TecnelSystem S.p.A.®
equipaggiamenti elettrici industriali

UNI EN ISO9001:2015
Nr. 9101.TNLS

Series 19

Proven. Streamlined and tactile.

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Cert.CSQ-IQNet ISO9001:2015 N. 9101TNLS www.tecnelsystem.it e-mail: tecnel@tecnelsystem.it

19 Information about the Series

Key advantages

- Excellent tactile feedback
- Gold contacts available for low voltages and currents
- Bright, homogenous illumination
- Compact construction
- Can be mounted on PCBs

Typical application areas

- Audio / video
- Measurement technology
- Medical engineering

Functions

- Illuminated pushbutton
- Indicator

Design

- Raised

IP front protection

- IP40

Raitings

- 42 VAC (100 mA)

Mounting cut-outs

- Ø 8 mm

Terminal

- Soldering terminal
- PCB (with PCB plug-in base)

Lens Material

- Plastic

Markings

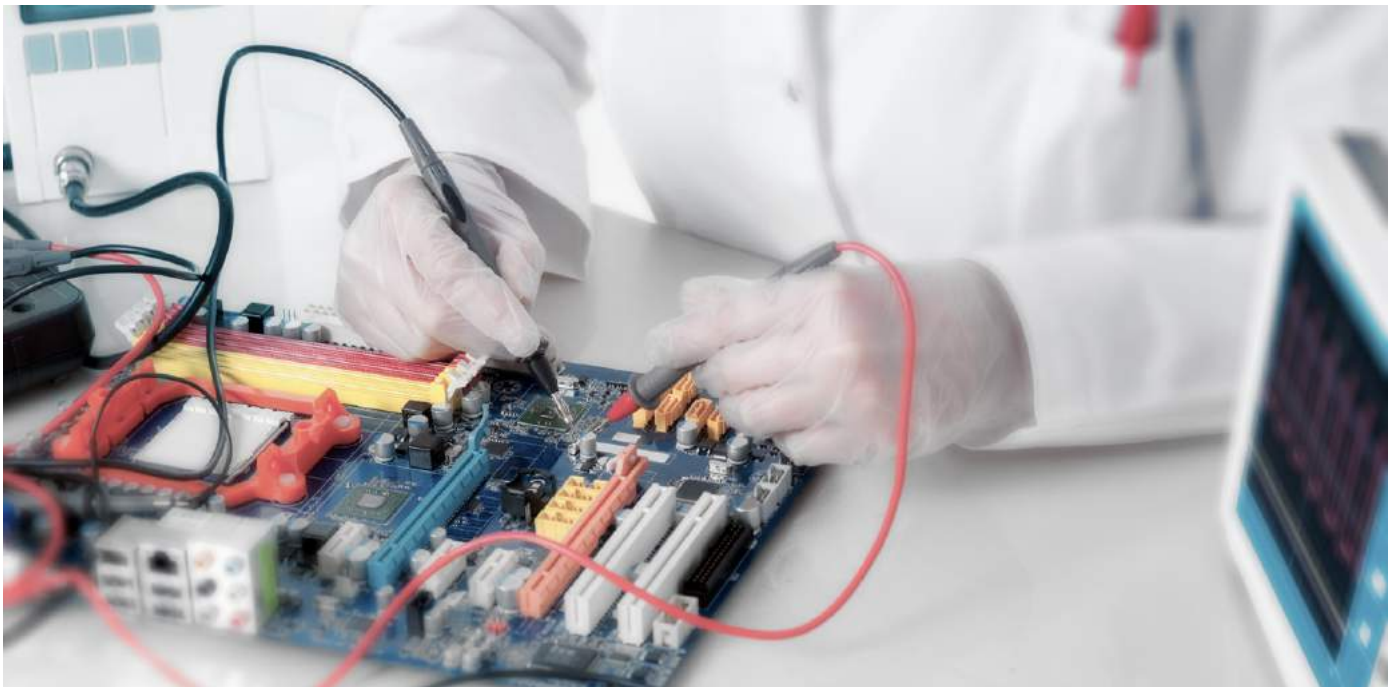
- Engraving
- Film insert

Approvals

- No approbations

Conformities

- CE
- 2011/65/EU (RoHS)



Raised design	
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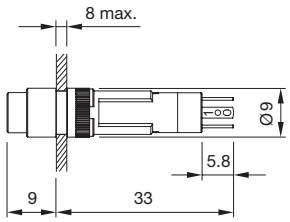
Illuminated pushbutton square, IP40

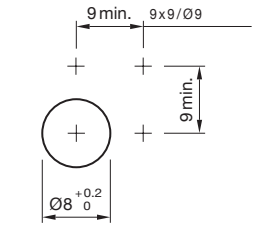
Product can differ from the current configuration.



Dimensions [mm]

General information

- For LED element fitting information see Application guidelines, LED polarity

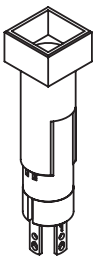


Mounting cut-outs [mm]

Equipment consisting of (schematic overview)

Lens — Page 418

Single-LED — Page 418



Actuator

Fixing nut

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

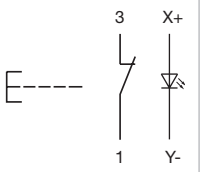
To obtain a complete unit, please select the red components from the pages shown.

Actuator, Front dimension 9 mm x 9 mm

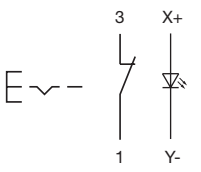
Terminal	Switching system	Switching action	Contacts	Contact material	Part No.	Wiring diagram	Component Layout
Plug-in terminal	Snap-action switching element	Momentary	1 NO	Silver	19-159.015	143	17
	Snap-action switching element	Momentary	1 NO	Gold	19-159.035	143	17
	Snap-action switching element	Maintained	1 NO	Silver	19-289.015	144	17
	Snap-action switching element	Maintained	1 NO	Gold	19-289.035	144	17
	Low-level element	Momentary	1 NO	Gold	19-451.035	143	17
	Low-level element	Momentary	1 NC	Gold	19-452.035	141	17
	Low-level element	Maintained	1 NO	Gold	19-481.035	144	17
	Low-level element	Maintained	1 NC	Gold	19-482.035	142	17

Contacts: NC = Normally closed, NO = Normally open

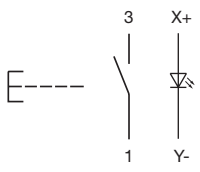
Wiring diagrams



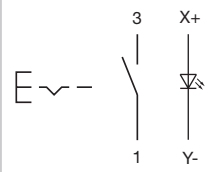
Wiring diagram 141



Wiring diagram 142

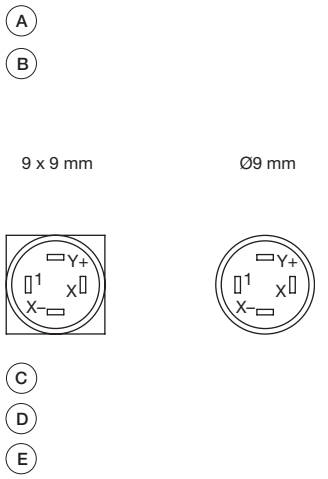


Wiring diagram 143



Wiring diagram 144

Component layouts

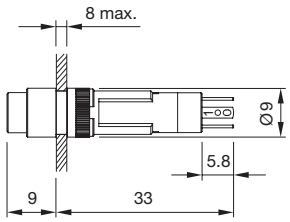


Component layout 17

A = Terminals (rear side)
B = Illuminated pushbutton
C = x = Contact no.
D = 2 = Normally open
E = 4 = Normally close

Illuminated pushbutton round, IP40

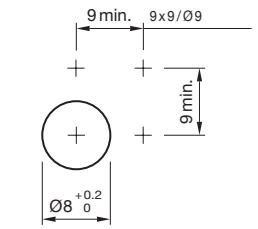
Product can differ from the current configuration.



Dimensions [mm]

General information

- For LED element fitting information see Application guidelines, LED polarity



Mounting cut-outs [mm]

Equipment consisting of (schematic overview)

Lens — Page 418

Single-LED — Page 418

Actuator

Fixing nut

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

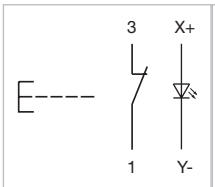
To obtain a complete unit, please select the red components from the pages shown.

Actuator, Front dimension Ø 9 mm

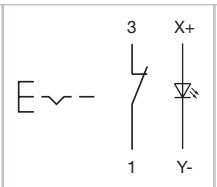
Terminal	Switching system	Switching action	Contacts	Contact material	Part No.	Wiring diagram	Component Layout
Plug-in terminal	Snap-action switching element	Momentary	1 NO	Silver	19-139.015	143	17
	Snap-action switching element	Momentary	1 NO	Gold	19-139.035	143	17
	Snap-action switching element	Maintained	1 NO	Silver	19-279.015	144	17
	Snap-action switching element	Maintained	1 NO	Gold	19-279.035	144	17
	Low-level element	Momentary	1 NO	Gold	19-431.035	143	17
	Low-level element	Momentary	1 NC	Gold	19-432.035	141	17
	Low-level element	Maintained	1 NO	Gold	19-471.035	144	17
	Low-level element	Maintained	1 NC	Gold	19-472.035	142	17

Contacts: NC = Normally closed, NO = Normally open

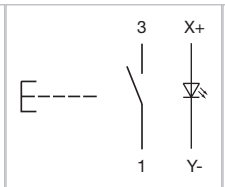
Wiring diagrams



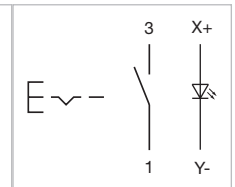
Wiring diagram 141



Wiring diagram 142

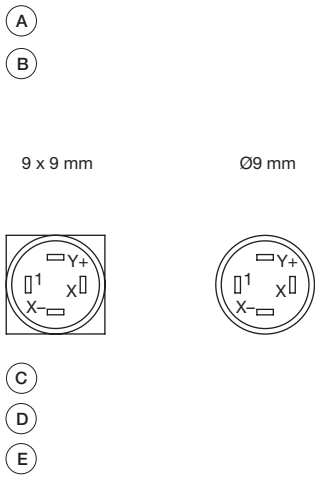


Wiring diagram 143



Wiring diagram 144

Component layouts



Component layout 17

A = Terminals (rear side)
B = Illuminated pushbutton
C = x = Contact no.
D = 2 = Normally open
E = 4 = Normally close

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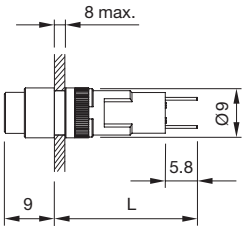
Indicator square, IP40

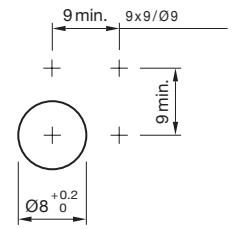
Product can differ from the current configuration.



Dimensions [mm]

General information

- For LED element fitting information see Application guidelines, LED polarity

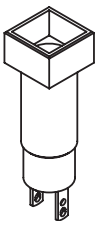


Mounting cut-outs [mm]

Equipment consisting of (schematic overview)

Lens Page 418

Single-LED Page 418



Actuator

Fixing nut

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.

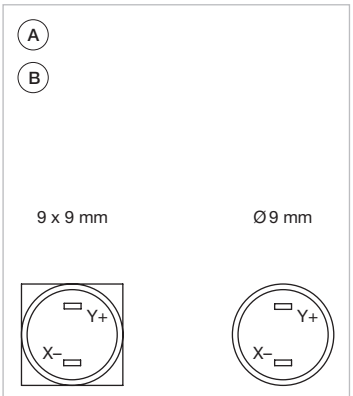
Actuator, Front dimension 9 mm x 9 mm

Terminal	Back panel depth	Part No.	Wiring diagram	Component Layout
Plug-in terminal	25 mm	19-050.005	140	16
	33 mm	19-051.005	140	16

Wiring diagrams

Wiring diagram 140

Component layouts

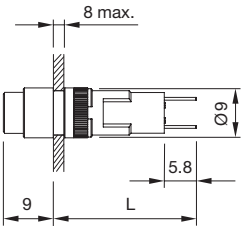


Component layout 16

A = Terminals (rear side)
B = Indicator

Indicator round, IP40

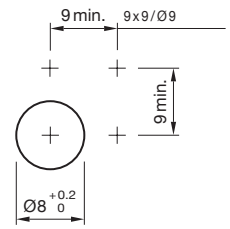
Product can differ from the current configuration.



Dimensions [mm]

General information

- For LED element fitting information see Application guidelines, LED polarity

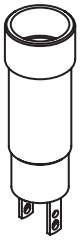


Mounting cut-outs [mm]

Equipment consisting of (schematic overview)

Lens — Page 418

Single-LED — Page 418



Actuator

Fixing nut

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.

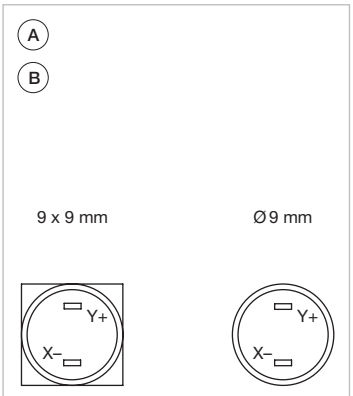
Actuator, Front dimension Ø 9 mm

Terminal	Back panel depth	Part No.	Wiring diagram	Component Layout
Plug-in terminal	25 mm	19-030.005	140	16
	33 mm	19-031.005	140	16

Wiring diagrams

Wiring diagram 140

Component layouts



Component layout 16

A = Terminals (rear side)
B = Indicator

Lens

Product attributes	Lens material	Lens colour	Lens optics	Lens shape	Lens illumination	Dimensions	Part No.
For film insert	Plastic	Red	transparent	flush	illuminative	7.3 mm x 7.3 mm	19-951.2
	Plastic	Yellow	transparent	flush	illuminative	7.3 mm x 7.3 mm	19-951.4
	Plastic	Green	transparent	flush	illuminative	7.3 mm x 7.3 mm	19-951.5
	Plastic	Blue	transparent	flush	illuminative	7.3 mm x 7.3 mm	19-951.6
	Plastic	White	transparent	flush	illuminative	7.3 mm x 7.3 mm	19-951.9
Not recommended for film insert	Plastic	Red	transparent	flush	illuminative	7.3 mm x 7.3 mm	19-952.2
	Plastic	Yellow	transparent	flush	illuminative	7.3 mm x 7.3 mm	19-952.4
	Plastic	Green	transparent	flush	illuminative	7.3 mm x 7.3 mm	19-952.5
	Plastic	Blue	transparent	flush	illuminative	7.3 mm x 7.3 mm	19-952.6
	Plastic	Colourless	transparent	flush	illuminative	7.3 mm x 7.3 mm	19-952.7
	Plastic	Black	opaque	flush	non illuminative	7.3 mm x 7.3 mm	19-951.0
For film insert	Plastic	Grey	opaque	flush	non illuminative	7.3 mm x 7.3 mm	19-951.8

Lens round

Product attributes	Lens material	Lens colour	Lens optics	Lens shape	Lens illumination	Dimensions	Part No.
For film insert	Plastic	Red	transparent	flush	illuminative	Ø 7.3 mm	19-931.2
	Plastic	Yellow	transparent	flush	illuminative	Ø 7.3 mm	19-931.4
	Plastic	Green	transparent	flush	illuminative	Ø 7.3 mm	19-931.5
	Plastic	Blue	transparent	flush	illuminative	Ø 7.3 mm	19-931.6
	Plastic	White	transparent	flush	illuminative	Ø 7.3 mm	19-931.9
Not recommended for film insert	Plastic	Red	transparent	flush	illuminative	Ø 7.3 mm	19-932.2
	Plastic	Yellow	transparent	flush	illuminative	Ø 7.3 mm	19-932.4
	Plastic	Green	transparent	flush	illuminative	Ø 7.3 mm	19-932.5
	Plastic	Blue	transparent	flush	illuminative	Ø 7.3 mm	19-932.6
	Plastic	Colourless	transparent	flush	illuminative	Ø 7.3 mm	19-932.7
	Plastic	Black	opaque	flush	non illuminative	Ø 7.3 mm	19-931.0
	Plastic	Grey	opaque	flush	non illuminative	Ø 7.3 mm	19-931.8

Single-LED

Pins	Illumination colour	Lumi. Intensity	Dom. Wavelength	Forward voltage	Part No.	Wiring diagram
Max. length: 8 mm	Red	450 mcd	635 nm	2.0 VDC @ 20 mA	10-2601.3172K	145
	Yellow	450 mcd	587 nm	2.1 VDC @ 20 mA	10-2601.3174K	145
	Green	1600 mcd	525 nm	3.2 VDC @ 20 mA	10-2603.3175K	145
	Blue	500 mcd	465 nm	3.2 VDC @ 20 mA	10-2603.3176K	145
	White	4600 mcd	x: 0.31 / y: 0.32 nm	3.2 VDC @ 20 mA	10-2603.3178K	145

Additional information

- For LED element fitting information see Application guidelines, LED polarity
- 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

Wiring diagram 145

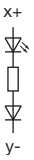
Single-LED,T1 Bi-Pin

Illumination colour	Operating voltage	Operation current	Lumi. Intensity	Dom. Wavelength	Part No.	Wiring diagram
Red	28 V AC/DC +10%	5 - 9 mA ±15 %	45 mcd	625 nm	10-2613.1072	146
Yellow	28 V AC/DC +10%	5 - 9 mA ±15 %	270 mcd	580 nm	10-2613.1074	146
Green	28 V AC/DC +10%	5 - 9 mA ±15 %	320 mcd	525 nm	10-2613.1075	146

Additional information

- Luminosity and wave length variations caused by LED manufacturing processes may cause slight differences regarding the illumination.

Wiring diagrams



Wiring diagram 146

Filament lamp

Pins	Operating voltage	Operation current	Part No.	Wiring diagram
Max. length: 8 mm	6 V AC/DC	70 mA ±10 %	10-1606.1309	147
Max. length: 5 mm	12 V AC/DC	25 mA ±10 %	10-1609.1199	147
	24 V AC/DC	20 mA ±10 %	10-1612.1179	147

Wiring diagrams

Wiring diagram 147

19 Accessories

Front side

Blind plug

Dimensions	Material	Colour	Mounting cut-out	Part No.
9 mm x 9 mm	plastic	Black	Ø 8 mm	19-948.0
Ø 9 mm	plastic	Black	Ø 8 mm	19-949.0

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Rear side

Flat receptacle

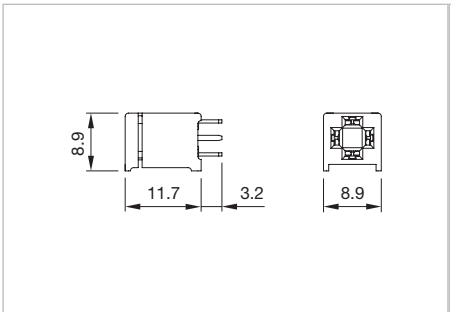
Product attributes	Material	Part No.
2.0 x 0.5 mm plug-in terminal	metal	31-945

Insulation sleeve

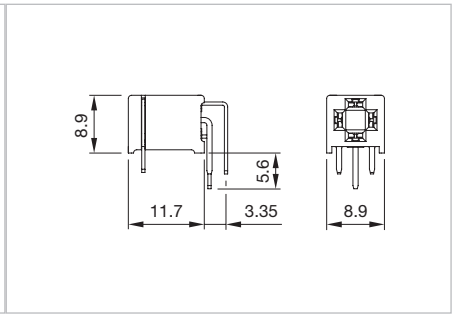
Product attributes	Material	Part No.
For flat receptacle 2.0 mm	plastic	31-928

PCB plug-in base

Dimensions	Terminal	Pins	Part No.	Com-ponent Layout
8.9 mm x 11.7 mm x 8.9 mm	PCB terminal	Axial	19-940	4
8.9 mm x 11.7 mm x 8.9 mm	PCB terminal	90° angled	19-941	3



Dimensions [mm]
for Part No. 19-940



Dimensions [mm]
for Part No. 19-940

Mounting

Fixing nut

Dimensions	Material	Thread	Part No.
Ø 9 mm	metal	M8 x 13 mm	19-991

Lens remover

Material	Part No.
metal	19-910

Lamp remover

Product attributes	Material	Part No.
A switching action may occur when replacing the lamp	plastic	11-906

Mounting tool

Product attributes	Material	Part No.
For fixing nut long Part No. 19-991	metal	19-905

Dressing tool

Product attributes	Material	Part No.
For aligning buttons	metal	19-906

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
Plastic

Actuator housing
Plastic, 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 mm^2

Plug-in terminal 2.0 mm x 0.5 mm
For these terminals we offer sockets for PCB mounting.

Tightening torque
For fixing nut max. 0.2 Nm

Actuating force
1.6 N

Actuating travel
Approx. 2.8 mm ±0.2 mm

Mechanical lifetime
2 million cycles of operations

Electrical characteristics

Switching voltage and switching current
Silver plated:
Max. 50 VAC, 0.8 A / 72 VDC, 0.7 A
Min. 20 V, 10 mA

Gold plated:
Max. 50 VAC, 100 mA / 72 VDC, 70 mA
Min. 100 µV, 50 µA

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

Ambient conditions

Operating 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.

Storage temperature
–40 °C … +85 °C

Protection degree
IP40 front side, as per DIN EN 60529

Approvals

Conformities
2011 / 65 / EC (RoHS)

19 Technical data

Actuator with low-level switching element

Switching system

This low-level switching system was developed for low switching voltages and currents.

Single-break momentary contact, as normally open or normally closed with 4 independent points of contact.

1 normally open or 1 normally closed contact.

Material

Material of contact
Gold plated

Actuator housing
Plastic, 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 mm x 0.5 mm

For these terminals we offer sockets for PCB mounting.

Tightening torque
For fixing nut max. 0.2 Nm

Actuating force
1.8 N ± 0.3 N

Actuating travel
Approx. 2.8 mm ± 0.2 mm

Mechanical lifetime
5 million cycles of operation

Electrical characteristics

Switching voltage and switching current
100 mA at 42 VAC / VDC

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

Ambient conditions

Operating 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.

Storage temperature
–40 °C … +85 °C

Protection degree
IP40 front side, as per DIN EN 60529

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

Approvals

Conformities
2011 / 65 / EC (RoHS)

EAO reserves the right to alter specifications without further notice.

Suppressor circuits

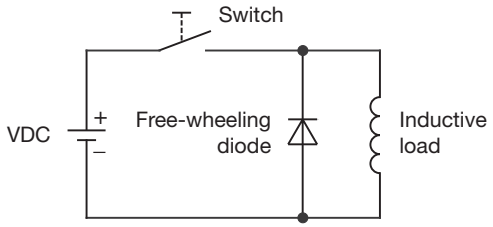
When switching inductive loads such as relays, DC motors, and DC solenoids, it is always important to absorb surges (e.g. with a diode) to protect the contacts. When these inductive loads are switched off, a counter emf can severely damage switch contacts and greatly shorten lifetime.

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. 12 VDC) see Fig. 2.

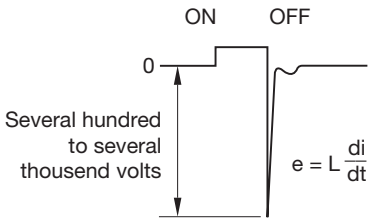
The free-wheeling diode should be chosen so that the reverse breakdown voltage is greater than the voltage driving the inductive load. The DC blocking voltage (VR) of the free-wheeling diode can be found in the datasheet of a diode. The forward current should be equal or greater than the maximum current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

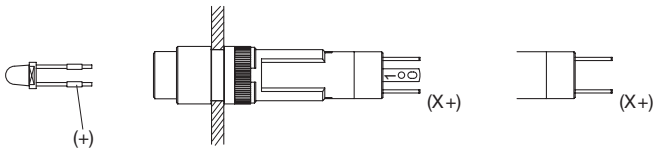


Counter EMF
over load without free-wheeling diode
Fig. 2



LED polarity

When fitting the LED element the polarity has to correspond with the respective terminal, (+) goes to +.



Recommended LED series resistors for optimum illumination

	LED red	LED yellow	LED green	LED white	LED blue
6 VDC	390R	390R	1K5	390R	390R
12 VDC	1K	1K	4K7	1K	1K
24 VDC	2K2	2K2	10K	2K2	2K2

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