Command and signalling devices
Contact and lighting elements

Area of application

The Schmersal Group has developed its own contact systems for series E, N and R command and signalling devices, which guarantee exceptional contacting even under the harshest ambient conditions.

Design and way of functioning

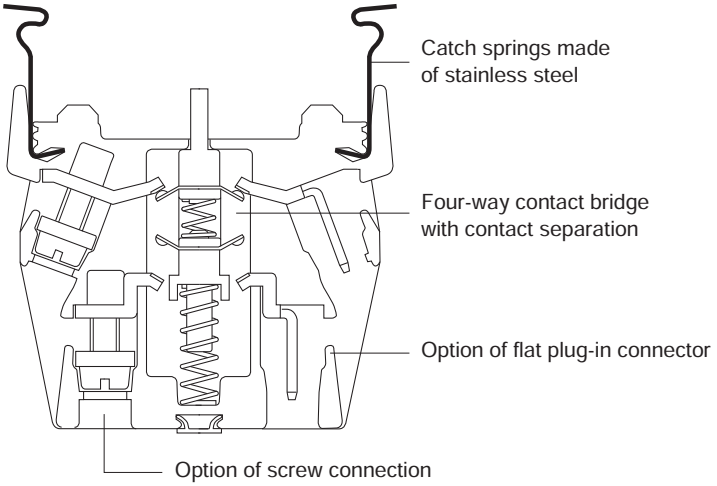
All the elements of the EF system have a special low-voltage-capable and self-cleaning four-way contact bridge system. This is a twin contact bridge that works in-parallel as well as crosswise. In this way, the fixed contact and the moveable contact bridge always achieve several contacts. This ensures high levels of contact security that is enhanced by the shape of the fixed contacts. Apart from this, the contacts have a self-cleaning function that removes oxide and dirt particles before they are deposited and are able to affect operation of the switchgear.

The EF contact system can be supplied in four terminations:
- Screw terminals
- Cage clamp
- Blade terminal
- Direct mounting on PCB

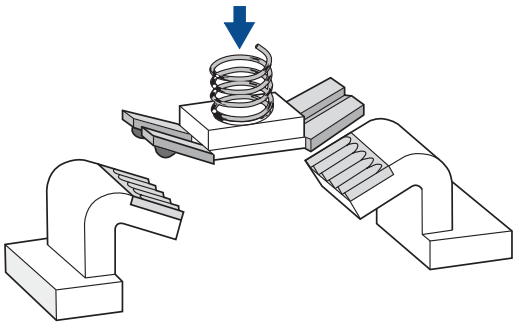
The RF contact system is used with series R command devices. It is particularly user-friendly to install, since the RF contact system's -mounting flange comprises two parts and allows users to pre-mount the contact elements whereas the other part is used to fasten the device head and to later attach the contact carrier. With this contact system, users have a free choice of contacts, since the contact elements can be mounted on two levels.

EF contact elements

Principle design of EF contact elements



Four-way contact bridge



The electrical way of working of the contact elements is based on the Elan four-way contact. This is a twin contact bridge that works in-parallel as well as crosswise. The high contact security that is provided due to several contactings by the fixed contact and the moveable contact bridge is enhanced for industrial practice by the fixed contacts being angled and being embossed several times. The self-cleaning feature of the contacts reliably removes any oxide or dirt particles that may be produced due to operation at extra-low voltages.

Contact and lighting elements
Technical data

	■ EF	■ EL / ELE
Key Features		
General description	Contact elements	Light terminal block with Ba9S base
Can be used with	E and N product portfolios	E and N product portfolios
Other designs are available		
ATEX design	–	–
Technical features		
Design	EF	EL
Material		
Material of the enclosure	Plastic, glass-fibre-reinforced, self-extinguishing	Plastic, glass-fibre-reinforced, self-extinguishing
Material of the contacts	Fine-silver, phosphor bronze or brass carrier	–
Utilisation category AC-15; DC-13	250 V / 8 A; 24 V / 5 A	–
Suitability for low voltages	> 5 VDC / 3.2 mA	–
Rated insulation voltage U_i	400 V	–
Rated impulse withstand voltage. U_{imp}	4 kV	–
Thermal test current I_{the}	10 A	–
Max. fuse rating	gG 10 A	Depending on version
Switching frequency	1200 s/h	–
Mechanical life	10,000,000 operations	–
Resistance to shock	110 g/4 ms…30 g/18 ms no bouncing	–
Resistance to vibration	> 20 g / 10 … 200 Hz *	–
Ambient temperature	−25 °C … +80 °C	−25 °C … +80 °C
Connection		
Screw terminals	Yes	Yes
Flat plug-in connector	Yes	depending on the version
Cage clamp connection	Yes	depending on the version
Cable section		
Solid wire	2 x (0.5 … 2.5 mm²)	2 x (0.5 … 2.5 mm²)
Stranded wire	2 x (0.5 … 1.5 mm²)	2 x (0.5 … 1.5 mm²)
Blade terminal	6,3 mm x 0.8 mm / 2 x 2.8 mm x 0.8 mm	6,3 mm x 0.8 mm / 2 x 2.8 mm x 0.8 mm
IP of terminals /switch rooms**	IP20 / IP40	IP20 / –
Safety classification		
Standards	IEC 60947-5-1; IEC 60947-1	IEC 60947-5-1; IEC 60947-1
B_{10d}	100,000 operations	–
Certificates	cULus CCC ***	cULus CCC ***

* For actuating heads with higher mass, appropriately lower
** With plug-in connectors, depends on the connector plug used
*** Except for cage clamp connections

			
■ ELDE	**■ RF**	**■ RL**	**■ RLDE**
Light terminal block with LED E and N product portfolios	Contact elements "R" program	Light terminal block with Ba9S base "R" program	Light terminal block with LED "R" program
–	■	–	■
EL	RF	RL	RL
Plastic, glass-fibre-reinforced, self-extinguishing	Plastic, glass-fibre-reinforced, self-extinguishing	Plastic, glass-fibre-reinforced, self-extinguishing	Plastic, glass-fibre-reinforced, self-extinguishing
–	Fine-silver, phosphor bronze or brass carrier	–	–
–	250 V / 6 A; 24 V / 3 A	–	–
–	>5VDC / 1 mA	–	–
–	400 V	–	–
–	4 kV	–	–
–	6 A	–	–
Depending on version	gG 6 A	Depending on version	Depending on version
–	1200 s/h	–	–
–	10,000,000 operations	–	–
–	110 g/4 ms…30 g/18 ms no bouncing	–	–
–	> 20 g / 10 … 200 Hz *	–	–
−25 °C … +80 °C	−25 °C … +75 °C	−25 °C … +75 °C	−25 °C … +75 °C
Yes	Yes	Yes	Yes
No	No	No	No
Yes	No	No	No
2 x (0.5 … 2.5 mm²)	2 x (0.5 … 2.5 mm²)	2 x (0.5 … 2.5 mm²)	2 x (0.5 … 2.5 mm²)
2 x (0.5 … 1.5 mm²)	2 x (0.5 … 1.5 mm²)	2 x (0.5 … 1.5 mm²)	2 x (0.5 … 1.5 mm²)
6,3 mm x 0.8 mm / 2 x 2.8 mm x 0.8 mm	–	–	–
IP20 / –	IP20 / IP40	IP20 / –	IP20 / –
IEC 60947-5-1; IEC 60947-1	IEC 60947-5-1; IEC 60947-1	IEC 60947-5-1; IEC 60947-1	IEC 60947-5-1; IEC 60947-1
–	100,000 operations	–	–
cULus CCC ***	cULus	cULus	cULus

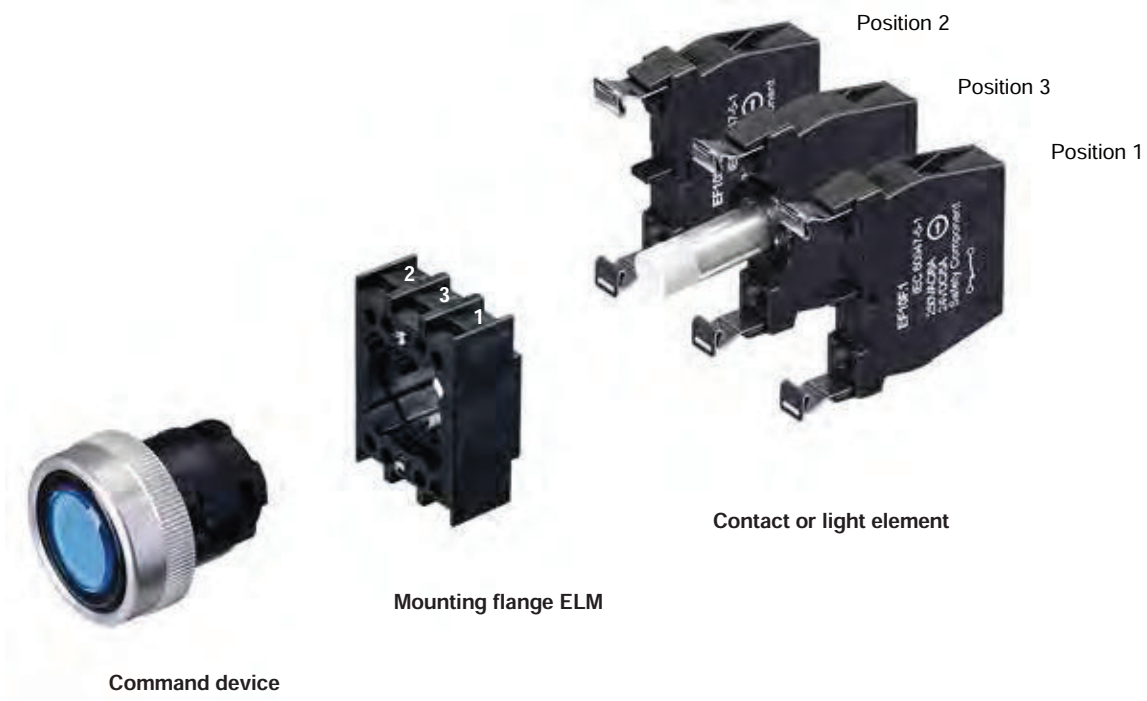
Contact and lighting elements
Type EF and EL

Command device	Mounting flange EFM		
	Position 2	Position 3	Position 1
EMERGENCY STOP	Contact element EF...	Spring element EFR	Contact element EF...
Pushbutton	Contact element EF...	Contact element EF...	Contact element EF...
Mushroom head impact button			
Selector switch/key button			
Key-operated selector switch/button			

Command device	Mounting flange ELM		
	Position 2	Position 3	Position 1
Illuminated pushbutton	Contact element EF...	Light terminal block EL…	Contact element EF...
Illuminated signal	---	Light terminal block EL…	---

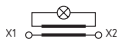
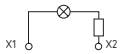
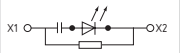
Design
A control and indicator device consists of an actuator, a mounting flange and a contact or light element
(in the case of EMERGENCY STOP devices, possibly plus a spring element).

Assembly example
This example shows an illuminated push button with ELM mounting flange, 2 EF... contact elements and an EL... lighting element



Contact and lighting elements
Type EF and EL

Type	Application	Function	Switch travel diagram	Position	Wiring configuration according to DIN 50005	Screw terminals	Flat plug-in connector	WAGO-Cage clamp
Contact element	EMERGENCY STOP	2 NC contacts		1	11-12/21-22	**EF220.1**	**EF220F.1**	-
				2	31-32/41-42	**EF220.2**	**EF220F.2**	-
		1 NC contact / 1 NO contact		1	11-12/23-24	**EF303.1**	**EF303F.1**	-
				2	31-32/43-44	**EF303.2**	**EF303F.2**	-
	Standard	1 NC contacts		1	11-12	**EF10.1**	**EF10F.1**	**EFK10.1**
				2	21-22	**EF10.2**	**EF10F.2**	**EFK10.2**
				3	31-32	**EF10.3**	**EF10F.3**	**EFK10.3**
		1 NO contacts		1	13-14	**EF03.1**	**EF03F.1**	**EFK03.1**
				2	23-24	**EF03.2**	**EF03F.2**	**EFK03.2**
				3	33-34	**EF03.3**	**EF03F.3**	**EFK03.3**
		2 NO contacts		1	13-14/23-24	**EF033.1**	**EF033F.1**	**EFK033.1**
				2	33-34/43-44	**EF033.2**	**EF033F.2**	**EFK033.2**
				3	53-54/63-64	**EF033.3**	**EF033F.3**	-
		1 NC contact / 1 NO contact		1	11-12/23-24	**EF103.1**	**EF103F.1**	**EF103.1**
				2	31-32/43-44	**EF103.2**	**EF103F.2**	**EF103.2**
				3	51-52/63-64	**EF103.3**	**EF103F.3**	-
		1 NC contact / 1 NO contact overlapping		1	11-12/23-24	**EF301.1**	**EF301F.1**	-
				2	31-32/43-44	**EF301.2**	**EF301F.2**	-
				3	51-52/63-64	**EF301.3**	**EF301F.3**	-

Type	Illuminant	Function	Diagram	Position	Description	Screw terminals	Flat plug-in connector	WAGO-Cage clamp
Light terminal block	Ba9S socket *	Lighting element / voltage sensor for lamps + acoustic signal		3	Standard	**EL**	**ELF**	-
				3	With transformer	**ELT**	**ELTF**	-
				3	With series resistor	**ELV**	**ELVF**	-
		Lighting element / voltage sensor for LED		3	24 VAC/DC	**ELE**	-	**ELEK**
				3	48 VAC/DC primary … 24 V secondary	**ELE 48**	-	-
				3	115 … 230 VAC primary 24 V secondary	**ELE 230**	-	-
	Integrated LED	Light element with integrated LED		3	LED red	**ELDE.N RT 24**	-	**ELDEK RT**
				3	LED yellow	**ELDE.N GB 24**	-	**ELDEK GB**
				3	LED green	**ELDE.N GN 24**	-	**ELDEK GN**
				3	LED blue	**ELDE.N BL 24**	-	**ELDEK BL**
				3	LED white	**ELDE.N WS 24**	-	**ELDEK WS**

Type	Application	Function	Position	Description	Screw terminals	Flat plug-in connector	WAGO-Cage clamp
EFR.EDRRS or EFR	EMERGENCY STOP	Snap-action mechanism with latching	3	Spring element	-	-	-

* Illuminant not included in delivery!