



Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!



## Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832

Email & Skype: info@chipsmall.com Web: www.chipsmall.com

Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China



# Series 70

## Characteristics

The Series 70 consists of special short stroke pushbuttons for use with membrane keyboards. It is particularly suited for:

- PCBs

The use of single LEDs ensures that the entire control panel is very well illuminated. The module is offered in six colours and in a round or square design.

## Functions

The Series 70 incorporates the following functions:

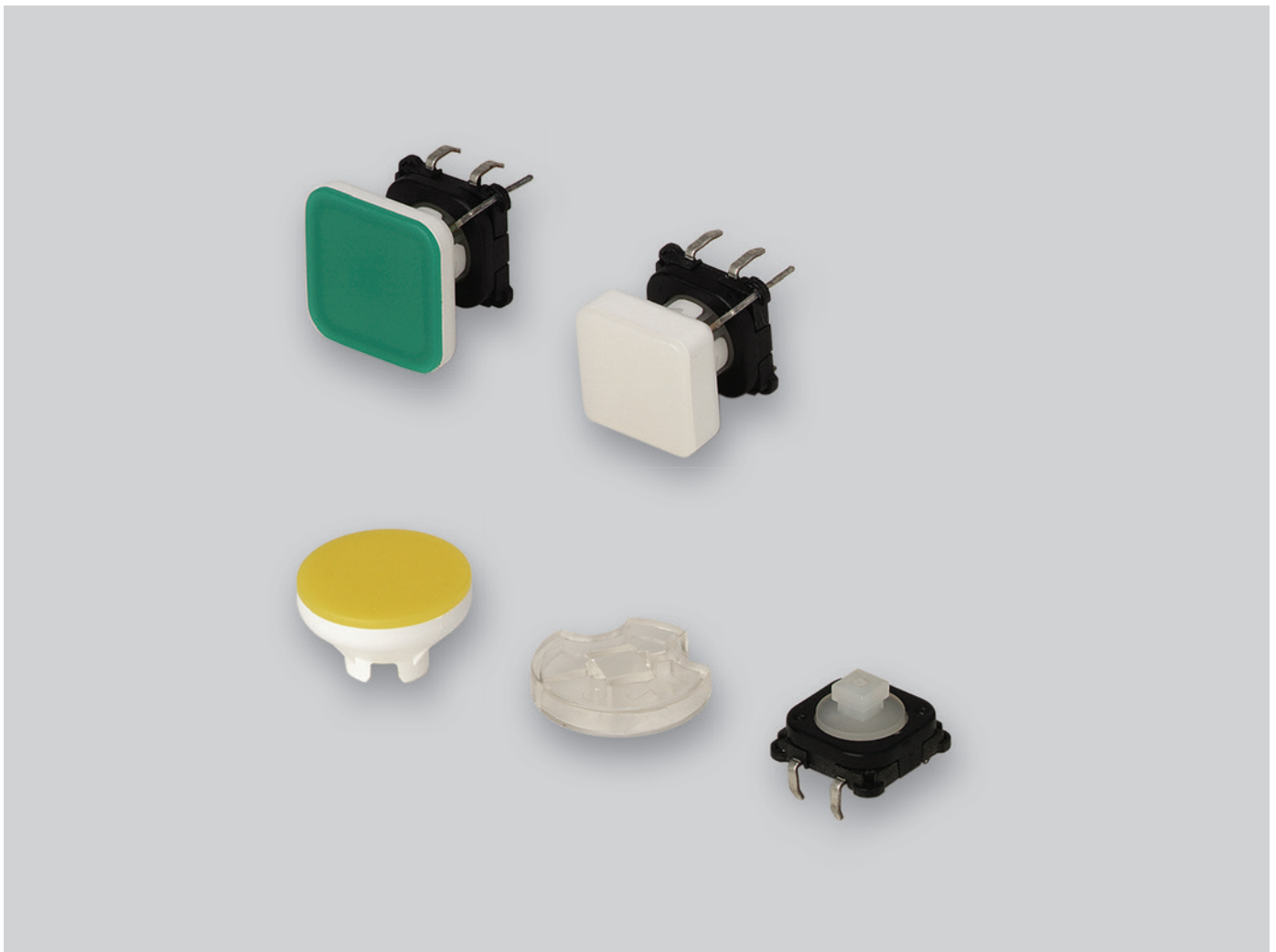
- Indicator
- Pushbutton
- Illuminated pushbutton

## Market segments

The EAO Series 70 is especially suited for applications in the segments:

- Machinery and Automation
- Medicinal technology
- Laboratory and measuring equipment

Please refer to the EAO website to obtain detailed information regarding this series [www.products.eao.com](http://www.products.eao.com)  
Configure a product to your exact needs and request a quotation.





**Overview****PCB pushbuttons**

Illumination element	4
Switching element without illumination	5
Switching element with illumination	6

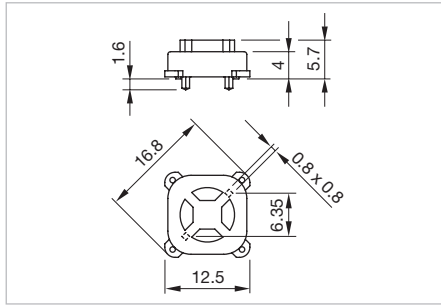
**Accessories** 7**Drawings** 10**Technical data** 11**Application guidelines** 13**Index** 15

# 70 PCB pushbuttons

## Illumination element



Product can differ from the current configuration.



Dimensions

### Equipment consisting of (schematic overview)



**Lens**

page 7



**LED**





**Illumination element**

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

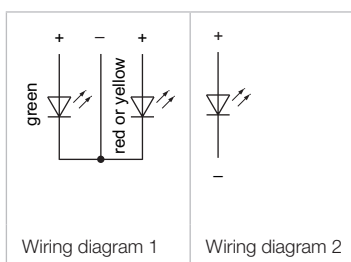
*To obtain a complete unit, please select the red components from the pages shown.*

### Additional Information

- The customer has to decide what series resistor shall be used to the LED
- Dimensions with fitted lens see details «Lens»
- Luminosity and wave length variations caused by LED manufacturing processes may cause slight differences regarding the illumination

LED colour	Forward voltage typ.	Lumi. intensity	Dom. wavelength	Terminal	Part No.	Component layout	Wiring diagram	Weight
 <p><b>Illumination element</b></p>								
Single-LED red	2.0 VDC @ 20 mA	160 mcd	625 nm	PCB	<b>70-820.2S</b>	3	2	0.001 kg
Single-LED green	3.2 VDC @ 20 mA	650 mcd	525 nm	PCB	<b>70-820.5S</b>	3	2	0.001 kg
 <p><b>Illumination element</b></p>								
				PCB	<b>92-800.042</b>	1		0.001 kg

The component layouts you will find from page 10



## Switching element without illumination

### Equipment consisting of (schematic overview)



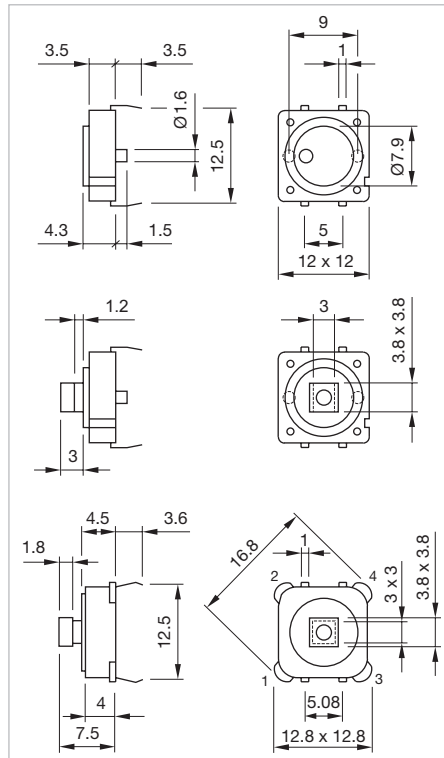
**Spacing cap** *page 8*



**Switching element**

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



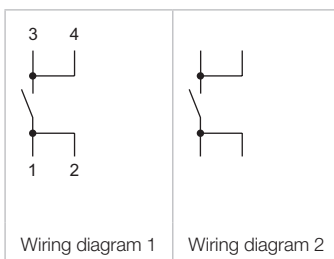
Product can differ from the current configuration.

### Additional Information

- Contact normally open
- Switching action momentary
- Dimensions with fitted spacing cap see details «Spacing cap»

Product attribute	Contact material	Terminal	Part No.	Component layout	Wiring diagram	Weight
 <p><b>Switching element without illumination</b></p>						
without spacing cap	Silver	PCB	<b>70-100.0</b>	2	2	0.001 kg
 <p><b>Switching element without illumination</b></p>						
without spacing cap	Silver	PCB	<b>70-101.0</b>	2	2	0.001 kg
 <p><b>Switching element without illumination</b></p>						
without spacing cap	Gold-plated silver	PCB	<b>70-201.0</b>	1	1	0.001 kg

The component layouts you will find from page 10

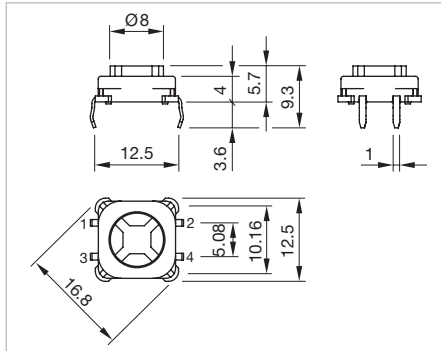


# 70 PCB pushbuttons

## Switching element with illumination



Product can differ from the current configuration.



Dimensions

### Equipment consisting of (schematic overview)



**Lens**

page 7



**LED**



**Switching element**

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

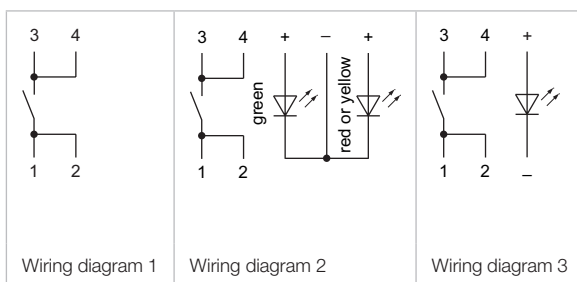
To obtain a complete unit, please select the red components from the pages shown.

### Additional Information

- Contact normally open
- Switching action momentary
- 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
- Dimensions with fitted lens see details «Lens»

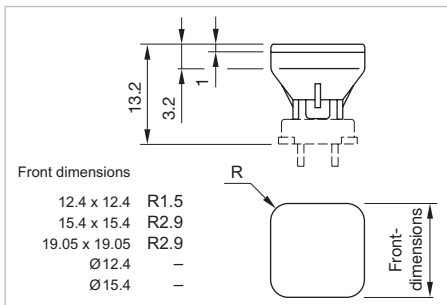
LED colour	Forward voltage typ.	Contact material	Lumi. intensity	Dom. wavelength	Terminal	Part No.	Component layout	Wiring diagram	Weight
<p><b>Switching element with illumination</b></p>									
Single-LED red	2.0 VDC @ 20 mA	Gold	160 mcd	625 nm	PCB	<b>70-220.2S</b>	4	3	0.001 kg
Single-LED yellow	2.9 VDC @ 20 mA	Gold	600 mcd	580 nm	PCB	<b>70-220.4S</b>	4	3	0.001 kg
Single-LED green	3.2 VDC @ 20 mA	Gold	650 mcd	525 nm	PCB	<b>70-220.5S</b>	4	3	0.001 kg
Single-LED blue	3.0 VDC @ 20 mA	Gold	250 mcd	467 nm	PCB	<b>70-220.6S</b>	4	3	0.001 kg
Single-LED white	3.2 VDC @ 20 mA	Gold	500 mcd	x=0.3/y=0.3	PCB	<b>70-220.9S</b>	4	3	0.001 kg
<p><b>Switching element with illumination</b></p>									
		Gold			PCB	<b>92-851.342</b>	4	1	0.001 kg

The component layouts you will find from page 10







Front

Lens




Dimensions

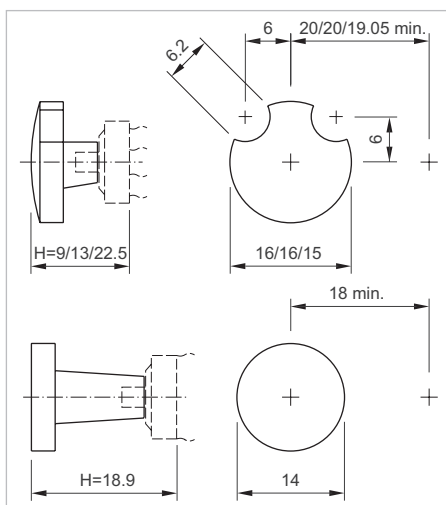
Lens	Part No.	Weight
 <p><b>Lens, Front dimension 19.05 x 19.05 mm</b></p>		
Plastic white translucent	<b>70-920.9</b>	0.001 kg
 <p><b>Lens, Front dimension 15.4 x 15.4 mm</b></p>		
Plastic red translucent	<b>70-921.2</b>	0.001 kg
Plastic orange translucent	<b>70-921.3</b>	0.001 kg
Plastic yellow translucent	<b>70-921.4</b>	0.001 kg
Plastic green translucent	<b>70-921.5</b>	0.001 kg
Plastic blue translucent	<b>70-921.6</b>	0.001 kg
Plastic white translucent	<b>70-921.9</b>	0.001 kg
 <p><b>Lens, Front dimension 12.4 x 12.4 mm</b></p>		
Plastic red translucent	<b>70-922.2</b>	0.001 kg
Plastic orange translucent	<b>70-922.3</b>	0.001 kg
Plastic yellow translucent	<b>70-922.4</b>	0.001 kg
Plastic green translucent	<b>70-922.5</b>	0.001 kg
Plastic blue translucent	<b>70-922.6</b>	0.001 kg
Plastic white translucent	<b>70-922.9</b>	0.001 kg
 <p><b>Lens, Front dimension Ø 15.4 mm</b></p>		
Plastic red translucent	<b>70-911.2</b>	0.001 kg
Plastic orange translucent	<b>70-911.3</b>	0.001 kg
Plastic yellow translucent	<b>70-911.4</b>	0.001 kg
Plastic green translucent	<b>70-911.5</b>	0.001 kg
Kunststoff weiss transluzent	<b>70-911.9</b>	0.001 kg




# 70 Accessories

Lens	Part No.	Weight
 <b>Lens, Front dimension Ø 12.4 mm</b>		
Plastic red translucent	<b>70-912.2</b>	0.001 kg
Plastic orange translucent	<b>70-912.3</b>	0.001 kg
Plastic yellow translucent	<b>70-912.4</b>	0.001 kg
Plastic green translucent	<b>70-912.5</b>	0.001 kg
Plastic white translucent	<b>70-912.9</b>	0.001 kg

## Spacing cap




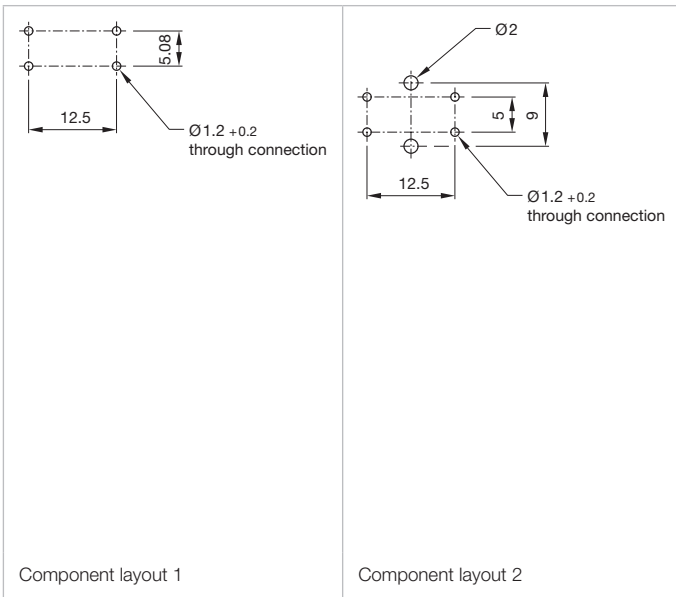
Dimensions

Product attribute	Part No.	Weight
 <b>Spacing cap</b>		
without recesses for LED, H = 18.9 mm	<b>70-901.0</b>	0.001 kg
2 recesses for LED, H = 9 mm	<b>70-910.0</b>	0.001 kg
2 recesses for LED, H = 13 mm	<b>70-911.0</b>	0.001 kg
2 recesses for LED, H = 22.5 mm	<b>70-912.0</b>	0.001 kg

**Illumination****Single-LED, T1 Bi-Pin****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

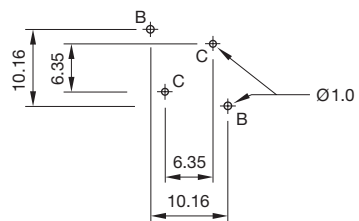
LED colour	Forward voltage typ.	Lumi. intensity	Dom. wavelength	Part No.	Weight
 <p><b>Single-LED</b></p>					
Single-LED red	2.0 VDC @ 20 mA	160 mcd	625 nm	<b>10-2601.3172S</b>	0.001 kg
Single-LED orange	2.0 VDC @ 20 mA	165 mcd	605 nm	<b>10-2601.3173S</b>	0.001 kg
Single-LED yellow	2.9 VDC @ 20 mA	600 mcd	580 nm	<b>10-2603.3174S</b>	0.001 kg
Single-LED green	3.2 VDC @ 20 mA	650 mcd	525 nm	<b>10-2603.3175S</b>	0.001 kg
Single-LED blue	3.0 VDC @ 20 mA	250 mcd	467 nm	<b>10-2603.3176S</b>	0.001 kg
Single-LED white	3.2 VDC @ 20 mA	500 mcd	x=0.3/y=0.3	<b>10-2603.3178S</b>	0.001 kg



### Single-LED

Drilling plan (element side)

B Holes for LED  
C Holes for centering pins

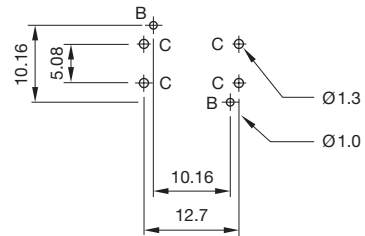


Component layout 3

### Single-LED

Drilling plan (element side)

B Holes for LED  
C Holes for contact pins  
Pad max.  $\varnothing 2.5$  mm  
Through-connection recommended



Component layout 4

**Switching element illuminated Part No. 92-851.342**
**Switching system**

Short-travel switching system with two independent contact points and tactile operation. Guarantees reliable switching even of very light loads.

1 normally open contact

**Material**
**Material of contact**

Gold-plated silver

**Switching element**

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

**Mechanical characteristics**
**Actuating force**

with overlay foil 4 N  $\pm$  1,5 N

Max. actuating force > 50 N, as per DIN 42115

**Actuating travel**

0.4 mm

**Rebound time**

$\leq$  1 ms

**Resistance to heat of soldering**

250 °C, 3 s (PCB assembly)

320 °C, 3 s (when using a soldering iron)

**Mechanical lifetime**

$\geq$  5 Mio. operations (switching element without overlay)

$\geq$  1 Mio. operations (switching element under overlay)

**Electrical characteristics**
**Contact resistance**

Starting value (initial)  $\leq$  100 m $\Omega$ , as per IEC 60512-2-2b

**Isolation resistance**

$\geq$  1000 M $\Omega$

**Contact resistance**

$\leq$  100 m $\Omega$

as per 500 000 cycles of operation at 12 VDC, 5 mA resistive load  $\leq$  200 m $\Omega$

**Electrical life**

$\geq$  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.

**Switch rating**

Switching voltage VDC/VAC min. 50 mV max. 42 V

Switching current VDC/VAC min. 10  $\mu$ A max. 100 mA

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 ... +85 °C

**Operating temperature**

-25 °C ... +70 °C

**Approvals**
**Declaration of conformity**

CE

**Switching element non-illuminated Part No. 70-100.0 and 70-101.0**
**Switching system**

Short-travel switching system with two independent contact points and tactile operation. Guarantees reliable switching even of very light loads.

1 normally open contact

**Material**
**Material of contact**

Silver (Ag)

**Mechanical characteristics**
**Actuating force**

with overlay foil 5 N  $\pm$  2 N

Max. actuating force > 50 N, as per DIN 42115

**Actuating travel**

0.3 mm

**Rebound time**

$\leq$  5ms

**Mechanical lifetime**

> 1 Mio. operations with overlay

**Electrical characteristics**
**Isolation resistance**

$\geq$  50 M $\Omega$

**Contact resistance**

$\leq$  100 m $\Omega$

as per 500 000 cycles of operation at 12 VDC, 5 mA resistive load  $\leq$  200 m $\Omega$

# 70 Technical data

## Electrical life

at 5 VDC, 1 mA > 1 million operations  
at 24 VDC, 1 mA > 100 000 operations

## Switch rating

≤ 1 watt (resistive load)

## Switch rating

≤ 24 VDC, ≤ 50 mA

## Electric strength

250 VAC for 1 min.

## Environmental conditions

### Storage temperature

-30 °C ... +85 °C

### Operating temperature

-20 °C ... +70 °C

## Approvals

### Declaration of conformity

CE

## Switching element non-illuminated Part No. 70-201.0

### Switching system

Short-travel switching system with two independent contact points and tactile operation. Guarantees reliable switching even of very light loads.

1 normally open contact

### Material

#### Material of contact

Gold-plated silver

#### Switching element

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

### Mechanical characteristics

#### Actuating force

with overlay foil 2.1 N ±0.2 N

Max. actuating force > 50 N, as per DIN 42115

#### Actuating travel

max. 0.5 mm

#### Rebound time

≤ 1 ms

#### Resistance to heat of soldering

260 °C, 3 s, as per IEC 60068-2-20

#### Mechanical lifetime

≥ 5 Mio. operations (switching element without overlay)

≥ 1 Mio. operations (switching element under overlay)

#### Front protection

front with overlay foil IP 65

### Electrical characteristics

#### Contact resistance

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

#### Isolation resistance

≥ 1000 MΩ

#### Contact resistance

≤ 100 mΩ

as per 500 000 cycles of operation at 12 VDC, 5 mA resistive load ≤ 200 mΩ

#### 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 ¾ to ½ the electrical life can be prolonged.

#### Switch rating

Switching voltage VDC/VAC	min. 50 mV	max. 42 V
---------------------------	------------	-----------

Switching current VDC/VAC	min. 10 mA	max. 100 mA
---------------------------	------------	-------------

Switch rating	max. 2 W	
---------------	----------	--

#### Electric strength

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

## Environmental conditions

### Storage temperature

-40 °C ... +85 °C

### Operating temperature

-25 °C ... +70 °C

## Approvals

### Declaration of conformity

CE

EAO reserves the right to alter specifications without further notice.

## Suppressor circuits

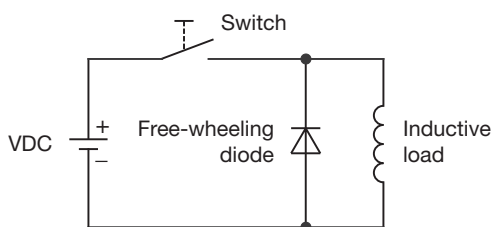
When switching inductive loads such as relays, DC motors, and DC solenoids, it is always important to absorb surges (e.g. with a diode) to protect the contacts. When these inductive loads are switched off, a counter emf can severely damage switch contacts and greatly shorten lifetime.

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. 12VDC) see Fig. 2.

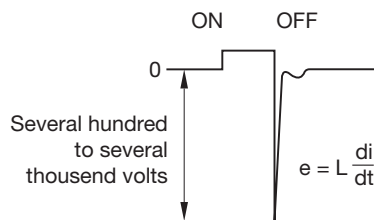
The free-wheeling diode should be chosen so that the reverse breakdown voltage is greater than the voltage driving the inductive load. The DC blocking voltage ( $V_R$ ) of the free-wheeling diode can be found in the datasheet of a diode. The forward current should be equal or greater than the maximum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

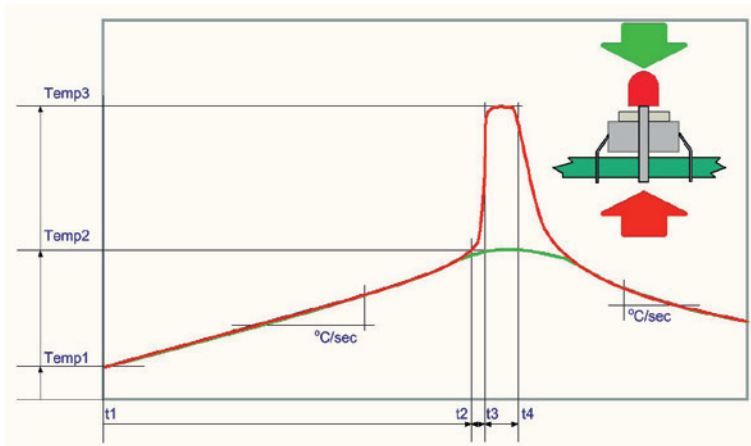
### Process parameter for wave soldering

Basic specification for wave soldering J-STD 75 W4C

Maximum temperature on the component side of the pcb (Temperature must not exceed during the entire processing)	120 °C
Preheating phase (t1 ... t2)	70 ... 120 sec
Ramp up	typ. + 1°C/sec
Ramp up to maximum temperature (t2 ... t3)	not defined
Maximum temperature on the soldering side (Temp 3)	250 °C
Maximum time of soldering process (t3 ... t4)	3 sec
Ramp down at 170 °C:	typ. -2 °C/sec

# 70 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: Temperature process = Temp 1 ... Temp 2  
Process time = t1 ... t2

Ramp up to soldering temperature: Process time = t2 ... t3

Soldering phase: Temperature process = Temp 3  
Process time = t3 ... t4

## Iron soldering

Basic specification for iron soldering IEC 60068-2-20

Maximum temperature at tip of iron: 320 °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.

## Index from Part No.

Part No.	Page
10-2601.3172S.....	9
10-2601.3173S.....	9
10-2603.3174S.....	9
10-2603.3175S.....	9
10-2603.3176S.....	9
10-2603.3178S.....	9
70-100.0.....	5
70-101.0.....	5
70-201.0.....	5
70-220.2S.....	6
70-220.4S.....	6
70-220.5S.....	6
70-220.6S.....	6
70-220.9S.....	6
70-820.2S.....	4
70-820.5S.....	4
70-901.0.....	8
70-910.0.....	8
70-911.0.....	8
70-911.2.....	7
70-911.3.....	7
70-911.4.....	7
70-911.5.....	7
70-911.9.....	7
70-912.0.....	8
70-912.2.....	8
70-912.3.....	8
70-912.4.....	8
70-912.5.....	8
70-912.9.....	8
70-920.9.....	7
70-921.2.....	7
70-921.3.....	7
70-921.4.....	7
70-921.5.....	7
70-921.6.....	7
70-921.9.....	7
70-922.2.....	7
70-922.3.....	7
70-922.4.....	7
70-922.5.....	7
70-922.6.....	7
70-922.9.....	7
92-800.042.....	4
92-851.342.....	6



