Series 92

Series 92
Clear, unambiguous and intuitive.
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## Key advantages

- Mounted on PCBs
- Intuitive to use
- Bright illumination

Typical application areas

- Audio / video
- Measurement technology
- Medical engineering


## Functions

- Pushbutton
- Illuminated pushbutton
- Indicator


## Design

- Raised

IP front protection

- IP40
- IP67

Raitings

- 42 VAC ( 100 mA )

Mounting cut-outs

- $\varnothing 16$ mm

Terminal

- PCB

Lens Material

- Plastic


| PCB |  |
| :--- | :--- |
| Pushbutton | 950 |
| Pushbutton | 952 |
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## 92 рсв

## Pushbutton



Mounting cut-outs [mm]


Actuator

| Front bezel colour | Front bezel material | Switching action | IP front protection | Lens colour | Lens material | Housing colour | Housing material | Dimensions | Part No. | Wiring diagram |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Black | Plastic | Momentary | IP67 | Black | Plastic | White | Plastic | $\begin{aligned} & 18.8 \mathrm{~mm} x \\ & 18.8 \mathrm{~mm} \end{aligned}$ | 92-441.000 | 72 |
|  | Plastic | Momentary | IP67 | Grey | Plastic | White | Plastic | $\begin{aligned} & 18.8 \mathrm{~mm} x \\ & 18.8 \mathrm{~mm} \end{aligned}$ | 92-441.800 | 72 |

Actuator

| Front bezel colour | Front bezel material | Switching action | IP front protection | Lens colour | Lens material | Housing colour | Housing material | Dimensions | Part No. | Wiring diagram |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| White | Plastic | Momentary | IP40 | Black | Plastic | White | Plastic | $\begin{aligned} & 18.4 \mathrm{~mm} x \\ & 18.4 \mathrm{~mm} \end{aligned}$ | 92-356.000 | 72 |
|  | Plastic | Momentary | IP40 | Grey | Plastic | White | Plastic | $\begin{aligned} & 18.4 \mathrm{~mm} x \\ & 18.4 \mathrm{~mm} \end{aligned}$ | 92-356.800 | 72 |
| Black | Plastic | Momentary | IP40 | Grey | Plastic | White | Plastic | $\begin{aligned} & 18.4 \mathrm{~mm} x \\ & 18.4 \mathrm{~mm} \end{aligned}$ | 92-456.800 | 72 |
|  | Plastic | Momentary | IP40 | White | Plastic | White | Plastic | $\begin{aligned} & 18.4 \mathrm{~mm} \mathrm{x} \\ & 18.4 \mathrm{~mm} \end{aligned}$ | 92-456.900 | 72 |
|  | Plastic | Momentary | IP40 | Red | Plastic | White | Plastic | $\begin{aligned} & 18.4 \mathrm{~mm} x \\ & 18.4 \mathrm{~mm} \end{aligned}$ | 92-456.200 | 72 |
|  | Plastic | Momentary | IP40 | Green | Plastic | White | Plastic | $\begin{aligned} & 18.4 \mathrm{~mm} x \\ & 18.4 \mathrm{~mm} \end{aligned}$ | 92-456.500 | 72 |

Wiring diagrams
E---
Wiring diagram 72

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[^0]
## 92 рсв

## Pushbutton



Mounting cut-outs [mm]

## Actuator

| Front bezel colour | Front bezel material | Switching action | IP front protection | Housing colour | Housing material | Part No. |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| White | Plastic | Momentary | IP40 | White | Plastic | 92-350.000 |
| Black | Plastic | Momentary | IP40 | White | Plastic | 92 |

## Wiring diagrams



Wiring diagram 72

## Pushbutton

Equipment consisting of (schematic overview)
Page 960

Each Part Number listed below includes all the black components shown in the 3D-drawing.

To obtain a complete unit, please select the red components from the pages shown.


Dimensions [mm]


Mounting cut-outs [mm]

Actuator, Front dimension $18,8 \mathrm{~mm} \times 18,8 \mathrm{~mm}$

| Front bezel colour | Front bezel material | Switching action | IP front protection | Housing colour | Housing material | Part No. |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| White | Plastic | Momentary | IP67 | White | Plastic | W2-340.000 |
| Black | Plastic | Momentary | IP67 | diagram |  |  |

## Wiring diagrams



## 92 рсв

## Illuminated pushbutton



Product can differ from the current configuration.

## General information

- Transparent lens and pressure plate


Dimensions [mm]


Equipment consisting of (schematic overview)



Switching element
Page 961

Each Part Number listed below includes all the black components shown in the 3D-drawing.

To obtain a complete unit, please select the red components from the pages shown.

Mounting cut-outs [mm]

Actuator

| Front bezel colour | Front bezel material | Switching action | IP front protection | Lens colour | Lens material | Housing colour | Housing material | Dimensions | Part No. | Wiring diagram |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| White | Plastic | Momentary | IP67 | Orange | Plastic | White | Plastic | $\begin{aligned} & 18.8 \mathrm{~mm} x \\ & 18.8 \mathrm{~mm} \end{aligned}$ | 92-343.300 | 357 |
|  | Plastic | Momentary | IP67 | Yellow | Plastic | White | Plastic | $\begin{aligned} & 18.8 \mathrm{~mm} x \\ & 18.8 \mathrm{~mm} \end{aligned}$ | 92-343.400 | 357 |
|  | Plastic | Momentary | IP67 | Colourless | Plastic | White | Plastic | $\begin{aligned} & 18.8 \mathrm{~mm} x \\ & 18.8 \mathrm{~mm} \end{aligned}$ | 92-343.700 | 357 |
|  | Plastic | Momentary | IP40 | Red | Plastic | White | Plastic | $\begin{aligned} & 18.4 \mathrm{~mm} x \\ & 18.4 \mathrm{~mm} \end{aligned}$ | 92-358.200 | 357 |
|  | Plastic | Momentary | IP40 | Yellow | Plastic | White | Plastic | $\begin{aligned} & 18.4 \mathrm{~mm} x \\ & 18.4 \mathrm{~mm} \end{aligned}$ | 92-358.400 | 357 |
|  | Plastic | Momentary | IP40 | Green | Plastic | White | Plastic | $\begin{aligned} & 18.4 \mathrm{~mm} x \\ & 18.4 \mathrm{~mm} \end{aligned}$ | 92-358.500 | 357 |
|  | Plastic | Momentary | IP40 | Blue | Plastic | White | Plastic | $\begin{aligned} & 18.4 \mathrm{~mm} x \\ & 18.4 \mathrm{~mm} \end{aligned}$ | 92-358.600 | 357 |
|  | Plastic | Momentary | IP40 | Colourless | Plastic | White | Plastic | $\begin{aligned} & 18.4 \mathrm{~mm} x \\ & 18.4 \mathrm{~mm} \end{aligned}$ | 92-358.700 | 357 |
| Black | Plastic | Momentary | IP67 | Red | Plastic | White | Plastic | $\begin{aligned} & 18.8 \mathrm{~mm} x \\ & 18.8 \mathrm{~mm} \end{aligned}$ | 92-443.200 | 357 |
|  | Plastic | Momentary | IP67 | Orange | Plastic | White | Plastic | $\begin{aligned} & 18.8 \mathrm{~mm} x \\ & 18.8 \mathrm{~mm} \end{aligned}$ | 92-443.300 | 357 |
|  | Plastic | Momentary | IP67 | Yellow | Plastic | White | Plastic | $\begin{aligned} & 18.8 \mathrm{~mm} x \\ & 18.8 \mathrm{~mm} \end{aligned}$ | 92-443.400 | 357 |
|  | Plastic | Momentary | IP67 | Green | Plastic | White | Plastic | $\begin{aligned} & 18.8 \mathrm{~mm} x \\ & 18.8 \mathrm{~mm} \end{aligned}$ | 92-443.500 | 357 |
|  | Plastic | Momentary | IP67 | Blue | Plastic | White | Plastic | $\begin{aligned} & 18.8 \mathrm{~mm} \mathrm{x} \\ & 18.8 \mathrm{~mm} \end{aligned}$ | 92-443.600 | 357 |
|  | Plastic | Momentary | IP67 | Colourless | Plastic | White | Plastic | $\begin{aligned} & 18.8 \mathrm{~mm} x \\ & 18.8 \mathrm{~mm} \end{aligned}$ | 92-443.700 | 357 |

Actuator

| Front bezel colour | Front bezel material | Switching action | IP front protection | Lens colour | Lens material | Housing colour | Housing material | Dimensions | Part No. | Wiring diagram |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Black | Plastic | Momentary | IP40 | Smokey black | Plastic | White | Plastic | $\begin{aligned} & 18.4 \mathrm{~mm} x \\ & 18.4 \mathrm{~mm} \end{aligned}$ | 92-458.100 | 357 |
|  | Plastic | Momentary | IP40 | Red | Plastic | White | Plastic | $\begin{aligned} & 18.4 \mathrm{~mm} \mathrm{x} \\ & 18.4 \mathrm{~mm} \end{aligned}$ | 92-458.200 | 357 |
|  | Plastic | Momentary | IP40 | Orange | Plastic | White | Plastic | $\begin{aligned} & 18.4 \mathrm{~mm} x \\ & 18.4 \mathrm{~mm} \end{aligned}$ | 92-458.300 | 357 |
|  | Plastic | Momentary | IP40 | Yellow | Plastic | White | Plastic | $\begin{aligned} & 18.4 \mathrm{~mm} \mathrm{x} \\ & 18.4 \mathrm{~mm} \end{aligned}$ | 92-458.400 | 357 |
|  | Plastic | Momentary | IP40 | Green | Plastic | White | Plastic | $\begin{aligned} & 18.4 \mathrm{~mm} x \\ & 18.4 \mathrm{~mm} \end{aligned}$ | 92-458.500 | 357 |
|  | Plastic | Momentary | IP40 | Blue | Plastic | White | Plastic | $\begin{aligned} & 18.4 \mathrm{~mm} x \\ & 18.4 \mathrm{~mm} \end{aligned}$ | 92-458.600 | 357 |
|  | Plastic | Momentary | IP40 | Colourless | Plastic | White | Plastic | $\begin{aligned} & 18.4 \mathrm{~mm} x \\ & 18.4 \mathrm{~mm} \end{aligned}$ | 92-458.700 | 357 |

Wiring diagrams


## 92 рсв

## Illuminated pushbutton



Actuator, Front dimension $18,4 \mathrm{~mm} \times 18,4 \mathrm{~mm}$

| Front bezel colour | Front bezel material | Switching action | IP front protection | Housing colour | Housing material | Part No. |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| White | Plastic | Momentary | IP40 | White | Plastic | $92-350.000$ |
| Black | Plastic | Momentary | IP40 | White | Plastic | 72 |

## Wiring diagrams

## E---

Wiring diagram 72

## Illuminated pushbutton



Actuator, Front dimension $18,8 \mathrm{~mm} \times 18,8 \mathrm{~mm}$

| Front bezel colour | Front bezel material | Switching action | IP front protection | Housing colour | Housing material | Part No. |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| White | Plastic | Momentary | IP67 | White | Plastic | Wiring |
| diagram |  |  |  |  |  |  |

## Wiring diagrams



## 92 рсв

## Indicator



Actuator

| Front bezel colour | Front bezel material | IP front protection | Lens colour | Lens material | Lens plate colour | Lens plate material | Dimensions | Part No. | Wiring diagram |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Black | Plastic | IP67 |  | Plastic | Red | Plastic | $\begin{aligned} & 18.8 \mathrm{~mm} \times 18.8 \\ & \mathrm{~mm} \end{aligned}$ | 92-143.200 | 330 |
|  | Plastic | IP67 |  | Plastic | Yellow | Plastic | $\begin{aligned} & 18.8 \mathrm{~mm} \times 18.8 \\ & \mathrm{~mm} \end{aligned}$ | 92-143.400 | 330 |
|  | Plastic | IP67 |  | Plastic | Green | Plastic | $\begin{aligned} & 18.8 \mathrm{~mm} \times 18.8 \\ & \mathrm{~mm} \end{aligned}$ | 92-143.500 | 330 |
|  | Plastic | IP40 | Green | Plastic |  |  | $\begin{aligned} & 18.4 \mathrm{~mm} \times 18.4 \\ & \mathrm{~mm} \end{aligned}$ | 92-158.500 | 330 |
|  | Plastic | IP40 | Colourless | Plastic |  |  | $\begin{aligned} & 18.4 \mathrm{~mm} \times 18.4 \\ & \mathrm{~mm} \end{aligned}$ | 92-158.700 | 330 |

## Wiring diagrams



Indicator, IP67


Actuator, Front dimension $18,8 \mathrm{~mm} \times 18,8 \mathrm{~mm}$

| Front bezel colour | Front bezel material | IP front protection |  | Part No. |
| :--- | :--- | :--- | :--- | :--- |
| Black | Plastic | IP67 | Wiring <br> diagram |  |

## Wiring diagrams

## 92 components

Lens plastic

| Lens material | Lens colour | Lens optics | Lens shape | Lens illumination | Dimensions | Part No. |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Plastic | Black | opaque | flush | non illuminative | $13,2 \mathrm{~mm} \times 13,2 \mathrm{~mm}$ | 92-956.000 |
|  | Grey | opaque | flush | non illuminative | $13,2 \mathrm{~mm} \times 13,2 \mathrm{~mm}$ | 92-956.800 |
|  | White | opaque | flush | non illuminative | $13,2 \mathrm{~mm} \times 13,2 \mathrm{~mm}$ | 92-956.900 |
|  | Yellow | translucent | flush | illuminative | $13,2 \mathrm{~mm} \times 13,2 \mathrm{~mm}$ | 92-956.400 |
|  | Green | translucent | flush | illuminative | $13,2 \mathrm{~mm} \times 13,2 \mathrm{~mm}$ | 92-956.500 |
|  | Smokey black | transparent | flush | illuminative | $13,2 \mathrm{~mm} \times 13,2 \mathrm{~mm}$ | 92-958.100 |
|  | Red | transparent | flush | illuminative | $13,2 \mathrm{~mm} \times 13,2 \mathrm{~mm}$ | 92-958.200 |
|  | Yellow | transparent | flush | illuminative | $13,2 \mathrm{~mm} \times 13,2 \mathrm{~mm}$ | 92-958.400 |
|  | Green | transparent | flush | illuminative | $13,2 \mathrm{~mm} \times 13,2 \mathrm{~mm}$ | 92-958.500 |
|  | Blue | transparent | flush | illuminative | $13,2 \mathrm{~mm} \times 13,2 \mathrm{~mm}$ | 92-958.600 |
|  | Colourless | transparent | flush | illuminative | $13,2 \mathrm{~mm} \times 13,2 \mathrm{~mm}$ | 92-958.700 |

## Additional information

- With white marking plate


Lens plate

| Dimensions | Lens plate material | Lens plate colour | Lens plate optical effect | Lens plate shape | Lens plate illumination | Part No. |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $12 \mathrm{~mm} \times 12 \mathrm{~mm}$ | Plastic | Black | opaque | flush | non illuminative | 92-941.000 |
|  | Plastic | Red | transparent | flush | illuminative | 92-941.200 |
|  | Plastic | Orange | transparent | flush | illuminative | 92-941.300 |
|  | Plastic | Yellow | transparent | flush | illuminative | 92-941.400 |
|  | Plastic | Green | transparent | flush | illuminative | 92-941.500 |
|  | Plastic | Blue | transparent | flush | illuminative | 92-941.600 |
|  | Plastic | Colourless | transparent | flush | illuminative | 92-941.700 |

Front bezel round, raised design

| Front bezel material | Front bezel colour | Material | Colour | Part No. |
| :--- | :--- | :--- | :--- | :--- |
| Plastic | Black | plastic | Black |  |

## Single-LED, T1 3/4 MG

|  | Lumi. Intensity |  |  | Forward voltage | Wiring |
| :--- | :--- | :--- | :--- | :--- | :--- |
| diagram |  |  |  |  |  |$|$| Part No. |
| :--- | :--- |

## Additional information

- The customer has to decide what series resistor shall be used to the LED
- Luminosity and wave length variations caused by LED manufacturing processes may cause slight differences regarding the illumination. The customer has to decide what resistor shall be used to the LED


## Wiring diagrams



Switching element PCB illuminative

|  |  |  |  |  |  | Wiring <br> Som- <br> diagram |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| Switching system | Contacts | Contact material |  | Terminal | Part No. |  |
| Short-travel element | 1 NO | Gold-plated silver | PCB terminal | $92-851.342$ | 332 | 82 |

Contacts: NO = Normally open

## Additional information

- The customer has to decide what series resistor shall be used to the LED
- LED and mounting flange to be ordered separately


Dimensions [mm]

## 92 components

## Wiring diagrams



## Component layouts

| (A) <br> (B) | (C) |
| :---: | :---: |
|  |  |
| Component layout 82 |  |

Dimensions [mm]
A = Switching element with illumination
B = Single LED
C = Drilling plan (component side)
$\mathrm{D}=$ Hole for switching element, pad max. Ø 2.5 mm
E = Hole for LED

Indicator element

| Terminal | Part No. | Wiring diagram | Component Layout |
| :---: | :---: | :---: | :---: |
| PCB terminal | 92-800.042 | 330 | 79 |

## Additional information

- The customer has to decide what series resistor shall be used to the LED
- LED and mounting flange to be ordered separately


Dimensions [mm]

## Wiring diagrams



## Component layouts



Component layout 79
Dimensions [mm]
A = Switching element without illumination
$\mathrm{B}=$ Drilling plan (component side)
C = Occupancy plan (component side)
$D=$ Hole for switching element


## PCB assembled

| Material | Part No. | Wiring diagram | Component Layout |
| :---: | :---: | :---: | :---: |
| metal / plastic | 92-981.0 | 358 | 92 |

Wiring diagrams


## 92 components

## Component layouts



Dimensions [mm]
A $=4=$ Switch
B $=\mathrm{x}+=$ LED Anode ( + )
$C=1 \mathrm{x}-=$ LED Cathode (-)


Mounting flange

| Material | Fastening | Part No. |
| :--- | :--- | :--- |
| plastic | With screws | 92-960.0 |

## Additional information

- For discrete switching applications including switching element and mounting flange, soldering termina (assembled PCB incl. series resistor and LED on request)


Dimensions [mm]


## Anti-twist ring

| Material | Mounting cut-out | Part No. |
| :--- | :--- | :--- |
| metal | $\varnothing 16.2 \mathrm{~mm}$ | $51-910$ |

## Front side



Blind plug

| Dimensions | Material | Colour | Mounting cut-out | Part No. |
| :--- | :--- | :--- | :--- | :--- |
| $18 \mathrm{~mm} \times 18 \mathrm{~mm}$ | plastic | Black | $\varnothing 16.2 \mathrm{~mm}$ | $51-948.0$ |

## Additional information

- Blind plugs fit also in mounting cut-outs with anti-twist device



## 92 <br> Accessories

## Mounting



## Dismantling tool

| Material | Part No. |
| :--- | :--- | :--- |
| metal | $92-971.0$ |

## Additional information

- For actuator dismantling of switching element, illumination element and mounting flange


## Lens remover

| Material | Part No. |
| :--- | :--- | :--- |
| metal / plastic | 18-910 |


| Product attributes | Dimensions | Material | Part No. |
| :--- | :--- | :--- | :--- |
| For tightening or loosening of the fixing nut $\varnothing 16$ <br> mm | $\varnothing 16 \mathrm{~mm}$ | metal | 01-907 |

## 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
Plastic

Front bezel
Plastic

## Frame

Plastic

Material of contact
Gold (Au)

Switching element
Plastic

Housing
Plastic

## Mechanical characteristics

Tightening torque
Fixing screw mounting flange 0.4 Nm
Fixing nut max. 0.5 Nm

## Actuating force

$2.7 \mathrm{~N} \pm 1 \mathrm{~N}$ measured at the switching element
5 N measured at the lens

## Actuating travel

Switching element approx. 0.4 mm

## Resistance to heat of soldering

Please see application guidelines

## Mechanical lifetime

$\geq 1$ Million cycles of operation as per IEC 60512-5-9a

## Electrical characteristics

Electrical life
500000 cycles of operation at $42 \mathrm{VDC}, 50 \mathrm{~mA}$ as per IEC 60512-5-9c.

Electrostatic discharge (ESD)
15 kV

Switching voltage and switching current
Switching voltage min. $50 \mathrm{mVAC} / \mathrm{DC}$
max. 42VAC/DC
Switching current min. $10 \mu \mathrm{~A} A C / D C$ max. $100 \mathrm{~mA} A C / D C$
Power rating max. 2 W

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

## Ambient conditions

Storage temperature
$-40^{\circ} \mathrm{C} \ldots+80^{\circ} \mathrm{C}$

Operating temperature
$-25^{\circ} \mathrm{C} \ldots+70^{\circ} \mathrm{C}$

## Protection

IP40 switching element (fluxproof to DIN 41640 Part 84) IP67 or IP40 frontside

Shock resistance
(semi-sinusoidal)
Max. $500 \mathrm{~m} / \mathrm{s}^{2}$, pulse width $11 \mathrm{~ms}, 3$-axis,
as per EN IEC 60068-2-27

## Vibration resistance

(sinusoidal)
Max. $100 \mathrm{~m} / \mathrm{s}^{2}$ at $10 \mathrm{~Hz} \ldots 500 \mathrm{~Hz}, 10$ cycles, 3 -axis, as per EN IEC 60068-2-6

## Approvals

Approbations
CQC

## Conformities

CE
UKCA
2014/35/EU (LVD)
2011/65/EG (RoHS)

## 92 <br> Marking

## 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. Engraving (Fig. 1)

With laser marking, the font or symbol is applied directly to the lens applied.

## 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 $11.4 \times 11.4 \mathrm{~mm}$ for IP $4010.4 \times 10.4 \mathrm{~mm}$ for IP 67 Film thickness 0.2 mm .

## 2. Hot stamping (Fig. 1)

For larger series it is worth considering markings by means of hot stamping. We will pleased to advise you.

## All dimensions in mm

| Lens size | Height of letters h | Number of lines | Number of capital letters per line (target value) | Number of small letters per line (target value) |
| :---: | :---: | :---: | :---: | :---: |
| $13.2 \times 13.2$ | 2.5 | 3 | 6 | 7 |
|  | 3 | 3 | 5 | 6 |
|  | 4 | 2 | 4 | 4 |
|  | 5 | 2 | 3 | 3 |
|  | 6 | 1 | 3 | 3 |
|  | 8 | 1 | 2 | 2 |
| $12 \times 12$ | 2.5 | 3 | 6 | 6 |
|  | 3 | 3 | 5 | 5 |
|  | 4 | 2 | 4 | 4 |
|  | 5 | 2 | 3 | 3 |
|  | 6 | 1 | 2 | 2 |
|  | 8 | 1 | 2 | 2 |


| Film insert max. size | Height of letters h | Number of lines | Number of capital letters per line (target value) | Number of small letters per line (target value) |
| :---: | :---: | :---: | :---: | :---: |
| $11.4 \times 11.4$ | 2.5 | 3 | 5 | 6 |
|  | 3 | 2 | 4 | 5 |
|  | 4 | 2 | 3 | 4 |
|  | 5 | 1 | 3 | 3 |
|  | 6 | 1 | 2 | 2 |
|  | 8 | 1 | 2 | 2 |
| $10.4 \times 10.4$ | 2.5 | 3 | 5 | 5 |
|  | 3 | 2 | 4 | 4 |
|  | 4 | 2 | 3 | 3 |
|  | 5 | 1 | 2 | 3 |
|  | 6 | 1 | 2 | 2 |
|  | 8 | 1 | 1 | 2 |



## 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 kilo-
volts in amplitude even when nominal circuit voltages are low (e.g. 12VDC) 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


## Note for soldering

Process parameter for wave soldering
Basic specification for wave soldering J-STD 75 W4C.

Maximum temperature on the component side (Temp 2):
(Temperature must not exceed during the entire processing)

Preheating phase (t1 ... t2):
Ramp up:

Ramp up to maximum temperature ( $\mathrm{t} 2 \ldots \mathrm{t}$ ) :

Maximum temperature on the soldering side (Temp 3):
Maximum time of soldering process ( $\mathrm{t} 3 \ldots \mathrm{t} 4$ ):

Ramp down at $170^{\circ} \mathrm{C}$ :
$120^{\circ} \mathrm{C}$
$70 . . .120 \mathrm{sec}$
typ. $+1^{\circ} \mathrm{C} / \mathrm{sec}$
not defined
$250^{\circ} \mathrm{C}$
3 sec
typ. $-2^{\circ} \mathrm{C} /$ sec

## 92 Application guidelines

## Temperature curve wave soldering



| Green curve: | Temperature on the component side of the pcb |
| :---: | :---: |
| Red curve: | Temperature on the soldering side of the pcb |
| Room temperature: | Temp 1 |
| Preheating: | $\text { Temperature process }=\text { Temp } 1 \ldots \text { Temp } 2$ |
| Ramp up to soldering temperature: | Process time $=\quad$ t2 $\ldots$ t3 |
| Soldering phase: | Temperature process $=$ Temp 3 <br> Process time $=$ $\mathrm{t} 3 \ldots \mathrm{t} 4$ |

## Iron soldering

Basic specification for iron soldering IEC 60068-2-20

| Maximum temperature at tip of iron: | $320^{\circ} \mathrm{C}$ |
| :--- | :--- |
| Maximum soldering time: | 3 sec |

## Cleaning/Lacquering

The switching elements are not sealed. Cleaning up the PCB may damage the contacts in the switching elements. For this reason, the following points should be noted:

- When soldering make sure that the flux does not pass on the upper side of the PCB.
- When cleaning the PCB with detergents ensure that no dust or other debris may get inside of the switching elements.
- Ensure that no lacquer penetrates into the interior of the switching element when lacquering the PCB.


## Storage of components

To obtain the optimum solderability of the components, the following points should be noted during storage:

- Do not store components in locations with high temperature or humidity.
- Do not expose components to corrosive gases.
- Avoid direct sunlight for a long period.

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 Part No. 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 Part. No. 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.


[^0]:    On our website you can download technical data, assembly instructions,
    catalogs, brochures and much more.

