Command and signalling devices

Product information

SCHMERSAL

Safe solutions for your industry

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	"E" program	"N" program	"R" program
Area of application	Applications under difficult operating conditions	Food, hygiene and external applications	Heavy-duty applications
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Potentiometer drive	 see page 24	 see page 40	 see page 56
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Area of application

The Series E command and signalling devices for 22.3 mm and 30 mm installation boreholes have been developed as universal operator input and display elements for all mechanical engineering, plant construction and automotive applications. They are generally integrated in the control panels or enclosures of machines and are in use all over the world.

The separate N and R product portfolios are available for applications that make particular demands of either hygiene or the toughness of the command and signalling devices.

Design and way of functioning

The command and signalling devices of Series E are each designed with an operating button and an EF contact system. Both parts are simply joined by catch springs. This principle ensures fast assembly on the front panel of the control panel and a permanent connection between the head and the contact system. When doing this, the modular principle of this range makes it possible to increase flexibility and to adapt the Human Machine Interface to individual requirements in an optimum way.

The control heads of Series E are made from anodized aluminium, with the collars being glass. The seals on the front of the devices complies with protection class IP 67/65.

Users can choose between a vast range of different variants. The product portfolio includes amongst other things push buttons, mushroom head impact buttons, illuminated control push buttons and indicator lights, selector switches and selection buttons as well as key selector switches and key selection buttons.

In the E range, the mushroom head impact buttons are particularly important. They are used all over the world in mechanical engineering and plant construction and stand out due to their extremely robust design. On vibrating machines or with frequent shock loading, these EMERGENCY STOP buttons function reliably and thus increases the machines' productivity and extend their service lives. If the EMERGENCY STOP button fails, the safety system shuts down the machine, this happens extremely rarely with E and N range switchgears with an external snap-action mechanism.

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Command and signalling devices – E programme
EMERGENCY STOP control devices



	■ EDRR40RT	■ EDRZ40RT	■ EDRRS40RT
Key Features			
General description	EMERGENCY STOP - with twist and pull-to-unlatch mechanism	EMERGENCY STOP - with pull-to-unlatch mechanism	EMERGENCY STOP - with key unlatching mechanism
Area of application	Applications under difficult operating conditions	Applications under difficult operating conditions	Applications under difficult operating conditions
Mounting-Ø	22.3 mm	22.3 mm	22.3 mm
Housing material			
Material of operating element	Aluminium	Aluminium	Chrome-plated brass
Material front ring	Aluminium	Aluminium	Aluminium
Other designs are available			
Mounting-Ø 30.5 mm	■	■	■
Technical features			
Mechanical data			
Colour	■	■	■
Design	round	round	round
Front panel thickness	1…6 mm	1…6 mm	1…6 mm
Unlocking type	Twist and pull-to-unlatch mechanism	Pull-to-unlatch mechanism	Release by key
Snap-action mechanism			
Integrated	–	■	–
Externally via additional module	■	–	■
Mounting			
Mounting flange included in delivery	■	■	■
Mounting position	any	any	any
Ambient conditions			
Ambient temperatures	−25 °C … +75 °C	−25 °C … +75 °C	−25 °C … +75 °C
IP Protection class	IP65	IP65	IP65
Safety classification			
Standards	EN ISO 13850; IEC 60947-5-1; IEC 60947-5-5; IEC 60947-1	EN ISO 13850; IEC 60947-5-1; IEC 60947-5-5; IEC 60947-1	EN ISO 13850; IEC 60947-5-1; IEC 60947-5-5; IEC 60947-1
Mechanical life	100,000 operations	100,000 operations	100,000 operations
Certificates	cULus	cULus	cULus
Note	cULus in conjunction with the corresponding contact elements only		

Command and signalling devices – E programme

EMERGENCY STOP control devices

Type	Unlocking	Snap-action mechanism	A	B	C	Type designation	Material number
EMERGENCY STOP push buttons	Pull-to-unlatch mechanism	Integrated	29	22.3	38.5	**EDRZ40 RT**	**101177107**
				30.5		**EDRZ40VH RT**	**101182360**
	Twist and pull-to-unlatch mechanism	External with spring element EFR *	29	22.3	38.5	**EDRR40 RT**	**101021009**
					49	**EDRR50 RT**	**101021015**
				30.5	38.5	**EDRR40VH RT**	**101024290**
					49	**EDRR50VH RT**	**101024299**
	Release by key (cover red)	External with spring element EFR.EDRRS *	29	22.3	37.5	**EDRRS40 RT**	**101025432**
				30.5		**EDRRS40VH RT**	**101025435**

* Spring element EFR or EFR.EDRRS must be ordered separately!

All dimensions in mm.

Key

A	Height	Height of command device in front of the front panel
B	Mounting-Ø	Installation diameter for the command device head
C	Key Ø	Width of command device head

Command and signalling devices – E programme
Illuminated signal

	■ EML / EMLH	■ EME / EMEH
Key Features		
General description	Illuminated signal for BA9s	Illuminated signal with integrated LED
Area of application	Applications under difficult operating conditions	Applications under difficult operating conditions
Mounting-Ø	22.3 mm	22.3 mm
Housing material		
Material of operating element	Glass	Glass
Material front ring	Aluminium	Aluminium
Other designs are available		
Mounting-Ø 30.5 mm	■	■
Vandal-proof devices	■	■
Technical features		
Mechanical data		
Colour	■ ■ ■ □ ■	■ ■ ■ □ ■
Design	Round with flat or high glass	Round with flat or high glass
Front panel thickness	1…6 mm	1…6 mm
Integrated LED 24 VAC/DC *	–	■
Mounting		
Mounting flange included in delivery	■	■
Mounting position	any	any
Ambient conditions		
Ambient temperatures	−25 °C … +75 °C	−25 °C … +40 °C
IP Protection class	IP65	IP65
Safety classification		
Standards	IEC 60947-5-1; IEC 60947-1	IEC 60947-5-1; IEC 60947-1
Mechanical life	–	–
Certificates	cULus	cULus
Note	cULus in conjunction with the corresponding contact elements only	

* A voltage sensor, e.g. an ELE is also needed for driving. You can find the voltage sensors on page 58

Command and signalling devices – E programme
Illuminated signal

Type	Illuminant	Collar	A	B	C	Type designation
Illuminated signal	Without integrated illuminant	Flat collar	14	22.3	29.5	**EML** ①
			2.5	30.5	34.5	**EML.V** ①
		High collar	20	22.3	29.5	**EMLH** ①
			2.5	30.5	34.5	**EMLH.V** ①
LED indicator light	With integrated illuminant	High collar	20	22.3	29.5	**EME** ①

① **Abbreviations of colours:** BK GB RD GN WH BL
You append the abbreviations of the colours to the type designation. For details of possible colour combinations, refer to the technical data on the previous page.

All dimensions in mm.

Key

A	Height	Height of command device in front of the front panel
B	Mounting-Ø	Installation diameter for the command device head
C	Key Ø	Width of command device head


EML GN


EMLH RT


EME GB


EME.V BL

Command and signalling devices – E programme

Pushbuttons and illuminated pushbuttons

	■ EDT	■ EDL
Key Features		
General description	Pushbutton	Illuminated pushbutton
Area of application	Applications under difficult operating conditions	Applications under difficult operating conditions
Mounting-Ø	22.3 mm	22.3 mm
Housing material		
Material of operating element	Aluminium	Glass
Material front ring	Aluminium	Aluminium
Other designs are available		
Mounting-Ø 30.5 mm	■	■
Vandal-proof devices	■	■
Technical features		
Mechanical data		
Colour	■ ■ ■ ■ □ ■	■ ■ ■ ■ □ ■
Design	round	round
Front panel thickness	1…6 mm	1…6 mm
Mounting		
Mounting flange included in delivery	■	■
Mounting position	any	any
Ambient conditions		
Ambient temperatures	−25 °C … +75 °C	−25 °C … +75 °C
IP Protection class	IP65	IP65
Safety classification		
Standards	IEC 60947-5-1; IEC 60947-1	IEC 60947-5-1; IEC 60947-1
Mechanical life	10,000,000 operations	5,000,000 operations
Certificates	cULus	cULus
Note	cULus in conjunction with the corresponding contact elements only	

Command and signalling devices – E programme

Pushbuttons and illuminated pushbuttons

Type	Description		A	B	C	Type designation
Pushbutton	Standard	Standard	14	22.3	29.5	**EDT** ①
		2 mm-high key	16	22.3	29.5	**EDT2** ①
		6 mm-high key	20	22.3	29.5	**EDT6** ①
		6 mm edge to prevent unwanted activation	20	22.3	29.5	**EDTH** ①
	With membrane	Standard	14	22.3	29.5	**EDM** ①
		6 mm edge to prevent unwanted activation	20	22.3	29.5	**EDMH** ①
	With latching	Standard	14	22.3	29.5	**EDTR** ①
Illuminated pushbutton	Standard	Standard	14	22.3	29.5	**EDL** ①
		6 mm edge to prevent unwanted activation	20	22.3	29.5	**EDLH** ①
	With membrane	Standard	14	22.3	29.5	**EDLM** ①
		6 mm edge to prevent unwanted activation	20	22.3	29.5	**EDLMH** ①
	With latching	Standard	14	22.3	29.5	**EDLR** ①

① **Abbreviations of colours:** BK GB RD GN WH BL
You append the abbreviations of the colours to the type designation.
For details of possible colour combinations, refer to the technical data on the previous page.

All dimensions in mm.

Key

A	Height	Height of command device in front of the front panel
B	Mounting-Ø	Installation diameter for the command device head
C	Key Ø	Width of command device head

EDM RT

EDT2 GB

EDT6.V GB

EDLMH BL

EDL GN

Command and signalling devices – E programme

Mushroom head impact button

	■ EDP	■ EDR	■ EDRS40
Key Features			
General description	Mushroom button without latching function	Mushroom button with latching function	Mushroom button with latching function and release by key
Area of application	Applications under difficult operating conditions	Applications under difficult operating conditions	Applications under difficult operating conditions
Mounting-Ø	22.3 mm	22.3 mm	22.3 mm
Housing material			
Material of operating element	Aluminium	Aluminium	Chrome-plated brass
Material front ring	Aluminium	Aluminium	Aluminium
Other designs are available			
Mounting-Ø 30.5 mm	EDP40 version only	–	■
Technical features			
Mechanical data			
Colour	■ ■ ■ ■ □ ■	■ ■ ■ ■ □ ■	■ ■ ■ ■ □ ■
Design	round	round	round
Front panel thickness	1…6 mm	1…6 mm	1…6 mm
With latching	–	■	■
Mounting			
Mounting flange included in delivery	■	■	■
Mounting position	any	any	any
Ambient conditions			
Ambient temperatures	−25 °C … +75 °C	−25 °C … +75 °C	−25 °C … +75 °C
IP Protection class	IP65	IP65	IP65
Safety classification			
Standards	IEC 60947-5-1; IEC 60947-1	IEC 60947-5-1; IEC 60947-1	IEC 60947-5-1; IEC 60947-1
Mechanical life	10,000,000 operations	10,000,000 operations	10,000,000 operations
Certificates	cULus	cULus	cULus
Note	cULus in conjunction with the corresponding contact elements only		

Command and signalling devices – E programme
Mushroom head impact button

Type	Description	Key	A	B	C	Type designation
Mushroom head impact button	Mushroom head impact button	Mushroom-shaped	27.5	22.3	32	**EDP** ①
			27.5	22.3	37	**EDP40** ①
			27.5	22.3	55	**EDP55** ①
			27.5	22.3	70	**EDP70** ①
		Flat key	27.5	22.3	35	**EDP35** ①
	Mushroom button with latching function	Mushroom-shaped	29	22.3	38.5	**EDR40** ①
			27.5	22.3	70	**EDR70** ①
		Flat key	27.5	22.3	35	**EDR35** ①
		Release by key	29	22.3	38	**EDRS40** ①

① **Abbreviations of colours:** BK GB RD GN WH BL
You append the abbreviations of the colours to the type designation.
For details of possible colour combinations, refer to the technical data on the previous page.

All dimensions in mm.

Key

A	Height	Height of command device in front of the front panel
B	Mounting-Ø	Installation diameter for the command device head
C	Key Ø	Width of command device head


EDP SW


EDP70 GN


EDR35 GN


EDR70 GB


EDRS40 RT

Command and signalling devices – E programme

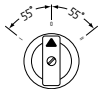
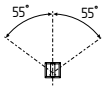
Maintained selector switches and spring return selector switches



	■ EWS / EWT	■ EWS .1 / EWT .1	■ EWS DB / EWT DB
Key Features			
General description	Selector switch/button with short toggle	Selector switch/button with long toggle	Selector switch/key button with rectangular activator
Area of application	Applications under difficult operating conditions	Applications under difficult operating conditions	Applications under difficult operating conditions
Mounting-Ø	22.3 mm	22.3 mm	30.5 mm
Toggle length	28 mm	45 mm	–
Housing material			
Material of operating element	Thermoplastic	Thermoplastic	Metal
Material front ring	Aluminium	Aluminium	Aluminium
Other designs are available			
Mounting-Ø 30.5 mm	■	■	–
Technical features			
Mechanical data			
Colour	■	■	Metal (silver)
Design	round	round	round
Front panel thickness	1…6 mm	1…6 mm	1.5…14 mm
Maintained switching positions	2…3 positions	2…3 positions	2…3 positions
Mounting			
Mounting flange included in delivery	■	■	–
Mounting position	any	any	any
Ambient conditions			
Ambient temperatures	0 °C … +75 °C	0 °C … +75 °C	−40 °C … +80 °C
IP Protection class	IP65	IP65	IP65
Safety classification			
Standards	IEC 60947-5-1; IEC 60947-1	IEC 60947-5-1; IEC 60947-1	IEC 60947-5-1; IEC 60947-1
Mechanical life	300,000 operations	300,000 operations	300,000 operations
Certificates	cULus	cULus	cULus
Note	cULus in conjunction with the corresponding contact elements only		

Command and signalling devices – E programme

Maintained selector switches and spring return selector switches

Type	Maintained and momentary positions	Positions	Actuator	A	B	C	Type designation
Selector switch	2 maintained positions		Short toggle	28	22.3	29.5	**EWS21**
			Long toggle				**EWS21.1**
			Rectangular actuator	6	30.5	36	**EWS21DB**
							EWS21ÖBB
	3 maintained positions		Short toggle	28	22.3	29.5	**EWS32**
			Long toggle				**EWS32.1**
			Rectangular actuator	6	30.5	36	**EWS32DB**
							EWS32ÖBB
Spring-return selector switch	1 momentary position and automatic return to the zero position		Short toggle	28	22.3	29.5	**EWT21**
			Long toggle				**EWT21.1**
			Rectangular actuator	6	30.5	36	**EWT21DB**
							EWT21ÖBB
	1 momentary position each to the right and left of the zero position		Short toggle	28	22.3	29.5	**EWT32**
			Long toggle				**EWT32.1**
			Rectangular actuator	6	30.5	36	**EWT32DB**
							EWT32ÖBB
Maintained spring-return rotary selector switch	Maintained position to left and momentary position to right		Short toggle	28	22.3	29.5	**EWTS32**
			Long toggle				**EWTS32.1**
	Maintained position on right and momentary position on left		Short toggle	6	30.5	36	**EWTS321**
			Long toggle				**EWTS321.1**

① **Toggle length:**
If you want a long toggle, append a "1" to the type designation.

All dimensions in mm.

Key

A	Height	Height of command device in front of the front panel
B	Mounting-Ø	Installation diameter for the command device head
C	Key Ø	Width of command device head

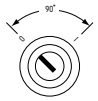
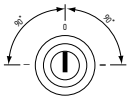
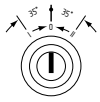
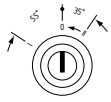
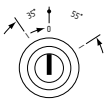
Command and signalling devices – E programme

Key selector switches, buttons and -touch contact switches

	■ ESS	■ EST
Key Features		
General description	Key-operated selector switch	Key-operated spring-return selector switch
Area of application	Applications under difficult operating conditions	Applications under difficult operating conditions
Mounting-Ø	22.3 mm	22.3 mm
Housing material		
Material of operating element	Aluminium	Aluminium
Material front ring	Aluminium	Aluminium
Other designs are available		
Mounting-Ø 30.5 mm	on request	on request
Technical features		
Mechanical data		
Colour	Metal (silver)	Metal (silver)
Design	round	round
Front panel thickness	1…6 mm	1…6 mm
Maintained switching positions	2 or 3 positions	2 or 3 positions
Mounting		
Mounting flange included in delivery	■	■
Mounting position	any	any
Ambient conditions		
Ambient temperatures	0 °C … +75 °C	0 °C … +75 °C
IP Protection class	IP65	IP65
Safety classification		
Standards	IEC 60947-5-1; IEC 60947-1	IEC 60947-5-1; IEC 60947-1
Mechanical life	300,000 operations	300,000 operations
Certificates	cULus	cULus
Note	cULus in conjunction with the corresponding contact elements only	

Command and signalling devices – E programme

Key selector switches, buttons and -touch contact switches

Type	Maintained and momentary positions	Key positions	Key-withdrawal position	A	B	C	Type designation
Key-operated selector switch	2 maintained positions		O	33	22.3	29.5	**ESS21S1**
			I				**ESS21S2**
			O + I				**ESS21S12**
	3 maintained positions		I	33	22.3	29.5	**ESS32S1**
			O				**ESS32S2**
			II				**ESS32S3**
			I + O + II				**ESS32S123**
Key-operated spring-return selector switch	1 momentary position and automatic return to the zero position		O	33	22.3	29.5	**EST21S1**
	2 momentary positions on the right and left with automatic return to the zero position		O	33	22.3	29.5	**EST32S2**
Key-operated selector switch pushbutton	3 positions: momentary position 35° actuating angle and maintained position 55° actuating angle (zero position in middle, key position at top)		I	33	30.5	34.5	**ESTS32S1**
			O				**ESTS32S2**
			O				**ESTS321S2**
			II				**ESTS321S3**

All dimensions in mm.

Key

A	Height	Height of command device in front of the front panel without key
B	Mounting-Ø	Installation diameter for the command device head
C	Key Ø	Width of command device head

Command and signalling devices – E programme
Special devices

	■ EWSE..K	■ EDAN6
Key Features		
General description	Step selector switch	Potentiometer drive
Area of application	Applications under difficult operating conditions	Applications under difficult operating conditions
Mounting-Ø	22.3 mm	22.3 mm
Housing material		
Material of operating element	Thermoplastic	Thermoplastic
Material front ring	Aluminium	Aluminium
Other designs are available		
Mounting-Ø 30.5 mm	on request	■
Technical features		
Electrical data		
Cam-operated switch	Kraus & Naimer Series CA10	–
Contacts	One NO contact per stage	–
Insulation voltage U_i	690V	–
Utilisation category AC-15	220 V…240 V / 5 A, 380 V…440 V / 4 A	–
Rated impulse withstand voltage. U_{imp}	6 kV	–
Rated continuous current I_{the}	20 A	–
Fuse rating	gG 25 A	–
Cable section	max. 2 x 2.5 mm² *	–
Mechanical data		
Colour		
Operating element	■	■
Front ring	Silver	Silver
Front panel thickness	1 … 6 mm	1 … 6 mm
Maintained switching positions	3 … 12 positions	Infinite
Mounting		
Integrated mounting plate	■	■
Mounting position	any	any
Ambient conditions		
Ambient temperatures	0 °C … +60 °C	0 °C … +75 °C
IP protection class (device head)	IP65	IP65
Safety classification		
Standards	IEC 60947-3 (VDE 0660 Part 107)	–
Mechanical life	Load-dependent	–
Certificates		–

* Use copper conductors only

Command and signalling devices – E programme
Special devices

Type	Circuit diagram and connecting terminals	Switching angle	L	LE	A	B	C	Type designation
Cam switching design step switches with latching mechanism, 1-pole no zero position		60°	40.7	60	28	22.3	29.5	**EWSE3K**
		60°	40.7	60	28	22.3	29.5	**EWSE4K**
		60°	50.2	69.5	28	22.3	29.5	**EWSE5K**
		60°	50.2	69.5	28	22.3	29.5	**EWSE6K**
		45°	59.7	78	28	22.3	29.5	**EWSE7K**
		45°	59.7	78	28	22.3	29.5	**EWSE8K**
		30°	69.2	87.5	28	22.3	29.5	**EWSE9K**
		30°	69.2	87.5	28	22.3	29.5	**EWSE10K**
		30°	78.7	97	28	22.3	29.5	**EWSE11K**
		30°	78.7	97	28	22.3	29.5	**EWSE12K**

Type	Description	LE	A	B	C	Type designation
Potentiometer drive	for 6 mm shaft Ø, shaft length 30 … 40 mm	63	28	22.3	29.5	**EDAN 6**

All dimensions in mm.

Key

A	Height	Height of command device in front of the front panel
B	Mounting-Ø	Installation diameter for the command device head
C	Key Ø	Width of command device head
L	Length	Length of step switch block
LE	Installation depth	Length between command device head and bottom edge of switch when mounted

Command and signalling devices
"N" program

Area of application

Series N was originally developed for the specific requirements of food industry mechanical engineering. The command and signalling devices of the machines for this branch of industry must comply with strict hygiene requirements and be easy to clean.

Series N command and signalling devices meet the requirements of Protection class IP69K. This means that even when cleaned on a regular basis using high-pressure cleaners they have an outstanding long service life. They were designed on the basis of the general design concepts for hygienic construction of food processing machinery (EN 1762-2). This means, for example, that the geometry of the devices has no sharp edges. Type examination carried out by the Meat Trade Association confirmed that the design of the N programme was hygiene-appropriate.

In addition, the devices are clean room-approved and also due to their resistance to spray water, they are deployed in outdoor-applications, e.g on municipal vehicles and in car washes. Apart from this, they are tried and tested in extreme applications in food processing, e.g. fish filleting and packaging lines that are installed directly on trawlers.

Design and way of functioning

The N series is of modular structure too which means that machine tool builders always have available a wide selection of different command and signalling devices. The device heads each have one mounting flange that provides effective sealing in conjunction with a labyrinth seal. The EF contact system (see page 62) is used in exactly the same way as with the series.

The N range is characterised by the short actuating stroke of the command devices and the high protection class even behind the front plate. This is a significant benefit in butchers' machines, for example, since condensation can form inside the machines.

The special features of the N range include main switches for up to 63 A. They allow design engineers to design the entire control unit of a (food) machine using just one range of products.

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Command and signalling devices – N programme
EMERGENCY STOP control devices

	■ NDRR50RT	■ NDRZ50RT
Key Features		
General description	EMERGENCY STOP - with pull-to-unlatch mechanism by integrated snap-action mechanism	EMERGENCY STOP - with pull-to-unlatch mechanism by separate spring element
Area of application	Food, hygiene and outdoor applications	Food, hygiene and outdoor applications
Mounting-Ø	22.3 mm	22.3 mm
Housing material		
Material of operating element	ABS	ABS
Material front ring	ABS, chrome-plated	ABS, chrome-plated
Technical features		
Mechanical data		
Colour of the operating element	■	■
Colour of sealing membranes	□ ■	□ ■
Design	round	round
Front panel thickness	1…6 mm	1…6 mm
Unlocking type	Pull-to-unlatch mechanism	Pull-to-unlatch mechanism
Snap-action mechanism		
Integrated	–	■
Externally via additional module	■	–
Mounting		
Mounting flange included in delivery	■	■
Mounting position	any	any
Ambient conditions		
Ambient temperatures	−25 °C … +80 °C	−25 °C … +80 °C
IP Protection class	IP69K	IP69K
Safety classification		
Standards	IEC 60947-5-1; IEC 60947-5-5; IEC 60947-1; EN ISO 13850	IEC 60947-5-1; IEC 60947-5-5; IEC 60947-1; EN ISO 13850
Mechanical life	100,000 operations	100,000 operations
Certificates		
Note	cULus in conjunction with the corresponding contact elements only	

Command and signalling devices – N programme
EMERGENCY STOP control devices

Type	Unlocking	Snap-action mechanism	Bellows	A	B	C	Type designation	Material number
EMERGENCY STOP command device	Pull-to-unlatch mechanism	Integrated	White	45	22.3	50	**NDRZ50RT**	**101177168**
			Black				**NDRZ50GR/RT**	**101177170**
		External with spring element EFR *	White				**NDRR50RT**	**101163587**
			Black				**NDRR50GR/RT**	**101163594**

* Spring element EFR must be ordered separately.

All dimensions in mm.

Key

A	Height	Height of command device in front of the front panel
B	Mounting-Ø	Installation diameter for the command device head
C	Key Ø	Width of command device head

Command and signalling devices – N programme
Illuminated signal

	■ NML / NMLH	■ NME / NMEH
Key Features		
General description	LED indicator light for LED illuminants	Illuminated signal with integrated LED
Area of application	Food, hygiene and outdoor applications	Food, hygiene and outdoor applications
Mounting-Ø	22.3 mm	22.3 mm
Housing material		
Material of operating element	PA (12)	PA (12)
Material front ring	ABS, chrome-plated	ABS, chrome-plated
Technical features		
Mechanical data		
Colour of the operating element	■ ■ ■ □ ■	■ ■ ■ □ ■
Colour of seal	–	–
Design	Round, flat or high collar	Round, flat or high collar
Front panel thickness	1…6 mm	1…6 mm
Integrated LED 24 VAC/DC *	–	■
Mounting		
Mounting flange included in delivery	■	■
Mounting position	any	any
Ambient conditions		
Ambient temperatures	−25 °C … +80 °C	−25 °C … +80 °C
IP Protection class	IP69K	IP69K
Safety classification		
Standards	IEC 60947-5-1; IEC 60947-1	IEC 60947-5-1; IEC 60947-1
Mechanical life	–	–
Certificates		
Note	cULus in conjunction with the corresponding contact elements only	

* A voltage sensor, e.g. an ELE is also needed for driving. You can find the voltage sensors on page 58

Command and signalling devices – N programme
Illuminated signal

Type	Description		A	B	C	Type designation
Illuminated signal	Without integrated illuminant	Flat collar	9	22.3	44.5	**NML** ①
		High collar	17.4	22.3	44.5	**NMLH** ①
LED indicator light	With integrated illuminant	Flat collar	9	22.3	44.5	**NMEF** ①
		High collar	17.4	22.3	44.5	**NME** ①

① **Abbreviations of colours:** BK GB RD GN WH BL GR
You append the abbreviations of the colours to the type designation.
For details of possible colour combinations, refer to the technical data on the previous page.

All dimensions in mm.

Key

A	Height	Height of command device in front of the front panel
B	Mounting-Ø	Installation diameter for the command device head
C	Key Ø	Width of command device head

Command and signalling devices – N programme
Pushbuttons and illuminated pushbuttons

	■ NDT	■ NDL
Key Features		
General description	Pushbutton	Illuminated pushbutton
Area of application	Food, hygiene and outdoor applications	Food, hygiene and outdoor applications
Mounting-Ø	22.3 mm	22.3 mm
Housing material		
Material of operating element	ABS	PA (12)
Material front ring	ABS, chrome-plated	ABS, chrome-plated
Technical features		
Mechanical data		
Colour of the operating element	■ ■ ■ ■ □ ■	■ ■ ■ □ ■
Colour of seal	□ ■	□ ■
Design	round	round
Front panel thickness	1…6 mm	1…6 mm
Mounting		
Mounting flange included in delivery	■	■
Mounting position	any	any
Ambient conditions		
Ambient temperatures	−25 °C … +80 °C	−25 °C … +80 °C
IP Protection class	IP69K	IP69K
Safety classification		
Standards	IEC 60947-5-1; IEC 60947-1	IEC 60947-5-1; IEC 60947-1
Mechanical life	1,000,000 operations	1,000,000 operations
Certificates		
Note	cULus in conjunction with the corresponding contact elements only	

Command and signalling devices – N programme

Pushbuttons and illuminated pushbuttons

Type	Description		A	B	C	Type designation
Pushbutton	Hygiene application	"White" bellows	11	22.3	44.5	**NDT** ①
	Outdoor usage	Black "bellows"	11	22.3	44.5	**NDTGR** ①
Illuminated pushbutton	Hygiene application	"White" bellows	11	22.3	44.5	**NDL** ①
	Outdoor usage	Black "bellows"	11	22.3	44.5	**NDLGR** ①

① **Abbreviations of colours:** BK GB RD GN WH BL GR
You append the abbreviations of the colours to the type designation.
For details of possible colour combinations, refer to the technical data on the previous page.

All dimensions in mm.

Key

A	Height	Height of command device in front of the front panel
B	Mounting-Ø	Installation diameter for the command device head
C	Key Ø	Width of command device head

Command and signalling devices – N programme

Mushroom head impact button

	■ NDP	■ NDR
Key Features		
General description	Mushroom button without latching function	Mushroom button with latching function
Area of application	Food, hygiene and outdoor applications	Food, hygiene and outdoor applications
Mounting-Ø	22.3 mm	22.3 mm
Housing material		
Material of operating element	Thermoplastic	Thermoplastic
Material front ring	ABS, chrome-plated	ABS, chrome-plated
Technical features		
Mechanical data		
Colour of the operating element	■ ■ ■ ■ □ ■	■ ■ ■ ■ □ ■
Colour of sealing membranes	□ ■	□ ■
Design	round	round
Front panel thickness	1…6 mm	1…6 mm
With latching	–	■
Mounting		
Mounting flange included in delivery	■	■
Mounting position	any	any
Ambient conditions		
Ambient temperatures	−25 °C … +80 °C	−25 °C … +80 °C
IP Protection class	IP69K	IP69K
Safety classification		
Standards	IEC 60947-5-1; IEC 60947-1	IEC 60947-5-1; IEC 60947-1
Mechanical life	1,000,000 operations	1,000,000 operations
Certificates		
Note	cULus in conjunction with the corresponding contact elements only	

Command and signalling devices – N programme

Mushroom head impact button

Type	Description		A	B	C	Type designation
Mushroom head impact button	Without latching	"White" bellows	45	22.3	50	**NDP50** ①
		Black "bellows"	45	22.3	50	**NDP50GR** ①
	With integrated latching	"White" bellows	45	22.3	50	**NDRZ50** ①
		Black "bellows"	45	22.3	50	**NDRZ50GR/** ①
	With latching via spring element EFR*	"White" bellows	45	22.3	50	**NDRR50** ①
		Black "bellows"	45	22.3	50	**NDRR50GR/** ①

* Spring element EFR must be ordered separately.

① **Abbreviations of colours:** BK GB RD GN WH BL GR
You append the abbreviations of the colours to the type designation.
For details of possible colour combinations, refer to the technical data on the previous page.

All dimensions in mm.

Key

A	Height	Height of command device in front of the front panel
B	Mounting-Ø	Installation diameter for the command device head
C	Key Ø	Width of command device head

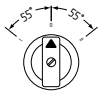
Command and signalling devices – N programme

Maintained selector switches and spring return selector switches

	■ NWS / NWT	■ NWS .1 / NWT .1
Key Features		
General description	Selector switches/spring-return selector switches with short toggle	Selector switches/spring-return selector switches with long toggle
Area of application	Food, hygiene and outdoor applications	Food, hygiene and outdoor applications
Mounting-Ø	22.3 mm	22.3 mm
Toggle length	33 mm	46 mm
Housing material		
Material of operating element	Thermoplastic	Thermoplastic
Material front ring	ABS, chrome-plated	ABS, chrome-plated
Technical features		
Mechanical data		
Colour of the operating element	□■	□■
Colour of seal	□■	□■
Design	round	round
Front panel thickness	1…6 mm	1…6 mm
Mounting		
Mounting flange included in delivery	■	■
Mounting position	any	any
Ambient conditions		
Ambient temperatures	0 °C … +80 °C	0 °C … +80 °C
IP Protection class	IP69K	IP69K
Safety classification		
Standards	IEC 60947-5-1; IEC 60947-1	IEC 60947-5-1; IEC 60947-1
Mechanical life	300,000 operations	300,000 operations
Certificates		
Note	cULus in conjunction with the corresponding contact elements only	

Command and signalling devices – N programme

Maintained selector switches and spring return selector switches

Type	Maintained and momentary positions	Positions	Actuator	A	B	C	Type designation
Selector switch	2 maintained positions		Short toggle	26	22.3	44.5	**NWS21** ①
			Long toggle	26	22.3	44.5	**NWS21.1** ①
	3 maintained positions		Short toggle	26	22.3	44.5	**NWS32** ①
			Long toggle	26	22.3	44.5	**NWS32.1** ①
Spring-return selector switch	1 momentary position and automatic return to the zero position		Short toggle	26	22.3	44.5	**NWT21** ①
			Long toggle	26	22.3	44.5	**NWT21.1** ①
	1 momentary position each to the right and left of the zero position		Short toggle	26	22.3	44.5	**NWT32** ①
			Long toggle	26	22.3	44.5	**NWT32.1** ①
Maintained spring-return rotary selector switch	1 momentary position on the right and 2 maintained positions		Short toggle	26	22.3	44.5	**NWTS32** ①
			Long toggle	26	22.3	44.5	**NWTS32.1** ①
	1 momentary position on the left and 2 maintained positions		Short toggle	26	22.3	44.5	**NWTS321** ①
			Long toggle	26	22.3	44.5	**NWTS321.1** ①

① **Abbreviation of colour:** ☐ WH
If you want a white toggle, append "WH" to the type designation.

All dimensions in mm.

Key

A	Height	Height of command device in front of the front panel
B	Mounting-Ø	Installation diameter for the command device head
C	Key Ø	Width of command device head

Command and signalling devices – N programme
Main switches



	■ NHS16/2-pol	■ NHS40	■ NHS63
Key Features			
General description	Main switches 16A	Main switches 40A	Main switches 63A
Area of application	Food, hygiene and outdoor applications	Food, hygiene and outdoor applications	Food, hygiene and outdoor applications
Mounting	Ø 22.3 mm	110 x 110 mm or Ø 22.3 mm	110 x 110 mm or Ø 22.3 mm
Housing material			
Material of operating element	Thermoplastic	Thermoplastic	Thermoplastic
Material front ring	ABS, chrome-plated	ABS, chrome-plated	ABS, chrome-plated
Other designs are available			
EMERGENCY STOP design	■	■	■
Technical features			
Mechanical data			
Colour of the operating element	■ ■	■ ■	■ ■
Colour of seal	■	■	■
Design	round	Square	Square
Front panel thickness	1…6 mm	1…6 mm	1…6 mm
Maintained switching positions	2 positions	2 positions	2 positions
Mounting			
Mounting flange incl. in delivery	–	–	–
Integrated mounting plate	■	■	■
Mounting position	any	any	any
Ambient temperatures			
open	−25 °C … +50 °C	−25 °C … +50 °C	−25 °C … +50 °C
Enclosed	−25 °C … +40 °C	−25 °C … +40 °C	−25 °C … +40 °C
IP Protection class	IP69K	IP69K	IP69K
Safety classification			
Standards	IEC EN 60947, IEC EN 60204; UL 508; CSA22.2 No. 14	IEC EN 60947, IEC EN 60204; UL 508; CSA22.2 No. 14	IEC EN 60947, IEC EN 60204; UL 508; CSA22.2 No. 14
Mechanical life	1,000,000 operations	100,000 operations	100,000 operations
Certificates			

Command and signalling devices – N programme
Main switches

Type	Series	Description			A	B	C	Type designation	Material number
Main switches	NHS16	16 A, 2-pole	Standard	With black grip	29	22.3	70 x 80	**NHS16/2-POL**	**101204196**
			EMERGENCY STOP	With red grip + yellow background	29	22.3	Ø 100	**NHSNH16/2-POL**	**101209839**
		16 A, 4-pole	Standard	With black grip	29	22.3	70 x 80	**NHS16/4-POL**	**103002746**
			EMERGENCY STOP	With red grip + yellow background	29	22.3	Ø 100	**NHSNH16/4-POL**	**103002747**
	NHS40	40 A, 3-pole	Standard	With black grip	29	22.3	110 x 110	**NHS40**	**101185098**
			EMERGENCY STOP	With red grip + yellow background	29	22.3	110 x 110	**NHSNH40**	**101185097**
	NHS63	63 A, 3-pole	Standard	With black grip	29	22.3	110 x 110	**NHS63**	**101184920**
			EMERGENCY STOP	With red grip + yellow background	29	22.3	110 x 110	**NHSNH63**	**101184919**

All dimensions in mm.

Key

A	Height	Height of command device in front of the front panel
B	Mounting-Ø	Installation diameter for the command device head
C	Panel size	Dimensions of panel (if present)

Command and signalling devices – N programme
Special devices

	■ NWSE..K	■ NDAN6
Key Features		
General description	Step selector switch	Potentiometer drive
Area of application	Food, hygiene and outdoor applications	Food, hygiene and outdoor applications
Mounting-Ø	22.3 mm	22.3 mm
Housing material		
Material of operating element	Thermoplastic	Thermoplastic
Material front ring	ABS, chrome-plated	ABS, chrome-plated
Technical features		
Electrical data		
Cam-operated switch	Kraus & Naimer Series CA10	–
Contacts	One NO contact per stage	–
Insulation voltage U_i	690V	–
Utilisation category AC-15	220 V…240 V / 5 A, 380 V…440 V / 4 A	–
Rated impulse withstand voltage. U_{imp}	6 kV	–
Rated continuous current I_{the}	20 A	–
Fuse rating	gG 25 A	–
Cable section	max. 2 x 2.5 mm² *	–
Mechanical data		
Colour		
Operating element	□ ■	□ ■
Front ring	Silver	Silver
Front panel thickness	1 … 6 mm	1 … 6 mm
Maintained switching positions	3 … 12 positions	Infinite
Mounting		
Integrated mounting plate	■	■
Mounting position	any	any
Ambient conditions		
Ambient temperatures	0 °C … +60 °C	0 °C … +75 °C
IP protection class (device head)	IP69K	IP69K
Safety classification		
Standards	IEC 60947-3 (VDE 0660 Part 107)	–
Mechanical life	Load-dependent	–
Certificates		

* Use copper conductors only

Command and signalling devices – N programme
Special devices

Type	Circuit diagram and connecting terminals	Switching angle	L	LE	A	B	C	Type designation
Cam switching design step switches with latching mechanism, 1-pole no zero position		60°	40.7	60	26	22.3	44.5	**NWSE3K**
		60°	40.7	60	26	22.3	44.5	**NWSE4K**
		60°	50.2	69.5	26	22.3	44.5	**NWSE5K**
		60°	50.2	69.5	26	22.3	44.5	**NWSE6K**
		45°	59.7	78	26	22.3	44.5	**NWSE7K**
		45°	59.7	78	26	22.3	44.5	**NWSE8K**
		30°	69.2	87.5	26	22.3	44.5	**NWSE9K**
		30°	69.2	87.5	26	22.3	44.5	**NWSE10K**
		30°	78.7	97	26	22.3	44.5	**NWSE11K**
		30°	78.7	97	26	22.3	44.5	**NWSE12K**

Type	Description	LE	A	B	C	Type designation
Potentiometer drive	for 6 mm shaft Ø, shaft length 30 … 40 mm	63	26	22.3	44.5	**NDAN6**

All dimensions in mm.

Key

A	Height	Height of command device in front of the front panel
B	Mounting-Ø	Installation diameter for the command device head
C	Key Ø	Width of command device head
L	Length	Length of step switch block
LE	Installation depth	Length between command device head and bottom edge of switch when mounted

Command and signalling devices
"R" program

Area of application

When designing control panels on machines that will be working under particularly harsh conditions, it is advisable to use the R product portfolio. The "R" stands for "robust", which represents the main feature of this switchgear.

Design and way of functioning

Both the mechanical systems and the electrical components are of heavy-duty design. The R series is resistant to mechanical loading and you can also operate -it easily when wearing gloves. The use of an adapter ring makes it possible to easily mount series R devices in a 30.5 mm installation diameter without needing additional sealing on the front panel of the machine to seal the installation hole..

The contact system (see page 64) that Schmersal developed has also been designed for a long service life under heavy loading. In the same way as with the E and N product portfolios, users can choose from a wide range of different command devices and indicator lights.

If desired, we can supply command devices pre-wired and pre-assembled in the enclosure. An ATEX-compliant version of the R series is also available.

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6	Illuminated pushbutton		48
7	Illuminated signal		46
8	Step selector switch		56
9	Potentiometer drive		56
10	Mounting flange *	RLM *	64
11	Contact carrier *		64
12	Plunger elements *		64
13	Contact elements RF…		64
14	Light terminal block RLDE…		64
15	Light terminal block RL…		65
16	EMERGENCY STOP label		66
17	EMERGENCY STOP protective collar		66
18	EMERGENCY STOP enclosure for surface mounting		70
19	Identification label		66
20	Stainless steel enclosure for surface mounting		70
21	Adapter ring		68
22	Blanking plug		66
23	Mounting tool		68

* The RLM mounting flange consists of a mounting flange (10), a contact carrier (11) and 2 plunger elements (12).

Command and signalling devices – R programme
EMERGENCY STOP control devices

	■ RDRZ45RT
Key Features	
General description	EMERGENCY STOP - with pull-to-unlatch mechanism
Area of application	Heavy-duty applications
Mounting-Ø	22.3 mm
Housing material	
Material of operating element	Aluminium
Material front ring	Aluminium
Other designs are available	
ATEX design	■
Technical features	
Mechanical data	
Colour of the operating element	■
Design	round
Front panel thickness	1…6 mm
Unlocking type	Pull-to-unlatch mechanism
Snap-action mechanism	
Integrated	■
Externally via additional module	–
Mounting	
Mounting flange included in delivery	■
Mounting position	any
Ambient conditions	
Ambient temperatures	−25 °C … +75 °C
IP Protection class	IP65
Safety classification	
Standards	IEC 60947-5-1; IEC 60947-5-5; IEC 60947-1; EN ISO 13850
Mechanical life	100,000 operations
Certificates	cULus
Note	cULus in conjunction with the corresponding contact elements only

Command and signalling devices – R programme
EMERGENCY STOP control devices

Type	Unlocking	Snap-action mechanism	A	B	C	Type designation	Material number
EMERGENCY STOP command device	Pull-to-unlatch mechanism	Integrated	27.5	22.3	45	**RDRZ45RT**	**101193576**

All dimensions in mm.

Key

A	Height	Height of command device in front of the front panel
B	Mounting-Ø	Installation diameter for the command device head
C	Key Ø	Width of command device head

Command and signalling devices – R programme
Illuminated signal

	■ RMLF/RMLH	■ RMEF/RMEH
Key Features		
General description	Illuminated signal for BA9s	Illuminated signal with integrated LED
Area of application	Heavy-duty applications	Heavy-duty applications
Mounting-Ø	22.3 mm	22.3 mm
Housing material		
Material of operating element	Glass / PA (12)	Glass / PA (12)
Material front ring	Aluminium	Aluminium
Other designs are available		
ATEX design	■	–
Technical features		
Mechanical data		
Colour		
Design	Round with flat or high glass	Round with flat or high glass
Front panel thickness	1…6 mm	1…6 mm
Integrated LED 24 VAC/DC *	–	■
Mounting		
Mounting flange included in delivery	■	■
Mounting position	any	any
Ambient conditions		
Ambient temperatures	−25 °C … +75 °C	−25 °C … +40 °C
IP Protection class	IP65	IP65
Safety classification		
Standards	IEC 60947-5-1; IEC 60947-1	IEC 60947-5-1; IEC 60947-1
Mechanical life	–	–
Certificates		
Note	cULus in conjunction with the corresponding contact elements only	

* A voltage sensor, e.g. an RE is also needed for driving. You can find the voltage sensors on page 58

Command and signalling devices – R programme
Illuminated signal

Type	Description		A	B	C	Type designation
Illuminated signal	Without integrated illuminant	Flat collar	11	22.3	39.5	**RML** ①
		High collar	21.5	22.3	39.5	**RMLH** ①
LED indicator light	With integrated illuminant	Flat collar	11	22.3	39.5	**RMEF** ①
		High collar	21.5	22.3	39.5	**RMEH** ①

① **Abbreviations of colours:** BK GB RD GN WH BL GR
You append the abbreviations of the colours to the type designation.
For details of possible colour combinations, refer to the technical data on the previous page.

All dimensions in mm.

Key

A	Height	Height of command device in front of the front panel
B	Mounting-Ø	Installation diameter for the command device head
C	Key Ø	Width of command device head

Command and signalling devices – R programme
Pushbuttons and illuminated pushbuttons

	■ RDT	■ RDL
Key Features		
General description	Pushbutton	Illuminated pushbutton
Area of application	Heavy-duty applications	Heavy-duty applications
Mounting-Ø	22.3 mm	22.3 mm
Housing material		
Material of operating element	Aluminium	Glass
Material front ring	Aluminium	Aluminium
Other designs are available		
ATEX design	■	■
Technical features		
Mechanical data		
Colour	■ ■ ■ ■ □ ■	■ ■ ■ □ ■
Design	round	round
Front panel thickness	1…6 mm	1…6 mm
Mounting		
Mounting flange included in delivery	■	■
Mounting position	any	any
Ambient conditions		
Ambient temperatures	−25 °C … +75 °C	−25 °C … +75 °C
IP Protection class	IP65	IP65
Safety classification		
Standards	IEC 60947-5-1; IEC 60947-1	IEC 60947-5-1; IEC 60947-1
Mechanical life	10,000,000 operations	10,000,000 operations
Certificates	cULus	cULus
Note	cULus in conjunction with the corresponding contact elements only	

Command and signalling devices – R programme

Pushbuttons and illuminated pushbuttons

Type	Description	A	B	C	Type designation
Pushbutton	Standard	11	22.3	39.5	**RDT** ①
	With membrane	11	22.3	39.5	**RDM** ①
Illuminated pushbutton	Standard	11	22.3	39.5	**RDL** ①
	With membrane	11	22.3	39.5	**RDLM** ①

① **Abbreviations of colours:** BK GB RD GN WH BL GR
You append the abbreviations of the colours to the type designation.
For details of possible colour combinations, refer to the technical data on the previous page.

All dimensions in mm.

Key

A	Height	Height of command device in front of the front panel
B	Mounting-Ø	Installation diameter for the command device head
C	Key Ø	Width of command device head

Command and signalling devices – R programme
Mushroom head impact button

	■ RDP40	■ RDRZ45
Key Features		
General description	Mushroom button without latching function	Mushroom button with latching function
Area of application	Heavy-duty applications	Heavy-duty applications
Mounting-Ø	22.3 mm	22.3 mm
Housing material		
Material of operating element	Aluminium	Aluminium
Material front ring	Aluminium	Aluminium
Other designs are available		
ATEX design	■	■
Technical features		
Mechanical data		
Colour	■ ■ ■ ■ □ ■	■ ■ ■ ■ □ ■
Design	round	round
Front panel thickness	1…6 mm	1…6 mm
With latching	–	■
Mounting		
Mounting flange included in delivery	■	■
Mounting position	any	any
Ambient conditions		
Ambient temperatures	−25 °C … +75 °C	−25 °C … +75 °C
IP Protection class	IP65	IP65
Safety classification		
Standards	IEC 60947-5-1; IEC 60947-1	IEC 60947-5-1; IEC 60947-1
Mechanical life	10,000,000 operations	10,000,000 operations
Certificates	cULus	cULus
Note	cULus in conjunction with the corresponding contact elements only	

Command and signalling devices – R programme

Mushroom head impact button

Type	Description		A	B	C	Type designation
Mushroom head impact button	without latching	Mushroom-shaped	27	22.3	39.5	**RDP40** ①
	with latching	Mushroom-shaped	27	22.3	45	**RDRZ45** ①

① **Abbreviations of colours:** BK GB RD GN WH BL
You append the abbreviations of the colours to the type designation.
For details of possible colour combinations, refer to the technical data on the previous page.

All dimensions in mm.

Key

A	Height	Height of command device in front of the front panel
B	Mounting-Ø	Installation diameter for the command device head
C	Key Ø	Width of command device head

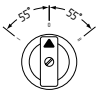
Command and signalling devices – R programme

Maintained selector switches and spring return selector switches

	■ RWS / RWT	■ RWS .1 / RWT .1
Key Features		
General description	Selector switches/spring-return selector switches with short toggle	Selector switches/spring-return selector switches with long toggle
Area of application	Heavy-duty applications	Heavy-duty applications
Mounting-Ø	22.3 mm	22.3 mm
Toggle length	40 mm	49 mm
Housing material		
Material of operating element	Thermoplastic	Thermoplastic
Material front ring	Aluminium	Aluminium
Other designs are available		
ATEX design	■	■
Technical features		
Mechanical data		
Colour	■	■
Design	round	round
Front panel thickness	1…6 mm	1…6 mm
Maintained switching positions	2…3 positions	2…3 positions
Mounting		
Mounting flange included in delivery	■	■
Mounting position	any	any
Ambient conditions		
Ambient temperatures	0 °C … +75 °C	0 °C … +75 °C
IP Protection class	IP65	IP65
Safety classification		
Standards	IEC 60947-5-1; IEC 60947-1	IEC 60947-5-1; IEC 60947-1
Mechanical life	300,000 operations	300,000 operations
Certificates	cULus	cULus
Note	cULus in conjunction with the corresponding contact elements only	

Command and signalling devices – R programme

Maintained selector switches and spring return selector switches

Type	Maintained and momentary positions	Positions	Actuator	A	B	C	Type designation
Selector switch	2 maintained positions		Short toggle	32	22.3	39.5	**RWT21**
			Long toggle	32	22.3	39.5	**RWT21.1**
	3 maintained positions		Short toggle	32	22.3	39.5	**RWT32**
			Long toggle	32	22.3	39.5	**RWT32.1**
Spring-return selector switch	1 momentary position and automatic return to the zero position		Short toggle	32	22.3	39.5	**RWS21**
			Long toggle	32	22.3	39.5	**RWS21.1**
	1 momentary position each to the right and left of the zero position		Short toggle	32	22.3	39.5	**RWS32**
			Long toggle	32	22.3	39.5	**RWS32.1**
Maintained spring-return rotary selector switch	1 momentary position on the right and 2 maintained positions		Short toggle	32	22.3	39.5	**RWTS32**
			Long toggle	32	22.3	39.5	**RWTS32.1**
	1 momentary position on the left and 2 maintained positions		Short toggle	32	22.3	39.5	**RWTS321**
			Long toggle	32	22.3	39.5	**RWTS321.1**

① **Toggle length:**
If you want a long toggle, append a "1" to the type designation.

All dimensions in mm.

Key

A	Height	Height of command device in front of the front panel
B	Mounting-Ø	Installation diameter for the command device head
C	Key Ø	Width of command device head

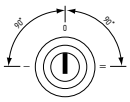
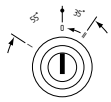
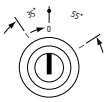
Command and signalling devices – R programme

Key selector switches, buttons and -touch contact switches

	■ RSS	■ RST
Key Features		
General description	Key-operated selector switch	Key-operated spring-return selector switch
Area of application	Heavy-duty applications	Heavy-duty applications
Mounting-Ø	22.3 mm	22.3 mm
Housing material		
Material of operating element	Aluminium	Aluminium
Material front ring	Aluminium	Aluminium
Other designs are available		
ATEX design	–	–
Technical features		
Mechanical data		
Colour	Metal (silver)	Metal (silver)
Design	round	round
Front panel thickness	1…6 mm	1…6 mm
Maintained switching positions	2 or 3 positions	2 or 3 positions
Mounting		
Mounting flange included in delivery	■	■
Mounting position	any	any
Ambient conditions		
Ambient temperatures	0 °C … +75 °C	0 °C … +75 °C
IP Protection class	IP65	IP65
Safety classification		
Standards	IEC 60947-5-1; IEC 60947-1	IEC 60947-5-1; IEC 60947-1
Mechanical life	300,000 operations	300,000 operations
Certificates	cULus	cULus
Note	cULus in conjunction with the corresponding contact elements only	

Command and signalling devices – R programme

Key selector switches, buttons and -touch contact switches

Type	Maintained and momentary positions	Positions	Key-withdrawal position	A	B	C	Type designation
Key-operated selector switch	2 maintained positions		O	31.5	22.3	39.5	**RSS21S1**
			I	31.5	22.3	39.5	**RSS21S2**
			O + I	31.5	22.3	39.5	**RSS21S12**
	3 maintained positions		I	31.5	22.3	39.5	**RSS32S1**
			O	31.5	22.3	39.5	**RSS32S2**
			II	31.5	22.3	39.5	**RSS32S3**
			I + O + II	31.5	22.3	39.5	**RSS32S123**
Key-operated spring-return selector switch	1 momentary position and automatic return to the zero position		O	31.5	22.3	39.5	**RST21S1**
	2 momentary positions on the right and left with automatic return to the zero position		O	31.5	22.3	39.5	**RSTS32S2**
Key-operated selector switch pushbutton	3 positions: momentary position 35° actuating angle and maintained position 55° actuating angle (zero position in middle, key position at top)		I	31.5	22.3	39.5	**RSST32S1**
			O	31.5	22.3	39.5	**RSTS32S2**
			O	31.5	22.3	39.5	**RSTS321S2**
			II	31.5	22.3	39.5	**RSTS32S3**

All dimensions in mm.

Key

A	Height	Height of command device in front of the front panel without key
B	Mounting-Ø	Installation diameter for the command device head
C	Key Ø	Width of command device head

Command and signalling devices – R programme
Special devices

	■ RWSE..K	■ RDAN6
Key Features		
General description	Step selector switch	Potentiometer drive
Area of application	Heavy-duty applications	Heavy-duty applications
Mounting-Ø	22.3 mm	22.3 mm
Housing material		
Material of operating element	Thermoplastic	Thermoplastic
Material front ring	Aluminium	Aluminium
Other designs are available		
ATEX design	–	–
Technical features		
Electrical data		
Cam-operated switch	Kraus & Naimer Series CA10	–
Contacts	One NO contact per stage	–
Insulation voltage U_i	690 V	–
Utilisation category AC-15	220 V … 240 V / 5 A, 380 V … 440 V / 4 A	–
Rated impulse withstand voltage. U_{imp}	6 kV	–
Rated continuous current I_{the}	20 A	–
Fuse rating	gG 25 A	–
Cable section	max. 2 x 2.5 mm² *	–
Mechanical data		
Colour		
Operating element	■	■
Front ring	Silver	Silver
Front panel thickness	1 … 6 mm	1 … 6 mm
Maintained switching positions	3 … 12 positions	Infinite
Mounting		
Integrated mounting plate	■	■
Mounting position	any	any
Ambient conditions		
Ambient temperatures	0 °C … +60 °C	0 °C … +75 °C
IP protection class (device head)	IP65	IP65
Safety classification		
Standards	IEC 60947-3 (VDE 0660 Part 107)	–
Mechanical life	Load-dependent	–
Certificates		–

Command and signalling devices – R programme
Special devices

Type	Circuit diagram and connecting terminals	Switching angle	L	LE	A	B	C	Type designation	Material number
Cam switching design step switches with latching mechanism, 1-pole no zero position		60°	40.7	60	32	22.3	54	**RWSE3K.1**	**101195857**
		60°	40.7	60	32	22.3	54	**RWSE4K.1**	**101195858**
		60°	50.2	69.5	32	22.3	54	**RWSE5K.1**	**101195859**
		60°	50.2	69.5	32	22.3	54	**RWSE6K.1**	**101195860**
		45°	59.7	78	32	22.3	54	**RWSE7K.1**	**101195861**
		45°	59.7	78	32	22.3	54	**RWSE8K.1**	**101195862**
		30°	69.2	87.5	32	22.3	54	**RWSE9K.1**	**101195863**
		30°	69.2	87.5	32	22.3	54	**RWSE102K.1**	**101195864**
		30°	78.7	97	32	22.3	54	**RWSE11K.1**	**101195865**
		30°	78.7	97	32	22.3	54	**RWSE12K.1**	**101195866**

Type	Description	LE	A	B	C	Type designation
Potentiometer drive	for 6 mm shaft Ø, shaft length 30 … 40 mm	63	31	22.3	39.5	**RDAN6**

All dimensions in mm.

Key

A	Height	Height of command device in front of the front panel
B	Mounting-Ø	Installation diameter for the command device head
C	Key Ø	Width of command device head
L	Length	Length of step switch block
LE	Installation depth	Length between command device head and bottom edge of switch when mounted

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

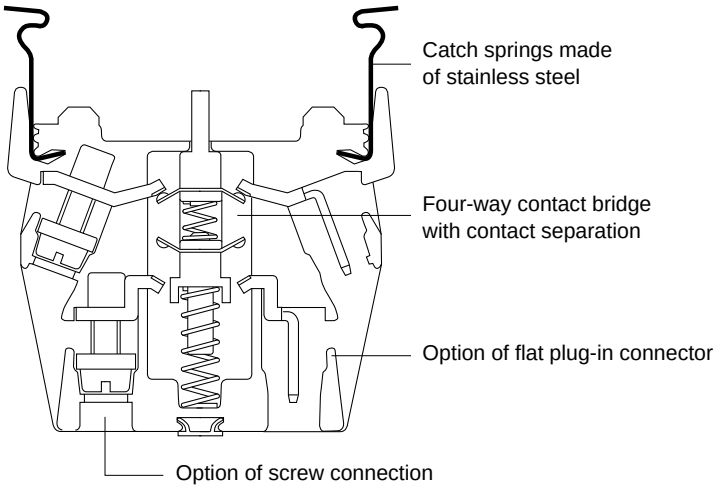
All the elements of the EF system have a special low-voltage-capable and self-cleaning four-way contact bridge system. This is a twin contact bridge that works in-parallel as well as crosswise. In this way, the fixed contact and the moveable contact bridge always achieve several contacts. This ensures 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

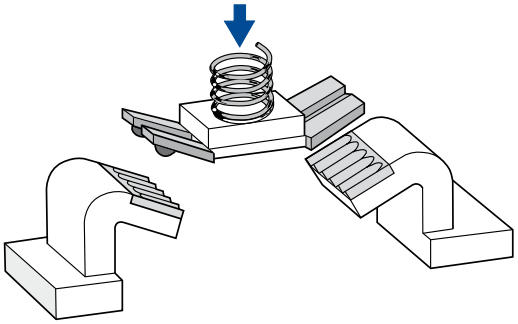
The RF contact system is used with series R command devices. It is particularly user-friendly to install, since the RF contact system's -mounting flange comprises two parts and allows users to pre-mount the contact elements whereas the other part is used to fasten the device head and to later attach 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	***	***

* 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	–	–
***			

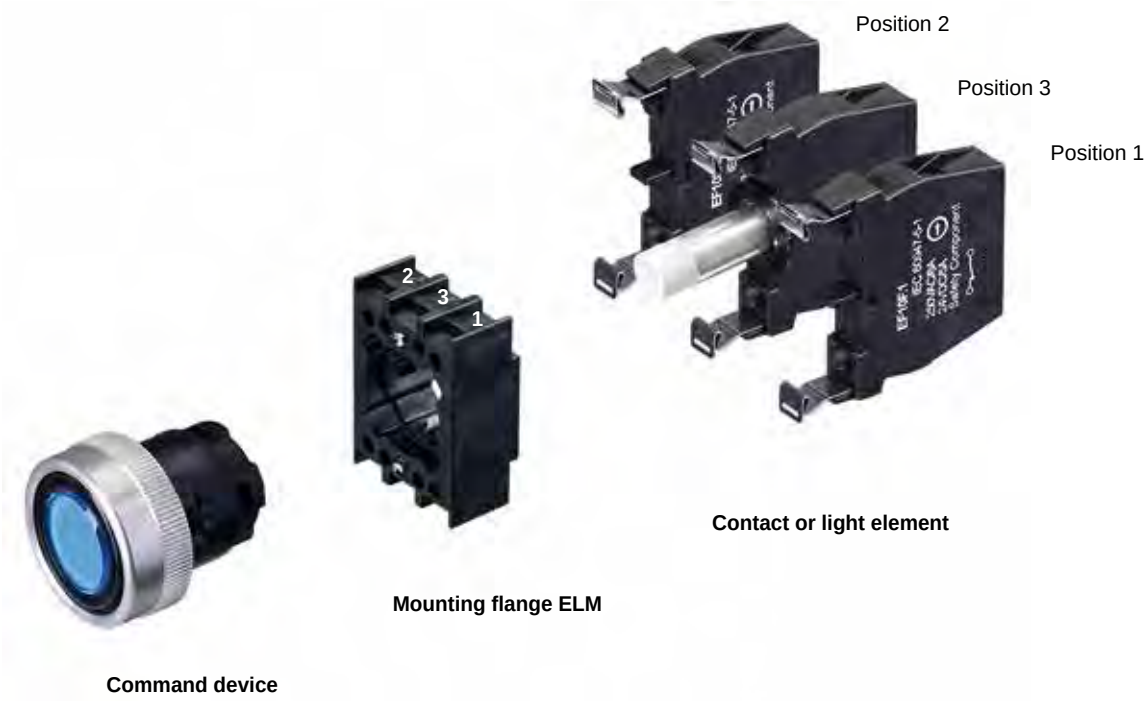
Contact and lighting elements
Type EF and EL

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…	---

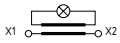
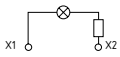
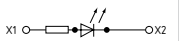
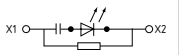
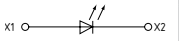
Design
A control and indicator device consists of an actuator, a mounting flange and a contact or light element
(in the case of EMERGENCY STOP devices, possibly plus a spring element).

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	-	-	-

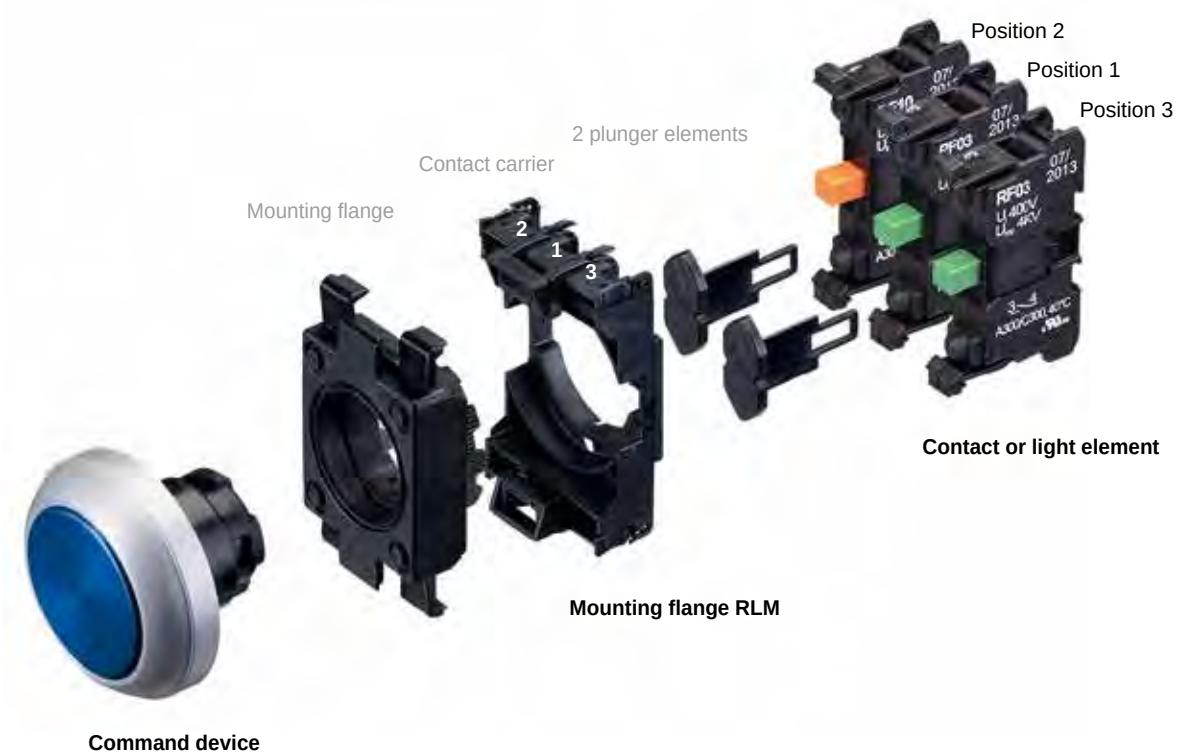
* Illuminant not included in delivery!

Contact and lighting elements
Type RF and RL

Command device	Mounting flange RLM		
	Position 2	Position 1	Position 3
EMERGENCY STOP	Contact element RF...	Contact element RF...	Contact element RF...
Pushbutton			
Mushroom head impact button			
Selector switch/key button			
Key-operated selector switch/button			
Illuminated pushbutton	Contact element RF...	Light terminal block RL…	Contact element RF...
Illuminated signal	---	Light terminal block RL…	---

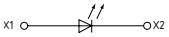
Design
The contact bracket is for preassembling the RF contact elements or the RL or RLDE lighting elements.. The scope of supply of the fastening flange includes a mounting flange, a contact carrier and two plunger elements.

Assembly example
This example shows a mushroom button with an RLM mounting flange(comprising a mounting flange, a contact carrier and two plunger elements) and 3 RF03 contact elements



Contact and lighting elements
Type RF and RL

Type	Application	Function	Switch travel diagram	Position	Connection	Plunger colour	Contact labelling	Type designation
Contact element	Standard and EMERGENCY STOP	1 NC contacts	■□□□□□	1, 2 and 3	Screw terminals	red	1, 2	**RF10**
							11, 12	**RF10.1**
		1 NO contacts	□□□■■■	1, 2 and 3	Screw terminals	green	3, 4	**RF03**
							13, 14	**RF03.1**

Type	Illuminant	Diagram	Position	Connection	Contact labelling	Type designation
Light terminal block	Ba9S socket *		3	Screw terminals	X1-X2	**RL**
	Integrated LED		3	Screw terminals	X1-X2	**RLDEWS24**

* Illuminant not included in delivery!

Command and signalling devices
Accessories

Type	Description	Type designation	Recommended for programme		
			E	N	R
EMERGENCY STOP label	Installation Ø for 22.3 mm, 53 mm external Ø	MDP-8	■		■
	Installation Ø for 22.3 mm, 100 mm external Ø	MDP-6	■		■
	Installation Ø for 30.5 mm, 53 mm external Ø	DPF-9	■		■
	Installation Ø for 30.5 mm, 100 mm external Ø	DPF-7	■		■
	External Ø 70 mm, V4A version, colour yellow, self-adhesive, no labelling	NDP-70	■	■	■
	External Ø 65 mm plastic – as adhesive foil	NDP-65	■	■	■
Protective collar	EMERGENCY STOP protective collar, installation Ø for 22.3 mm operating element Ø 38.5 mm	EDRR-1 SET	■		
	EMERGENCY STOP protective collar, installation Ø for 22.3 mm operating element Ø 49 mm	EDRR-2 SET	■		■
	EMERGENCY STOP protective collar, installation Ø for 30.5 mm operating element Ø 38.5 mm	EDRR-1.1 SET	■		
	EMERGENCY STOP protective collar, installation Ø for 30.5 mm operating element Ø 49 mm	EDRR-2.1 SET	■		■
	EMERGENCY STOP protective collar, material 1.4550, incl. fastening screws	NSK/V4A/GB		■	
	Protective collar to prevent accidental touching for pushbuttons and illuminated pushbuttons	NSK-GR		■	
Selector switch lock	Selector switch lock for two-position selector switch	NWSP21GR		■	
	Selector switch lock for three-position selector switch	NWSP32GR		■	
Blanking plug	Blanking plug, metallized	NB		■	
	Blanking plug, stainless steel	NB/VA		■	
	Blanking plug, installation Ø 22.3 mm	BN	■		
	Blanking plug, installation Ø 30.5 mm	MBN	■		■
Identification label	Identification label, small	NZSO/V4A		■	
	Identification label, large	NZSO2/V4A		■	
	Identification label, small	RZSO			■
	Identification label, medium	RZSO1			■
	Identification label, large	RZSO2			■
	Identification label, aluminium	MZSO	■		
	Identification label, plastic	KZSO	■		
	Identification label, 30.5 mm, small	ZSO2	■		
	Identification label, 30.5 mm, large	ZSO	■		
	Identification label, 30.5 mm, large	ZSNO	■		
Adapter ring	Adapter ring with gasket for using Ø 22 mm operating buttons to 30.5 mm drilled holes	NUE		■	
	Adapter ring with gasket for using Ø 22 mm operating buttons to 30.5 mm drilled holes	RUE			■
	Adapter ring with gasket for using Ø 22 mm operating buttons to 30.5 mm drilled holes	MUE	■		
Spare key	Spare key for key selector switch	SDS1/SDS2	■		■
mounting flange	mounting flange	EFM	■	■	–
	mounting flange	ELM	■	■	–
	Mounting flange for position switch	EFMH	■	■	
	mounting flange	RLM			■
	Driver for contact elements	R-F			■
Mounting tool	Mounting tool for mounting flange	RMW			■
Multi LED	Multi LED white Ba9S, 24 VDC	LE24/9WS	■	■	■
	Multi LED white Ba9S, 230 VDC	LE230/9WS	■	■	■
Lamp	Lamp 6V/2W	L6/9	■		■
	Lamp 12V/2W	L12/9	■		■
	Lamp 24V/1.9W	L24/9	■		■
	Lamp 30V/2W	L30/9	■		■
	Lamp 130V/2W	L130/9	■		■
Acoustic signal	Acoustic signal for EL voltage sensor, 24 VDC	EMES	■		

Command and signalling devices
Accessories

EMERGENCY STOP label

- NDP-70
- Material V4A
- Yellow powder-coated

EMERGENCY STOP protective collar

- EDRR-1 SET
- Aluminium die-cast
- Yellow powder-coated

EMERGENCY STOP protective collar

- NSK/V4A/GB
- Bracket material 1.4550 plate V4A powder-coated

Protective collar

- NSK-GR
- Protective collar to prevent accidental touching
- For pushbuttons and illuminated N product portfolio pushbuttons and Illuminated pushbuttons
- Command device not included in delivery

Selector switch lock

- NWSP21GR / NWSP32GR
- Replacement measure for key-operated selector switch
- For selector switches with long toggle
- Padlock not included in the delivery

Blanking plug

- NB
- Plastic, metallized
- For installation diameter 22.3 mm

Identification label

- RZSO2
- Aluminium plate with black anodized labelling area
- Depending on version, 1 to 3 lines can be written

Identification label

- NZSO…
- Stainless-steel plate V4A
- Depending on version, 1 to 3 lines can be written

Identification label

- MZSO
- Aluminium plate with black anodized labelling area

Command and signalling devices
Accessories

Adapter ring

- RUE
- Plastic
- Adapter ring from installation diameter of 30.5 mm to 22.3 mm

Spare key

- SDS1/SDS2
- Spare key for key selector switch with EKM locking
- Note: You must state the locking number too

Mounting flange

- ELM
- Mounting flange for E and N product portfolio illuminated pushbuttons

Mounting flange

- EFM
- Mounting flange for E and N product portfolio pushbuttons

Mounting flange

- EFMH
- Mounting flange for E and N product portfolio position switches
- Depending on the version, with position switch included in delivery too

Mounting flange

- RLM
- Mounting flange for R product portfolio with contact carrier and driver

Mounting tool

- RMW
- Mounting tool for R product portfolio mounting flange

Multi LED

- LE24/9WS
- LED white
- For Ba9S socket
- 24VAC/DC
- Also available as 230V version

Acoustic signal

- EMES
- Acoustic signal for EL voltage sensor
- 24 VDC

Command and signalling devices
Enclosure for surface mounting

Enclosure MBG/ MBGH

These enclosures are made of solid cast alloy. This makes them appropriately robust and non-sensitive. Sealing of the enclosures has been designed so that the fastening screws are outside the gasket; this makes possible protection class IP65 without needing additional sealing of the fastening screws. A special EMERGENCY STOP enclosure with an integrated protective collar is available in this range that has been coordinated exactly with the EMERGENCY STOP command devices of product portfolios E and R. This protects the EMERGENCY STOP from being touched accidentally and offers plant owners the benefit of reducing undesirable downtimes.

Enclosure MBGAC

Aluminium MBGAC series enclosures can be used on a very versatile basis due to their plain but functional design. They offer users the same robust features as MBG series enclosures. The MBGAC enclosures also have the same IP65 protection class as MBG ones. However, the tried and tested sealing concept has been applied here too.

Enclosure MBK

MBK enclosures are manufactured from a very high-quality plastic. This allows users to deploy them under extreme conditions like temperatures of -40°C to +100°C; in the same way, only a very few chemicals can endanger these enclosures. The fibreglass reinforcement in the plastic makes this small thermoplastic enclosure so extremely robust. Users have available two "knock-out" drilled holes for M20 cable glands to route cables in.

Enclosure KG

The KG enclosures are simple ABS plastic ones for simple requirements that do not need a robust housing. The cable outlets are already mounted on these enclosures, which means that users only need to mount the command devices.

Enclosure NBG/ EBG/ EX-EBG

Series NBG / EBG / EX-EBG assembly housings are made of high-quality stainless steel using a special deep-drawing process; they have been specially developed for hygiene and heavy-duty applications. The special ribbed gasket that surrounds the base of the enclosure on which the enclosure cover is forged on makes it possible to implement the particularly high IP 69K protection class. The EX-EBG enclosures have an additional integrated reinforcement panel that exceeds even the extreme requirements for explosion protection.

MBG

- Enclosure material, alloy

MBGH

- Enclosure material, alloy
- For EMERGENCY STOP with protective collar

MBGAC

- Enclosure material, alloy

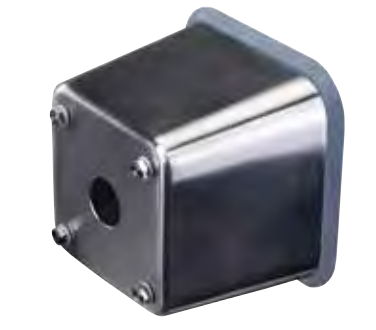
MBK

- Enclosure material, plastic

KG

- Enclosure material, plastic

NBG/EBG/EX-EBG



- Enclosure material, stainless steel

Command and signalling devices

Enclosure for surface mounting

Type	Description	Housing material	Number of drilled holes	Middle spacing of drilled holes (mm)	Length of enclosure (mm)
MBG	Assembly housing for EMERGENCY STOP	Alloy	1	–	85
			1	–	85
	Enclosure for surface mounting		1	–	85
			1	–	85
			2	30	125
			2	40	125
			2	50	165
			3	30	165
			3	40	165
			3	50	205
			4	30	205
			4	40	205
			4	50	245
			5	30	205
			5	40	245
			5	50	305
			6	30	245
			6	40	305
			8	30	305
MBGAC	Enclosure for surface mounting	Alloy	1	–	100
			3	40	160
			4	40	200
			5	40	245
			6	40	305
			2	50	160
			3	50	200
			4	50	245
			5	50	305
MBK	For surface mounting	Thermoplastic	1	40	85
	For EMERGENCY STOP		1	40	85
KG	Enclosure for surface mounting	Thermoplastic	1	40	82
			1	40	82
			2	40	120
			2	40	120
			3	40	160
			3	40	160
			2	40	120
			2	40	120
			3	40	160
			3	40	160
NBG/EBG	Enclosure for surface mounting	Stainless steel	1	–	110
			0	–	154
			0	–	324
			2	60	154
			3	60	154
			4	60	324
			5	60	324
			5	65 / 55 / 55 / 55	324
	Assembly housing for EMERGENCY STOP		3	54 / 50	154
			3	54 / 50	154
	Enclosure for surface mounting		1	–	110
			3	60	154
			5	60	324
EX-EBG	Enclosure for surface mounting	Stainless steel	1	–	110
			3	60	154
			5	60	324

Width of enclosure (mm)	Height of enclosure (mm)	Drilled hole for cable gland	Type designation	Recommended command device range		
				"E" program	"N" program	"R" program
85	80	M20	**MBG311GB**	■		■
85	80	M20	**MBGH311GB**	■		■
85	80	M20	**MBG311**	■		■
85	80	M20	**MBGH311**	■		■
85	80	M20	**MBG322**	■		
85	80	M20	**MBG422**	■		■
85	80	M20	**MBG532**	■		■
85	80	M20	**MBG333**	■		
85	80	M20	**MBG433**	■		■
85	80	M20	**MBG543**	■		■
85	80	M20	**MBG344**	■		
85	80	M20	**MBG444**	■		■
85	80	M25	**MBG554**	■		■
85	80	M20	**MBG345**	■		
85	80	M25	**MBG455**	■		■
85	80	M25	**MBG565**	■		■
85	80	M25	**MBG356**	■		
85	80	M25	**MBG466**	■		■
85	80	M25	**MBG368**	■		
100	80	M20	**MBGAC311**	■		■
100	80	M20	**MBGAC433**	■		■
100	80	M20	**MBGAC444**	■		■
100	80	M25	**MBGAC455**	■		■
100	80	M25	**MBGAC466**	■		■
100	80	M20	**MBGAC532**	■		■
100	80	M20	**MBGAC543**	■		■
100	80	M25	**MBGAC554**	■		■
100	80	M25	**MBGAC565**	■		■
85	84	M20	**MBK311**	■		■
85	84	M20	**MBK311GB**	■		■
80	85	M20	**KG411-A**	■		Restricted possible
80	85	M20	**KG411-C**	■		Restricted possible
80	85	M20	**KG422-A**	■		Restricted possible
80	85	M20	**KG422-B**	■		Restricted possible
80	85	M20	**KG433-A**	■		Restricted possible
80	85	M20	**KG433-B**	■		Restricted possible
80	85	M20	**KG432-A**	■		Restricted possible
80	85	M20	**KG432-B**	■		Restricted possible
80	85	M20	**KG443-A**	■		Restricted possible
80	85	M20	**KG443-B**	■		Restricted possible
110	88	M20	**NBG311**	■		Restricted possible
110	88	M20	**NBG630**		■	
110	88	2x M20	**NBG660**		■	
110	88	M20	**NBG632/NM**		■	
110	88	M20	**NBG633**		■	
110	88	2x M20	**NBG664/NM**		■	
110	88	2x M20	**NBG665**		■	
110	88	2x M20	**NBG665/65.55**		■	
110	88	M20	**NBG633/54.50/NSK**		■	
110	88	M20	**NBG633/54.50**		■	
110	88	M20	**EBG311.O**	■	■	■
110	88	M20	**EBG633.O**	■	■	■
110	88	M20	**EBG665.O**	■	■	■
110	88	M20	**EX-EBG311.O**			■
110	88	M25	**EX-EBG633.O**			■
110	88	2x M25	**EX-EBG665.O**			■

Control panels
Description

Area of application

Ergonomic operation of the main machine functions at the human-machine interface is a key factor in safety. The control units should be mounted as close as possible to the safety doors so that operators have an overview of the process.
BDF Series control units meet this requirement. This series has been designed for mounting onto the commercially available aluminium profile systems of machine enclosures and you can quickly attach them and integrate them in the ambient structure.

Design and way of functioning

The range is based on a high-quality design with slimline housing made from impact-resistant plastic. Two designs are available to accommodate one or four command devices or indicator lights.

Users can choose from a large product portfolio of illuminated control push buttons, selector switches and selector buttons, LED illuminated indicators, key-operated switches and standards-compliant EMERGENCY STOP command devices. Positioning of the pushbuttons on the control panel is also freely selectable. Labelling fields allow you to label the functions individually.

This makes it possible for machine builders to use the BDF range to represent the most common operator functions like Emergency Stop, ON/OFF, Forwards/Backwards, Operating Mode Selection, display of operating status conditions or error messages, etc. All the command devices and indicator lights have been developed for industrial applications and have been tried and tested in other series of the command device product portfolio.

The system also includes a mounting plate to combine the control panel with a solenoid interlock and an ergonomic door handle. The BDF 200 AS variant is available to integrate operating devices into the AS Interface Safety at Work (AS-i SaW) communications network.

Control panels
Technical data

	■ BDF100…-NH	■ BDF100…
Key Features		
	• Slim, shock-resistant thermoplastic enclosure • For mounting on commercially available aluminium profile systems	• EMERGENCY STOP function with and without protective collar	• Large product portfolio of operating and lighting elements
Other designs		
ATEX / IECEx	–	–
AS-i SaW	–	–
Technical features		
General description	Control panel with EMERGENCY STOP	Control panel with one control element
Mechanical data		
Housing material	Glass-fibre reinforced thermoplastic, self-extinguishing	Glass-fibre reinforced thermoplastic, self-extinguishing
Colour (of cover/enclosure box)	Yellow / Black	Black / Black
Dimensions L x W x H (with connector)		
With protective collar	99 x 40 x 69 mm	–
Without protective collar	99 x 40 x 49 mm	99 x 40 x 49 mm
Connection	Connector plug M12, 8-pole	Connector plug M12, 8-pole
Electrical data		
Rated operating voltage Ue	24 V	24 V
Thermal test current I_{the}	2.5 A	2.5 A
Utilisation category	AC-15: 24 VAC/2 A; DC-13: 24 VDC/1 A	AC-15: 24 VAC/2 A; DC-13: 24 VDC/1 A
Switching of low loads	5 V / 1 mA	5 V / 1 mA
Rated insulation voltage U_i	60 V	60 V
Circuit versions		
EMERGENCY STOP	2 NC / 1 NO	–
Command devices	–	1 NO /1 NC; 2 NO
EMERGENCY STOP with lamp	2 NC / 1 NO	–
Command devices with lamp	–	1 NO /1 NC; 2 NO
Ambient conditions		
Ambient temperature	−25 °C … +65 °C	−25 °C … +65 °C
Protection class	IP65	IP65
Safety classification		
Standards	EN ISO 13849-1	EN ISO 13849-1
Mechanical life	100,000	1,000,000
B_{10d} value	100,000	100,000
Certificates		

	
■ BDF200-NH-...	**■ BDF200...**
• EMERGENCY STOP function with and without protective collar • Large product portfolio of operating and lighting elements	• Large product portfolio of operating and lighting elements
–	–
■	■
Control panel with EMERGENCY STOP and 3 control elements	Control panel with 4 control elements
Glass-fibre reinforced thermoplastic, self-extinguishing	Glass-fibre reinforced thermoplastic, self-extinguishing
Yellow / Black	Black / Black
220 x 40 x 69 mm	–
220 x 40 x 49 mm	220 x 40 x 49 mm
M20 cable gland with plug-in terminals	M20 cable gland with plug-in terminals
24 V	24 V
2.5 A	2.5 A
AC-15: 24 VAC/2 A; DC-13: 24 VDC/1 A	AC-15: 24 VAC/2 A; DC-13: 24 VDC/1 A
5 V / 1 mA	5 V / 1 mA
60 V	60 V
2 NC / 1 NO	–
1 NC /1 NO; 2 NO	1 NC /1 NO; 2 NO
2 NC	–
1 NO	1 NO
−25 °C … +65 °C	−25 °C … +65 °C
IP65	IP65
EN ISO 13849-1	EN ISO 13849-1
1,000,000 (EMERGENCY STOP 100,000)	1,000,000
100,000	100,000

Control panels
Actuating elements

EMERGENCY STOP pushbutton NH

- Mushroom-shaped plastic button, Ø 30 mm
- Without protective collar: ordering suffix NH
- Pull to reset
- 1 NO contact / 2 NC contacts

EMERGENCY STOP pushbutton NHK

- Mushroom-shaped plastic button, Ø 30 mm
- With protective collar: ordering suffix NHK
- Pull to reset
- 1 NO contact / 2 NC contacts

Pushbutton DT..

- With concave button, button surface 19 x 19
- 2 NO contacts or 1 NO contact / 1 NC contact
- Printing is possible on request
- Refer to the table below for the ordering suffix

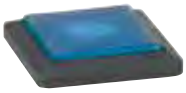
Indicator lights LM..

- Illuminated surface 19 x 19 mm
- Lamp replacement at the front
- Printing is possible on request
- Refer to the table below for the ordering suffix

EMERGENCY STOP pushbutton PT..

- Button surface 25 x 25 with rounded edges
- Without latching
- 2 NO contacts or 1 NO contact / 1 NC contact
- Printing is possible on request
- Refer to the table below for the ordering suffix

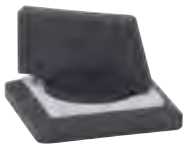
Illuminated pushbutton LT..

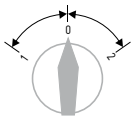
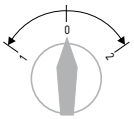
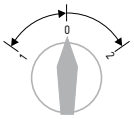


- With concave button, button surface 19 x 19
- 2 NO contacts or 1 NO contact / 1 NC contact
- Lamp replacement at the front
- Printing is possible on request
- Refer to the table below for the ordering suffix

Ordering suffix	yellow	red	green	blue	Black	white
 EMERGENCY STOP pushbutton PT..	PTYE	PTRD	PTGN	PTBU	PTBK	PTWH
 Pushbutton DT..	DTYE	DTRD	DTGN	DTBU	DTBK	DTWH
 Illuminated pushbutton LT..	LTYE	LTRD	LTGN	LTBU		LTWH
 Indicator lights LM..	LMYE	LMRD	LMGN	LMBU		LMWH

Control panels
Actuating elements

Maintained / spring-return selector switches	Maintained / spring-return selector switches	Key-operated selector switches/buttons
		
■ Version with standard toggle, anthracite ■ Refer to the table below for the ordering suffix	■ Version with long toggle, anthracite ■ Refer to the table below for the ordering suffix	■ Version with high-quality cylinder lock; therefore, IP65 in this case too ■ Key can be removed in all positions ■ Refer to the table below for the ordering suffix

Ordering suffix	Selector switch	Selector switch	Selector switch	Selector switch	Selector switches
					
	1 latched position	2 latched positions to the left/right of the zero position	1 momentary position and automatic return to the zero position	2 touch positions to the left/right of the zero position and automatic return to the zero position	1 momentary position on the right and automatic return to the zero position and 1 maintained position to the left of the zero position
	2 NO or 1 NO / 1 NC	1 NO per position or 1 NC (position 1) / 1 NO (position 2)	2 NO or 1 NO / 1 NC	1 NO per position or 1 NC (position 1) / 1 NO (position 2)	1 NO per position or 1 NC (position 1) / 1 NO (position 2)
 Standard toggle	**WS20**	**WS30**	**WT20**	**WT30**	**WTS30**
 Long toggle	**WS21**	**WS31**	**WT21**	**WT31**	**WTS31**
 Key-operated switch	**SWS20**		**SWT20**		

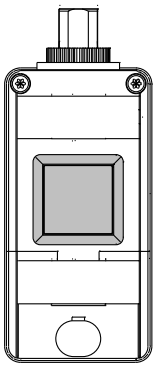
Control panels

Combination options

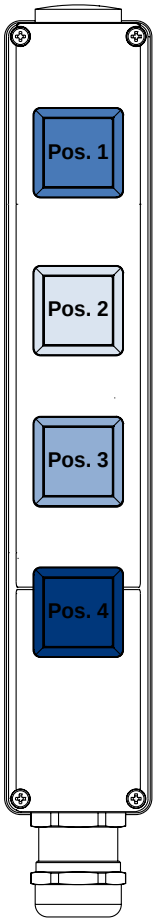
Actuating elements		BDF100 with	BDF200 at pos. 1	at pos. 2	at pos. 3	at pos. 4
	NH	•	•			
	NHK	•	•			
	PT..		•	•	•	•
	DT..	•	•	•	•	•
	LT..	•	•	•	•	•
	LM..		•	•	•	•
	SW.20	•		•	•	
	W..0	•		•	•	
	W..1	•		•	•	

Control panels

BDF100



BDF200



Control panels

Preferred types[1)] and accessories

Series	Fitting at pos. 1	Pos. 2	Pos. 3	Pos. 4	Indicator lamp	Type designation	Material number
BDF100 	NH	-	-	-	-	**BDF100-NH-G-ST**	**101215862**
	NHK	-	-	-		**BDF100-NHK-G-ST**	**101211974**
	LTBU	-	-	-		**BDF100-11-LTBU-ST**	**101216402**
	LTGN	-	-	-		**BDF100-11-LTGN-ST**	**101216247**
	SWS20	-	-	-		**BDF100-11-SWS20-ST**	**101217193**
	WS20	-	-	-	green	**BDF100-11-WS20-G/GN-ST**	**103001068**
	LTBU	-	-	-	-	**BDF100-20-LTBU-ST**	**101217770**
	LTGN	-	-	-		**BDF100-20-LTGN-ST**	**101217217**
BDF200 	NH	LTGN	LTGN	LTYE	red	**BDF200-NH-10-LTGN-LTGN-LMYE-G24**	**103000487**
		LTYE	SWS20	LTBU		**BDF200-NH-10-LTYE-SWS20-LTBU-G24**	**103000657**
		LTBU	LTRD	LTGN	-	**BDF200-NHK-20-LTGN-LTBU-LTRD**	**101212033**
		SWS20	LTGN	LTRD		**BDF200-NHK-20-LTGN-LTBU-LTRD**	**101212023**
		LT	LT	LT		**BDF200-NH-10-LT-LT-LT-2875**	**103007781**
		LT	LT	LT		**BDF200-NH-11-LT-LT-LT-2875**	**103007782**
		LT	LT	LT		**BDF200-NH-20-LT-LT-LT-2875**	**103007783**
		SWS20	LT	LT		**BDF200-NH-11-SWS20-LT-LT-2875**	**103007789**
		SWS20	LT	LT		**BDF200-NH-20-SWS20-LT-LT-2875**	**103007790**
	NHK	WT30	DTRD	DTGN	-	**BDF200-NHK-11-WT30-DTRD-DTGN**	**101212034**
		LTGN	LTBU	LTRD		**BDF200-NHK-20-LTGN-LTBU-LTRD**	**101211180**
		LT	LT	LT		**BDF200-NKH-10-LT-LT-LT-2875**	**103007784**
		LT	LT	LT		**BDF200-NHK-11-LT-LT-LT-2875**	**103007785**
		LT	LT	LT		**BDF200-NHK-20-LT-LT-LT-2875**	**103007786**
		SWS20	LT	LT		**BDF200-NHK-11-SWS20-LT-LT-2875**	**103007791**
		SWS20	LT	LT		**BDF200-NHK-20-SWS20-LT-LT-2875**	**103007792**
	LT	LT	LT	LT	-	**BDF200-LT-11-LT-LT-LT-2875**	**103007787**
		LT	LT	LT		**BDF200-LT-20-LT-LT-LT-2875**	**103007788**

AZM 200

- Can be combined with the AZM200 solenoid interlock
- For more information, visit **www.schmersal.net**

MP BDF 200 101214126

- Mounting plate for combination of AZM200 solenoid interlock with -B30 actuator and BDF200 control panel

[1)] The preferred types designate the choice of devices with faster delivery times.
Type designation **-2875:** the coloured button caps are included in the scope of delivery as an accessory pack for customers to mount themselves.

Two-hand control panels
Description

Area of application

The job of two-hand controls or two-hand control panels is to ensure that machine operators hands are located on the control panel when they issue the control signal for a hazardous movement. This prevents operators from reaching into the danger area on starting or shortly after starting the machine or process.

The main areas of application for two-hand controls are presses and stamping units in the metal processing or powder metallurgy industries as well as similar machines and systems that involve manual insertion and removal operations. These include printing and paper processing machines, rubber and plastics processing machines, machines involved in the chemical industry and assembly plants.

Design and way of functioning

Two-hand control panels are designed as such so the operators need both hands at the same time to start a hazardous movement. This forces operators to keep their hands in the same place which means that they cannot reach into the danger zone while the system is carrying out the hazardous movement.

All Schmersal Group two-hand control panels are fitted with an Emergency Stop button that complies with EN ISO 13850. Apart from this, there are guard hoods over the operating elements, which prevent people from circumventing the protection function using their hands, elbows, stomach, hips, thighs or knees, for example. It is also not possible to operate from the back of the control panels.

The devices comply with the requirements of EN 574, which, amongst other things, specifies the spacing of the controls. Users can choose between different versions that differ, amongst other things, by virtue of the material of the enclosure (plastic and die-cast aluminium). In the central part of the folding enclosure, it is possible to mount up to eight additional command and signalling devices.

Accessories include, amongst other things, various stand versions. Combined with the PROTECT SRB 201 ZH safety-monitoring module, it is possible to integrate two-hand control panels into the machine controller.

Wide selection of mounting posts

You can find appropriate mounting posts and other accessories on page 88 ›

Two-hand control panels
Technical data

	SEPK02	SEPG05
Key Features		
	• Enclosure, plastic • Control panel with 8 additional drilled holes that you can knock out if required • 2-piece enclosure for simple and favourable assembly	• Die-cast aluminium enclosure • Control panel suitable for mounting a minimum of 8 additional command and signalling devices • Easy assembly thanks to 2-piece folding enclosure • Ergonomic operation due to wrist support • Terminal strips and relay assembly possible in the interior
Technical features		
General description	Two-hand control panel	Two-hand control panel
Mechanical data		
Housing material	Thermoplastic	Die-cast aluminium
Colour	RAL 7035 (tinted)	RAL 7004 (powder-coated)
Dimensions (L x W x H)	469 x 137 x 185 mm	494 x 160 x 184 mm
Possible fastening		
On mounting post	Yes	Yes
Directly on the machine or wall	Yes	Yes
Command positions		
Number of drilled holes	3	3
Possible command positions	8	8
Ø of drilled hole	22.3 mm	22.3 mm
Electrical data	Depends on the pre-mounted command device	Depends on the pre-mounted command device
Ambient conditions		
IP Protection class	IP54	IP54
Safety classification		
Standards	IEC 60947-5-1; IEC 60947-1; IEC 60947-5-5; EN ISO 13850; EN 574	IEC 60947-5-1; IEC 60947-1; IEC 60947-5-5; EN ISO 13850; EN 574
Certificates	–	–

We recommend using our SRB safety-monitoring module to monitor two-hand control panels.

SEP09

- Aluminium enclosure
- For separate assembly of the controls for two-hand control
- Specify on user side spacing according to EN 574

Two-hand control
Aluminium
RAL 7004 (powder-coated)
155 x 150 x 160 mm (per operating element)
No
Yes
1 per operating element
–
22.3 mm
Depends on the pre-mounted command device
IP54
IEC 60947-5-1; IEC 60947-1; IEC 60947-5-5; EN ISO 13850; EN 574
–

Two-hand control panels

Preferred types [1)]

Series	Enclosure	Description	Controls	Head Ø	Contacts
SEPK02 	Thermoplastic	2-piece enclosure with 8 additional drilled holes that you can knock out if required	ADP55.3SW 	55 mm	1 NO / 1 NC
			ADP55.3SW/O.F 		
			Empty enclosure		
SEPG05 	Metal	2-part enclosure suitable for mounting a minimum of 8 additional command and signalling devices	EDP42SW 	42 mm	1 NO / 1 NC
			EDP55SW 	55 mm	1 NO / 1 NC
			ADP55.3SW 	55 mm	1 NO / 1 NC
			Empty enclosure		
SEP09  	Metal	For separate assembly of the controls for two-hand control with detachable aluminium cover on the bottom	EDP55SW 	55 mm	1 NO / 1 NC
			EDP42SW 	42 mm	1 NO / 1 NC
			Empty enclosure		

[1)] The preferred types designate the choice of devices with faster delivery times.

	EMERGENCY STOP	Head Ø	Contacts	Type designation	Material number
	ADRR40RT 	40 mm	1 NO / 1 NC	**SEPK02.0.4.0.22/95**	**101027371**
				SEPK02.0.4.0.22/95.E2	**101211126**
				SEPK02.0.L.22	**101027369**
	EDRR40RT 	40 mm	1 NO / 1 NC	**SEPG05.3.3.0.22/95**	**101172764**
	EDRR50RT 	50 mm	1 NO / 1 NC	**SEPG05.3.2.0.22/95**	**101172762**
	EDRR40RT 	40 mm	1 NO / 1 NC	**SEPG05.3.4.0.22/95**	**101172765**
	EDRR50RT 	50 mm	1 NO / 1 NC	**SEPG05.3.1.0.22/95**	**101172760**
	EDRR40RT 	40 mm	1 NO / 1 NC	**SEPG05.3.4.0.22/95.E1**	**101210845**
				SEPG05.3.L.22	**101172767**
	–	–	–	**SEP09.0.1.0.22/95**	**101022849**
	–	–	–	**SEP09.0.3.0.22/95**	**101022851**
				SEP09.0.L.22	**101022856**

Two-hand control panels
Mounting post

STPLC1 101024774

- Welded structure with base-fastening tapped holes
- Without height adjustment, without distance ring
- Can be combined with SEP ... control panel for use as a two-hand foot operating station

STP 01.1.1 101022859

- Welded structure with base-fastening tapped holes
- Without height adjustment
- Without distance ring

STP 01.4.1 101022861

- Welded structure with base-fastening tapped holes
- Without height adjustment
- With distance ring

STP 01.5.1 101022863

- Welded structure with base-fastening tapped holes
- Without height adjustment, with distance ring
- Fixing of the distance ring by fixing and welding on the user side

STP 02.1.1 101022865

- Welded structure with base-fastening tapped holes
- With height adjustment
- Without distance ring

STP 02.4.1 101022867

- Welded structure with base-fastening tapped holes
- With height adjustment
- With distance ring

STPSK1 101171474

- Mobile sheet-metal structure with base-fastening tapped holes
- With height adjustment
- With distance ring
- Can be combined with SEP ... control panel and foot switches with protective hood for use as a two-hand foot operating station

Two-hand control panels
Recommended evaluations

SRB 201ZH-24VDC	SRB 301HC/R-24V/-230V	
		
■ Evaluation of two-hand operator inputs ■ 2 STOP 0 safety contacts ■ 1 auxiliary contact (not safe)	■ Evaluation of two-hand operator inputs ■ 3 STOP 0 safety contacts ■ 1 auxiliary contact	

Maintained and spring-return joystick switches
Description

Area of application

Extremely robust, compact, versatile and functional: These properties make MK/WK series joystick buttons and switches highly suitable for use on machinery and plants in the food-processing and process technology industries.

Furthermore, they are suitable for especially harsh industrial applications, including outdoor usage. Compared with multifunctional command systems, such as those used on the control units for cranes and automated guided vehicles (AGV), they need considerably less installation space.

Design and way of functioning

Users can choose between three designs:

- Maintained joystick switch, reset by touch and spring force
- Spring-return joystick switch, reset by spring force
- Maintained and spring-return joystick switch, reset by touch and spring force

All the designs are available with up to four switch positions/actuating directions.

This means that the joystick switches and buttons make the HMI easier: It is possible to actuate different machine functions with a single, compact piece of robust switchgear.

The joystick switches and buttons are available in a wide range of different contact variants with up to eight galvanically isolated contacts as well as in protection classes IP65, IP67 and IP69K. We can also supply versions for outdoor applications that are suitable for temperatures of -25 °C to +80 °C. If you want protection from accidental actuation from the zero position, it is possible to fit the operating devices with a mechanical lock.

The contact system in series MK and WK works on the tried and tested four-way contact ("H bridge") principle that is extremely shock- and jolt-resistant.

Operating principle

Spring-return joystick switch
Spring-return switching position (touch position)
Reset by spring force

Maintained joystick switch
Maintained switching positions (latched position)
Reset by touch and spring force

Maintained/spring-return joystick switch
Switching position spring-return and maintained
Reset by touch and spring force

Locking sleeve
All devices are available with an additional mechanical lock as a protection against accidental shifts out of the home position. The holding force of the lock is approx. 100 N for devices with an installation diameter of 22.3 mm and approx. 200 N for devices with an installation diameter of 30.5 mm.

Maintained and spring-return joystick switches
Technical data

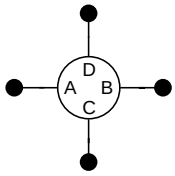
	■ MKT	■ MKS
Key Features		
	• Mounting hole Ø 22.3 mm • Spring-return joystick switch	• Mounting hole Ø 22.3 mm • Maintained joystick switch
Technical features		
Mechanical data		
Length of actuator	77 mm	77 mm
Material of the front ring	Al anodised	Al anodised
Fixing	Lock nut	Lock nut
Mounting hole	22.3 mm	22.3 mm
Installation depth	Depending on contact type	Depending on contact type
Front plate thickness	1.5 mm … 6 mm	1.5 mm … 6 mm
Spacing	80 × 80 mm	80 × 80 mm
Actuating force	approx. 11 N	approx. 11 N
Momentary position	To left and right of zero position	-
Latched position	-	To left and right of zero position
Resistance to shock	110 g/4 ms − 30 g/18 ms, no bouncing	110 g/4 ms − 30 g/18 ms, no bouncing
Resistance to vibrations	> 20 g/10 … 200 Hz	> 20 g/10 … 200 Hz
Switching frequency	1,200 s/h	1,200 s/h
Switching principle	Creep circuit element	Creep circuit element
Design of elect. connection	Screw terminals	Screw terminals
Cable section	0.5 mm² … 2.5 mm²	0.5 mm² … 2.5 mm²
Electrical data		
Rated impulse withstand voltage U_{imp}	4 KV	4 KV
Rated insulation voltage U_i	400 V	400 V
Thermal test current I_{the}	10 A	10 A
Max. fuse rating	10 A gG D-fuse	10 A gG D-fuse
Utilisation category	AC-15: 250 VAC/8 A; DC-13: 24 VDC/5 A	AC-15: 250 VAC/8 A; DC-13: 24 VDC/5 A
Ambient conditions		
Ambient temperature	−25 °C … +80 °C	−25 °C … +80 °C
Protection class	IP65 / IP67 to IEC 60529	IP65 / IP67 to IEC 60529
Safety classification		
Standards	IEC 60947-5-1, IEC 60947-1	IEC 60947-5-1, IEC 60947-1
Mechanical life	1,000,000	1,000,000
B_{10d} value	100,000	100,000

■ WKT	■ WKS
• Mounting hole Ø 30.5 mm • Spring-return joystick switch	• Mounting hole Ø 30.5 mm • Maintained joystick switch
90 mm	90 mm
Al anodised	Al anodised
mounting flange	mounting flange
30.5 mm	30.5 mm
Depending on contact type	Depending on contact type
1.5 mm … 10 mm	1.5 mm … 10 mm
80 × 80 mm	80 × 80 mm
approx. 11 N	approx. 11 N
To left and right of zero position	-
-	To left and right of zero position
110 g/4 ms − 30 g/18 ms, no bouncing	110 g/4 ms − 30 g/18 ms, no bouncing
> 20 g/10 … 200 Hz	> 20 g/10 … 200 Hz
1,200 s/h	1,200 s/h
Creep circuit element	Creep circuit element
Screw terminals	Screw terminals
0.5 mm² … 2.5 mm²	0.5 mm² … 2.5 mm²
4 KV	4 KV
400 V	400 V
10 A	10 A
10 A gG D-fuse	10 A gG D-fuse
AC-15: 250 VAC/8 A; DC-13: 24 VDC/5 A	AC-15: 250 VAC/8 A; DC-13: 24 VDC/5 A
−25 °C … +80 °C	−25 °C … +80 °C
IP65 / IP67 to IEC 60529	IP65 / IP67 to IEC 60529
IEC 60947-5-1, IEC 60947-1	IEC 60947-5-1, IEC 60947-1
1,000,000	1,000,000
100,000	100,000

Maintained and spring-return joystick switches
Selection aid

1st step: Selection of the device design

Choice of device



Contact variants				Spring-return joystick switch			
				Range MKT Mounting - Ø 22.3 mm		Range WKT Mounting - Ø 30.5 mm	
Position A	Position B	Position C	Position D	without locking sleeve	with locking sleeve	without locking sleeve	with locking sleeve
1 NO	1 NO			MKTA32	MKTA321	WKTA32	WKTA321
1 NC	1 NC			MKTA32/401	MKTA321/401	WKTA32/401	WKTA321/401
2 NO	2 NO			MKTB32	MKTB321	WKTB32	WKTB321
1 NC/1 NO	1 NC/1 NO			MKTB32/1x401	MKTB321/1x401	WKTB32/1x401	WKTB321/1x401
2 NO	2 NO			MKTC32	MKTC321	WKTC32	WKTC321
1 NO	1 NO	1 NO		MKTC42	MKTC421	WKTC42	WKTC421
1 NO	1 NO	1 NO	1 NO	MKTC52	MKTC521	WKTC52	WKTC521
1 NC	1 NC	1 NC	1 NC	MKTC52/2x401	MKTC521/2x401	WKTC52/2x401	WKTC521/2x401
4 NO	4 NO			MKTE32	MKTE321	WKTE32	WKTE321
4 NC	4 NO			MKTE32/404	MKTE321/404	WKTE32/404	WKTE321/404
4 NC	4 NC			MKTE32/800	MKTE321/800	WKTE32/800	WKTE321/800
2 NO	2 NO	2 NO	2 NO	MKTE52	MKTE521	WKTE52	WKTE521
1 NC/ 1 NO	1 NC/ 1 NO	2 NO	2 NO	MKTE52/206	MKTE521/206	WKTE52/206	WKTE521/206
2 NC	2 NO	2 NO	2 NO	MKTE52/206.1	MKTE521/206.1	WKTE52/206.1	WKTE521/206.1
1 NC/1 NO	1 NC/1 NO	1 NC/1 NO	1 NC/1 NO	MKTE52/2x401	MKTE521/2x401	WKTE52/2x401	WKTE521/2x401

2nd step: Selection of the bellows

Bellows

	Standard	/WKT-19.4	/WKT-19.3	/WKT-26
Description	Bellows rubber	Bellows rubber, suitable for outdoor usage	Silicone bellows, UV-resistant up to −40 °C	Silicone bellows, UV-resistant, up to −40 °C thick-walled / tear-proof IP69K
Material thickness	approx. 1 mm		approx. 2 mm	
Material features	tear-proof		partly tear-proof	tear-proof
Protection class (frontside)	IP65 / IP67		IP67 / IP69K	
Ambient temperature	−25 … +80 °C		−40 … +80 °C	
Mechanical life	1,000,000	500,000	300,000	500,000
Notes	-	-	-	Only usable in combination with spring-return joystick switches without locking sleeve
Material resistance	Rubber		Silicone	
- UV/ozone	not suitable	suitable	particularly suitable	
- Outdoor usage	not suitable	suitable	particularly suitable	
- Fuel, oil	partly suitable		not suitable	
- Solvents	partly suitable		partly suitable	
- Acids	partly suitable		not suitable	
- Chemicals	not suitable		partly suitable	
- Foodstuff	not suitable		physiologically harmless	

Optional bellows
To order, the order code of the bellows is added to the order code of the switch.

Maintained joystick switch				Maintained/spring-return	
Range MKS Mounting - Ø 22.3 mm		Range WKS Mounting - Ø 30.5 mm		Range WKTS Mounting - Ø 30.5 mm	
without locking sleeve	with locking sleeve	without locking sleeve	with locking sleeve	without locking sleeve	with locking sleeve
MKSA32	MKSA321	WKSA32	WKSA321	WKTSA32[1)]	WKTSA321[1)]
MKSA32/401	MKSA321/401	WKSA32/401	WKSA321/401		
MKSB32	MKSB321	WKSB32	WKSB321		
MKSB32/1x401	MKSB321/1x401	WKSB32/1x401	WKSB321/1x401		
MKSC32	MKSC321	WKSC32	WKSC321		
MKSC42	MKSC421	WKSC42	WKSC421		
MKSC52	MKSC521	WKSC52	WKSC521	WKTSC52[2)]	WKTSC521[2)]
MKSC52/2x401	MKSC521/2x401	WKSC52/2x401	WKSC521/2x401		
MKSE32	MKSE321	WKSE32	WKSE321		
MKSE32/404	MKSE321/404	WKSE32/404	WKSE321/404		
MKSE32/800	MKSE321/800	WKSE32/800	WKSE321/800		
MKSE52	MKSE521	WKSE52	WKSE521		
MKSE52/206	MKSE521/206	WKSE52/206	WKSE521/206		
MKSE52/206.1	MKSE521/206.1	WKSE52/206.1	WKSE521/206.1		
MKSE52/2x401	MKSE521/2x401	WKSE52/2x401	WKSE521/2x401		

[1)] Position A spring-return (touch position) and Position B maintained (latched position)
[2)] Position C/D spring-return (touch position) and Position A/B maintained (latched position)

3rd step: Your product

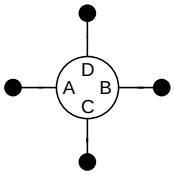
Ordering example	Type designation					
Mounting hole 22,3 mm	M					
Spring-return joystick switch		KT				
Contacts 4 NO contacts Position A			E32			
4 NO contacts Position B						
With locking sleeve				1		
Bellows suitable for outdoor usage					/WKT-19.4	
	MKTE321/WKT-19.4					

Maintained and spring-return joystick switches

Preferred types [1)]

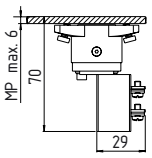
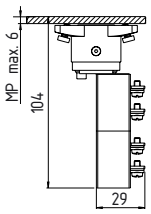
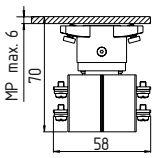
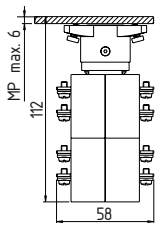
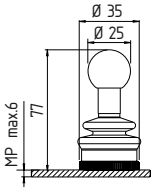
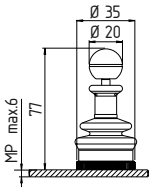
Mounting-Ø	Type	With locking sleeve	Installation depth	Contact variants Position A	Position B	Position C	Position D	Type designation	Material number
22.3 mm	Maintained joystick switch	-	70 mm	1 NO	1 NO	-	-	MKSA32	101005813
		■						MKSA321	101005816
		-	104 mm	2 NO	2 NO	-	-	MKSB32	101203907
		■						MKSB321/WKT-19.3	101191939
		-	70 mm					MKSC32	101005817
		■						MKSC321	101005818
		-		1 NO	1 NO	1 NO	1 NO	MKSC52	101005821
		■						MKSC521	101005822
		-	112 mm	2 NO	2 NO	2 NO	2 NO	MKSE52/WKT-19.4	101190916
		■						MKSE521	101005826
	Spring-return joystick switch	-	70 mm	1 NO	1 NO	-	-	MKTA32	101005827
		■						MKTA321	101005829
		-	104 mm	2 NO	2 NO	-	-	MKTB32	101005828
		■						MKTB321	101194681
		-	70 mm					MKTC32	101005832
		■						MKTC321	101005835
		-		1 NO	1 NO	1 NO	1 NO	MKTC52	101005837
		■						MKTC521	101005844
		■	112 mm	4 NO	4 NO	-	-	MKTE321	101190067
		-		2 NO	2 NO	2 NO	2 NO	MKTE52	101005842
		■						MKTE521	101005845
30.5 mm	Maintained joystick switch	-	57 mm	1 NO	1 NO	-	-	WKSA32	101019540
		■						WKSA321	101019545
		-		2 NO	2 NO	-	-	WKSC32	101019465
		■						WKSC321	101019493
		-		1 NO	1 NO	1 NO	1 NO	WKSC52	101019467
		■						WKSC521	101019473
		-	91 mm	2 NO	2 NO	2 NO	2 NO	WKSE52	101019489
		■						WKSE521	101019492
	Spring-return joystick switch	-	57 mm	1 NO	1 NO	-	-	WKTA32	101007593
		■						WKTA321	101019509
		-	91 mm	2 NO	2 NO	-	-	WKTB32	101019514
		■						WKTB321	101019539
		-	57 mm					WKTC32	101007594
		■						WKTC321	101007595
		-		1 NO	1 NO	1 NO	1 NO	WKTC52	101007597
		■						WKTC521	101019447
		-	91 mm	2 NO	2 NO	2 NO	2 NO	WKTE52	101019461
		■						WKTE521	101019464

Schematic representation of positions A-D

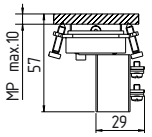
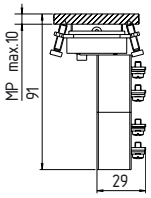
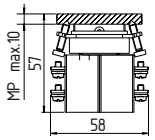
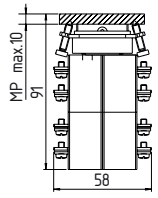
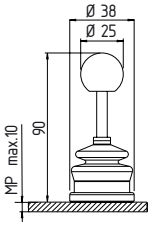
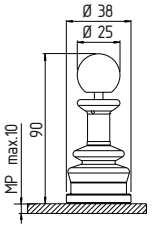


[1)] The preferred types designate the choice of devices with faster delivery times.

Maintained and spring-return joystick switches
Dimensions

Range MK... Mounting-Ø 22.3 mm		2 contacts	4 contacts	4 contacts	8 contacts
					
Without locking sleeve		MKTA32... MKSA32...	MKTB32... MKSB32...	MKTC32... MKSC32... MKTC42... MKSC42... MKTC52... MKSC52...	MKTE32... MKSE32... MKTE52... MKSE52...
With locking sleeve		MKTA321... MKSA321...	MKTB321... MKSB321...	MKTC321... MKSC321... MKTC421... MKSC421... MKTC521... MKSC521...	MKTE321... MKSE321... MKTE521... MKSE521...

MP = Mounting plate (Series MK... Max. thickness 6 mm)

Range WK... Mounting-Ø 30.5 mm		2 contacts	4 contacts	4 contacts	8 contacts
					
Without locking sleeve		WKTA32... WKSA32... WKTSA32...	WKTB32... WKSB32...	WKTC32... WKSC32... WKTC42... WKSC42... WKTC52... WKSC52... WKTSC52...	WKTE32... WKSE32... WKTE52... WKSE52...
With locking sleeve		WKTA321... WKSA321... WKTSA321...	WKTB321... WKSB321...	WKTC321... WKSC321... WKTC421... WKSC421... WKTC521... WKSC521... WKTSC521...	WKTE321... WKSE321... WKTE521... WKSE521...

MP = Mounting plate (Series WK... Max. thickness 10 mm)

Enabling switches
Description

Area of application

When carrying out set-up, refitting or service work on plant or machinery, it can be beneficial to partially or completely deactivate guard systems. Typically, this includes setting up a machine (set-up mode) and monitoring machining procedures (process monitoring).

One example: The operator of a machine tool is able to check format settings better and program movements more exactly if the safety door is open. The better view of the process makes operation more convenient and reduces set-up and refitting times.

Special safety measures are needed for this case and similar ones; these measures are referred to as special operating modes and are specified in the machine directive and in some type C standards.

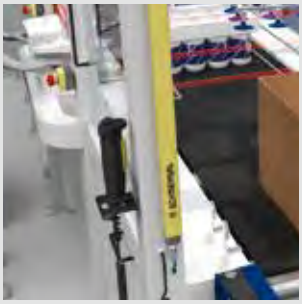
The measures that are required in this case include enabling devices that operators must actuate to start up the respective machine functions. In many cases, this is a slowed-down machine movement. The effect of the guard system is only partially or entirely suspended for the time in which the operator presses the enabling device.

Design and way of functioning

Operators must put the enabling device into the centre position and hold it in this position. As soon as they release the button or press it all the way down, the system interrupts the control command on a safety-related basis.

Series ZSD5 and ZSD6 enabling devices are of ergonomic design; with Series ZSD6, an additional pushbutton is integrated in the device head. Operators can select the optimum position to the machine or the process; the connection to the machine controller is guaranteed by a signal line.

Both series are suitable for robot applications in accordance with ANSI standards. There are of course suitable safety-monitoring modules available for signal evaluation.



Permissible speeds in enabling mode

It is controversial and standards deal differently with the question of what "reduced" speeds are justifiable in enabling mode to comply with the further condition of the machine directive(see Machine Directive Appendix I, Clause 1.2.5)that the operation of dangerous functions is only possible under minor risk conditions (= reduced speed, reduced power, step mode, etc.)

A man who has a C standard that offers concrete information that can be used for his individual application is a happy man.

Otherwise, it is advisable to differentiate between crushing and shearing hazards on the one hand and "just" collision hazards on the other. In this connection, people frequently quote values of 33 mm/sec. (2 m/min.) max. in the case of crushing and shearing hazards and 250 mm/sec. (15 m/min.) max. in the case of collision hazards A. MRL 2006/42/EG, however, "permits" higher values if absolutely technically necessary and execution is integrated into a considered and coherent safety concept [b/c].

That just leaves the question of whether it is possible to control the reduced speed (power, movement etc.) via the operating controller or whether you need a safety-related controller or monitoring system, e.g. Safety Limited Speed (SLS) or similar in accordance with EN/IEC 61800-5-2.

In this case too, we refer you to the "responsible" standards (to some extent, it is adequate to use just enabling devices for minor risks with a safe controller or monitoring system only being required above and beyond this, to some extent there is, however, a general requirement for "enabling devices + SLS", for example).

You must equally consider that the state of the art is tending towards "SLS for example" (i.e. "safe controllers or monitoring systems"), since more and more drives and drive controllers with integrated safety functions are on the market. However, it is not possible to use these new options in every situation whether due to compelling technical reasons and/or for reasons of cost.

It can help to consider whether pressing the enabling device through from stage 2 to stage 3, taking into account the machine's reaction time (delay time after signalling to standstill or non-critical speed) PLUS an additional human response time of 1 second, for example, results in an operating status that is acceptable to the machine operator from a safety point of view or not.

A You can find an overview of the maximum speeds that there are for manual intervention on running machines in the IFA Manual (loose leaf collection - Lfg. 2/11 - XII/2011 - Clause 330 216).

B See Machine Directive Appendix I, Clause 1.2.5: If it is not possible to comply with these requirements at the same time, the (mode selector switch) must trigger other protective measures …, such that a safe working area is guaranteed.

C See also specialist committee information sheet 002 of specialist committee MFS of DGUV Wood and Metal Professional Association, Mainz, Process Monitoring on the Shopfloor.

Enabling switches
Technical data

	■ ZSD 5	■ ZSD 6
Key Features		
	• 3-stage grip switch OFF-ON-OFF • Contacts do not close on resetting from stage 3 → stage 1	• 3-stage grip switch OFF-ON-OFF • Contacts do not close on resetting from stage 3 → stage 1 • With additional pushbutton
Technical features		
Mechanical data		
Housing material	Plastic, thermoplastic, self-extinguishing	Plastic, thermoplastic, self-extinguishing
Additional pushbutton in device head	No	YES
Number of NO contacts	2	3
With postive break (stages 2-3)	2	2
Number of NC contacts	1	1
Switching frequency	max. 1200/h	max. 1200/h
Cable section	0.14 mm² … 1.5 mm²	0.14 mm² … 1.5 mm²
Connection	Screw terminals	Screw terminals
Electrical data		
Rated operating voltage U_e	250 V	250 V
Operating current I_e	3 A	3 A
Utilisation category **NO contacts**	AC-15: 125 V / 1.5 A; 250 V / 0.75 A; DC-13: 30 V / 1.0 A; 125 V / 0.22 A; 250 V / 0.1 A	AC-15: 125 V / 1.5 A; 250 V / 0.75 A; DC-13: 30 V / 1.0 A; 125 V / 0.22 A; 250 V / 0.1 A
Auxiliary contacts	AC-15: 125 V / 1.5 A; 250 V / 0.75 A; DC-13: 30 V / 2.3 A; 125 V / 0.22 A; 250 V / 0.1 A	AC-15: 125 V / 1.5 A; 250 V / 0.75 A; DC-13: 30 V / 2.3 A; 125 V / 0.22 A; 250 V / 0.1 A
Additional pushbutton	-	AC-15: 125 V / 0.3 A; DC-13: 30 V / 0.7 A; 125 V / 0.1 A
Ambient conditions		
Ambient temperature	−10 °C … +60 °C	−10 °C … +60 °C
Protection class IP	IP65	IP65
Safety classification		
Standards	ISO 13849-1, IEC 61508	ISO 13849-1, IEC 61508
Mechanical life	Stage 1-2-1: min. 1,000,000; Stage 1-2-3-1: min. 100,000	Stage 1-2-1: min. 1,000,000; Stage 1-2-3-1: min. 100,000
B_{10d} value	100,000	100,000
Certificates	TÜV cULus	TÜV cULus

Enabling switches

Ordering details and recommended evaluations

Type	Description	Connecting cable	Type designation	Material number
Enabling switches	3-stage grip switch	Without	ZSD5/O.LTG	101199467
		5 m	ZSD5/5M	101199469
		10 m	ZSD5/10M	101199471
	3-stage grip switch with additional pushbutton in device head	Without	ZSD6/O.LTG	101199480
		5 m	ZSD6/5M	101210087
		10 m	ZSD6/10M	101199483
Accessories	Mounting angle made of metal		ZSD-H	101163725

Recommended evaluations

PROTECT SELECT	SRB 301ST	SRB 301MC
		
■ Evaluation of enabling devices ■ STOP 0 or STOP 1, depending on the setting values in the application program	■ Evaluation of enabling devices ■ 1- or 2-channel control, STOP 0	■ Evaluation of enabling devices ■ 1- or 2-channel control, STOP 0