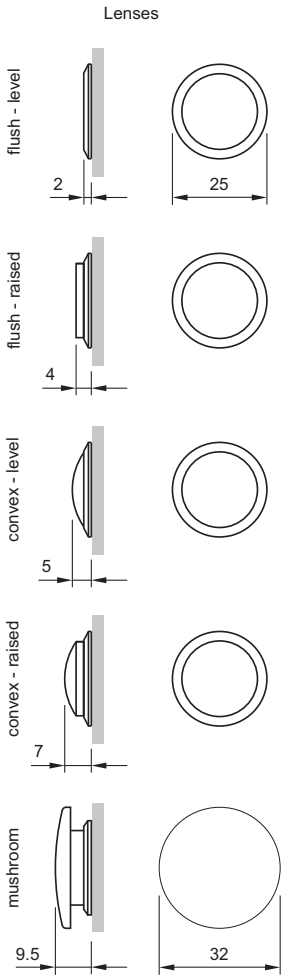


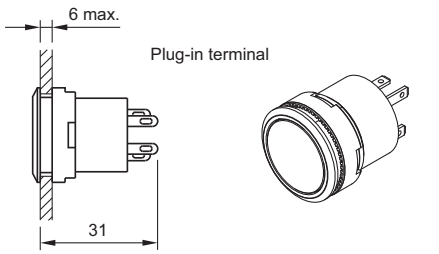
15 Switching element PCB mounting illuminative page 139

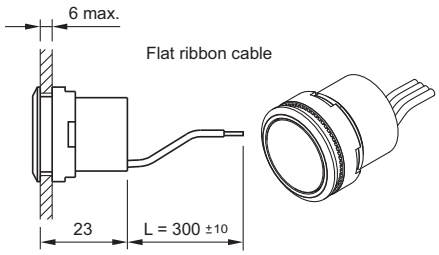


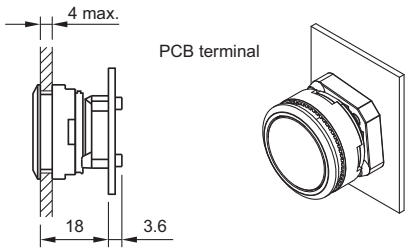
16 Indicator actuator page 127 **| Illuminated pushbutton actuator** page 127 **| Pushbutton actuator** page 128 **| Indicator actuator with ring illumination (illuminated bezel)** page 128 **| Pushbutton actuator with ring illumination (illuminated bezel)** page 129 **| Indicator actuator with ring illumination (illuminated multi-colour bezel)** page 129 **| Pushbutton actuator with ring illumination (illuminated multi-colour bezel)** page 130

Lenses

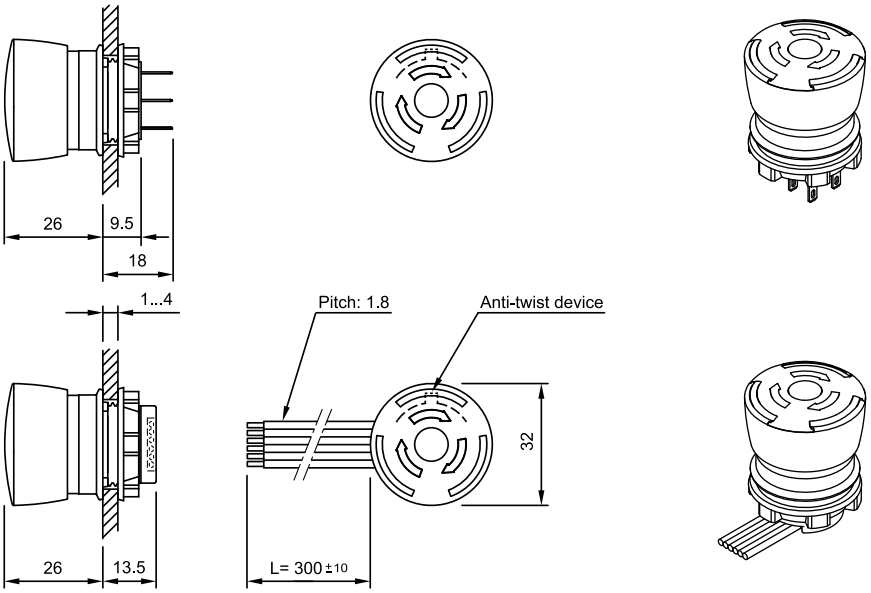




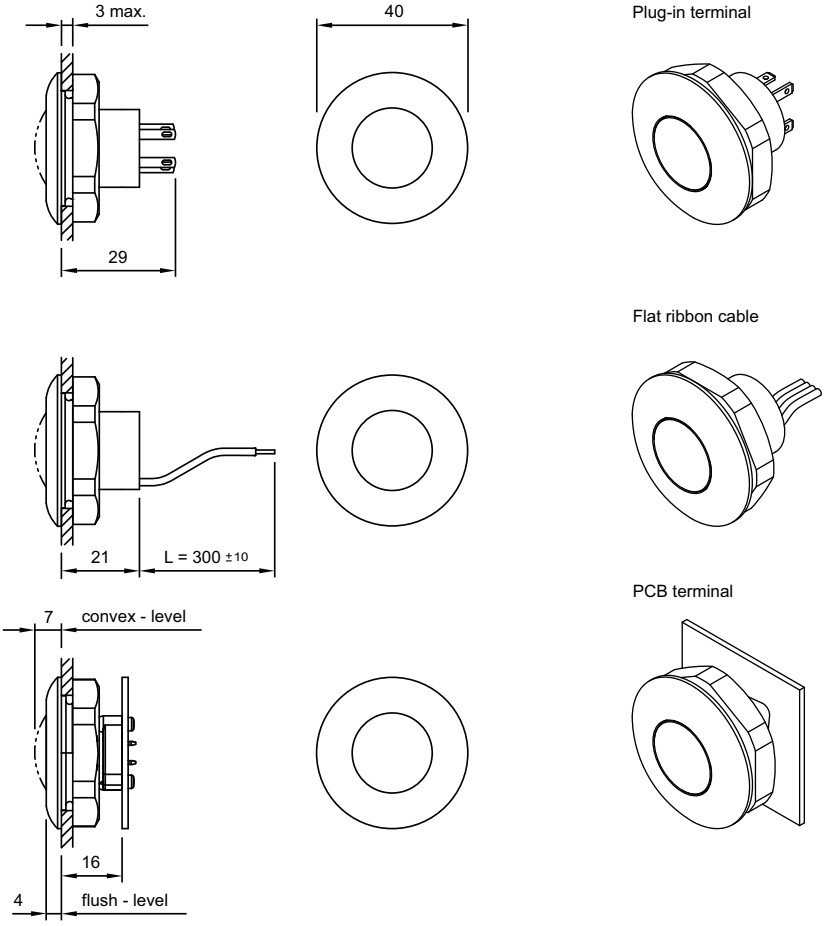




17 Emergency-stop pushbutton, foolproof EN IEC 60947-5-5, complete page 125 | **Stop pushbutton grey, complete** page 126

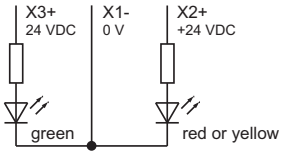


18 Illuminated pushbutton actuator page 127 | **Pushbutton actuator** page 128

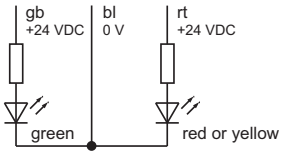


Circuit drawing

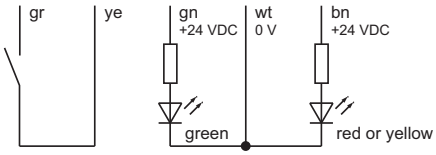
1 Illumination element with Bi-colour illumination page 136



2 Illumination element with Bi-colour illumination page 136

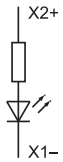


3 Switching element with Bi-colour illumination page 138



4 Illuminated pushbutton actuator page 127 | **Pushbutton actuator** page 128 | **Pushbutton actuator with ring illumination (illuminated bezel)** page 129 | **Pushbutton actuator with ring illumination (illuminated multi-colour bezel)** page 130

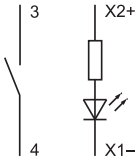
5 Illumination element page 135



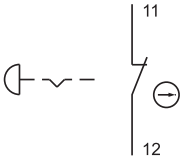
Drawings 84

6 Switching element non-illuminated page 138

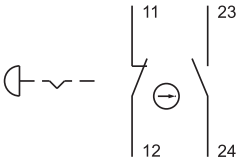
7 Switching element illuminated page 137



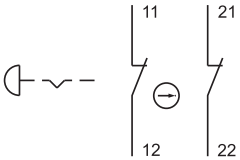
8 Emergency-stop pushbutton, foolproof EN IEC 60947-5-5, complete page 125 **| Stop pushbutton grey, complete** page 126



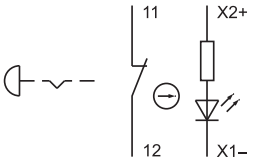
9 Emergency-stop pushbutton, foolproof EN IEC 60947-5-5, complete page 125 **| Stop pushbutton grey, complete** page 126



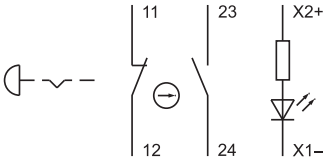
10 Emergency-stop pushbutton, foolproof EN IEC 60947-5-5, complete page 125 **| Stop pushbutton grey, complete** page 126



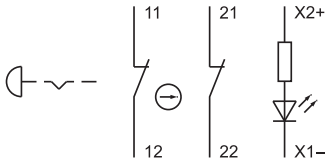
11 Emergency-stop pushbutton, foolproof EN IEC 60947-5-5, complete page 125 **| Stop pushbutton grey, complete** page 126



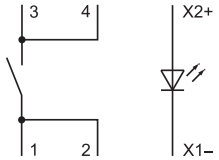
12 Emergency-stop pushbutton, foolproof EN IEC 60947-5-5, complete page 125 **| Stop pushbutton grey, complete** page 126



13 Emergency-stop pushbutton, foolproof EN IEC 60947-5-5, complete page 125 | **Stop pushbutton grey, complete** page 126



14 Switching element PCB mounting illuminative page 139



Index from Typ-Nr.

Index from Typ-Nr.

Index from Typ-Nr.

Index from Typ-Nr.

Index from Typ-Nr.

Index from Typ-Nr.

Index from Typ-Nr.

Notes

EAO – Your Expert Partner for
Human Machine Interfaces

EAO AG
Tannwaldstrasse 88
4601 Olten, Switzerland

E-mail info@eao.com
Website www.eao.com

Austria
Phone +49 201 85 87 0
Fax +49 201 85 87 210
E-mail sales.ede@eao.com

Belgium
Phone +32 3 777 82 36
Fax +32 3 777 84 19
E-mail sales.ebl@eao.com

China
Phone +852 27 86 91 41
Fax +852 27 86 95 61
E-mail sales.ehk@eao.com

France
Phone +33 1 64 43 37 37
Fax +33 1 64 43 37 49
E-mail sales.ese@eao.com

Germany
Phone +49 201 85 87 0
Fax +49 201 85 87 210
E-mail sales.ede@eao.com

Italy
Phone +39 035 481 0189
Fax +39 035 481 3786
E-mail sales.eit@eao.com

Japan
Phone +81 3 5444 5411
Fax +81 3 5444 0345
E-mail sales.esj@eao.com

Netherlands
Phone +31 78 653 17 00
Fax +31 78 653 17 99
E-mail sales.enl@eao.com

Sweden
Phone +46 8 683 86 60
Fax +46 8 724 29 12
E-mail sales.esw@eao.com

Switzerland
Phone +41 62 388 95 00
Fax +41 62 388 95 55
E-mail sales.ech@eao.com

United Kingdom
Phone +44 1444 236 000
Fax +44 1444 236 641
E-mail sales.euk@eao.com

USA
Phone +1 203 877 4577
Fax +1 203 877 3694
E-mail sales.eus@eao.com

Other Countries
Phone +41 62 286 92 10
Fax +41 62 296 21 62
E-mail sales@eao.com

eao

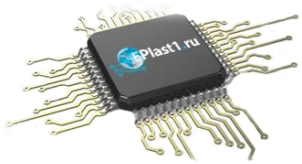
Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

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

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

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



Как с нами связаться

Телефон: 8 (812) 309 58 32 (многоканальный)
Факс: 8 (812) 320-02-42
Электронная почта: org@eplast1.ru
Адрес: 198099, г. Санкт-Петербург, ул. Калинина, дом 2, корпус 4, литера А.