

Enabling Switches

ZS

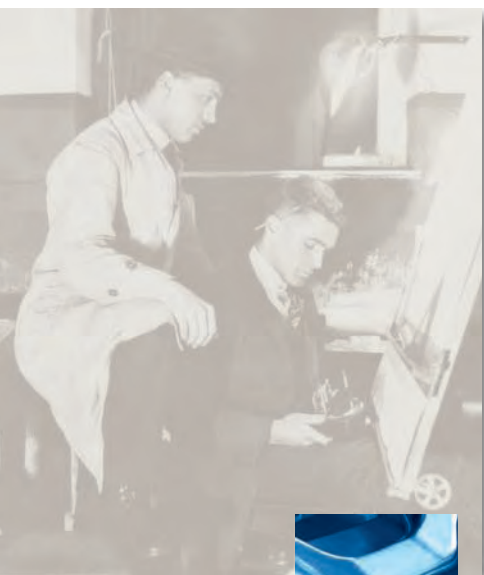


More than safety.

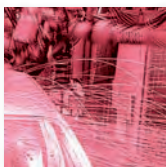


EUCHNER

More than safety.



Emil Euchner, the company's founder and inventor of the multiple limit switch, circa 1928.



Around the world – the Swabian specialists in motion sequence control for mechanical and systems engineering.

EUCHNER's history began in 1940 with the establishment of an engineering office by Emil Euchner. Since that time, EUCHNER has been involved in the design and development of switchgear for controlling a wide variety of motion sequences in mechanical and systems engineering. In 1953, Emil Euchner founded EUCHNER + Co., a milestone in the company's history. In 1952, he developed the first multiple limit switch – to this day a symbol of the enterprising spirit of this family-owned company.

Automation – Safety – ManMachine

Today, our products range from electromechanical and electronic components to complex system solutions. With this wide range of products we can provide the necessary technologies to offer the right solution for special requirements – regardless of whether these relate to reliable and precise positioning or to components and systems for safety engineering in the automation sector.

EUCHNER products are sold through a world-wide sales network of competent partners. With our closeness to the customer and the guarantee of reliable solutions throughout the globe, we enjoy the confidence of customers all over the world.

Quality, reliability, precision

Quality, reliability and precision are the hallmarks of our corporate philosophy. They represent concepts and values to which we feel totally committed.

At EUCHNER, quality means that all our employees take personal responsibility for the company as a whole and, in particular, for their own field of work. This individual commitment to perfection results in products which are ideally tailored to the customers' needs and the requirements of the market. After all: our customers and their needs are the focus of all our efforts. Through efficient and effective use of resources, the promotion of personal initiative and courage in finding unusual solutions to the benefit of our customers, we ensure a high level of customer satisfaction. We familiarize ourselves with their needs, requirements and products and we learn from the experiences of our customers' own customers.

EUCHNER – More than safety.



Quality – made by EUCHNER

Enabling switches

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About this catalog

The *Enabling Switch ZS* catalog provides an overview of our two-stage enabling devices and three-stage enabling switches. Due to their robust and ergonomic design, these switches are the right choice for numerous applications.

You will find the technical data after the product overview. There is a reference to the page with the related technical data on the pages listing the products.

At the front of the catalog you will find useful information on the topic of enabling switches.

You will find the following series and accessories in this catalog:

Enabling switches					
Enabling switches for building in	Hand-held enabling switches				Accessories
ZSG, ZSE and ZXE	in housing ZSM or as kit	in housing G1 or as kit	in housing G1, G3	in housing G2	Cables, plug connectors, holders, blanking covers
 ZSG  ZSE  ZXE	 ZSM	 ZSA G1	 ZSB G1  G3	 ZSR G2	

Standards and approvals

Standards

Enabling switches that are integrated into safety circuits have a safety function. For this reason they are assessed based on the Machinery Directive and the European standards. The Machinery Directive has been implemented in national law in the EU member states and, as a result, is binding for all manufacturers.

Detailed requirements for switches are defined in EN 60947 Part 5-1 (Specification for low-voltage switchgear and controlgear. Part 5-1: Control circuit devices and switching elements. Electromechanical control circuit devices).

If the requirements of these standards are met, conformity with the applicable laws and therefore with the Machinery Directive is assumed. EUCHNER enabling switches comply with the relevant standards for safety switchgear and therefore help you to comply with safety requirements during the design of your machinery.

User standards

As a user, you should take into consideration the following standards of relevance for enabling switches:

European and international standards

Standard	Title
EN 60 204	Safety of machinery. Electrical equipment of machines
EN 775/ EN ISO 10218	Robots for industrial environments - safety requirements (ISO 10218:1992, modified)
VDI 2853	Safety related requirements on design, configuration and operation of industrial robots (withdrawn)
VDI 2854	Safety related requirements on automated manufacturing systems

American standards

Standard	Title
ANSI B11-TR3-2000	Risk Assessment and Risk Reduction - A Guide to Estimate, Evaluate and Reduce Risks Associated with Machine Tools
NFPA 79 (2002)	Electrical Standard for Industrial Machinery
OSHA 29 CFR 1910	
Subpart O	Machinery and Machine Guarding
Subpart P	Hand and Portable Power Tools and Other Hand-Held Equipment
Subpart S	Electrical

Please also observe any existing C standards!

Approvals

To demonstrate conformity, the Machinery Directive also includes the possibility of type examination. In addition to taking into account all relevant standards, EUCHNER commissions type examinations by a notified body.

Many of the enabling switches listed in this catalog have been tested by an employers' liability insurance association (BG) and are given in the lists from the BG. Furthermore, many enabling switches are listed by the Underwriters Laboratories (UL) and the Canadian Standards Association (CSA). These enabling switches can be used in countries in which this listing is required. The approval symbols on the individual pages of the catalog indicate which body tested the enabling switches.

With the aid of the approval symbols listed below you can quickly see which approvals are available for the related enabling switches:



Switches with this symbol have the approval of the German Social Accident Insurance association (DGVV) – formerly the employers' liability insurance association (BG)



Switches with this symbol are approved by Underwriters Laboratories (UL, Canada and USA)

Function and technology used in enabling switches

Task of enabling switches

Enabling switches are manually operated control devices that, together with other control switches, enable commands related to potentially hazardous conditions to be run, as long as the enabling switches are actuated continuously.

These switches are used wherever personnel must work directly in the danger area on machines and systems. This is necessary, e.g. during setting up, programming, testing or servicing work. As per annex 1 of the Machinery Directive, the protective action of movable safety guards can be disabled in these operating modes. The Machinery Directive places the condition that these operating modes must be secured using a lockable device (e.g. key-operated switch) and machine operation is only allowed to be triggered by a second, separate action.

To enable the operator in the danger area of a machine to trigger a machine movement, an enabling device must also be actuated. The operator must also be able to stop the machine movement using the enabling device. This task is performed by the enabling switch.

Every person who is in the hazardous area must carry an enabling device so that suitable action can be taken in case of danger.

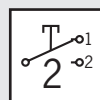
Two-stage enabling device or three-stage enabling switch?

The operator can only start a machine movement if he/she actuates the enabling device and keeps it in the actuated position. The movement is stopped again when the switch is released. This two-stage function (OFF-ON) is provided by all enabling switches.

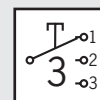
However, experience shows that the operator often clenches the enabling device in an emergency.

In this case a three-stage enabling switch is better and is specifically requested in many C standards. This switch has three switch positions (OFF-ON-OFF) and, if the operator clenches the switch, it is actuated beyond the enabling position (middle position) and the machine is shut down as a result.

If a 2-stage enabling switch is used, it must also be ensured that, in an emergency, the operator is in a position to activate an emergency stop device in close proximity (VDI 2853). To identify the type of enabling switch in the catalog, the following symbols are used:



Symbol for a
2-stage enabling device



Symbol for a
3-stage enabling switch

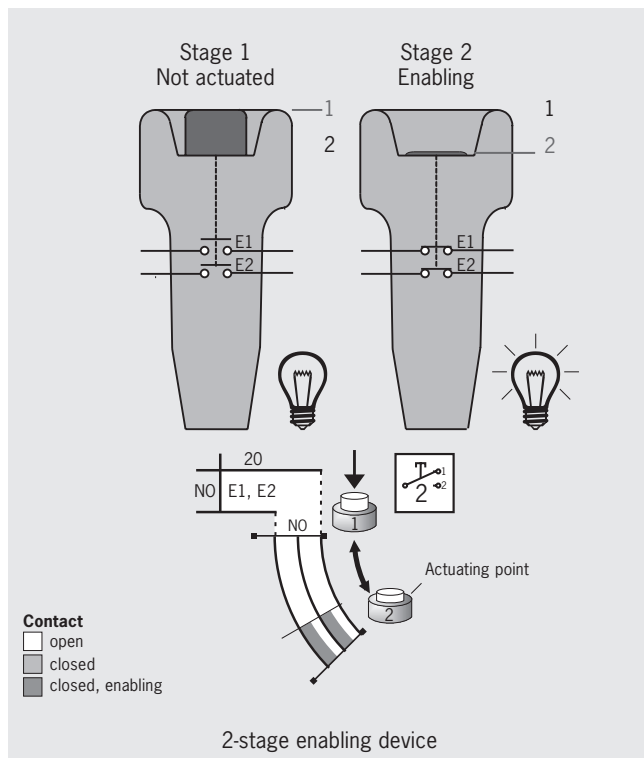
Large selection of switching elements

To be able to cover as many applications as possible, EUCHNER enabling switches can be fitted with various switching elements of single-channel or dual-channel design. Auxiliary contacts are also available, as are additional switches or displays.

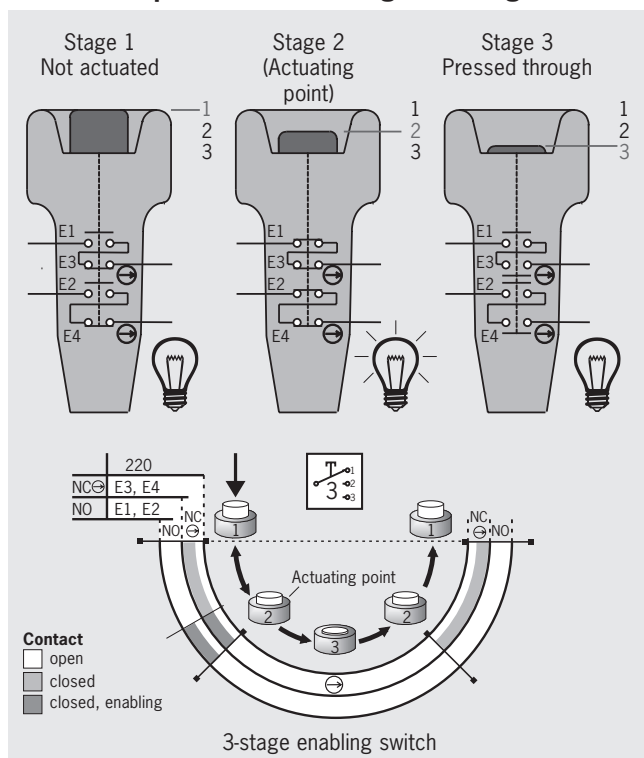
Positively driven contacts

Positively driven contacts are used in many switching elements. These are special switching contacts that are designed to ensure the switching contacts are always reliably separated. Even if contacts are welded together, the connection is opened by the actuating force.

Function sequence of two-stage enabling device



Function sequence of three-stage enabling switch



As can be clearly seen in the figure, the enabling function can only be achieved at stage 2. This function is provided by the closing of the normally open contacts (NO = E1 and E2).

If the button is released, that is back from stage 2 to stage 1, the normally open contacts are opened again. The 2-stage enabling devices and 3-stage enabling switches are identical in this function.

If, in this example, the button on a 3-stage enabling switch is pressed past the actuating point (stage 2) in panic (to stage 3), then not only the normally open contacts (NO) are reset, but also the safe positively driven contacts (NC ⊖).

The patented switch system ensures that the enabling function does not become active at stage 2 on the resetting of the pushbutton from stage 3 to stage 1. In this example the enable can only be given if normally open and positively driven contacts are closed at the same time. Das ist nur bei der Betätigung von Stufe 1 nach Stufe 2 möglich. In the other direction, from stage 3 to stage 1, stage 2 is skipped and unintentional re-starting prevented.

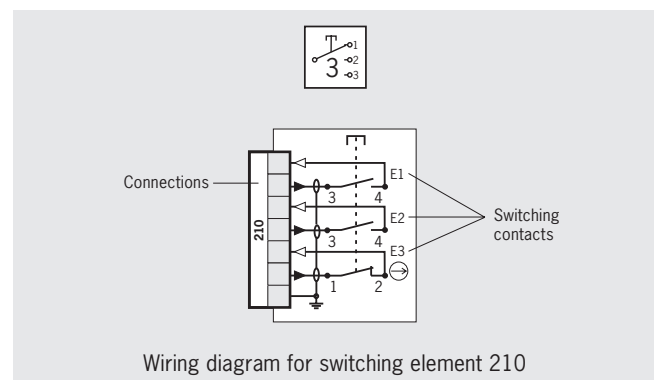
Once the pushbutton has reached stage 1, the function sequence can be started again.

Due to its design, the switch unit also provides a wear-free, constant actuating point (stage 2).

Reading travel diagrams and wiring diagrams

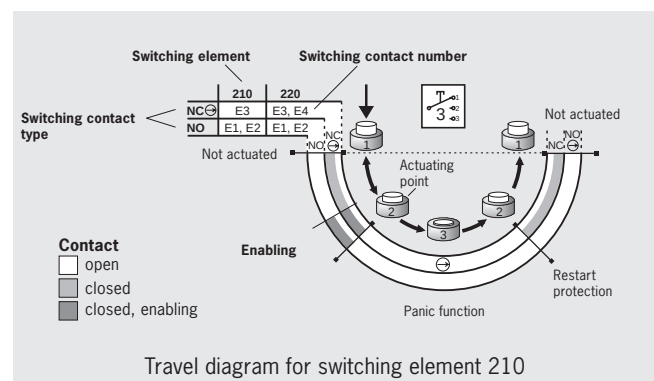
For each of the switching elements used, there is a travel diagram which, dependent of the enabling switch's switch stage, shows the switching states.

The following example is intended to explain these aspects:



The wiring diagram shows the switching element in the free position (enabling switch not actuated).

The switching element 210 has three switching contacts (E1, E2 and E3). The switching contact E3 is designed as a positively driven contact, the other two switching contacts as normally open contacts.



As in this example, in some cases several switching elements are combined in one travel diagram. Here, along with the switching element 210 with the switching contacts E1, E2 and E3, there is also the switching element 220 with the switching contacts E1 to E4.

The letters on the left beside the switching contact E3 define the switching contact type, in this case a positively driven contact (NC ⊖).

The following switching contact types are available:

- ▶ NO normally open contact
- ▶ NC normally closed contact
- ▶ NC $\ominus$ positively driven contact
- ▶ NO/NC three-point switch
(3-stage switching contact with normally open/normally closed function; switching stage dependent on the actuation travel)
- ▶ NO/NC $\ominus$ three-point switch
(as NO/NC but with positively driven contact)

The travel diagram shows the switching state of each switching contact for the three switch stages „Not actuated“, „Enabling“ and „Panic function“ (pressed past actuating point). Gray areas mean „switch closed“, white areas mean „switch open“.

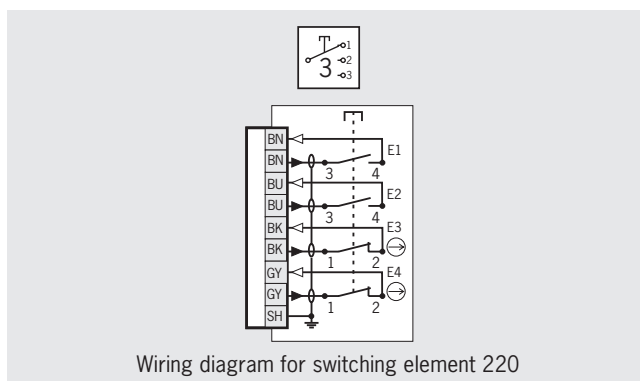
In the example for switching element 210 the sequence is as follows:

- ▶ In the not actuated state, the positively driven contact E3 is closed (gray area) and the two normally open contacts E1 and E2 are open.
- ▶ When the switch has reached stage 2, the normally open contacts E1 and E2 are closed; E3 remains closed. Dies ist der Zustimmungsbereich.
- ▶ If the switch is released, the switching contacts return to their initial state.
- ▶ If the switch is pressed beyond the enabling area, all switching contacts are opened. This is the „panic function“ area on the travel diagram.
- ▶ If the switch is now released again, the positively driven contact E3 is closed again, the switch system prevents the normally open contacts E1 and E2 closing again at the same time (restart protection).

An optimal sequence is provided by the series connection of E1 (normally open contact) and E3 (positively driven contact), as then enabling is only possible at the actuating point. On pressing through to stage 3, the safe positively driven contact opens the safety circuit. On this switching element E2 can be used as an auxiliary contact or 2nd channel.

Single-channel and dual-channel enabling switches

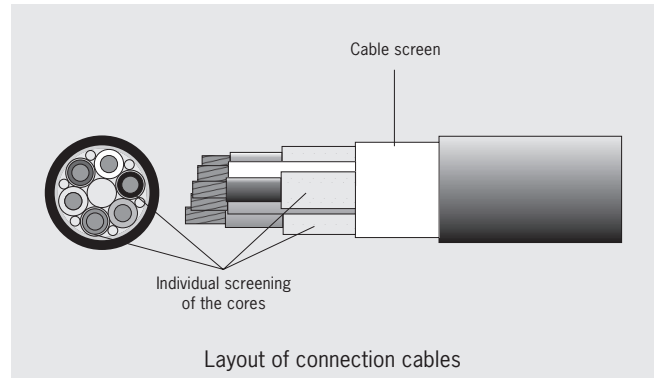
Often two positively driven contacts and normally open contacts are employed to increase safety using the principle of duplicated design (redundancy). This dual-channel design ensures that on the failure of one channel or on a fault in the control circuit (e.g. in the machine wiring), the safety function can still be provided with the aid of the second channel. An example is given in the wiring diagram for switching element 220:



The normally open contact E1 and the positively driven contact E3 as well as the normally open contact E2 and the positively driven contact E4 can be connected externally in series. In this way a dual-channel design is achieved.

Safety in case of faults

Along with the possibility of using positively driven contacts and the possible dual-channel layout of the design, the patented connection cables from EUCHNER provide additional protection on the occurrence of faults. Not only the outer screening of the cable, but also the individual screening of the cores enables, e.g. short circuits or cable breaks due to crushing, to be detected by a control system.



Protection against tampering

An enabling switch can only ensure that operation is free of hazards if it is not bypassed. To prevent tampering, our enabling switches are designed such that it is more difficult to bypass the safety function. The best tampering protection is, however, acceptance with the user.

Ergonomics

To achieve the related user acceptance of a manually operated control, the focus of EUCHNER enabling switches is on safe and balanced handling, even over extended periods (e.g. when observing manufacturing processes). Enabling switches manufactured by EUCHNER have a low weight, an ergonomic housing design and a light, stable actuating point. Both thumb-actuated switches and switches that can be actuated with several fingers in order to maintain the actuating force over an extended period are used.

By selecting a coiled cable with long cable ends, the weight of the switch is reduced as the heavy, spiral part of the cable lies on the floor and only the lighter, straight part needs to be held by the user.



Enabling switches for building in

The enabling devices in series ZSG and the enabling switches in series ZSE and ZXE can be integrated into any housings or control panels. As a result every customer can prepare a customized solution to suit his/her specific application.



Kits for enabling switches

Using enabling switch kits from EUCHNER you can assemble your own customized enabling switch ideally matched to your requirements. The kit is available for the housing G1 as a two or three-stage version and for the ZSM as a three-stage version. Various switching elements are available.

Hand-held enabling switches

The enabling switches in the series ZSM, ZSA, ZSB and ZSR are installed in a housing and are already pre-wired. Depending on the model, the hand-held enabling switches have degree of protection IP 67 or IP 65. Along with the enabling function, EUCHNER enabling switches can be equipped with further controls (pushbuttons, selector switches, key-operated switches or emergency stop device) and LED indicators. In this way work processes, such as axis selection and the movement of axes, can be performed directly at the machine using the enabling switch.



Electrical connection

Different cable lengths and cable types are available for the connection of the pre-assembled hand-held enabling switches.

Modern wiring concepts increasingly utilize plug-in connections. The enabling switch does not need to remain permanently connected, but is plugged in as required.

Furthermore, a switch with plug connectors can be easily replaced during servicing work. This configuration results in short downtimes.

The enabling switches ZSM, ZSA, ZSB and ZSR are available with various plug connectors. In addition to the related mating connectors, further accessories are available.

Marking of switching elements

The switching elements used in our enabling switches have a numbering system. A selection of switching elements is available depending on the series.

Explanation of symbols and notation

Symbols and specific notation related to the switches or the switching contact are used time and again in the catalog. The following example is intended to explain these aspects:

Notation

1 NC $\ominus$ + 1 NO

Explanation

Normally closed contacts are represented by NC, normally open contacts with NO. The number defines how many contacts are available. The symbol after the NC defines that the NC contact is a positively driven contact. This switch therefore has one normally closed contact and one normally open contact; the normally closed contact is a positively driven contact.

Acknowledgement of enabling

Vibration signal

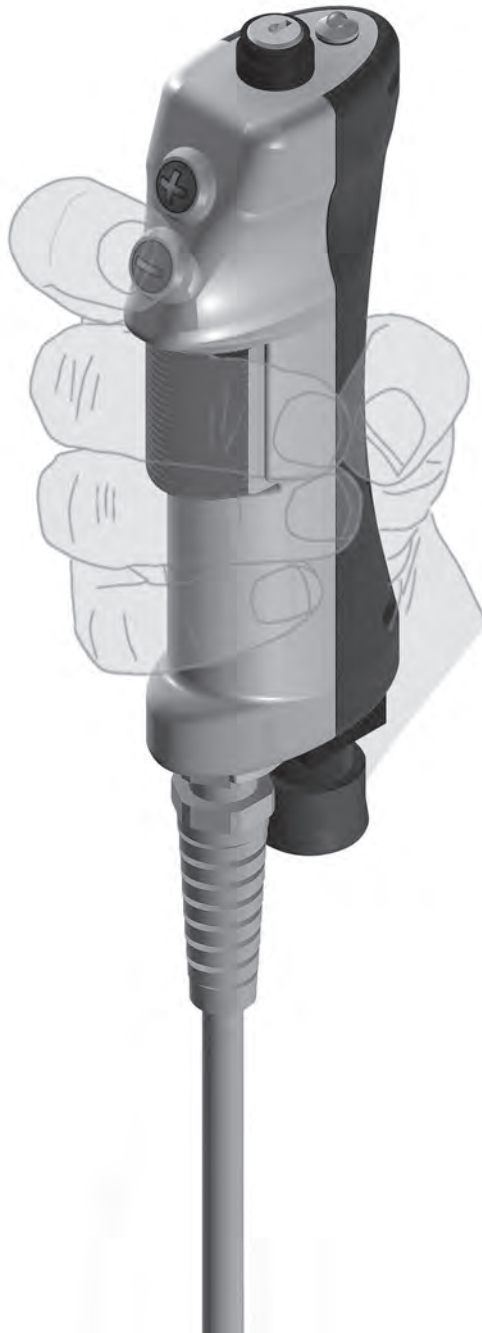
The ZSM enabling switch is optionally equipped with a vibration motor. This permits acknowledgement of enabling, e.g. in a loud environment. The signal pulsates, similar to the vibration signal of cellular telephones.

LED

An LED can also be optionally used as visual acknowledgement. Several products are equipped accordingly.

Emergency stop/machine stop

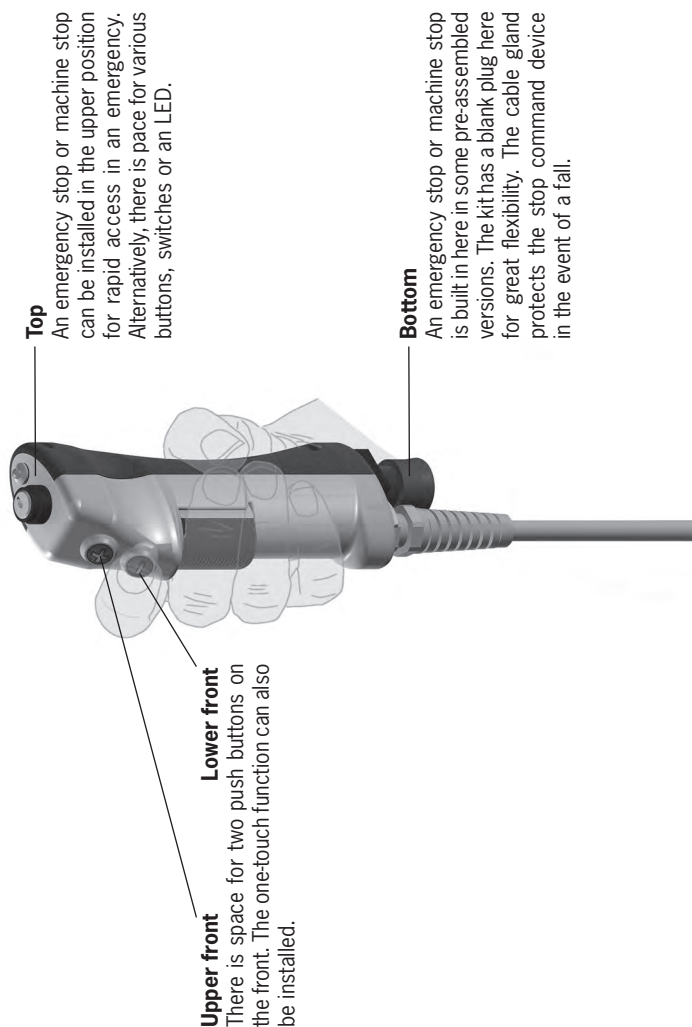
All emergency-stop devices with red pushbutton must be active in the danger area. Since a plugged connection could be unplugged in certain circumstances, enabling switches with plug connectors are equipped only with a black/yellow machine stop.



Article overview for enabling switch ZSM

Page	12	12	13	14	14	15	15	16	17	18	18	19	19	19	20
Plug connector	-	-	-	-	-	RC17	HAN Q17	-	-	-	-	RC12	RC12	RC12	-
Cable length [m]	Connection cable coiled		1.88 - 5			1.88 - 5	1.4 - 3.8		1.88 - 5			1.88 - 5	1.88 - 5		
	Connection cable Straight		5	5		5		5	-	5	5	-	-	5	10
vibration signal	●	●	-	●	●	-	●	-	-	●	●	●	●	-	●
ZS	3 W	3 W	3 W	2 S	2 S	2 S	2 S	3 W	1 C + 1 NO	2 S	2 S	2 S	2 S	2 S	2 S
Bottom Stop command device	Emergency stop red 2 NC (→)		-	-	-	-	-	-	-	-	-	-	-	-	-
	Machine stop Black 2 NC (→)		-	-	-	●	●	-	-	-	-	-	-	-	-
Front	One-touch function (joy-stick)		-	-	-	-	-	-	-	-	-	-	-	-	-
	Bottom push button		white	white	Black	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖
	Top push button		-	-	-	⊕	⊕	⊕	⊖	⊕	⊕	⊕	⊕	⊕	⊕
Top	Stop command device		-	●	●	-	-	-	-	-	-	-	-	-	-
	Machine stop Black 2 NC (→)		●	-	-	-	-	-	-	-	-	-	-	-	-
	LEDs		●	●	-	●	●	-	2 x ●	●	●	●	●	-	-
	Push button		-	-	-	-	● Reset	-	-	-	-	-	-	-	-
	Key switch		-	-	-	●	●	-	-	-	-	-	-	-	-
	Selector switch		-	-	-	-	3-stage 1 of 3	-	-	-	-	-	-	-	4-stage 1 of 4
Order no. / item	102059 ZSM4201-102059	102966 ZSM4204-102966	105645 ZSM4204-105645	099715 ZSM2101-099715	103126 ZSM2101-103126	110317 ZSM2301-110317	105075 ZSM2301-105075	099713 ZSM4200-099713	111871 ZSM2300-111871	099714 ZSM2100-099714	109971 ZSM2300-109971	111462 ZSM2300-111462	111594 ZSM2100-111594	099716 ZSM2300-099716	100697 ZSM2200-100697

106103 ZSM2100-106103	5-stage Gray code	-	-	-	-	-	-	-	⊕	⊖	-	-	-	2 S	-	3	-	20
105308 ZSM2200-105308	12-stage Gray code	-	-	-	-	-	-	-	⊕	⊖	-	-	-	3 S	-	5	-	21
103462 ZSM3100-103462	12-stage Gray code	-	-	-	-	-	-	-	⊕	⊖	-	-	-	2 NO + 1 C	-	1.88 - 5	-	21
105362 ZSM2200-105362	-	●	-	-	-	-	-	-	-	-	-	-	-	2 S	●	8	-	22
110338 ZSM2300-110338	-	●	-	-	-	-	-	-	⊕	⊖	-	-	-	2 S	-	1.55 - 3.5	RC12	22
106670 ZSM2300-106670	-	-	●	Reset	-	-	-	-	⊖	⊕	-	-	-	2 S	●	1.25 - 3.1	HAN Q17	23
106374 ZSM2300-106374	-	-	-	Black	-	-	-	-	-	-	●	-	-	1 NO + 1 C	-	-	RC17	23



Enabling switch ZSM with upper stop command device

- ▶ 3-stage function
- ▶ Stop command device
- ▶ Vibration signal optional
- ▶ LED indicator optional
- ▶ Push button
- ▶ Coiled connection cable optional

3-stage function

Enabling function is only active in the second stage (middle position, actuating point). If the button is released or pushed further (panic function), the enabling is removed (dependent on the wiring, see function sequence).

Stop command device

Two-channel emergency stop device (red, with pull-to-reset button) or machine stop (black, with pull-to-reset button) on the switch housing, for different wiring concepts. Upper position for rapid access in an emergency.

Vibration signal

The vibration signal is used for tactile feedback of the enabling position.

LEDs

The LED indicator is used for visual feedback directly at the enabling switch.

Push button

Additional functions can be run directly at the enabling switch using the buttons.

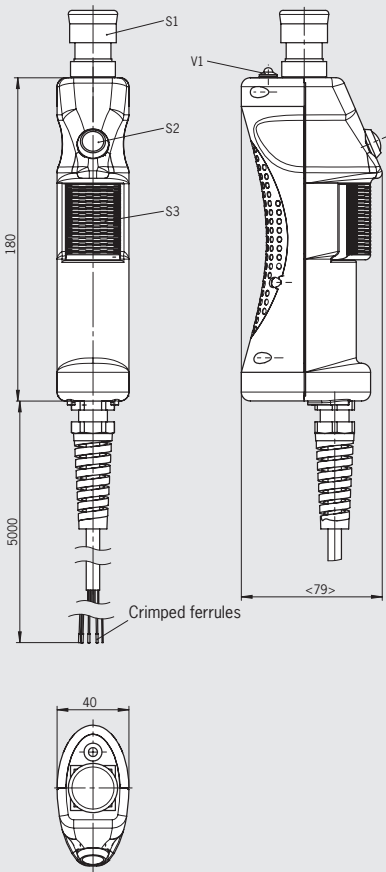
Cable

The high-quality connection cables are available in a straight or coiled version.

ZSM4201-102059, 3-stage function
Flying lead, machine stop

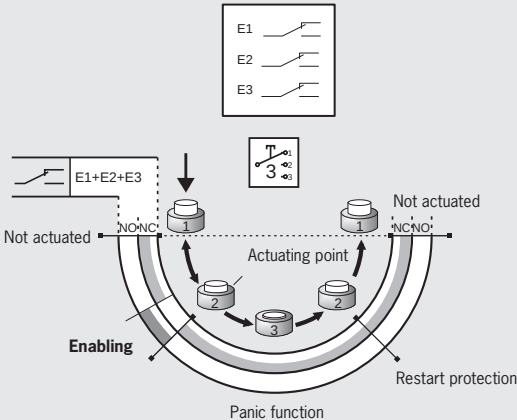
ZSM4204-102966, 3-stage function
Flying lead, emergency stop device

Dimension drawing



For wiring diagram see page 26

Switching element/function sequence

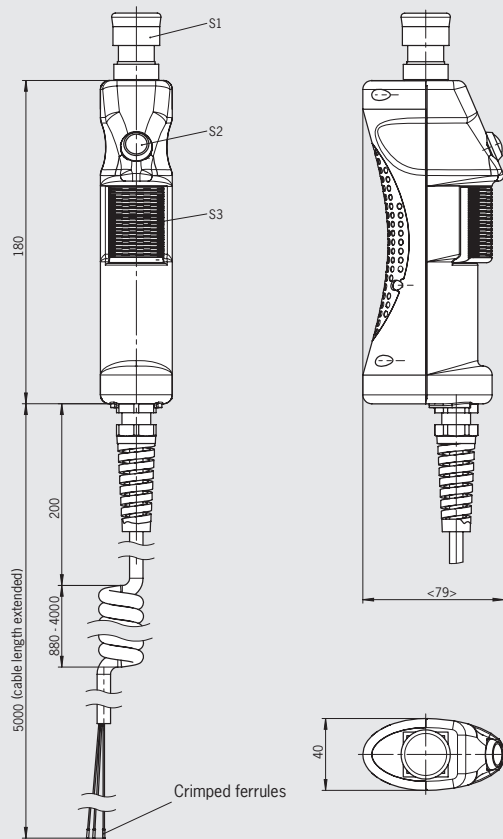


Ordering table

Design	Connection	Conductor length	Version	Order no. / item
ZSM	flying lead 23 x 0.14 mm ²	5 m Straight	Enabling switch with 3 changeover contacts (S3), black machine stop (S1), vibration signal, yellow LED indicator (V1), white push button (S2)	102059 ZSM4201-102059
			Enabling switch with 3 changeover contacts (S3), red emergency stop device (S1), vibration signal, yellow LED indicator (V1), white push button (S2)	102966 ZSM4204-102966

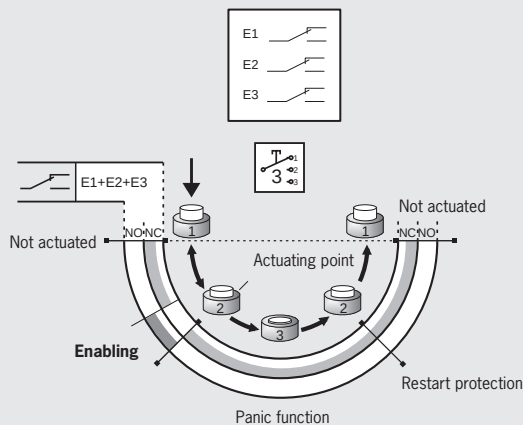
ZSM4204-105645, 3-stage function
Flying lead, emergency stop device

Dimension drawing



For wiring diagram see page 26

Switching element/function sequence



Ordering table

Design	Connection	Conductor length	Version	Order no. / item
ZSM	flying lead 23 x 0.14 mm ²	1.88 ... 5 m coiled	Enabling switch with 3 changeover contacts (S3), red emergency stop device (S1) white push button (S2)	105645 ZSM4204-105645

Enabling switch ZSM with lower stop command device

- ▶ 3-stage function
- ▶ Stop command device
- ▶ Vibration signal optional
- ▶ LEDs
- ▶ Reset button optional
- ▶ + and – buttons
- ▶ Selector switch optional
- ▶ Key-operated switch optional
- ▶ Coiled connection cable optional
- ▶ Plug connector optional

3-stage function

Enabling function is only active in the second stage (middle position, actuating point). If the button is released or pushed further (panic function), the enabling is removed (dependent on the wiring, see function sequence).

Stop command device

Two-channel emergency stop device (red, with pull-to-reset button) or machine stop (black, with pull-to-reset button) on the switch housing, for different wiring concepts.

Lower position, protected by anti-kink cable gland in case of a fall.

Vibration signal

The vibration signal is used for tactile feedback of the enabling position.

LEDs

The LED indicator is used for visual feedback directly at the enabling switch.

Reset button

Button for reset function directly from the enabling switch. Laser inscription on the button head: C (cancel).

+ and – buttons

These buttons can be configured individually. For example for moving axes in the positive or negative direction.

Selector switch

As required, the adjustable detent positions can, e.g. be used for axis, speed or range selection.

Key switch

For individual use, e.g. as operating mode selector switch.

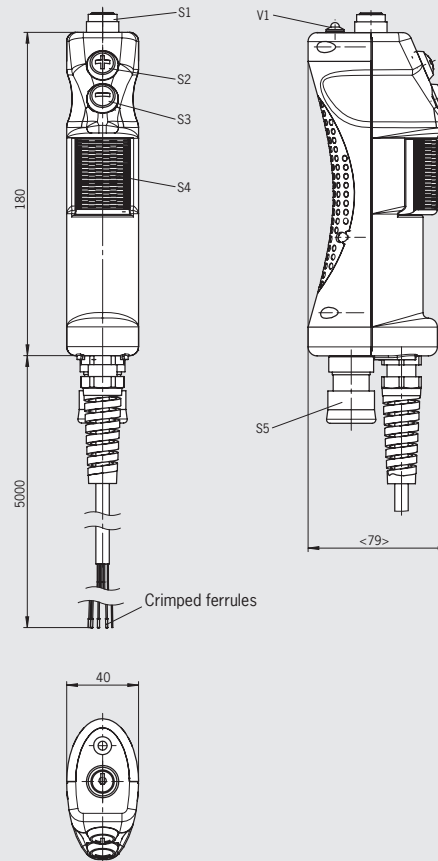
Cable

The high-quality connection cables are available in a straight or coiled version.

ZSM2101-099715, 3-stage function
Flying lead, machine stop

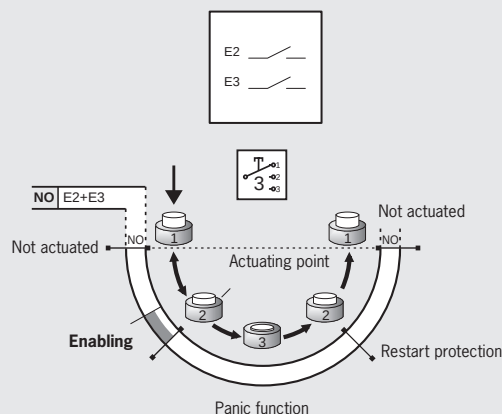
ZSM2101-103126, 3-stage function
Flying lead, emergency stop device

Dimension drawing



For wiring diagram see page 27

Switching element/function sequence

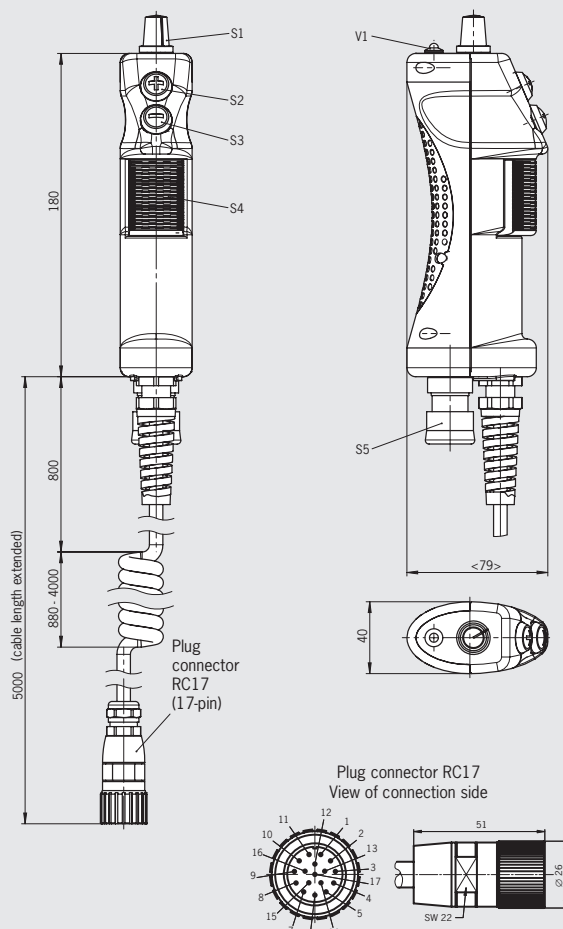


Ordering table

Design	Connection	Conductor length	Version	Order no. / item
ZSM	flying lead 23 x 0.14 mm ²	5 m Straight	Enabling switch with 2 NO contacts (S4), black machine stop (S5), vibration signal, yellow LED indicator (V1), +/- buttons (S2/S3), key-operated switch (S1)	099715 ZSM2101-099715
			Enabling switch with 2 NO contacts (S4), red emergency stop device (S5), vibration signal, yellow LED indicator (V1), +/- buttons (S2/S3), key-operated switch (S1)	103126 ZSM2101-103126

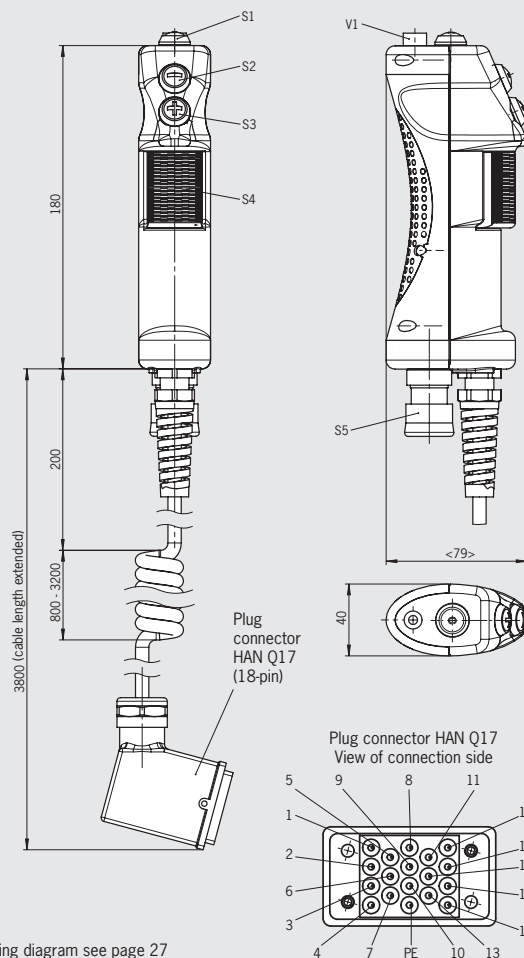
ZSM2301-110317, 3-stage function Plug connector RC17, machine stop

Dimension drawing



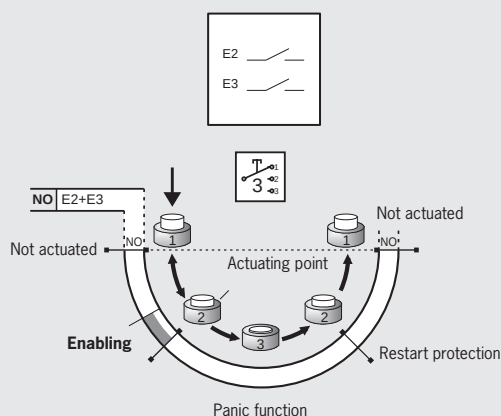
For wiring diagram see page 27
For mating connectors see page 25

ZSM2301-105075, 3-stage function Plug connector HAN Q17, machine stop



For wiring diagram see page 27
For mating connectors see page 25

Switching element/function sequence



Ordering table

Design	Connection	Conductor length	Version	Order no. / item
ZSM	RC17 Plug connector (17-pin)	1.88 ... 5 m coiled	Enabling switch with 2 NO contacts (S4), black machine stop (S5), yellow LED indicator (V1), +/- buttons (S2/S3), selector switch 3-stage 1 from 3 (S1)	110317 ZSM2301-110317
	HAN Q17 Plug connector (18-pin)	1.4 ... 3.8 m coiled	Enabling switch with 2 NO contacts (S4), black machine stop (S5), vibration signal, red/green LED indicator (V1), +/- buttons (S3/S2), reset button (S1)	105075 ZSM2301-105075

Enabling switch ZSM without stop command device

- ▶ 3-stage function
- ▶ Vibration signal optional
- ▶ LED indicator optional
- ▶ + and – buttons optional
- ▶ Plug connector optional

3-stage function

Enabling function is only active in the second stage (middle position, actuating point). If the button is released or pushed further (panic function), the enabling is removed (dependent on the wiring, see function sequence).

Vibration signal

The vibration signal is used for tactile feedback of the enabling position.

LEDs

The LED indicator is used for visual feedback directly at the enabling switch.

+ and – buttons

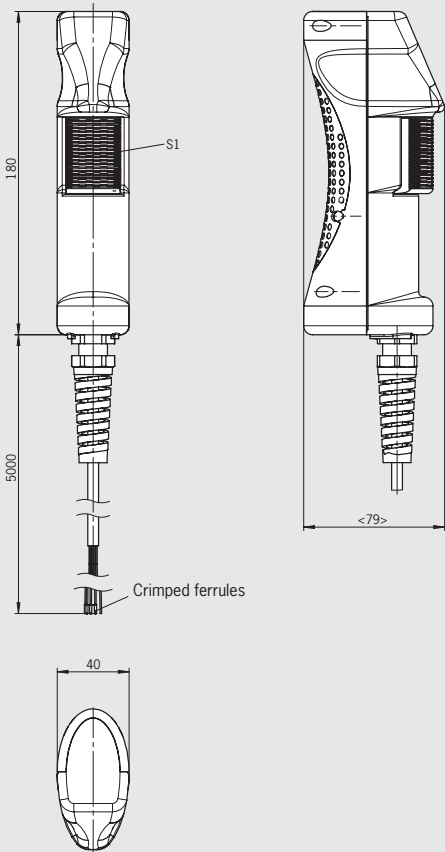
These buttons can be configured individually. For example for moving axes in the positive or negative direction.

Cable

The high-quality connection cables are available in a straight or coiled version.

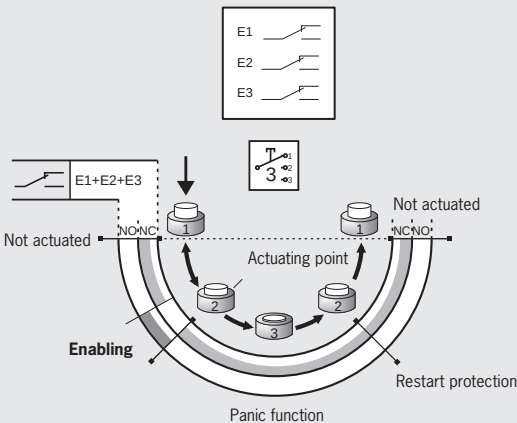
ZSM4200-099713, 3-stage function flying lead

Dimension drawing



For wiring diagram see page 28

Switching element/function sequence

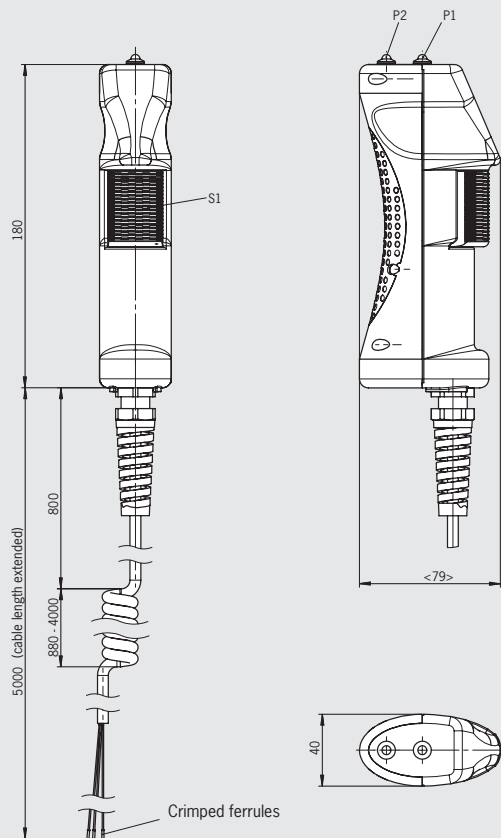


Ordering table

Design	Connection	Conductor length	Version	Order no. / item
ZSM	flying lead 12 x 0.14 mm ²	5 m Straight	Enabling switch with 3 changeover contacts (S1)	099713 ZSM4200-099713

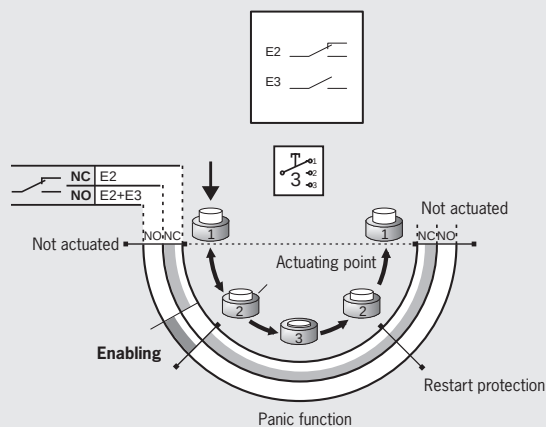
ZSM2300-111871, 3-stage function flying lead

Dimension drawing



For wiring diagram see page 28

Switching element/function sequence



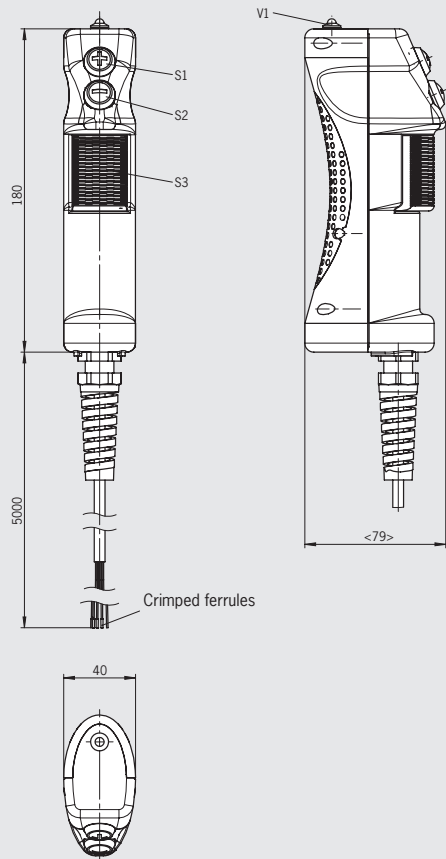
Ordering table

Design	Connection	Conductor length	Version	Order no. / item
ZSM	flying lead 12 x 0.14 mm ²	1.88 ... 5 m coiled	Enabling switch with 1 changeover contact and 1 normally open contact (S1), 2 green (P1) and yellow (P2) LED indicators	111871 ZSM2300-111871

ZSM2100-099714, 3-stage function
flying lead

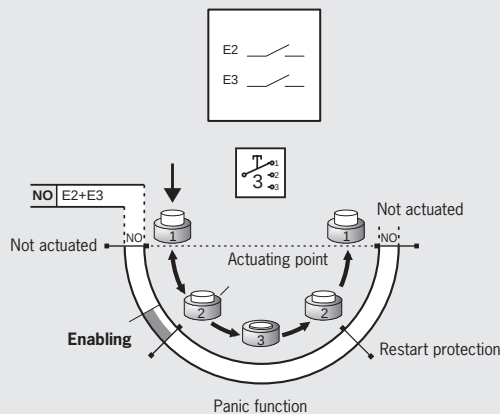
ZSM2300-109971, 3-stage function
flying lead

Dimension drawing



For wiring diagram see page 28

Switching element/function sequence



Ordering table

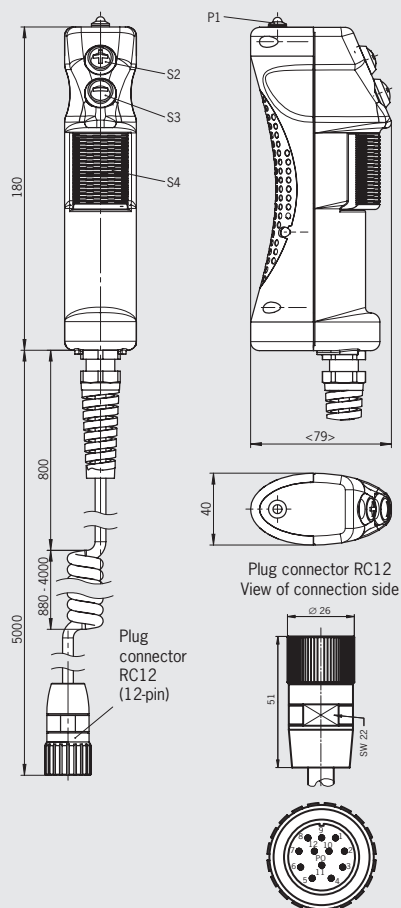
Design	Connection	Conductor length	Version	Order no. / item
ZSM	flying lead 12 x 0.14 mm ²	5 m Straight	Enabling switch with 2 NO contacts (S3), vibration signal, yellow LED indicator (V1), +/- buttons (S1/S2)	099714 ZSM2100-099714
			Enabling switch with 2 NO contacts (S3), vibration signal, yellow LED indicator (V1), +/- buttons (S1/S2), alternative wiring	109971 ZSM2300-109971

ZSM2300-111462, 3-stage function Plug connector RC12

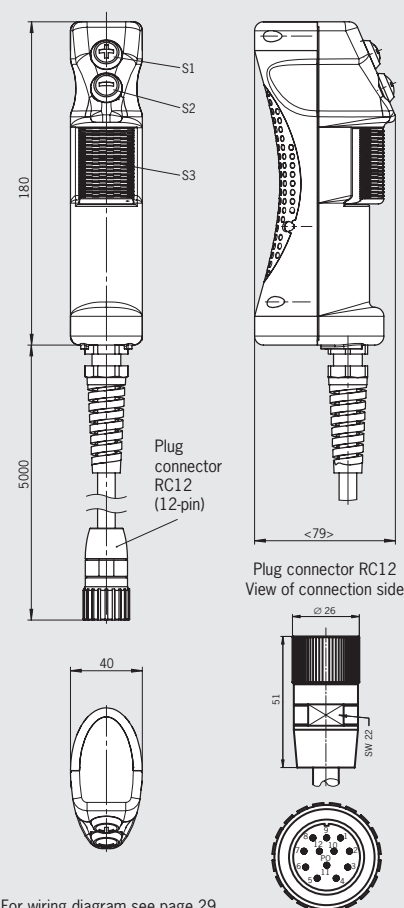
ZSM2100-111594, 3-stage function Plug connector RC12

ZSM2300-099716, 3-stage function Plug connector RC12

Dimension drawing

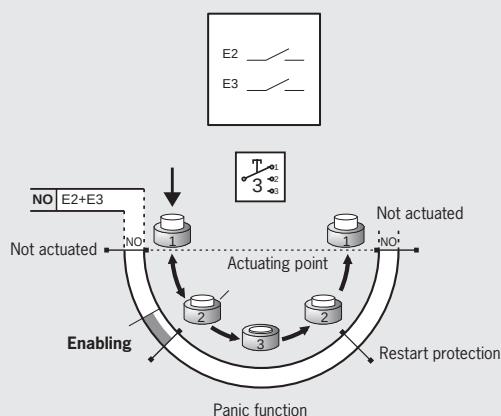


For wiring diagram see page 29
For mating connectors see page 25



For wiring diagram see page 29
For mating connectors see page 25

Switching element/function sequence



Ordering table

Design	Connection	Conductor length	Version	Order no. / item
ZSM	RC12 Plug connector (12-pin)	1.88 ... 5 m coiled	Enabling switch with 2 NO contacts (S3), yellow LED indicator (P1), +/- buttons (S1/S2)	111462 ZSM2300-111462
			Enabling switch with 2 NO contacts (S3), yellow LED indicator (P1), +/- buttons (S1/S2), alternative wiring	111594 ZSM2100-111594
		5 m Straight	Enabling switch with 2 NO contacts (S3), +/- buttons (S1/S2)	099716 ZSM2300-099716

Enabling switch ZSM without stop command device

- ▶ 3-stage function
- ▶ Vibration signal optional
- ▶ LED indicator optional
- ▶ + and – buttons
- ▶ Selector switch
- ▶ Coiled connection cable optional

3-stage function

Enabling function is only active in the second stage (middle position, actuating point). If the button is released or pushed further (panic function), the enabling is removed (dependent on the wiring, see function sequence).

Vibration signal

The vibration signal is used for tactile feedback of the enabling position.

LEDs

The LED indicator is used for visual feedback directly at the enabling switch.

+ and – buttons

These buttons can be configured individually. For example for moving axes in the positive or negative direction.

Selector switch

As required, the adjustable detent positions can, e.g. be used for axis, speed or range selection.

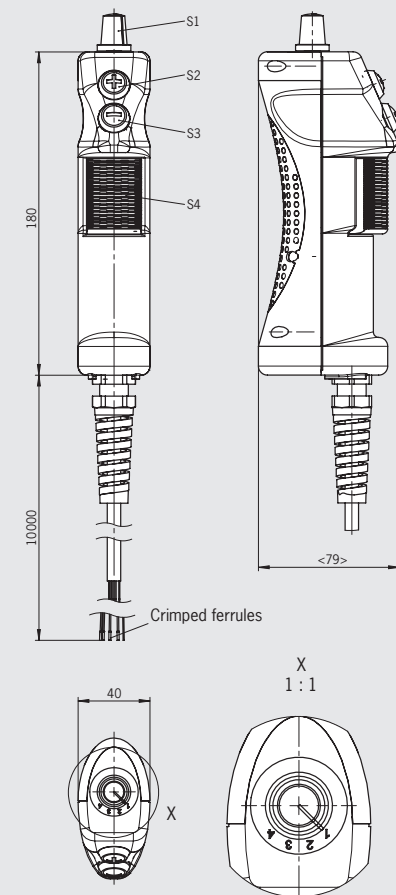
Cable

The high-quality connection cables are available in a straight or coiled version.

ZSM2200-100697, 3-stage function

Flying lead, selector switch

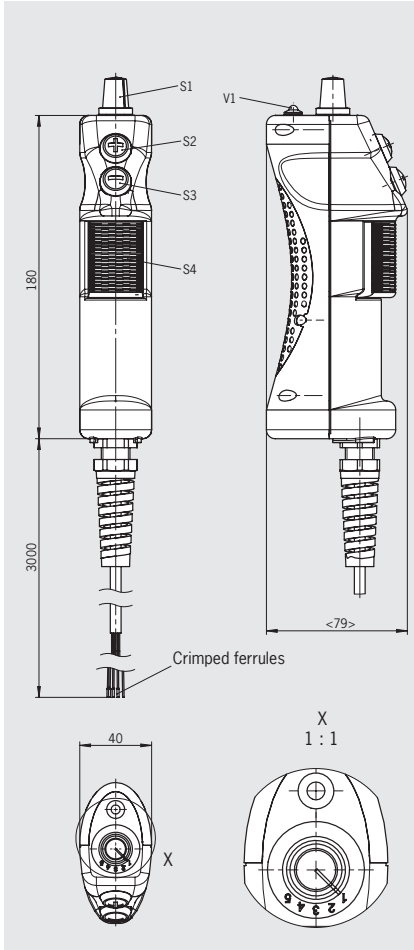
Dimension drawing



For wiring diagram see page 29

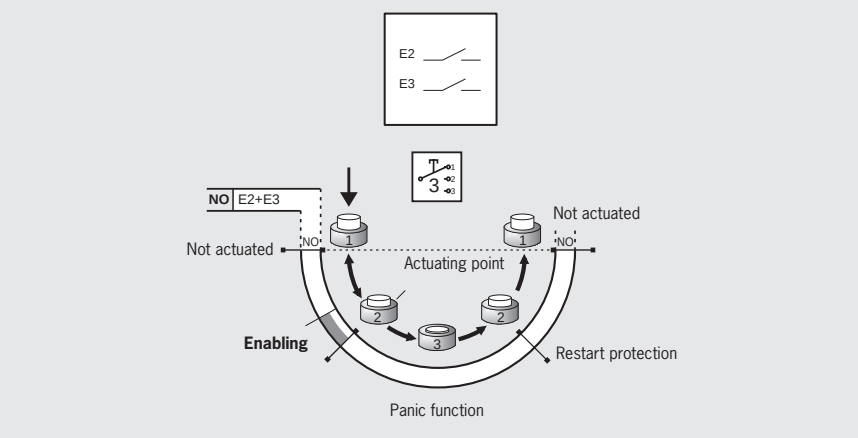
ZSM2100-106103, 3-stage function

Flying lead, selector switch



For wiring diagram see page 30

Switching element/function sequence



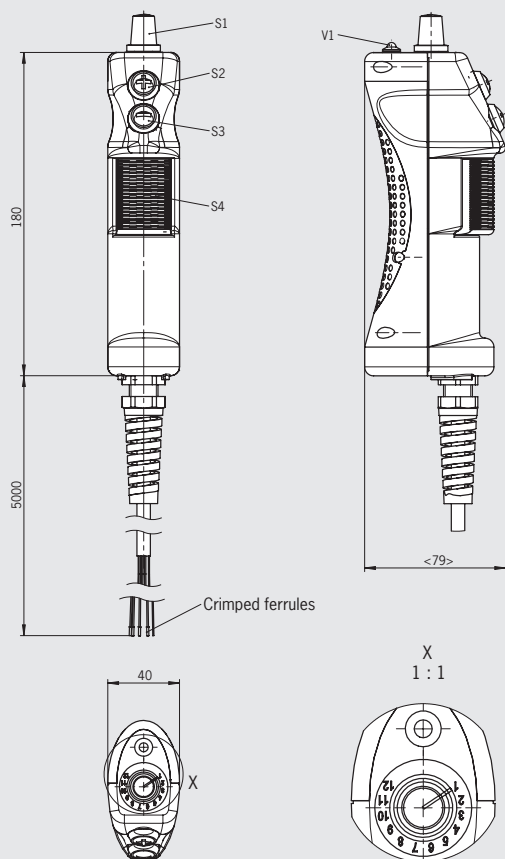
Ordering table

Design	Connection	Conductor length	Version	Order no. / item
ZSM	flying lead 23 x 0.14 mm ²	10 m Straight	Enabling switch with 2 NO contacts (S4), vibration signal, +/– buttons (S2/S3), selector switch 4-stage 1 from 4 (S1)	100697 ZSM2200-100697
	flying lead 12 x 0.14 mm ²	3 m Straight	Enabling switch with 2 NO contacts (S4), yellow LED indicator (V1), +/– buttons (S2/S3), selector switch 5-stage Gray code (S1)	106103 ZSM2100-106103

ZSM2200-105308, 3-stage function

Flying lead, selector switch

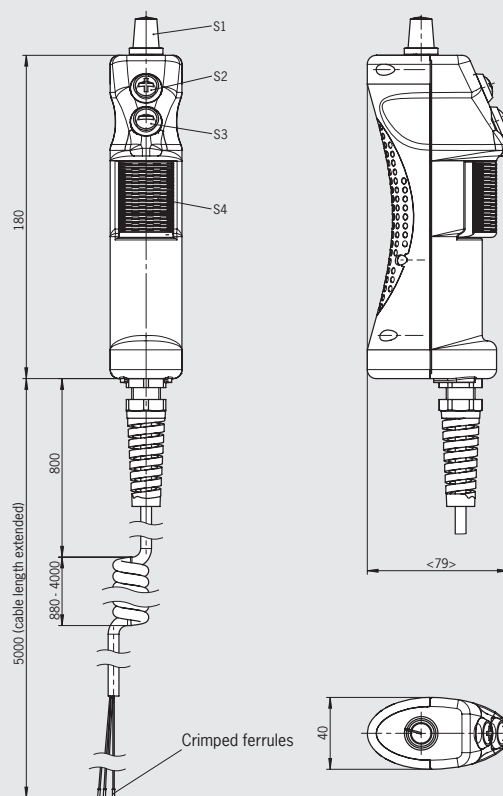
Dimension drawing



For wiring diagram see page 30

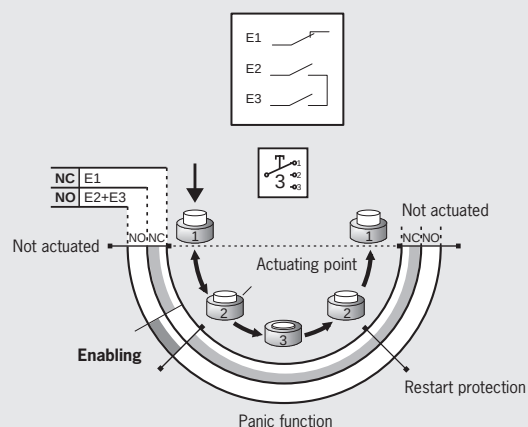
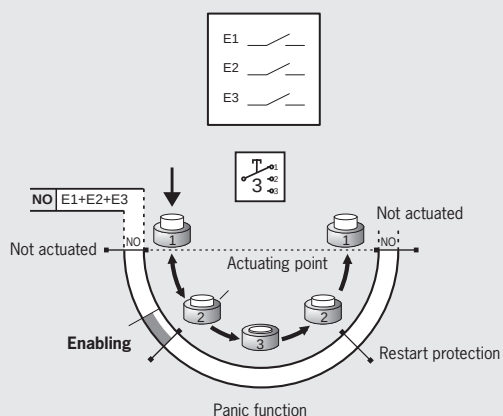
ZSM3100-103462, 3-stage function

Flying lead, selector switch



For wiring diagram see page 30

Switching element/function sequence



Ordering table

Design	Connection	Conductor length	Version	Order no. / item
ZSM	flying lead 23 x 0.14 mm ²	5 m Straight	Enabling switch with 3 NO contacts (S4), +/- buttons (S2/S3), selector switch 12-stage Gray code (S1)	105308 ZSM2200-105308
	flying lead 12 x 0.14 mm ²	1.88 ... 5 m coiled	Enabling switch with 1 NC contact and 2 NO contacts (S4), +/- buttons (S2/S3), selector switch 12-stage Gray code (S1)	103462 ZSM3100-103462

Enabling switch ZSM without stop command device

- ▶ 3-stage function
- ▶ Vibration signal optional
- ▶ LED indicator optional
- ▶ Reset button optional
- ▶ + and – buttons optional
- ▶ Push button optional
- ▶ Key-operated switch optional
- ▶ Mini joystick optional
- ▶ Coiled connection cable optional
- ▶ Plug connector optional

3-stage function

Enabling function is only active in the second stage (middle position, actuating point). If the button is released or pushed further (panic function), the enabling is removed (dependent on the wiring, see function sequence).

Vibration signal

The vibration signal is used for tactile feedback of the enabling position.

LEDs

The LED indicator is used for visual feedback directly at the enabling switch.

Reset button

Button for reset function directly from the enabling switch. Laser inscription on the button head: C (cancel).

+ and – buttons

These buttons can be configured individually. For example for moving axes in the positive or negative direction.

Push button

Additional functions can be run directly at the enabling switch using the buttons.

Key switch

For individual use, e.g. as operating mode selector switch.

One-touch function (joystick)

The four contacts are connected to a common pin. This permits a one-touch function irrespective of the actuating direction.

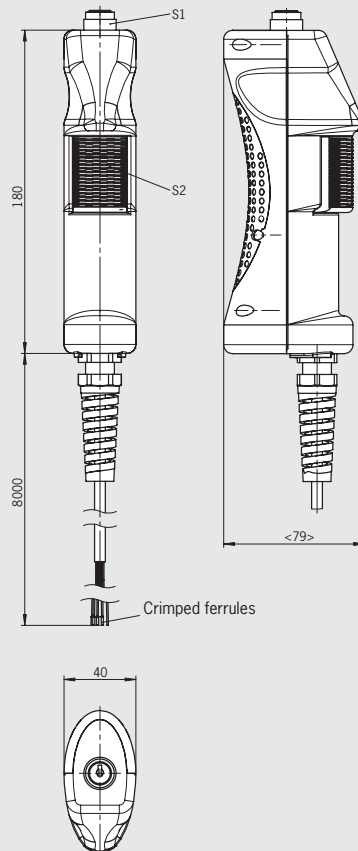
Cable

The high-quality connection cables are available in a straight or coiled version.

ZSM2200-105362, 3-stage function

Flying lead, key-operated switch

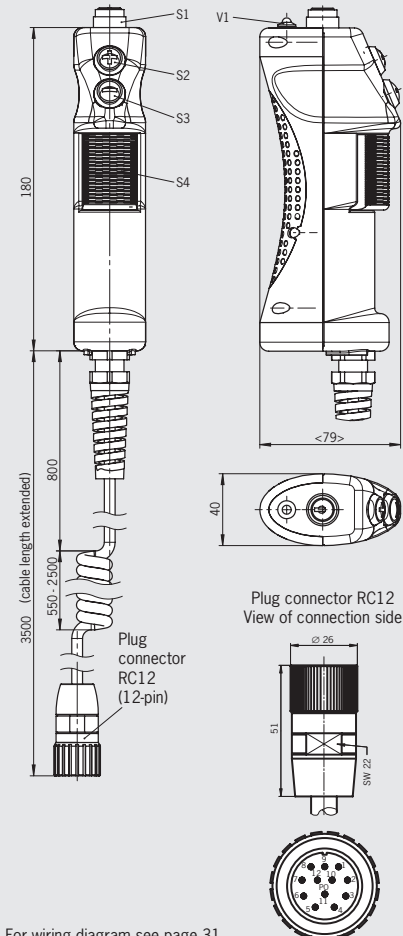
Dimension drawing



For wiring diagram see page 30

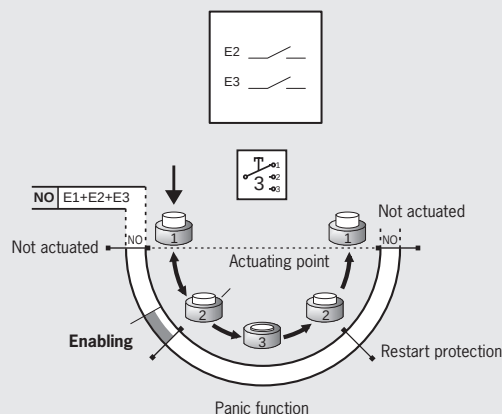
ZSM2300-110338, 3-stage function

Plug connector RC12, key operated switch



For wiring diagram see page 31
For mating connectors see page 25

Switching element/function sequence

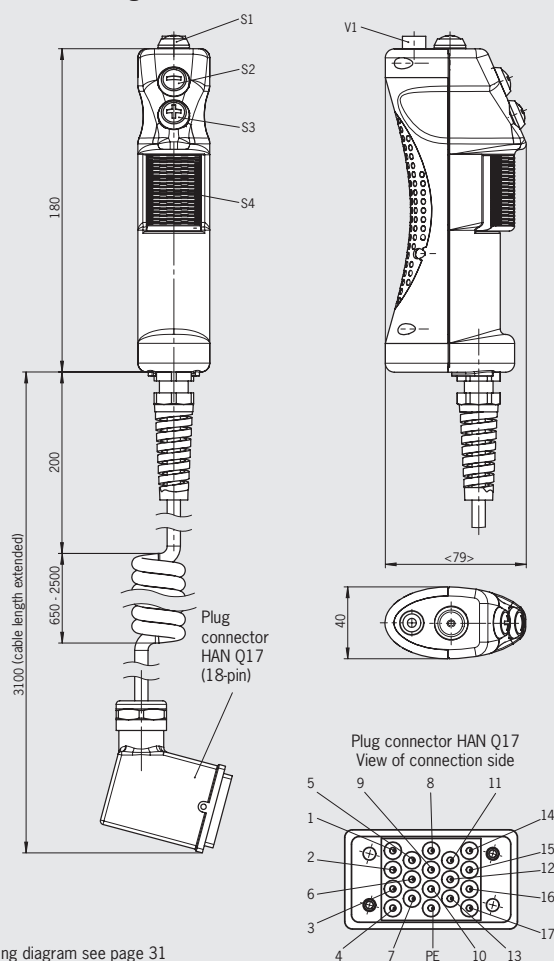


Ordering table

Design	Connection	Conductor length	Version	Order no. / item
ZSM	flying lead 12 x 0.14 mm²	8 m Straight	Enabling switch with 2 NO contacts (S2), vibration signal, key-operated switch (S1)	105362 ZSM2200-105362
	RC12 Plug connector (12-pin)	1.55 ... 3.5 m coiled	Enabling switch with 2 NO contacts (S4), yellow LED indicator (V1), +/- buttons (S2/S3), key-operated switch (S1)	110338 ZSM2300-110338

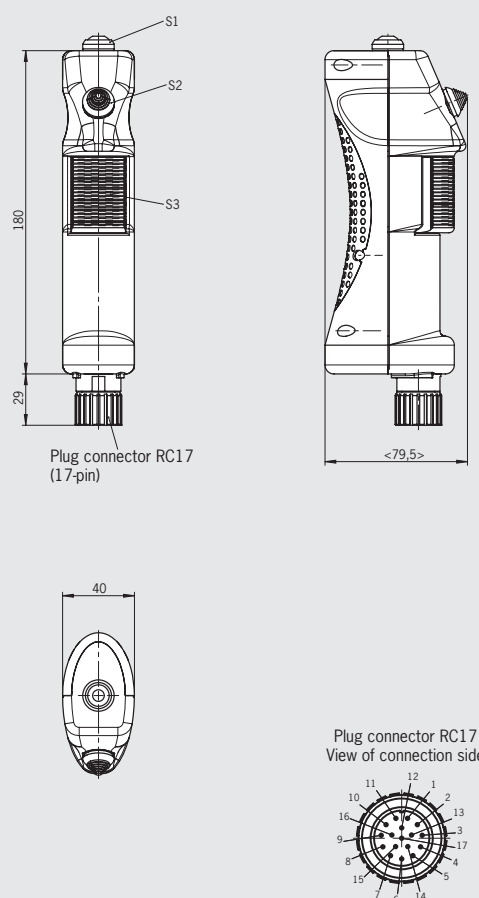
ZSM2300-106670, 3-stage function Plug connector HAN Q17, reset button

Dimension drawing



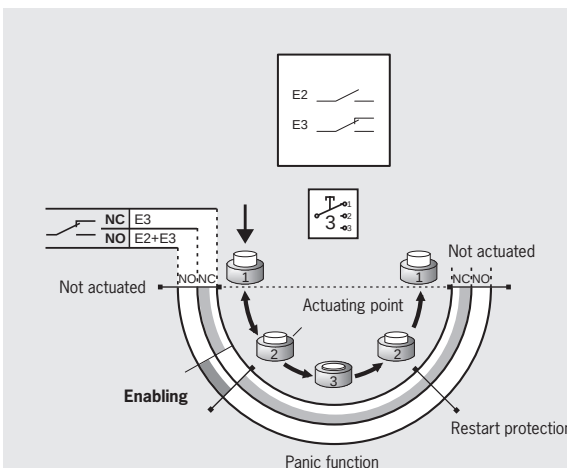
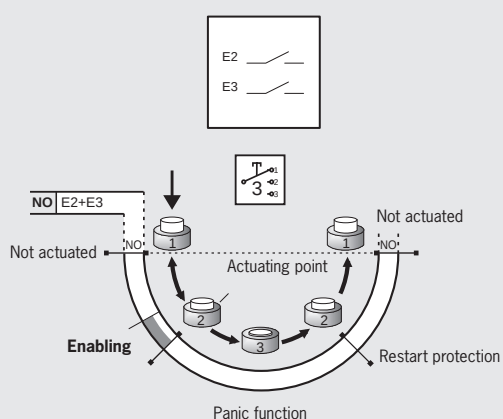
For wiring diagram see page 31
 For mating connectors see page 25

ZSM2300-106374, 3-stage function Plug connector RC17, one-touch function (joystick)



For wiring diagram see page 31
 For mating connectors see page 25
 For connection cable see page 24

Switching element/function sequence



Ordering table

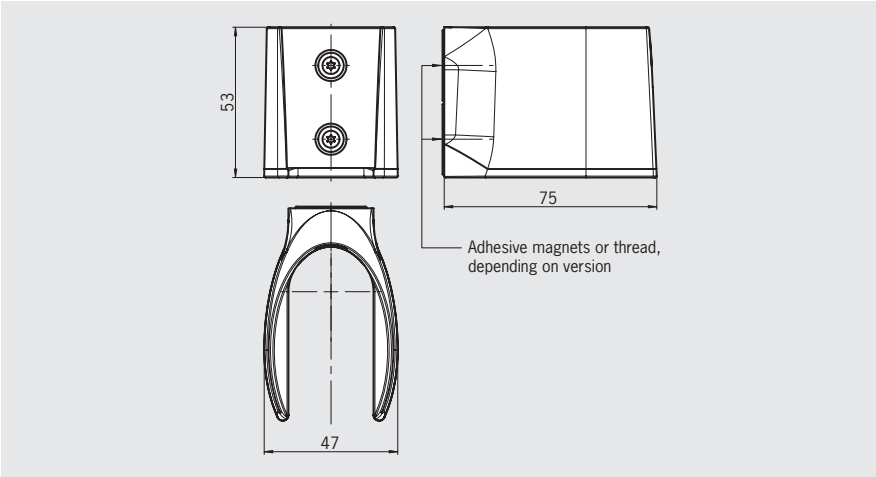
Design	Connection	Conductor length	Version	Order no. / item
ZSM	HAN Q17 Plug connector (18-pin)	1.25 ... 3.1 m coiled	Enabling switch with 2 NO contacts (S4), vibration signal, yellow LED indicator (V1), +/- buttons (S3/S2), reset button (S1)	106670 ZSM2300-106670
	RC17 Plug connector (17-pin)	without cable	Enabling switch with 1 NO contact and 1 changeover contact (S3), one-touch function (S2), black push button (S1)	106374 ZSM2300-106374

Accessories

- ▶ **Holder for enabling switch ZSM**
- ▶ **Connection cable for enabling switch ZSM with plug connector RC17**

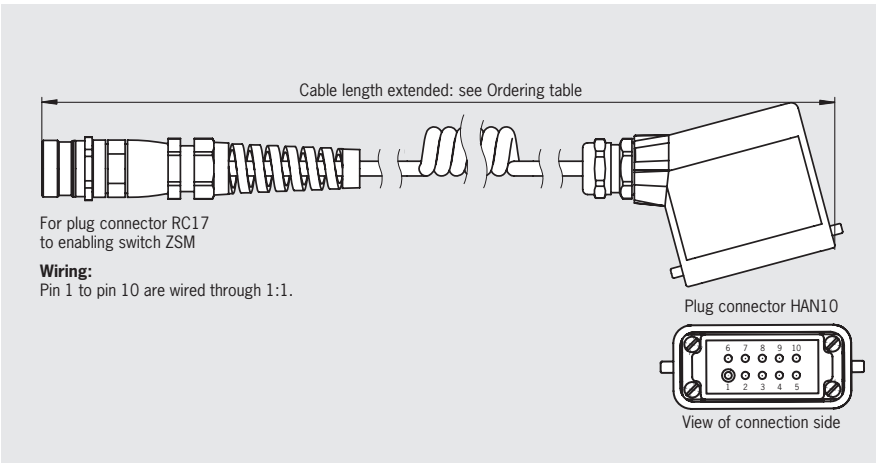
Screw holder for enabling switch ZSM

Depending on the version, the holder can be fastened to machine parts either with a magnet or two screws.



Connection cable for enabling switch ZSM with plug connector RC17

The high-quality connection cable for the ZSM2300-106374 is available in two lengths and can be plugged directly on the device. The corresponding flange connector is available for the ZSM kit (see page 36).



Ordering table

Designation	Version	Order no. / item
Holder for enabling switch ZSM	Screw mounting	102969 Holder ZSM
	Magnet fastening	102965 Holder ZSM with magnet
Connection cable for enabling switch ZSM with plug connector RC17	Coiled, length 3.9 m	106391 Coiled cable with plug connector 3.9 m
	Coiled, length 9.0 m	106392 Coiled cable with plug connector 9 m

Accessories

- Female flange connector RC12
- Male plug RC12
- Dummy plug RC12
- Female flange connector RC17
- Male plug RC17
- Dummy plug RC17

Female flange connector RC12¹⁾
For front panel mounting for connection of hand-held enabling switch. Fitted with soldered contacts. Rubber seal included.

Male plug RC12¹⁾
For connection, e.g. to enabling switches.

Dummy plug RC12¹⁾
For covering the flange connector RC12. As an option, bridges can be fitted to the individual contacts at the customer, or a pre-wired version (coded) used.

Coding: bridge from pin 1 to pin 2 and from pin 9 to pin 10.

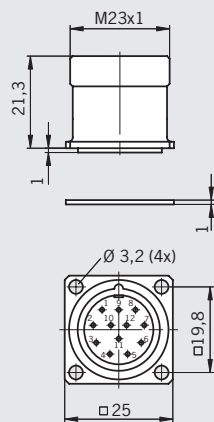
Flange connector RC17¹⁾
For front panel mounting for connection of enabling switches. Rubber seal included. Fitted with soldered contacts.

Male plug RC17¹⁾
For connection, e.g. to enabling switch.

Dummy plug RC17¹⁾
For covering the flange connector RC17. Optionally, individual contacts can be bridged at the customer.

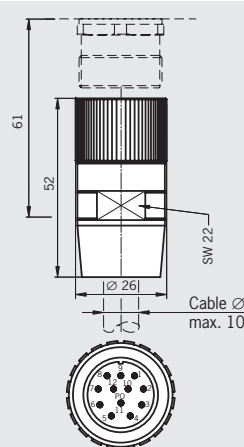
Female flange connector RC12
12-pin

Dimension drawings



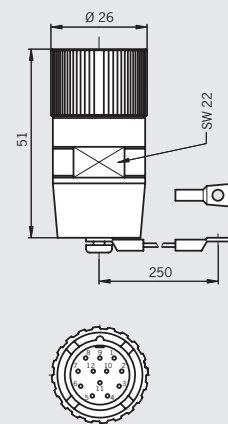
View of connection side, socket

Male plug RC12
12-pin



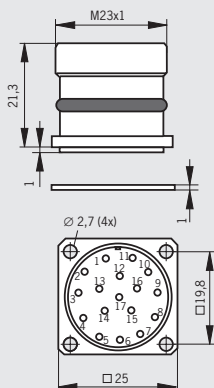
View of connection side, plug

Dummy plug RC12
12-pin



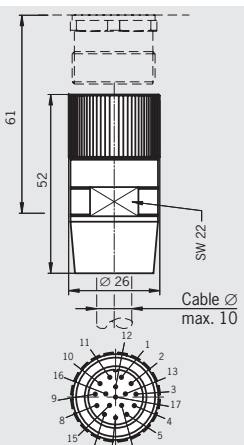
View of connection side, plug

Female flange connector RC17
17-pin



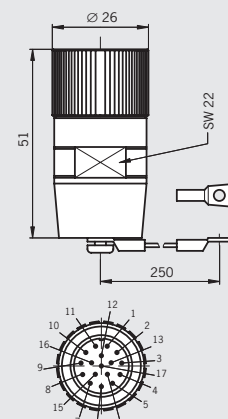
View of connection side, socket

Male plug RC17
17-pin



View of connection side, plug

Dummy plug RC17
17-pin



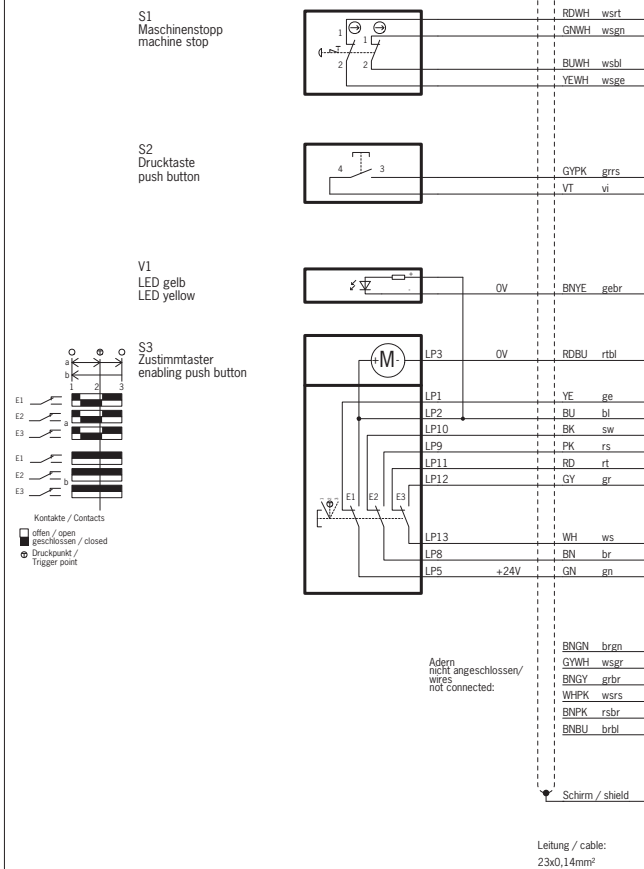
View of connection side, plug

Ordering table

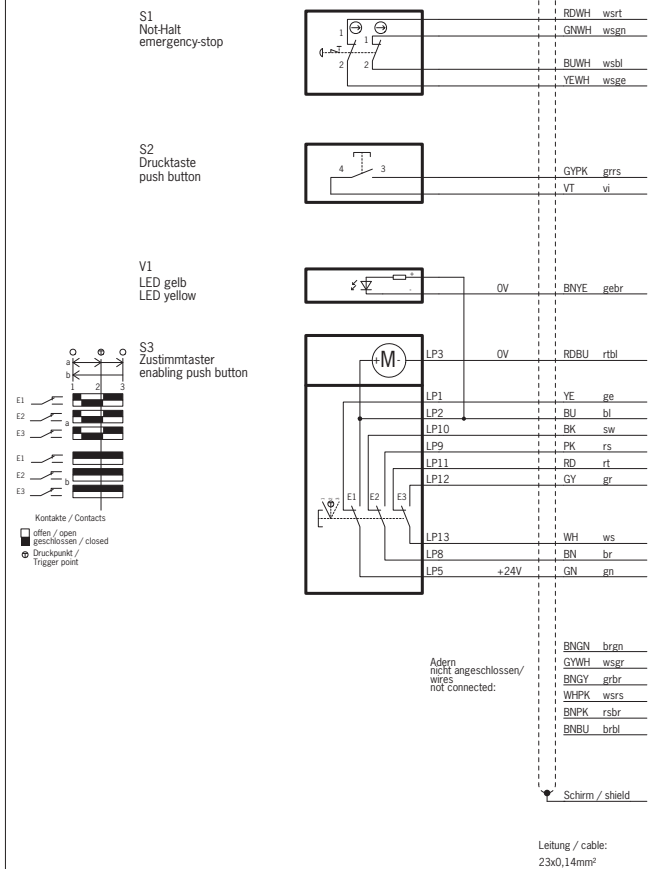
Item	Connection	Version	Order no. / item
RC12 12-pin	Soldered connection	Female flange connector	073290 Female flange connector 12-pin
	Crimp contact ¹⁾	Male plug	073294 Plug connector 12-pin
	Crimp contact ¹⁾	Dummy plug (with bridges) e.g. in combination with ZS...C1 770	073291 Dummy plug complete 12-pin
	Crimp contact ¹⁾	Dummy plug (without bridges)	073293 Dummy plug 12-pin
RC17 17-pin	Soldered connection	Female flange connector	077502 Female flange connector 17-pin
	Crimp contact ¹⁾	Male plug	096481 Plug connector 17-pin
	Crimp contact ¹⁾	Dummy plug (without bridges)	096159 Dummy plug 17-pin

Wiring diagrams

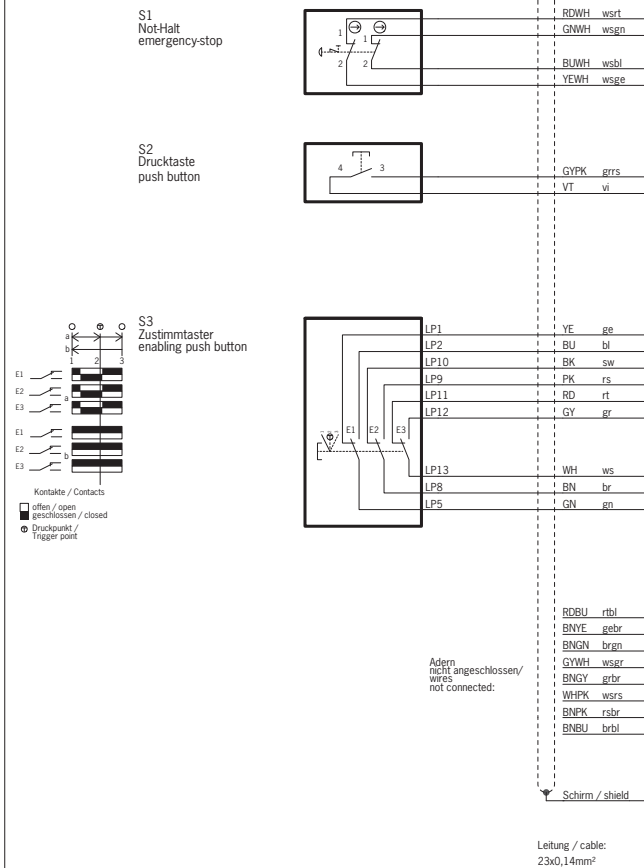
ZSM4201-102059



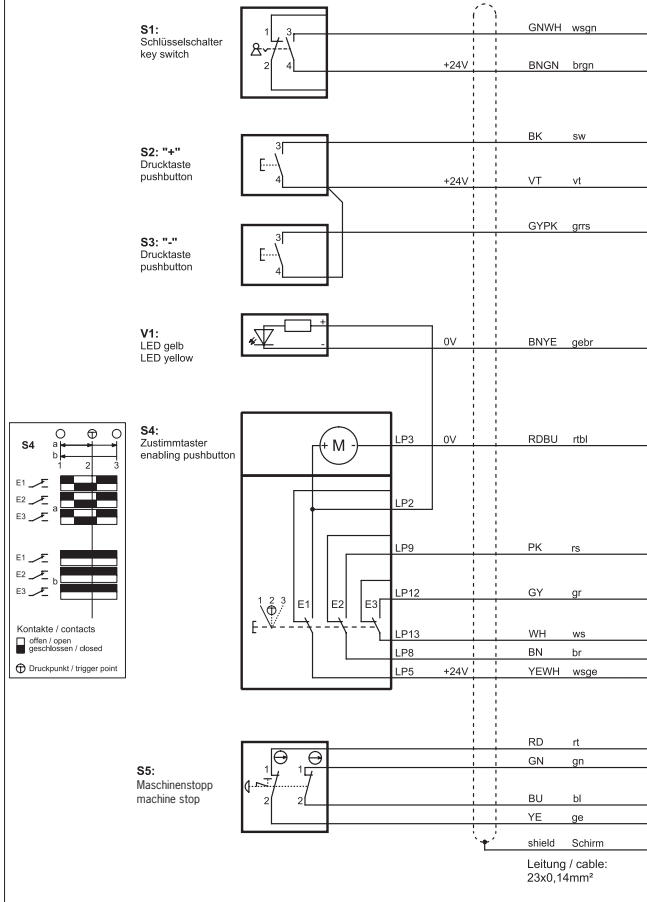
ZSM4204-102966



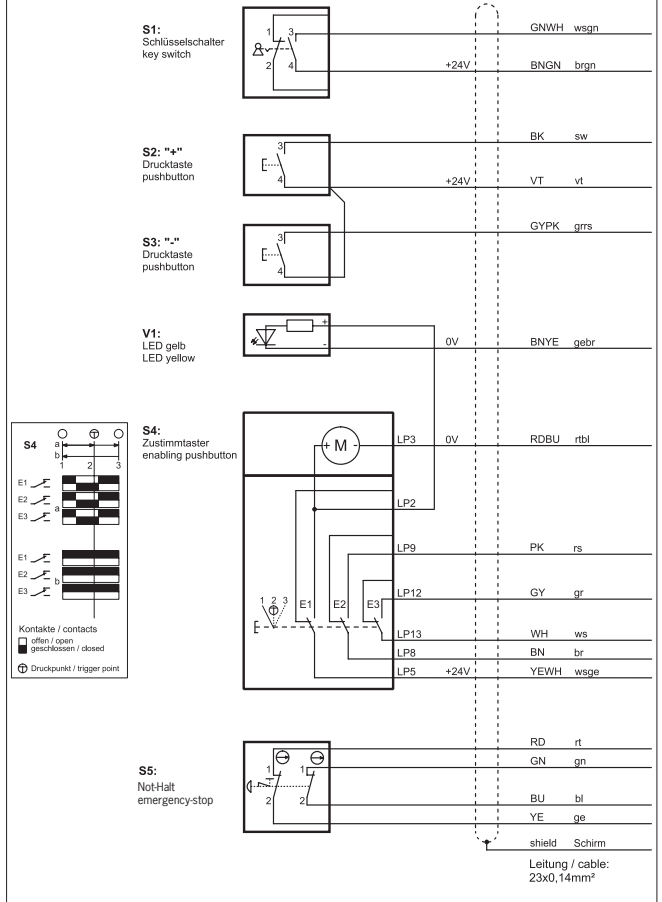
ZSM4204-105645



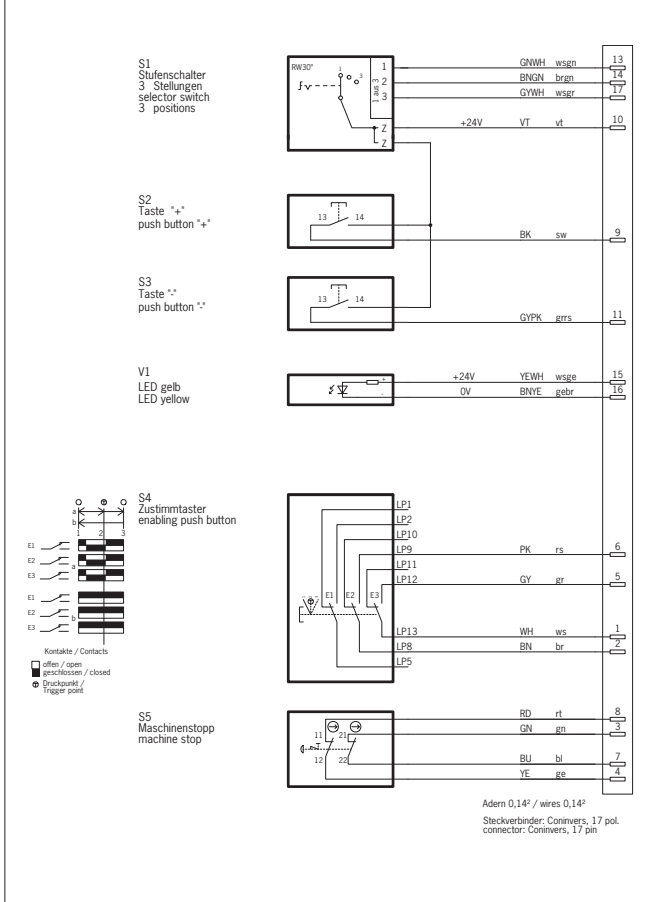
ZSM2101-099715



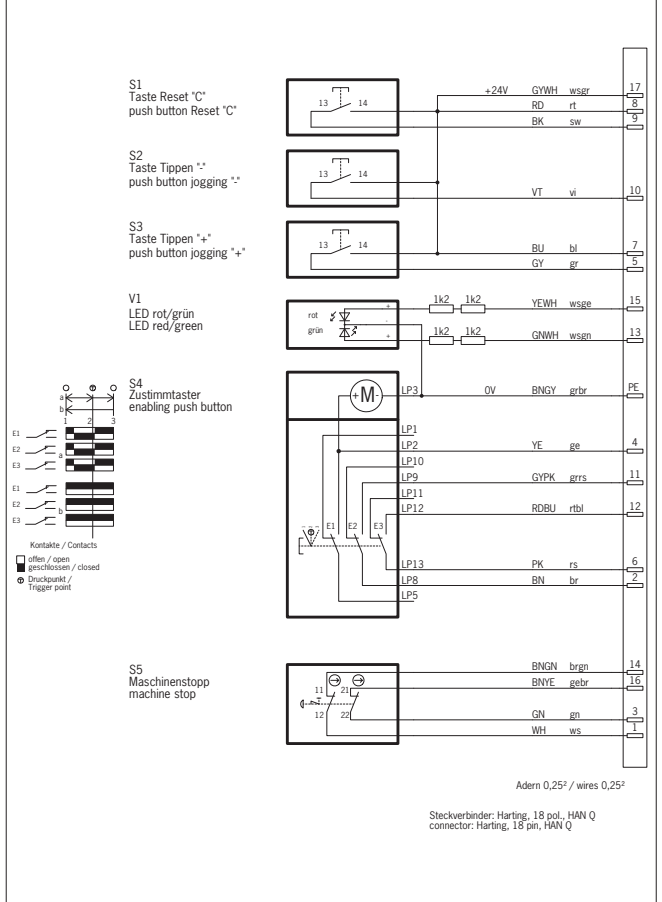
ZSM2101-103126



ZSM2301-110317

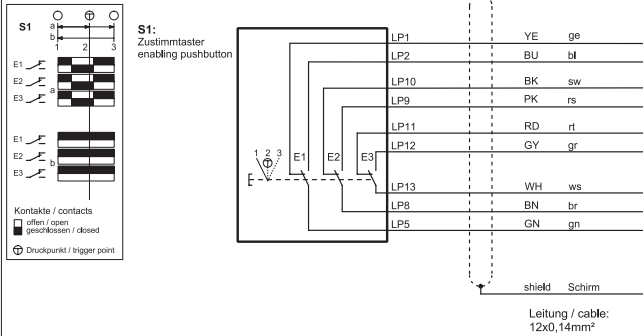


ZSM2301-105075

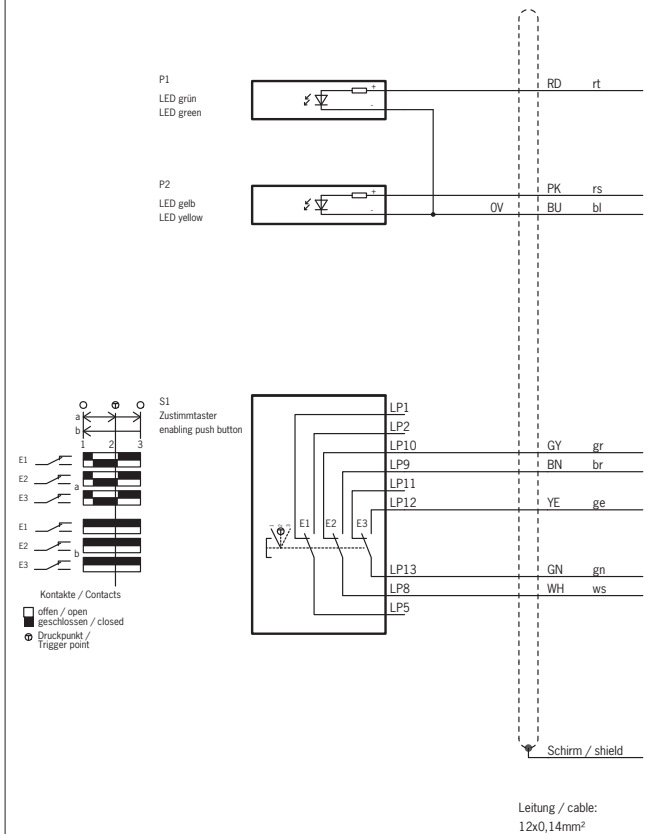


Wiring diagrams

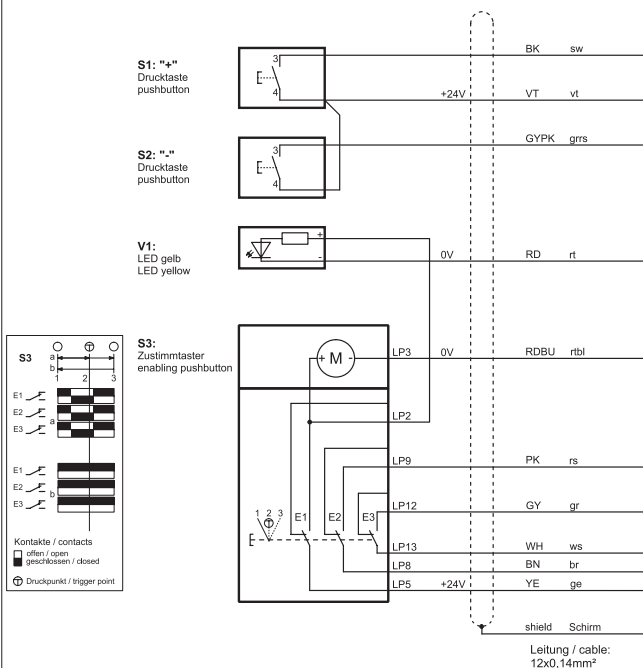
ZSM4200-099713



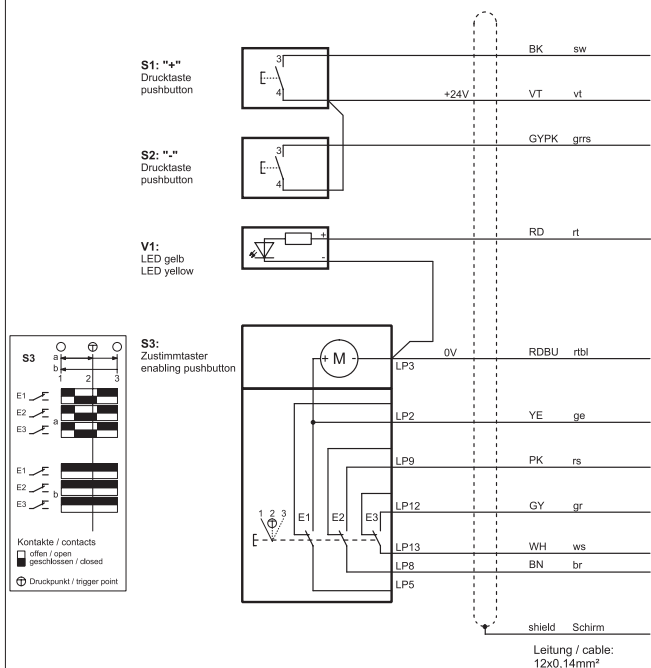
ZSM2300-111871



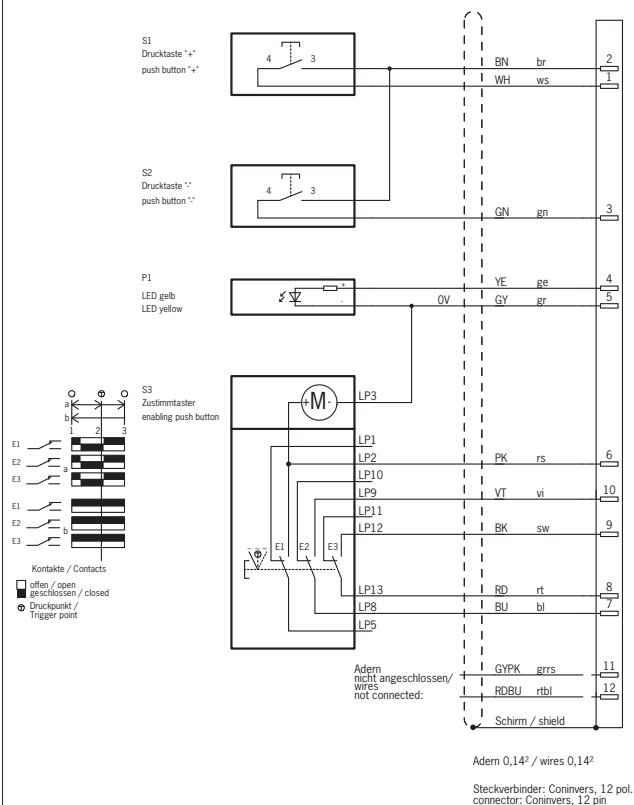
ZSM2100-099714



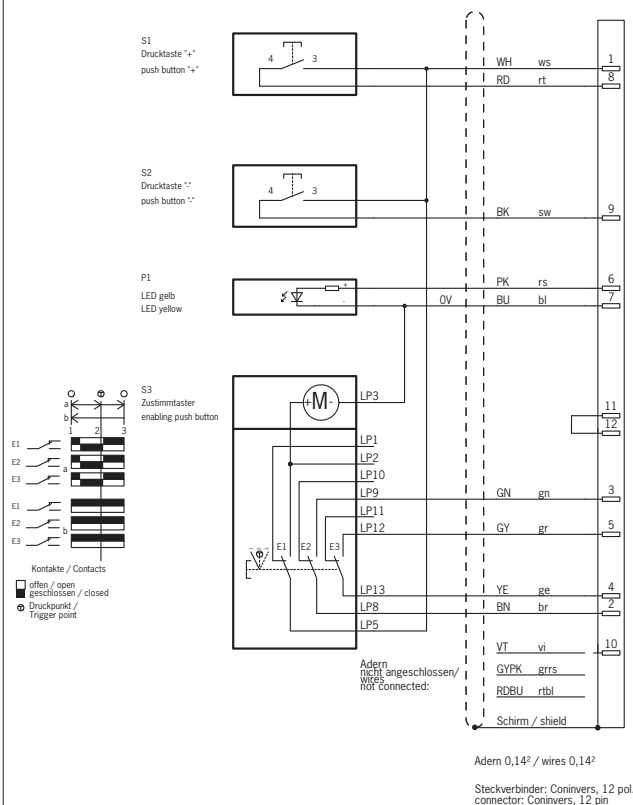
ZSM2300-109971



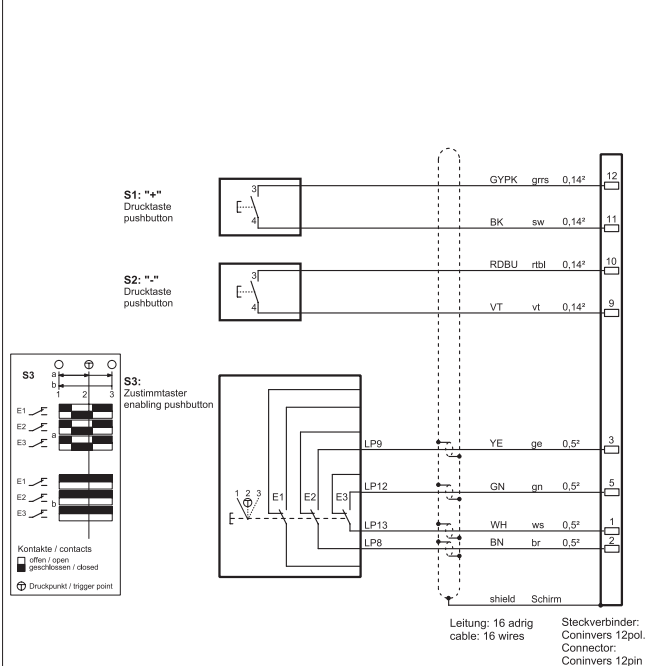
ZSM2300-111462



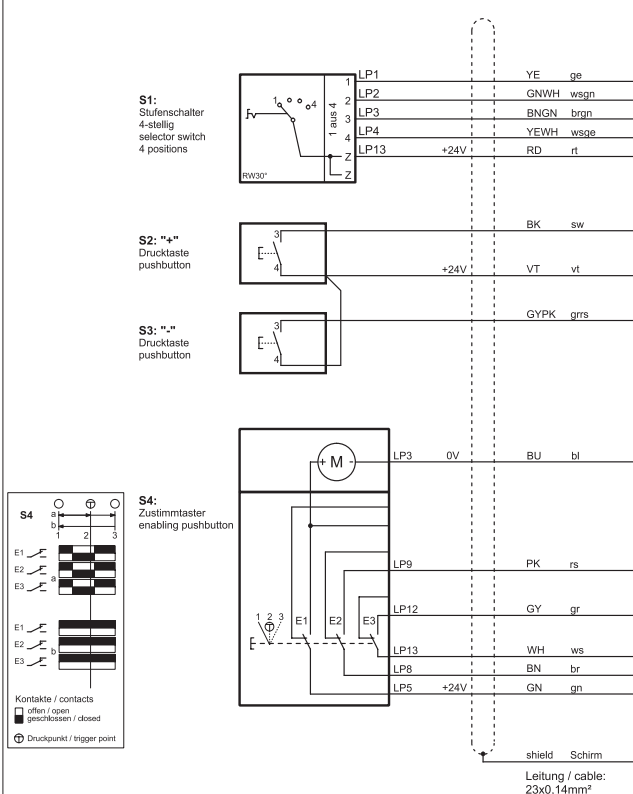
ZSM2100-111594



ZSM2300-099716



ZSM2200-100697



ZSM2100-106103

S1 DCBA	
1	0000
2	0001
3	0011
4	0010
5	0110
6	0111
7	0101
8	0100
9	1100
10	1101
11	1111
12	1110

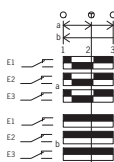
S1 Stufenschalter
5 Stellungen
selector switch
5 positions

S2 Drucktaste +
push button +

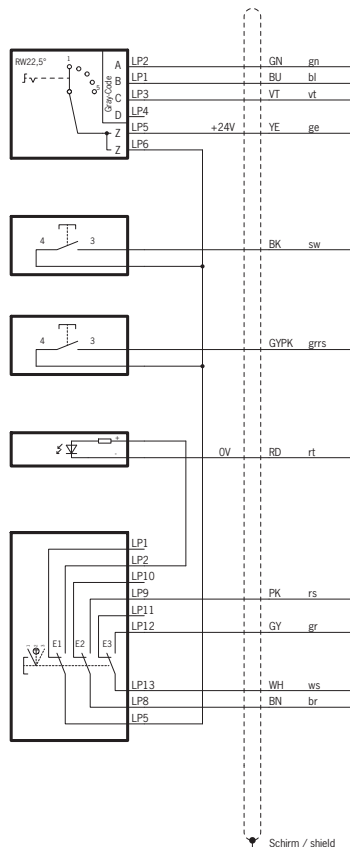
S3 Drucktaste -
push button -

V1 LED gelb
LED yellow

S4 Zustimmtaster
enabling push button



Kontakte / Contacts
□ offen / open
■ geschlossen / closed
● Druckpunkt / Trigger point



Leitung / cable:
12x0,14mm²

ZSM2200-105308

S1 DCBA	
1	0000
2	0001
3	0011
4	0010
5	0110
6	0111
7	0101
8	0100
9	1100
10	1101
11	1111
12	1110

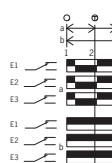
S1 Stufenschalter
12 Stellungen
selector switch
12 positions

V1 LED gelb
LED yellow

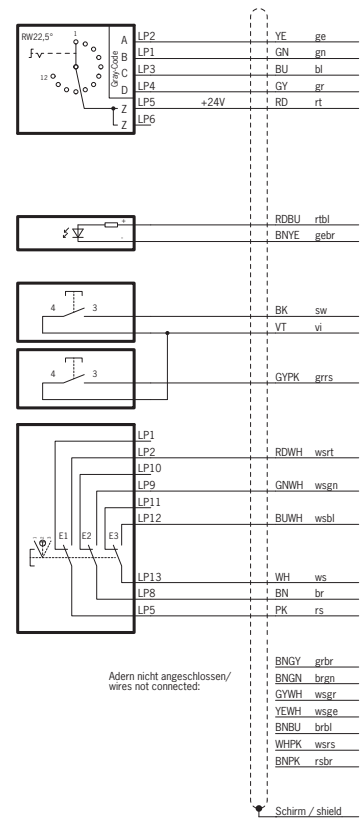
S2 Drucktaste "+"
push button "+"

S3 Drucktaste "-"
push button "-"

S4 Zustimmtaster
enabling push button



Kontakte / Contacts
□ offen / open
■ geschlossen / closed
● Druckpunkt / Trigger point



Adern nicht angeschlossen/
wires not connected:

Leitung / cable:
23x0,14mm²

ZSM3100-103462

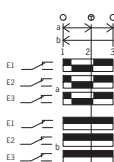
S1 DCBA	
1	0000
2	0001
3	0011
4	0010
5	0110
6	0111
7	0101
8	0100
9	1100
10	1101
11	1111
12	1110

S1 Stufenschalter
12 Stellungen
selector switch
12 positions

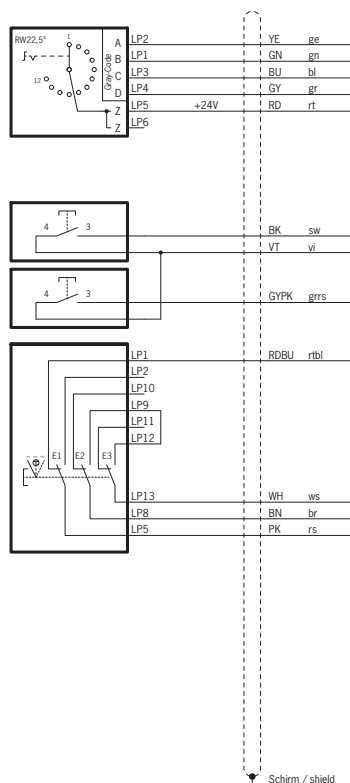
S2 Drucktaste "+"
push button "+"

S3 Drucktaste "-"
push button "-"

S4 Zustimmtaster
enabling push button



Kontakte / Contacts
□ offen / open
■ geschlossen / closed
● Druckpunkt / Trigger point

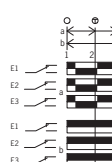


Leitung / cable:
12x0,14mm²

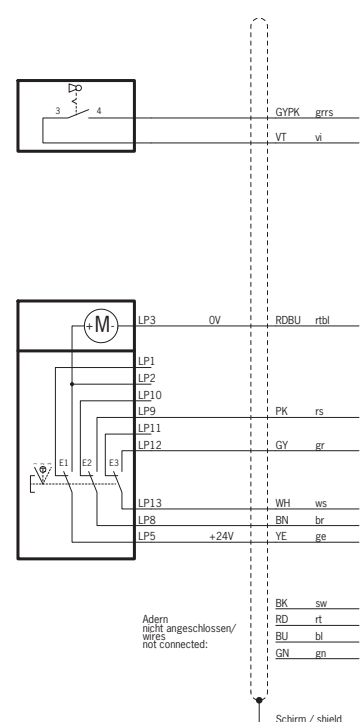
ZSM2200-105362

S1 Schlüsselschalter
key switch

S2 Zustimmtaster
enabling push button



Kontakte / Contacts
□ offen / open
■ geschlossen / closed
● Druckpunkt / Trigger point

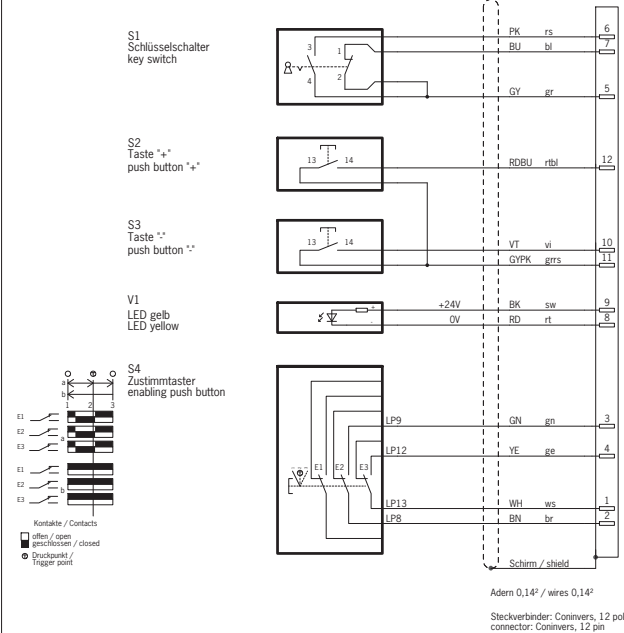


Adern nicht angeschlossen/
wires not connected:

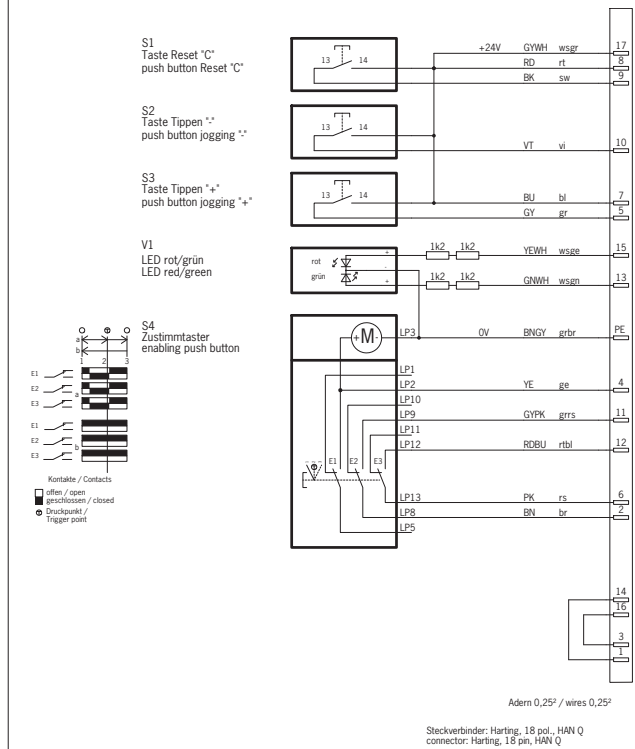
Adern/wires: 12x 0,14²

Wiring diagrams

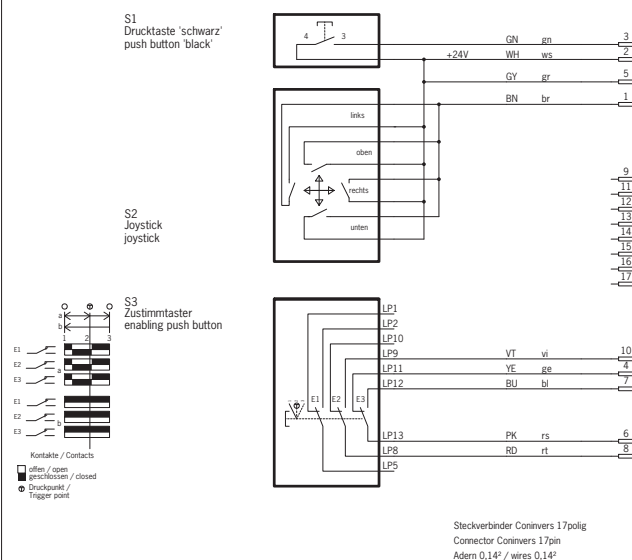
ZSM2300-110338



ZSM2300-106670



ZSM2300-106374



Technical data

Basic enabling switch ZSM

Parameter		Value	Unit
Material	Housing	PA	
	Enabling switch	CR	
	Grip/seal	TPE	
Degree of protection acc. to IEC 529		IP 54	
Ambient temperature		-5 ... +60	°C
Weight (incl. connection cable)		Approx. 1.1	kg

Switching element, enabling switch

Parameter		Value	Unit
Switching contacts		3 changeover contacts	
Life		1 x 10 ⁶ operating cycles	
Utilization category to IEC 947-5-1 (for enabling switch)		DC13 U _e 24V I _e 0.3 A U _e 24V I _e 1 A	

Machine stop

Parameter		Value	Unit
Color of actuating head		Black	
Color of bottom shell		yellow	
Reset		Pull-to-reset button	
Degree of protection		IP 65	
Max. number of switching elements		2	
Contact element		2 x positively driven contact	
Utilization category to IEC 947-5-1		DC-13 I _e 3 A U _e 24 V	

Emergency stop device

Parameter		Value	Unit
Color of actuating head		red	
Color of bottom shell		yellow	
Reset		Pull-to-reset button and turn-to-reset button	
Degree of protection		IP 65	
Number of switching elements		2	
Contact element		1 x positively driven contact	
Utilization category to IEC 947-5-1		DC-13 I _e 3 A U _e 24 V	

Single-color LED indicator

Parameter		Value	Unit
Housing		Chrome-plated	
Operating voltage		24	V
Color		yellow or red	

Two-color LED indicator

Parameter		Value	Unit
Forward current typ.		20	mA
Voltage red		1.85	V
Voltage green		2.2	V

Reset button/push button

Parameter		Value	Unit
Switching voltage max.		30	V DC
Switching current max.		100	mA

Selector switch

Parameter		Value	Unit
Output code		see wiring diagrams	
Switching voltage max.		25	V AC/DC
Breaking capacity max.		0.2	VA

One-touch function

Parameter	Value	Unit
Switching current max. at DC 28 V	2	A
- with ohmic load	1	
- with inductive load		

Key switch

Parameter	Value	Unit
Switching voltage max.	30	V AC/DC
Switching current max.	250	mA

Connection using flying lead

Parameter	Value	Unit
Connection	Cable 12 x 0.14 mm ²	Cable 23 x 0.14 mm ²
Degree of protection acc. to IEC 60529	IP 67	
Short circuit protection acc. to IEC 60269-1 (control circuit fuse)	2	A gG
Utilization category acc. to EN 60947-5-1		
Enabling switches	AC-15	I _e 2 A U _e 24 V
	DC-13	I _e 2 A U _e 24 V
Keys and LEDs	AC-15	24 V 400 mA
	DC-13	24 V 400 mA

Plug connector RC12 connection

Parameter	Value	Unit
Connection	Male connector	
Version	RC12 (11-pin + PE)	
Connection cable conductor cross-section	12 x 0.14	23 x 0.14
Degree of protection acc. to IEC 60529	IP 67 ¹⁾	
Rated insulation voltage U _i	0.8	kV
Short circuit protection acc. to IEC 60269-1 (control circuit fuse)	2	A gG
Utilization category acc. to EN 60947-5-1		
Enabling switches	AC-15	I _e 2 A U _e 24 V
	DC-13	I _e 2 A U _e 24 V
Keys and LEDs	AC-15	24 V 400 mA
	DC-13	24 V 400 mA

Plug connector RC17 connection

Parameter	Value	Unit
Connection	Male connector	
Version	RC17 (17-pin)	
Connection cable conductor cross-section	12 x 0.14	23 x 0.14
Degree of protection acc. to IEC 60529	IP 67 ¹⁾	
Rated insulation voltage U _i	0.8	kV
Short circuit protection acc. to IEC 60269-1 (control circuit fuse)	2	A gG
Utilization category acc. to EN 60947-5-1		
Enabling switches	AC-15	I _e 2 A U _e 24 V
	DC-13	I _e 2 A U _e 24 V
Keys and LEDs	AC-15	24 V 400 mA
	DC-13	24 V 400 mA

Plug connector connection HAN Q17

Parameter	Value	Unit
Connection	Male connector	
Version	HAN Q17 (17-pin)	
Connection cable conductor cross-section	12 x 0.14	23 x 0.14
Degree of protection acc. to IEC 60529	IP 65 ¹⁾	
Rated insulation voltage U _i	0.8	kV
Short circuit protection acc. to IEC 60269-1 (control circuit fuse)	2	A gG
Utilization category acc. to EN 60947-5-1		
Enabling switches	AC-15	I _e 2 A U _e 24 V
	DC-13	I _e 2 A U _e 24 V
Keys and LEDs	AC-15	24 V 400 mA
	DC-13	24 V 400 mA

1) Only screwed tight with the related plug connector

ZSM housing

- ▶ 3-stage function
- ▶ + and – buttons optional
- ▶ Hole for lower stop command device
- ▶ Cable gland included

3-stage function

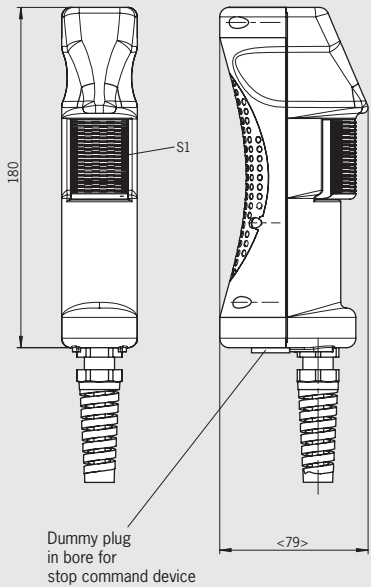
Enabling function is only active in the second stage (middle position, actuating point). If the button is released or pushed further (panic function), the enabling is removed (dependent on the wiring, see function sequence).

+ and – buttons

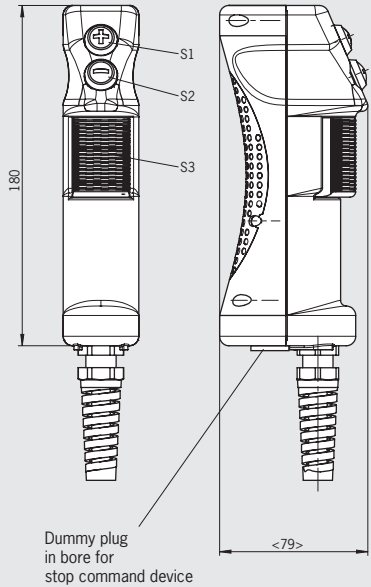
These buttons can be individually assigned, e.g. to move axes in positive or negative direction.

ZSM4200-106104, 3-stage function

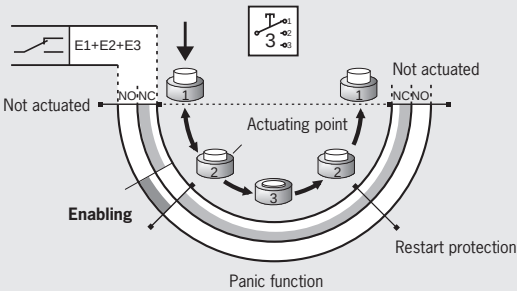
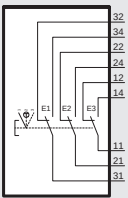
Dimension drawing



ZSM4200-106105, 3-stage function + and – buttons



Wiring diagram/function sequence



Ordering table

Design	Version	Order no. / item
ZSM	Enabling switch with 3 changeover contacts (S1), cable gland included	106104 ZSM4200-106104
	Enabling switch with 3 changeover contacts (S3), +/– buttons with one NO contact each (S1/S2), cable gland included	106105 ZSM4200-106105

Accessories for installation in ZSM housing

- Machine stop
- Emergency stop device

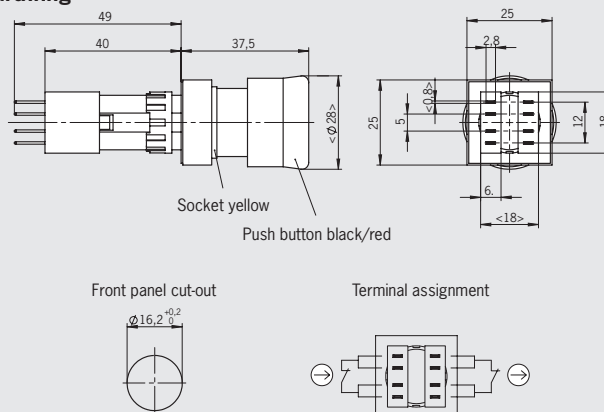
Machine stop

Machine stop (black, with pull-to-reset button) for installation in ZSM housing, for different wiring concepts.

Emergency stop device

Two-channel emergency stop device (red, with pull-to-reset button) for installation in ZSM housing, for different wiring concepts.

Dimension drawing



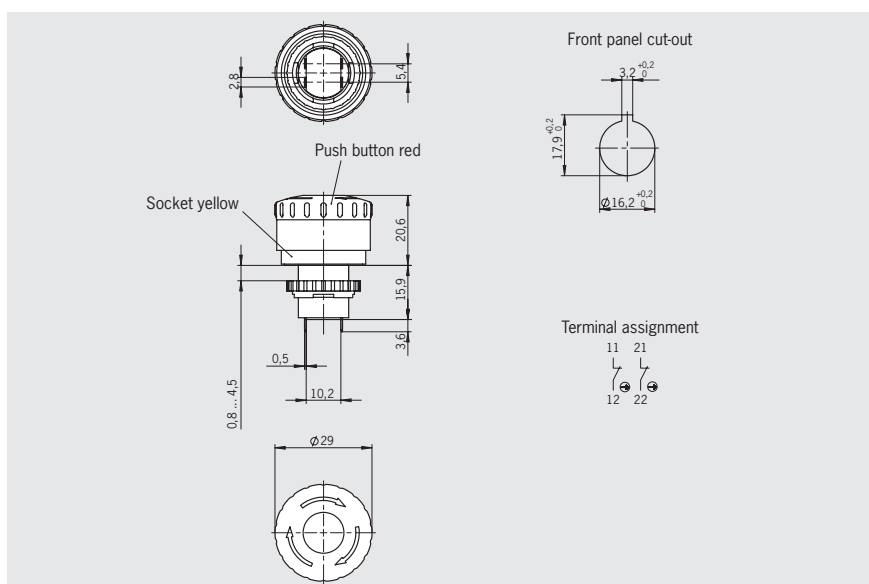
Parameter	Value
Color of actuating head	black/red
Color of bottom shell	yellow
Reset	Pull-to-reset button
Degree of protection	IP 65
Max. number of switching elements	2
Contact element	2 x positively driven contact
Utilization category to IEC 947-5-1	DC-13 I _e 3 A U _e 24 V

Ordering table

Designation	Version	Order no. / item
Machine stop	Installation $\varnothing$ 16 mm, palm button black $\varnothing$ 28 mm	106434 Machine stop 16 mm
Emergency stop device	Installation $\varnothing$ 16 mm, palm button red $\varnothing$ 28 mm	096298 Emergency stop 16 mm

Emergency stop device with small installation depth

Two-channel emergency stop device (red, with pull-to-reset button and turn-to-reset button) for installation in ZSM housing, for different wiring concepts.



Parameter	Value
Color of actuating head	red
Color of bottom shell	yellow
Reset	Pull-to-reset button and turn-to-reset button
Degree of protection	IP 65
Number of switching elements	2
Contact element	2 x positively driven contact
Utilization category to IEC 947-5-1	DC-13 I _e 3 A U _e 24 V

Ordering table

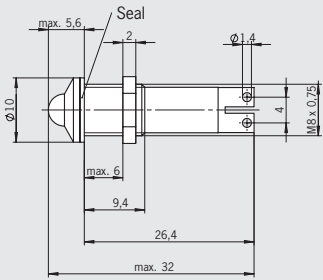
Designation	Version	Order no. / item
Emergency stop device with small installation depth	Installation $\varnothing$ 16 mm, palm button red $\varnothing$ 29 mm	106435 Emergency stop 16 mm

- ▶ LED indicator
- ▶ Female plug RC17
- ▶ Male flange connector RC17

LED indicator

The LED indicator is used for visual feedback directly at the enabling switch.

Dimension drawing



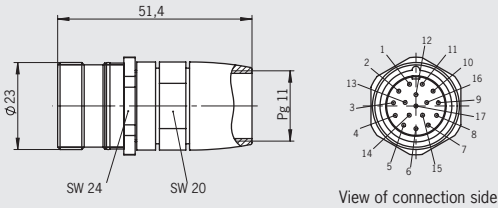
Parameter	Value
Housing	Chrome-plated
Operating voltage	24 V
Color	yellow

Ordering table

Designation	Version	Order no. / item
LED indicator	Color yellow	106347 LED indicator GE 106347

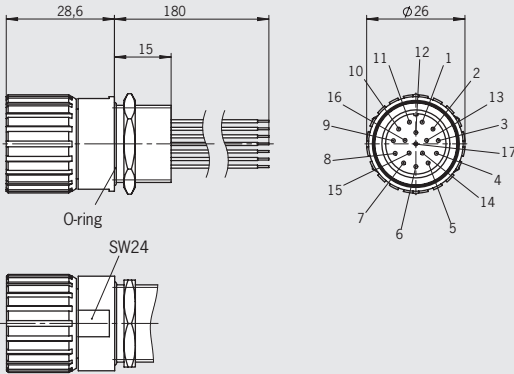
Female plug RC17

Female connector for hand-held enabling switches.



Male flange connector RC17

For connection, e.g. to enabling switches, pre-assembled.

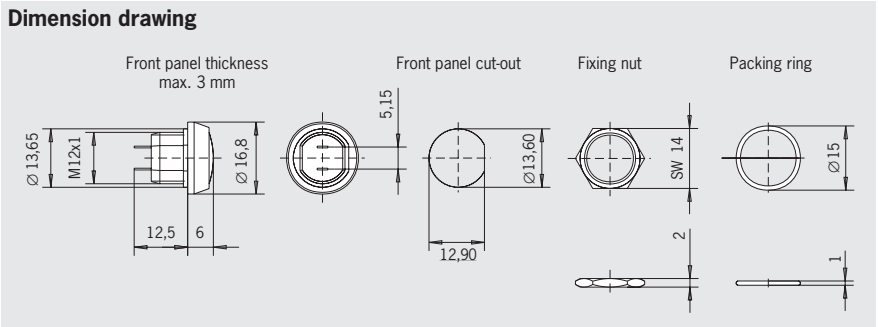


Parameter	Value
Housing material	Metal
Number of pins	12 (screen on the housing)
Cable diameter max.	Male plug 10 mm
Connection	Crimp contacts 0.14 ... 0.56 mm ²
Nominal voltage max.	230 V AC/DC
Degree of protection according to IEC 60529 (inserted)	IP 67

Ordering table

Item	Connection	Version	Order no. / item
RC17 17-pin	Crimp contact	Female plug	106349 Female connector 17-pin
		Male flange connector with wires, pre-assembled	106360 Male flange connector 17-pin

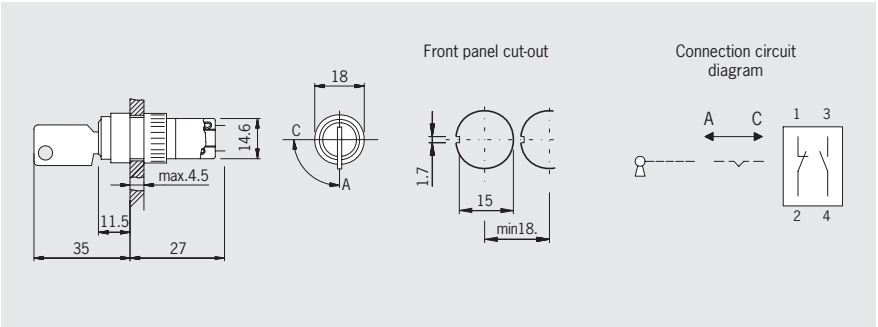
- Push button
- Key switch



Parameter	Value
Ambient temperature	-25 ... +70 °C
Front degree of protection (integrated in front plate)	IP 67
Switching principle	Button, snap-action switching element
Switching elements	1 NO contact
Switching voltage	DC 30 V
Switching current max.	100 mA
Connection type	Soldered connection

Ordering table

Designation	Button color	Order no.
Push button	Black	083640
	Red	086753
	Green	086754
	Blue	086757
	White	086755
	Yellow	086756



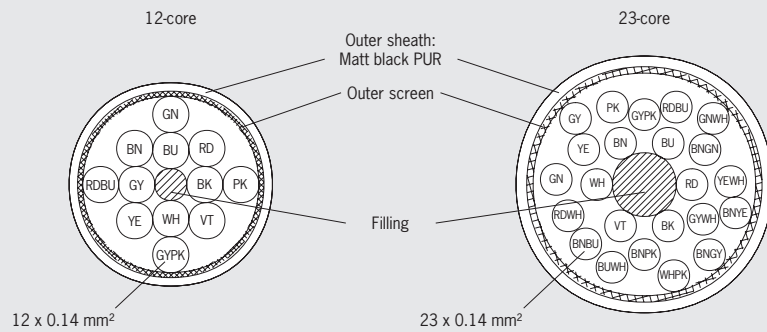
Parameter	Value
Ambient temperature	-25 ... +55 °C
Front degree of protection (integrated in front panel) / NEMA	IP 65 / 250-12
Switching principle	Snap-action switching element
Switching elements	1 NC contact, 1 NO contact
Switching voltage	AC/DC 30 V
Switching current max.	250 mA
Connection type	Soldered connection

Ordering table

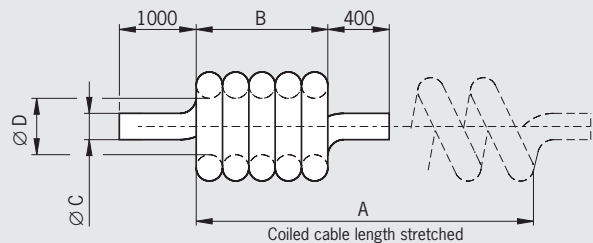
Designation	Version	Order no.
Key switch	Key removable in both positions	083639

► **Connection cable coiled and straight**

View of cable cross-section



Dimensions of spiral-shaped design

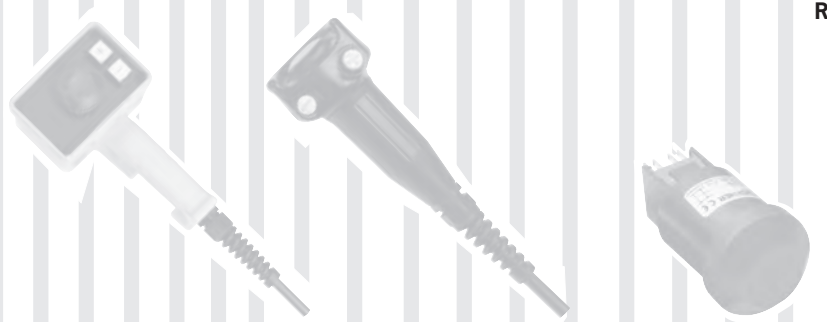


Parameter	Value
Cable resistance	$\leq 145 \, \Omega/\text{km}$
Test voltage core/core	1.0 kV _{rms}
Test voltage core / screen	1.0 kV _{rms}
Insulation resistance	≥ 200
Operating temperature	-10 ... +70 °C
Bending radius	$\geq 10 \times \text{cable diameter}$
once	
several times	$\geq 15 \times \text{cable diameter}$

Ordering table

Article	Conductor length [mm]	A [mm]	B [mm]	Ø C [mm]	Ø D [mm]	Order no.
12-pole, spiral-shaped cable	3900	Approx. 2500	550 ± 20	6 ± 3	8 ± 2	086721
12-pole, spiral-shaped cable	5400	Approx. 4000	880 ± 20	6 ± 3	8 ± 2	086722
12-pole, straight cable	3500	–	–	–	–	087379
12-pole, straight cable	5000	–	–	–	–	087380
12-pole, straight cable	10000	–	–	–	–	087381
23-pole, spiral-shaped cable	3900	Approx. 2500	550 ± 20	7.5 ± 0.3	10 ± 2	087408
23-pole, spiral-shaped cable	5400	Approx. 4000	880 ± 20	7.5 ± 0.3	10 ± 2	087409
23-pole, straight cable	3500	–	–	–	–	087382
23-pole, straight cable	5000	–	–	–	–	087383
23-pole, straight cable	10000	–	–	–	–	087384

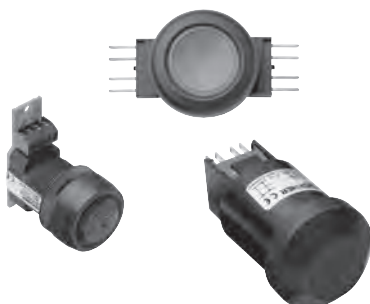
Selection table for enabling switches ZSG, ZSE, ZXE, ZSA, ZSB and ZSR

Housing																			
E	Built-in version (without cable)																		
K	Kit (without cable or with plug fitted)																		
G1	Housing G1, black																		
G2	Housing G2, yellow																		
G3	Housing G3, yellow																		
Function																			
2	2-stage (OFF - enabling)																		
3	3-stage (OFF - enabling - OFF)																		
Connection																			
C	Tab, screw connection, flying lead																		
SS4	Plug connector 3-pin + PE																		
SVM5	Plug connector M12 5-pin																		
C16	Plug connector 6-pin + PE																		
MR7	Plug connector 7-pin																		
MR8	Plug connector 8-pin																		
MR10	Plug connector 10-pin																		
HAN10	Plug connector 10-pin + PE																		
RC12	Plug connector 11-pin + PE																		
BS12	Plug connector 12-pin																		
RC17	Plug connector 17-pin																		
UT23	Plug connector 23-pin																		
Additional elements																			
Z	Additional elements, e.g. buttons, LEDs, key-operated switch, selector switch, etc.																		
																			
Enabling switch ZSB Housing G3																			
Enabling switch ZSB Housing G1																			
Enabling switch ZSE																			

Design					Stages		Connection															Page
E	K	G1	G2	G3	2	3	C	SS4	SVM5	C16	MR7	MR8	MR10	HAN10	RC12	BS12	RC17	UT23	Z			
●					●		●													40		
●						●	●													41/42		
	●				●		●													44		
	●					●	●						●							45		
		●			●		●													46		
		●				●	●													47		
		●				●	●													48		
		●				●		●	●											49		
		●				●				●				●	●					50		
		●				●									●			●		51		
		●				●									●		●			52		
		●				●	●												●	53		
		●				●					●	●							●	54		
		●				●									●	●	●		●	55		
			●			●	●													56		
			●			●	●													57		
				●		●	●												●	58		
				●		●	●								●				●	59		
				●		●	●												●	60		
				●		●											●		●	61/62		

Built-in enabling switches ZSG, ZSE and ZXE

- ▶ 2/3-stage function
- ▶ Dual-channel version
- ▶ Optionally with 22.5 mm, 30.5 mm or 34.4 mm installation dimension
- ▶ Suitable, e.g. for installation in the hand-held pendant stations HBL or housing G2 or G3



2-stage function ²⁾

Enabling function is active in the second stage (pressed position). When the button is released, the enabling is removed (see function sequence).

3-stage function

Enabling function is only active in the second stage (middle position, actuating point). If the button is released or pushed further (panic function), the enabling is removed (dependent on the wiring, see function sequence).

Hand-held pendant stations HBL

See catalog for hand-held pendant stations.

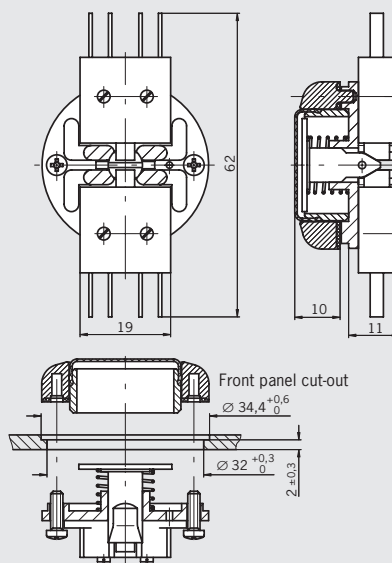
Switching elements (see also Page 8)

- ▶ **20** 2 NO
- ▶ **111** 1 NO + 1 NC $\ominus$ + 1 NC
- ▶ **121** 1 NO + 2 NC $\ominus$ + 1 NC
- ▶ **210** 2 NO + 1 NC $\ominus$
- ▶ **220** 2 NO + 2 NC $\ominus$
- ▶ **2202** 2 NO/NC ¹⁾

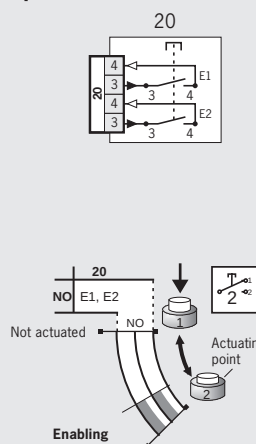
ZSG, 2-stage function ²⁾

Tab connection

Dimension drawings



Wiring diagrams/function sequence



Contact
☐ open
☒ closed
☒ closed, enabling

Ordering table

Design	Connection	Version	Switching element
			20: 2 NO
Built-in 2-stage ²⁾ ZSG	Tab connection	Suitable, e.g. for hand-held pendant stations HBL	070793 ZSG1-2

¹⁾ Only closed in middle position, a normally open contact and a normally closed contact are combined internally.

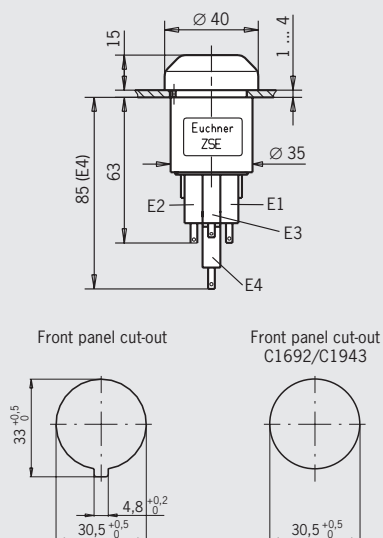
²⁾ As per VDI 2854, a device comparable to an emergency stop device must be fitted!



ZSE, 3-stage function

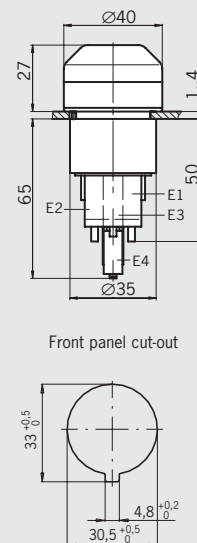
Tab connection

Dimension drawings

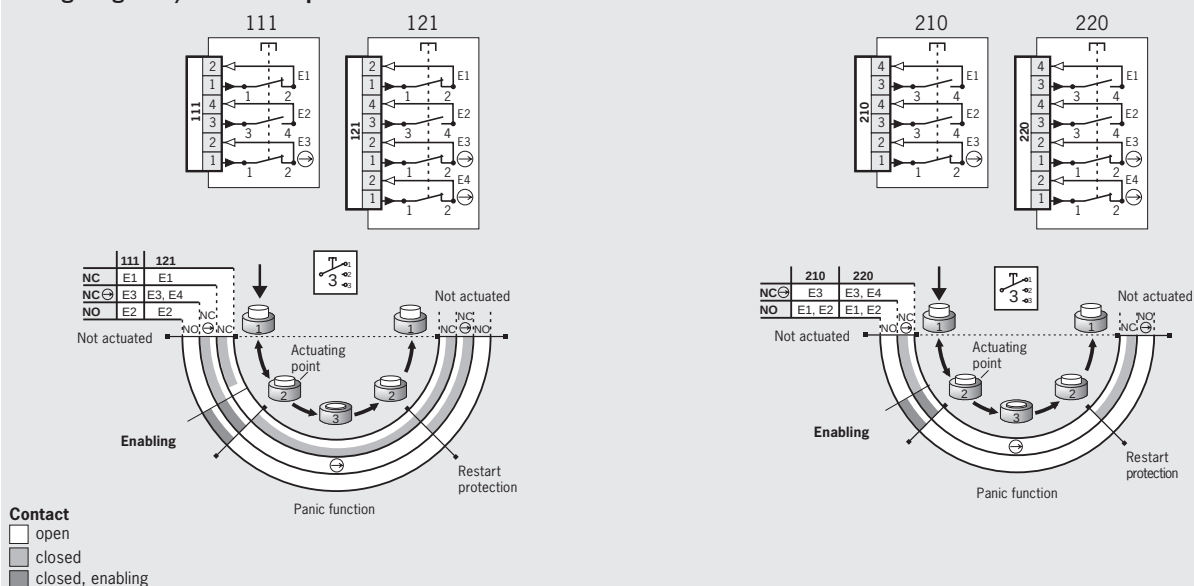


ZSE, 3-stage function

Tab connection, with spacer



Wiring diagrams/function sequence



Ordering table

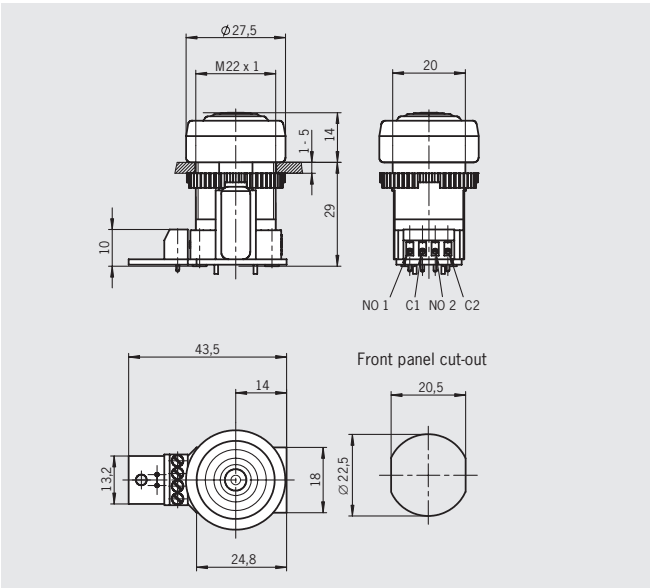
Design	Connection	Version	Switching element				
			111: 1NO+1NC ⊕ +1NC	121: 1NO+2NC ⊖ +1NC	210: 2NO+1NC ⊖	220: 2NO+2NC ⊖	2202: 2 NO/NC ⁽¹⁾
Built-in 3-stage ZSE	Tab connection		052448 ZSE2-1	070782 ZSE2-3	052449 ZSE2-2	070762 ZSE2-4	On request
		Suitable, e.g. for hand- pendant stations HBL	On request	On request	070752 ⁽²⁾ ZSE2-2C1692	083477 ⁽²⁾ ZSE2-4C1943	On request
	Tab connection	With spacer for installation in housing G2 or G3	On request	On request	On request	091098 ZSE2-4C1801	On request

1) From position 1 to position 2 $\Rightarrow$ NO contact; from position 2 to position 3 $\Rightarrow$ NC contact.

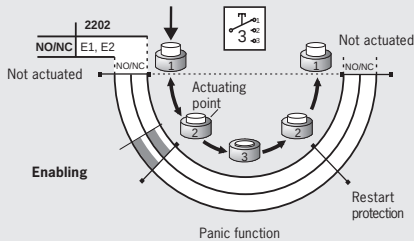
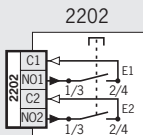
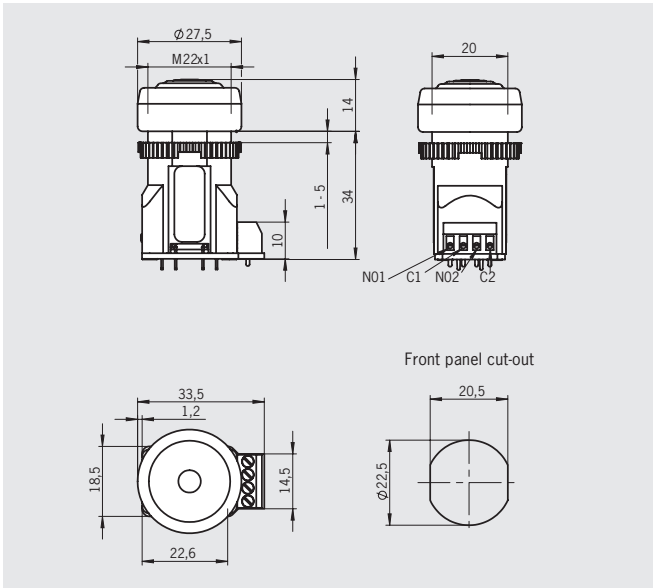
2) No BG type examination



ZXE, 3-stage function Screw terminals



ZXE, 3-stage function Screw terminals, with click sound ¹⁾



Contact
☐ open
☒ closed
☒ closed, enabling

Ordering table

Design	Connection	Version	Switching element
			2202: 2 NO/NC ²⁾
Built in 3-stage ZXE	Screw terminals	Slow-action switching contact	091336 ZXE-091336
		Snap-action switching contact	104833 ZXE-104833

1) With version ZXE-104833 a click sounds during the change from stage 1 to stage 2 and during the return from stage 2 to stage 1.
 2) From position 1 to position 2 ➔ NO contact; from position 2 to position 3 ➔ NC contact.

Enabling switch ZSA

Enabling switch kit ZSA and ZSA with built-in plug connector



- ▶ Housing G1
- ▶ 2-/3-stage function
- ▶ Single or dual-channel version
- ▶ Kit without connection cable



2-stage function ¹⁾
 Enabling function is active in the second stage (pressed position). When the button is released, the enabling is removed (see function sequence).

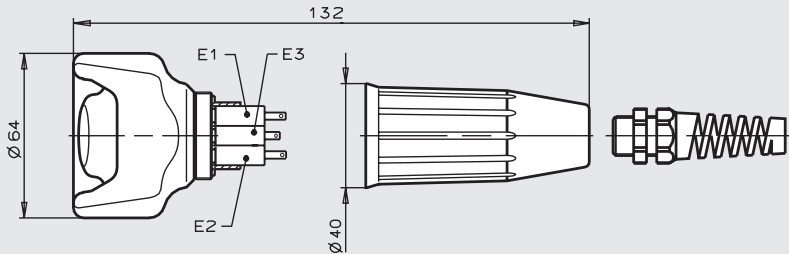
3-stage function
 Enabling function is only active in the second stage (middle position, actuating point). If the button is released or pushed further (panic function), the enabling is removed (dependent on the wiring, see function sequence).

Switching elements (see also Page 8)

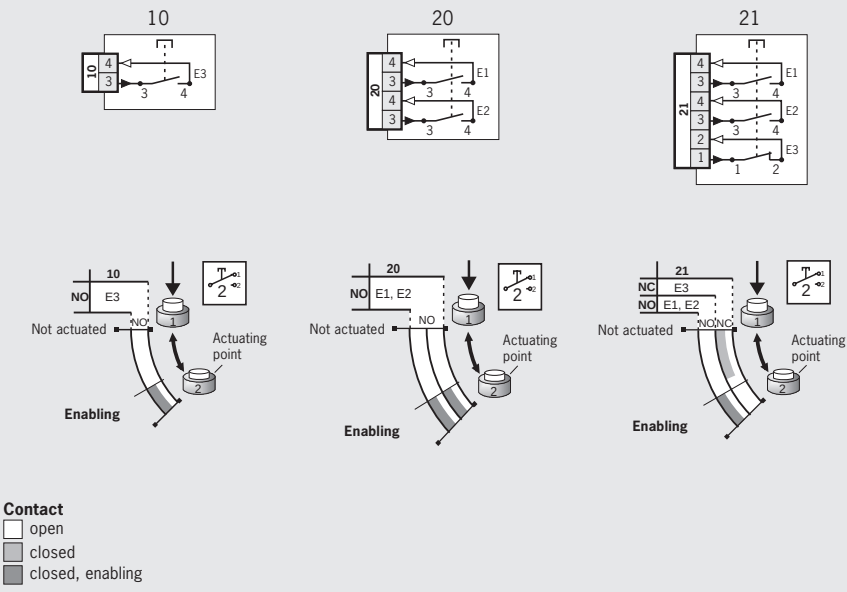
- ▶ **10** 1 NO
- ▶ **20** 2 NO
- ▶ **21** 2 NO + 1 NC
- ▶ **111** 1 NO + 1 NC $\ominus$ + 1 NC
- ▶ **121** 1 NO + 2 NC $\ominus$ + 1 NC
- ▶ **210** 2 NO + 1 NC $\ominus$
- ▶ **220** 2 NO + 2 NC $\ominus$
- ▶ **2220** 2 NO/NC $\ominus$ ²⁾

ZSA, 2-stage function ¹⁾
 Tab connection

Dimension drawings



Wiring diagrams/function sequence



Ordering table

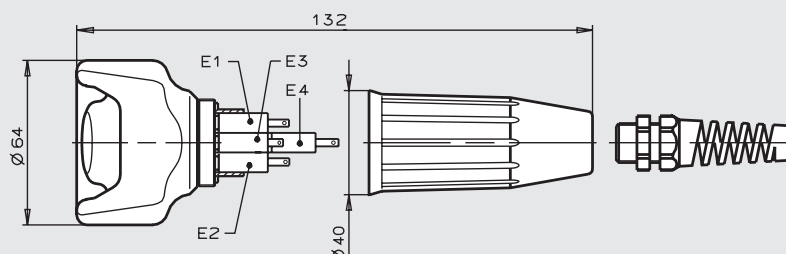
Design	Connection	Version	Switching element		
			10: 1 NO	20: 2 NO	21: 2NO + 1 NC
Kit	Tab connection	without cable	070750	070800	070736
2-stage ¹⁾			ZSA1-1	ZSA1-2	ZSA1-3
G1					

1) As per VDI 2854, a device comparable to an emergency stop device must be fitted!
 2) Only closed in middle position, a normally open contact and a positively driven contact are combined internally.

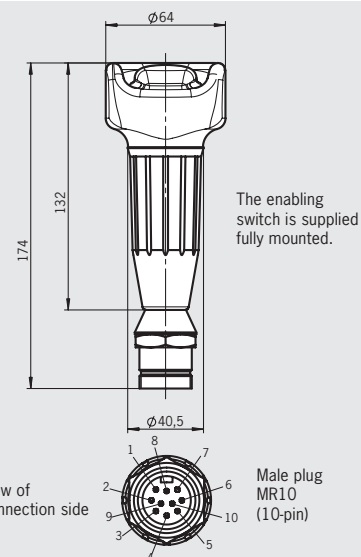


ZSA, 3-stage function Tab connection

Dimension drawings

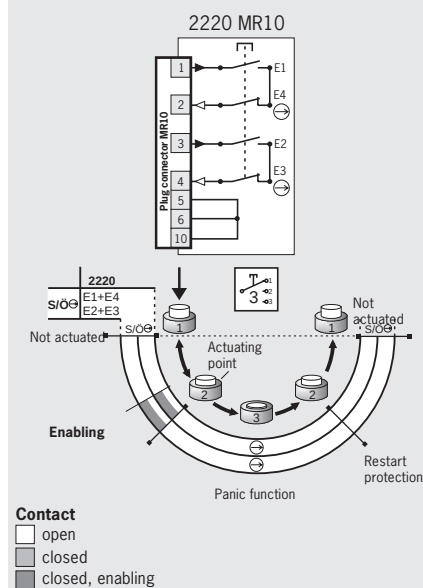
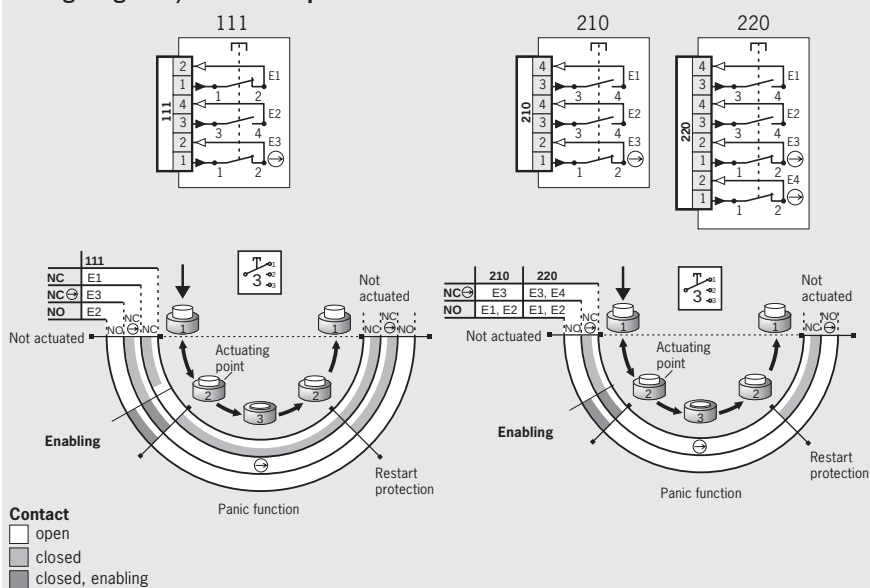


ZSA, 3-stage function With built-in plug connector



For mating connectors see page 69

Wiring diagrams/function sequence



Ordering table

Design	Connection	Version	Switching element			
			111: 1NO+1NC +1NC	210: 2NO+1NC	220: 2NO+2NC	2220: 2 NO/NC 1)
Kit 3-stage G1	Tab connection	without cable	070734 ZSA2-1	070735 ZSA2-2	070792 ZSA2-4	-
3-stage G1 with built-in plug	MR10 Plug connector (10-pin)	without cable	-	-	-	095497 ZSA2-4-10C1903

1) Only closed in middle position, a normally open contact and a positively driven contact are combined internally.

Enabling switch ZSA

Enabling switch ZSA



- ▶ Housing G1
- ▶ 2-/3-stage function
- ▶ Single or dual-channel version
- ▶ Connection cable straight or coiled
- ▶ Wall holder optional



2-stage function ¹⁾

Enabling function is active in the second stage (pressed position). When the button is released, the enabling is removed (see function sequence).

3-stage function

Enabling function is only active in the second stage (middle position, actuating point). If the button is released or pushed further (panic function), the enabling is removed (dependent on the wiring, see function sequence).

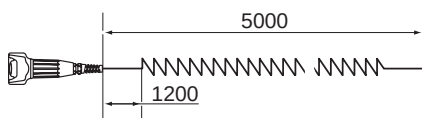
Cable

The high quality connection cables (individual screening of the safety contacts) are available straight or coiled.

Switching elements (see also page 8)

- ▶ **10** 1 NO
- ▶ **20** 2 NO
- ▶ **21** 2 NO + 1 NC
- ▶ **111** 1 NO + 1 NC ⊕ + 1 NC
- ▶ **121** 1 NO + 2 NC ⊕ + 1 NC
- ▶ **210** 2 NO + 1 NC ⊕
- ▶ **220** 2 NO + 2 NC ⊕

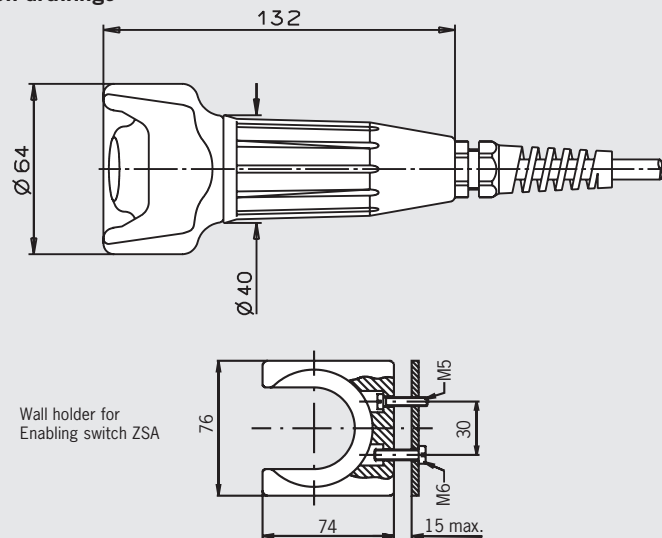
Cable lengths (coiled cable pulled out straight)



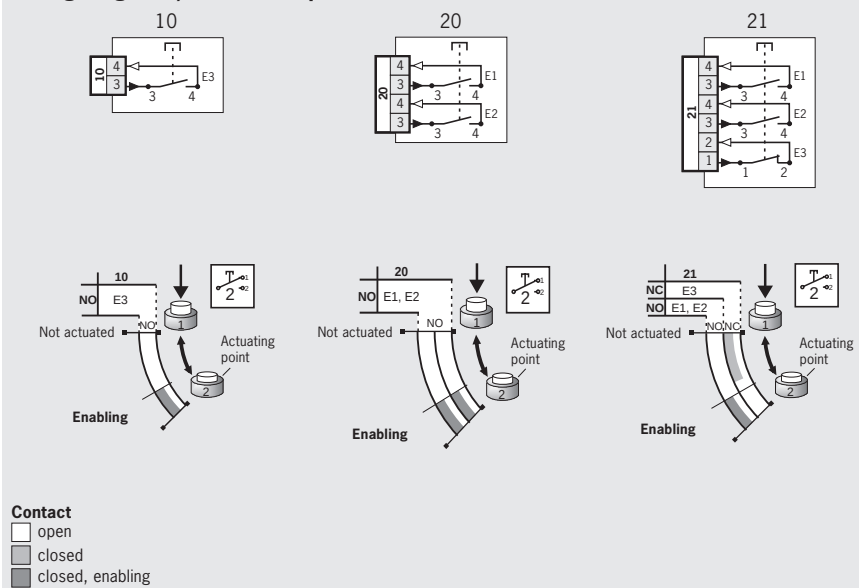
ZSA, 2-stage function ¹⁾

Flying lead

Dimension drawings



Wiring diagrams/function sequence



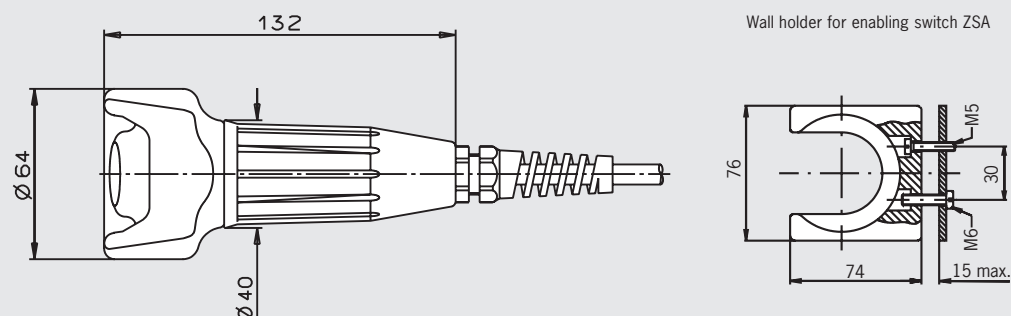
Ordering table

Design	Connection/ Cross section	Cable length	Version	Switching element		
				10: 1 NO	20: 2 NO	21: 2 NO + 1 NC
G1 2-stage ¹⁾	Flying lead 6 x 0.34 mm ²	2.5 m straight	incl. wall holder	On request	082557 ZSA1A2L25AC1909	On request
		5 m coiled		On request	On request	094321 ZSA1A2S05A
	Flying lead 3 x 0.75 mm ²	1 m straight	incl. wall holder	-	-	104231 ZSA1A2G01AC2246
		5 m straight		082524 ZSA1A5G05AC1917	-	-
		7 m straight		-	097909 ZSA1A2G07A	-
		10 m straight		095144 ZSA1A5G10AC1917	-	-

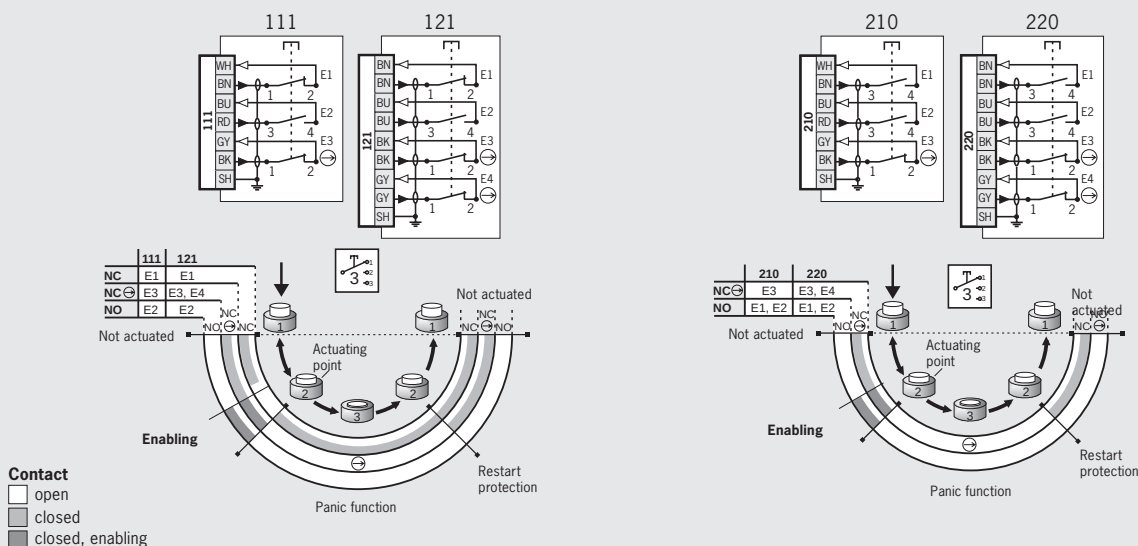
¹⁾ As per VDI 2854, a device comparable to an emergency stop device must be fitted!

ZSA, 3-stage function Flying lead

Dimension drawings



Wiring diagrams/function sequence



Ordering table

Design	Connection/ Cross section	Conductor length	Version	Switching element			
				111: 1NO+1NC $\ominus$ +1NC	121: 1NO+2NC $\ominus$ +1NC	210: 2NO+1NC $\ominus$	220: 2NO+2NC $\ominus$
G1 3-stage	Flying lead 6 x 0.34 mm ²	1.5 m straight	Incl. wall holder	057089 ZSA2A1L15AC1689	-	On request	-
		2 m straight		-	-	099371 ZSA2A2G02A	-
		2.5 m straight	incl. wall holder	072728 ZSA2A1L25AC1689	-	On request	-
		5 m straight		055402 ZSA2A1G05A	-	055406 ZSA2A2G05A	-
		5 m coiled		055404 ZSA2A1S05A	-	055408 ZSA2A2S05A	-
		10 m straight		055403 ZSA2A1G10A	-	055407 ZSA2A2G10A	-
		15 m straight		On request	-	057007 ZSA2A2G15A	-
		20 m straight		On request	-	075807 ZSA2A2G20A	-
		25 m straight		On request	-	078939 ZSA2A2G25A	-
	Flying lead 8 x 0.34 mm ²	2.5 m straight	incl. wall holder	-	On request	-	086788 ZSA2A4L25AC1689
		5 m straight		-	070784 ZSA2A3G05A	-	070764 ZSA2A4G05A
		5 m coiled		-	070786 ZSA2A3S05A	057010 ZSA2A2S05AC1643	070766 ZSA2A4S05A
		10 m straight		-	070785 ZSA2A3G10A	-	070765 ZSA2A4G10A
		20 m straight		-	On request	-	073300 ZSA2A4G20A

Enabling switch ZSA



Enabling switch ZSA

- ▶ Housing G1
- ▶ 3-stage function
- ▶ Single or dual-channel version
- ▶ Connection cable straight or coiled
- ▶ Plug connector optional
- ▶ Direct connection to safety switch optional
- ▶ Wall holder optional
- ▶ Increased actuating force optional



3-stage function

Enabling function is only active in the second stage (middle position, actuating point). If the button is released or pushed further (panic function), the enabling is removed (dependent on the wiring, see function sequence)

Cable

The high-quality connection cables (individual screening of the safety contacts) are available straight or coiled.

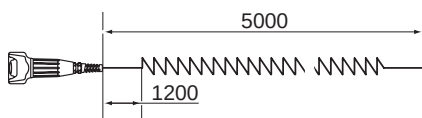
Suitable for direct connection to safety switch

This enabling switch can be connected directly to a safety switch (TZ...C1662) (see catalog for safety switches with metal housing).

Switching elements (see also Page 8)

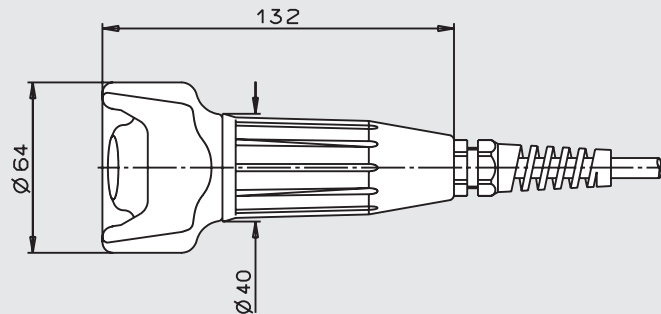
- ▶ **1110** 1 NO/NC $\ominus$ ¹⁾
- ▶ **1210** 1 NO/NC $\ominus$ ¹⁾ + 1 NO
- ▶ **2210** 1 NO/NC $\ominus$ ¹⁾
1 NO (additional auxiliary contact)
- ▶ **2220** 2 NO/NC $\ominus$ ¹⁾

Cable lengths (coiled cable pulled out straight)

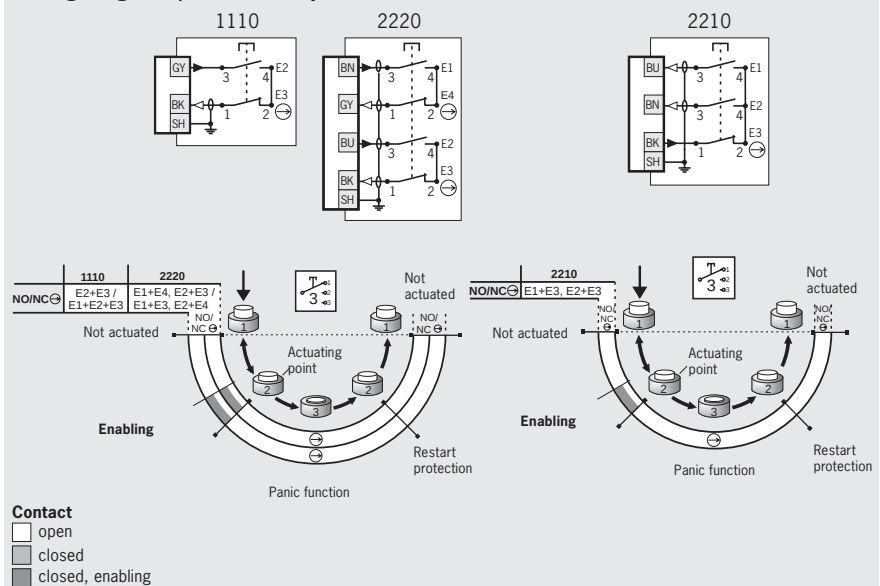


ZSA, 3-stage function Flying lead

Dimension drawings



Wiring diagrams/function sequence



Ordering table

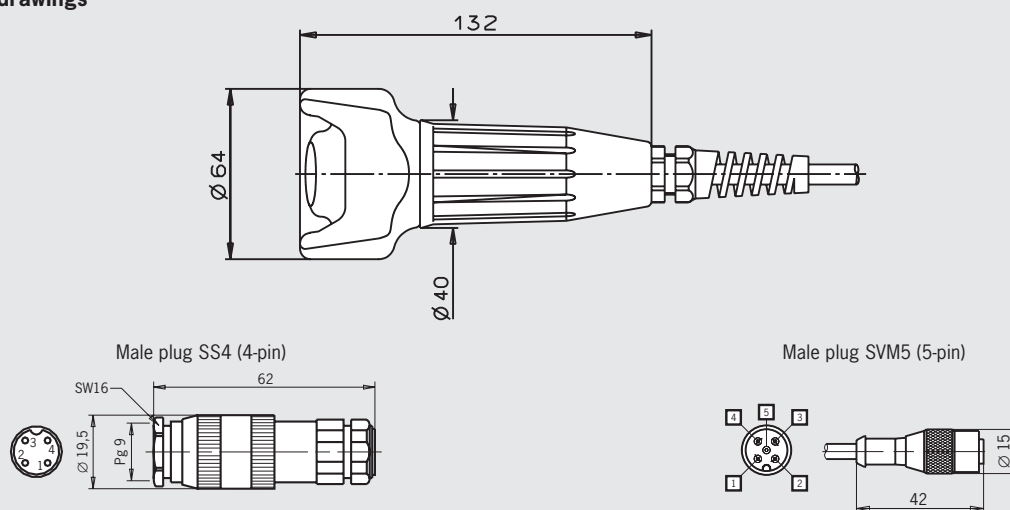
Design	Connection/ Cross section	Cablelength	Version	Switching element		
				1110: 1 NO/NC $\ominus$ ¹⁾	2210: 1 NO/NC $\ominus$ ¹⁾ + 1 NO	2220: 2 NO/NC $\ominus$ ¹⁾
G1 3-stage	Flying lead 8 x 0.34 mm ²	5 m straight		On request	On request	072961 ZSA2B4G05A
		5 m coiled		On request	On request	085118 ZSA2B4S05A
		10 m straight	Increased actuating force	072759 ²⁾ ZSA2B5G10AC1861	on request	On request
	Flying lead 3 x 0.75 mm ²	5 m straight		On request	055410 ZSA2B2G05A	-
		10 m straight		On request	055411 ZSA2B2G10A	-

1) Only closed in middle position, a normally open contact and a positively driven contact are combined internally.

2) No BG type examination

ZSA, 3-stage function Plug connectors

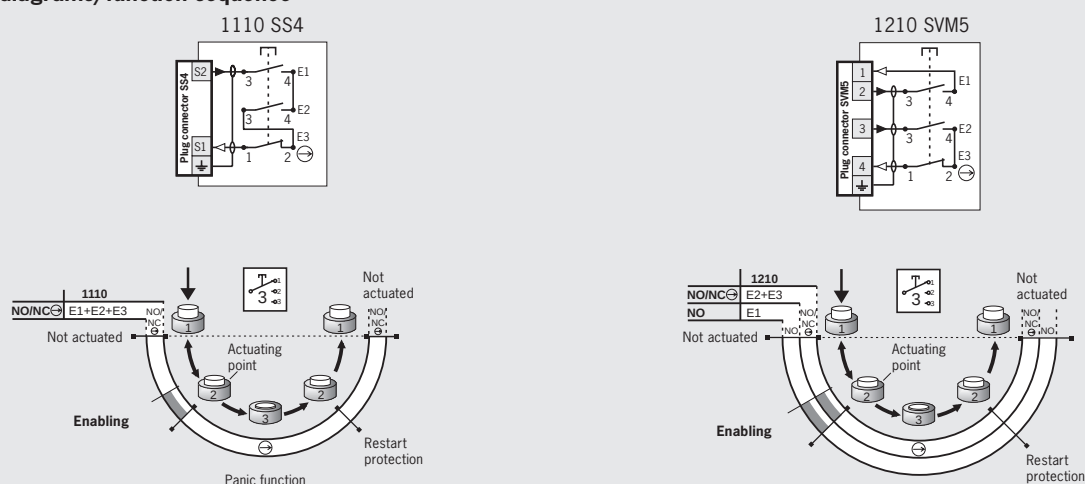
Dimension drawings



For mating connectors
see page 36

View of connection side

Wiring diagrams/function sequence



Contact
☐ open
☒ closed
☒ closed, enabling

Ordering table

Design	Connection	Cable length	Version	Switching element	
				1110: 1 NO/NC $\ominus$ ¹⁾	1210: 1 NO/NC $\ominus$ ¹⁾ + 1 NO
G1 3-stage	SS4 Plug connector (4-pin)	5 m straight	Direct connection to TZ...C1662 with plug BD4	057097 ZSA2B2G05B-C1662	-
		10 m straight	Direct connection to TZ...C1662 with plug BD4	057098 ZSA2B2G10B-C1662	-
	SVM5 Plug connector (5-pin)	15 m straight		On request	072870 ZSA2B2G15CC1926
		25 m straight		On request	086206 ZSA2B2G25CC1926

1) Only closed in middle position, a normally open contact and a positively driven contact are combined internally.

Enabling switch ZSA



Enabling switch ZSA

- ▶ Housing G1
- ▶ 3-stage function
- ▶ Single or dual-channel version
- ▶ Straight connection cable
- ▶ Plug connector
- ▶ Direct connection to safety switch optional
- ▶ Increased actuating force optional



3-stage function

Enabling function is only active in the second stage (middle position, actuating point). If the button is released or pushed further (panic function), the enabling is removed (dependent on the wiring, see function sequence).

Cable

The high quality connection cables (individual screening of the safety contacts) are available straight.

Suitable for direct connection to safety switch

This enabling switch can be connected directly to a safety switch (TZ...C1803) (see catalog for safety switches with metal housing).

Increased actuating force

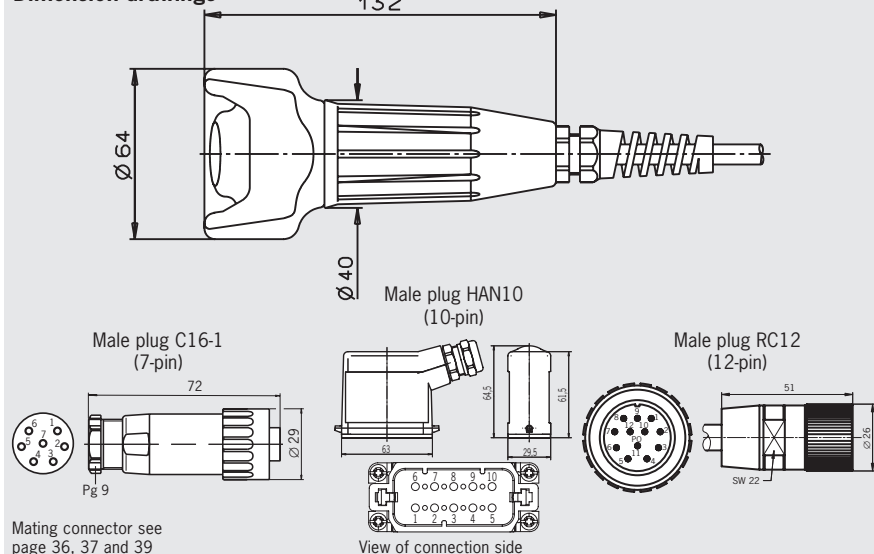
A higher force is required on pressing through from stage 2 (enabling) to stage 3 (pressed through „panic function“).

Switching elements (see also Page 8)

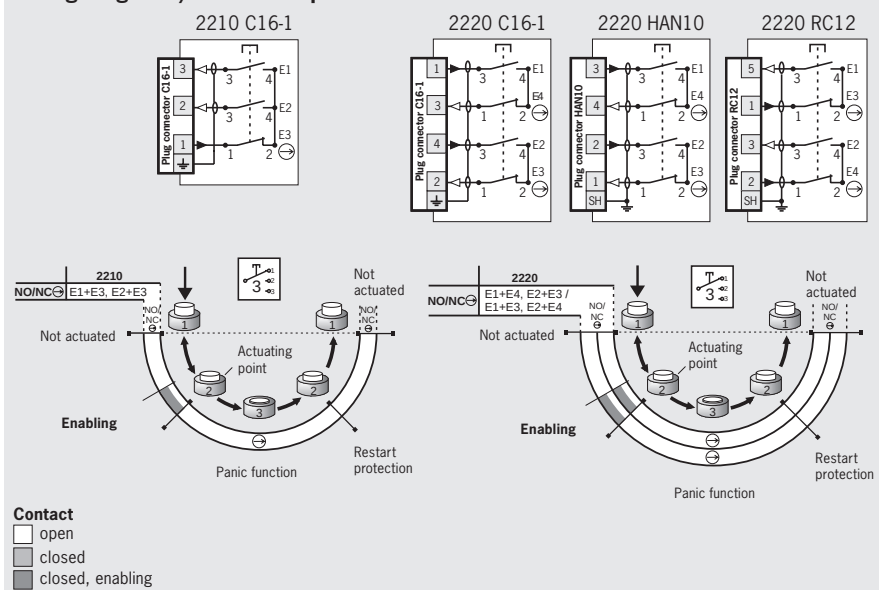
- ▶ **210** 2 NO + 1 NC ⊖
- ▶ **220** 2 NO + 2 NC ⊖
- ▶ **2210** 1 NO/NC ⊖¹⁾
1 NO (additional auxiliary contact)
- ▶ **2220** 2 NO/NC ⊖¹⁾

ZSA, 3-stage function Plug connector

Dimension drawings



Wiring diagrams/function sequence



Ordering table

Design	Connection	Cable length	Version	Switching element	
				2210: 1 NO/NC ⊖ ¹⁾ + 1 NO	2220: 2 NO/NC ⊖ ¹⁾
G1 3-stage	C16-1 ²⁾ Plug connector (7-pin)	10 m straight		057100 ZSA2B2G10B	070788 ZSA2B4G10B
		20 m straight		On request	079870 ZSA2B4G20B
	HAN10 Plug connectors (10-pin)	10 m straight	Increased actuating force Screen on plug housing	On request	077489 ³⁾ ZSA2B4G10CC1830
	RC12 Plug connector (12-pin)	5 m straight	Direct connection to TZ...C1803 Screen on plug housing	On request	092141 ³⁾ ZSA092141C2038
		10 m straight		On request	097567 ³⁾ ZSA097567C2038
		15 m straight		On request	099495 ³⁾ ZSA099459C2038
		25 m straight		On request	100873 ³⁾ ZSA0100873C2038

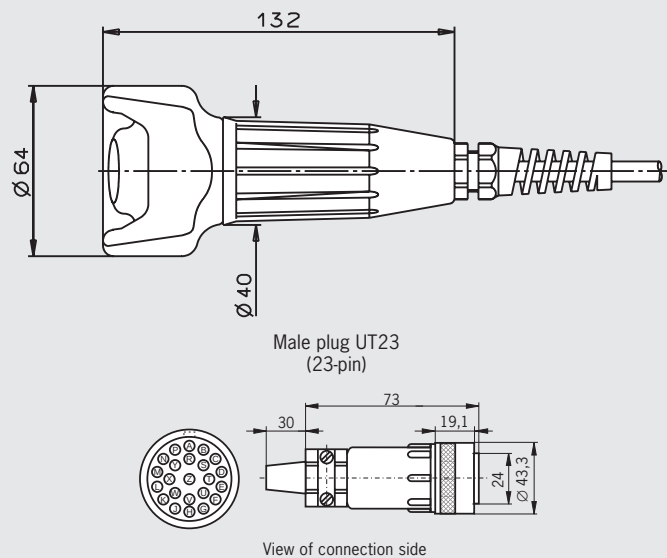
1) Only closed in middle position, a normally open contact and a positively driven contact are combined internally.

2) Enabling switch connector compatible with safety switch NZ..VZ.C1420 or NZ..VZ.C1701 (see catalog for safety switches with metal housing).

3) No BG type examination

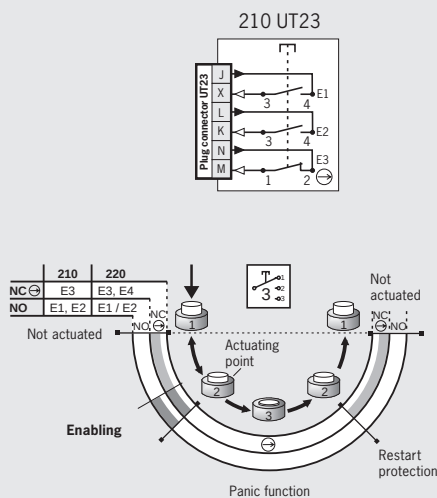
ZSA, 3-stage function Plug connector

Dimension drawings



For mating connectors
see page 38

Wiring diagrams/function sequence



Contact

- ☐ open
- ☒ closed
- ☒ closed, enabling

Ordering table

Design	Connection	Cable length	Switching element	
			210: 2 NO + 1 NC	220: 2 NO + 2 NC
G1 3-stage	UT23 Plug connector (23-pin)	12 m straight	070731 ZSA2A2L12CC1725	on request

Enabling switch ZSA and ZSB

- ▶ Housing G1
- ▶ 3-stage function
- ▶ Dual-channel version
- ▶ Straight connection cable
- ▶ Plug connector optional
- ▶ LED and/or buttons optional



3-stage function

Enabling function is only active in the second stage (middle position, actuating point). If the button is released or pushed further (panic function), the enabling is removed (dependent on the wiring, see function sequence).

Cable

The high quality connection cables (individual screening of the safety contacts) are available straight.

LEDs

The LEDs are used for visual feedback direct at the enabling switch.

+ and – buttons

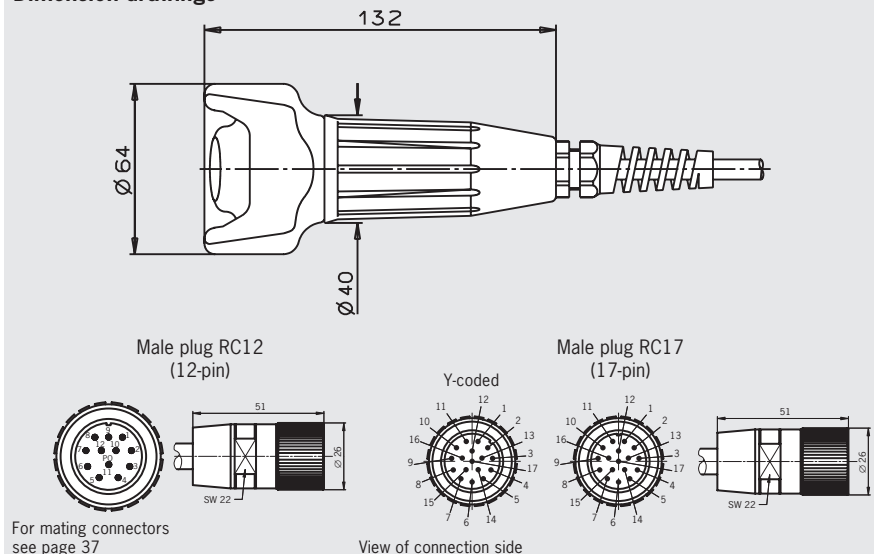
These buttons can be configured individually. For example for moving axes in positive or negative direction.

Switching elements (see also Page 8)

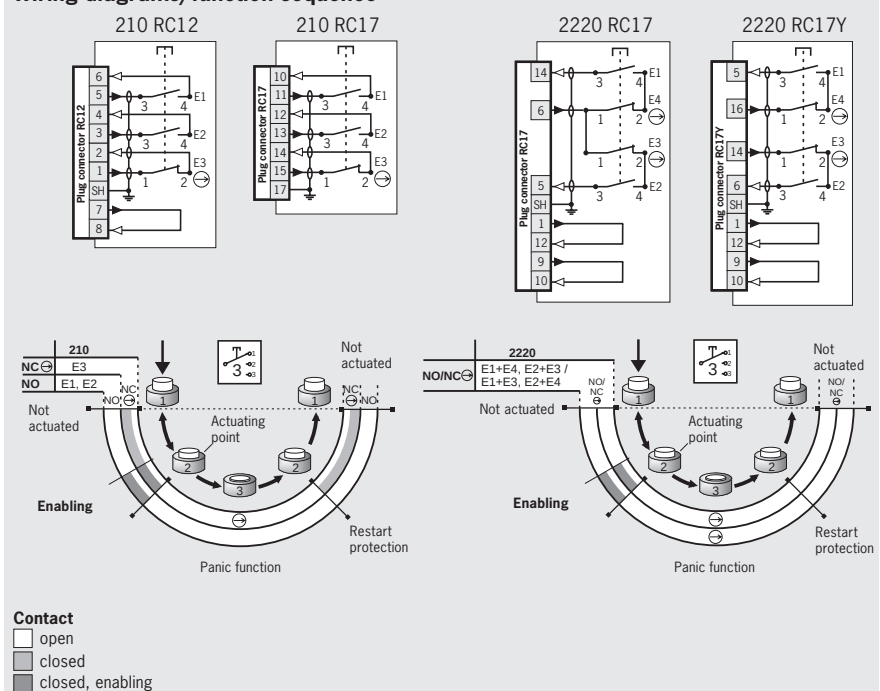
- ▶ **210** 2 NO + 1 NC ⊖
- ▶ **220** 2 NO + 2 NC ⊖
- ▶ **2220** 2 NO/NC ⊖ ¹⁾

ZSA, 3-stage function Plug connector

Dimension drawings



Wiring diagrams/function sequence



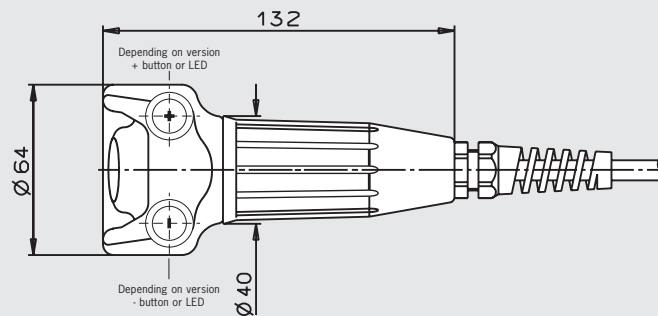
Ordering table

Design	Connection	Cable length	Version	Switching element	
				210: 2 NO + 1 NC ⊖	2220: 2 NO/NC ⊖ ¹⁾
G1 3-stage	RC12 Plug connectors (12-pin)	5 m straight	Screen on plug housing	073289 ZSA2AG05CC1770	On request
	RC17 Plug connector (17-pin)	5 m straight	Suitable for Siemens panel PP031 (1-channel)	070741 ZSA2AG05CC1714	On request
	RC17 Plug connector Y-coded (17-pin)	5 m straight	Screen on plug housing Suitable for Siemens panel PP012 and PP031 (2-channel)	On request	092738 ZSA2A4G05C-C2041
					091547 ZSA2A4G05C-C2032

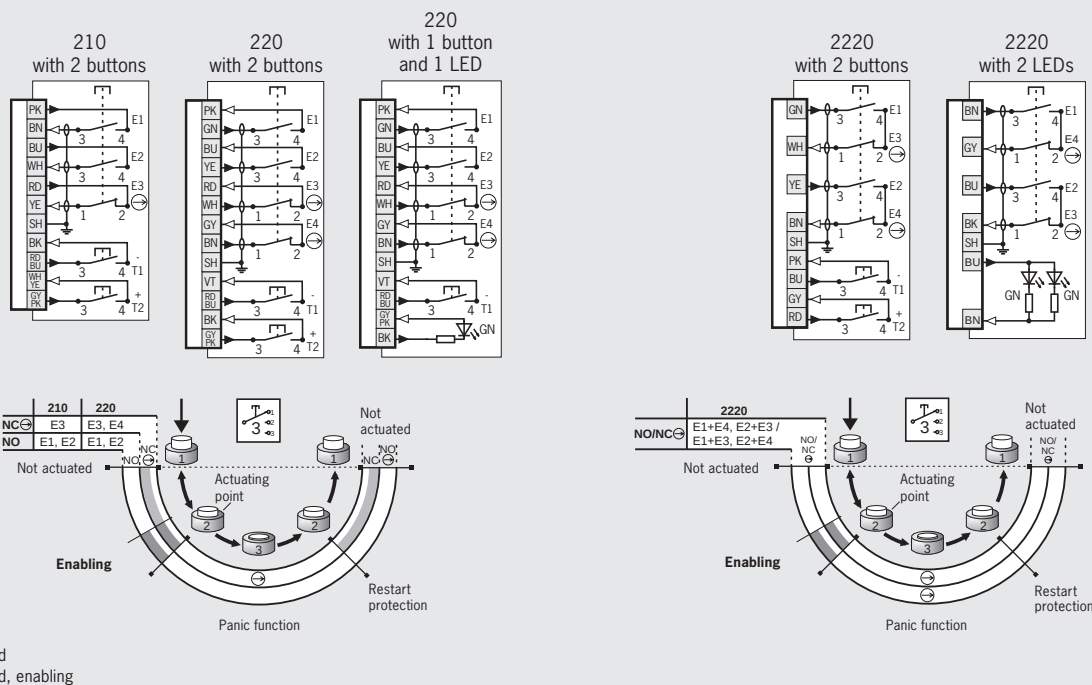
1) Only closed in middle position, a normally open contact and a positively driven contact are combined internally.

ZSB, 3-stage function flying lead

Dimension drawings



Wiring diagrams/function sequence



Ordering table

Design	Connection/ cross section	Cable length	Version	Switching element		
				210: 2 NO + 1 NC ⊖	220: 2 NO + 2 NC ⊖	2220: 2 NO/NC ⊖ ¹⁾
G1 3-stage	Flying lead 8 x 0.34 mm ²	10 m straight	2 LEDs (gn)	On request	On request	086707 ²⁾ ZSA086707C1983
		15 m straight	2 LEDs (gn)	On request	On request	072969 ²⁾ ZSA072969C1983
	Flying lead 8 x 0.5 mm ² + 8 x 0.14 mm ²	5 m straight	1 button 1 LED (gn)	On request	085126 ²⁾ ZSB085126	106112 ZSB2B4G05A-C2277
		5 m straight	2 buttons (+ and -)	073260 ZSB2A2G05A	083317 ²⁾ ZSB083317	092378 ^{2) 3)} ZSB092378
		10 m straight	2 buttons (+ and -)	073261 ZSB2A2G10A	On request	On request
		15 m straight	2 buttons (+ and -)	095612 ZSB2A2G15A	On request	On request
		20 m straight	2 buttons (+ and -)	On request	096900 ZSB096900	On request
		7 m coiled	1 button 1 LED (gn)	On request	109470 ²⁾ ZSB2A4S06A-C2302	On request
		8 m coiled	2 buttons (+ and -)	On request	103161 ZSB103161	On request
		22 m coiled	2 buttons (+ and -)	On request	On request	109136 ZSB2B4S22A

1) Only closed in middle position, a normally open contact and a positively driven contact are combined internally.

2) No BG type examination

3) No cULus type examination

Enabling switch ZSA and ZSB

- ▶ Housing G1
- ▶ 3-stage function
- ▶ Dual-channel version
- ▶ Straight connection cable optional
- ▶ Plug connector
- ▶ LED and/or buttons optional
- ▶ Actuator for safety switch NZ.VZ or TZ optional



3-stage function

Enabling function is only active in the second stage (middle position, actuating point). If the button is released or pushed further (panic function), the enabling is removed (dependent on the wiring, see function sequence).

Cable

The high quality connection cables (individual screening of the safety contacts) are available straight.

LEDs

The LEDs are used for visual feedback direct at the enabling switch.

+ and – buttons

These buttons can be configured individually. For example for moving axes in positive or negative direction.

Suitable for direct connection to safety switch

This enabling switch can be connected directly to a safety switch (TZ...C1803) (see catalog for safety switches with metal housing).

Actuator

Suitable for safety switch NZ.VZ/TZ (see catalog for safety switches with metal housing). By using an appropriate safety switch as the holder for the enabling switch, the position of the enabling switch can be safely sampled. By suitable integration of this combination, the signal from the safety switch can be used, e.g., as an operating mode selector switch when the actuator is removed (removal of the enabling switch).

Switching elements (see also page 8)

- ▶ **210** 2 NO + 1 NC ⊖
- ▶ **2220** 2 NO/NC ⊖¹⁾

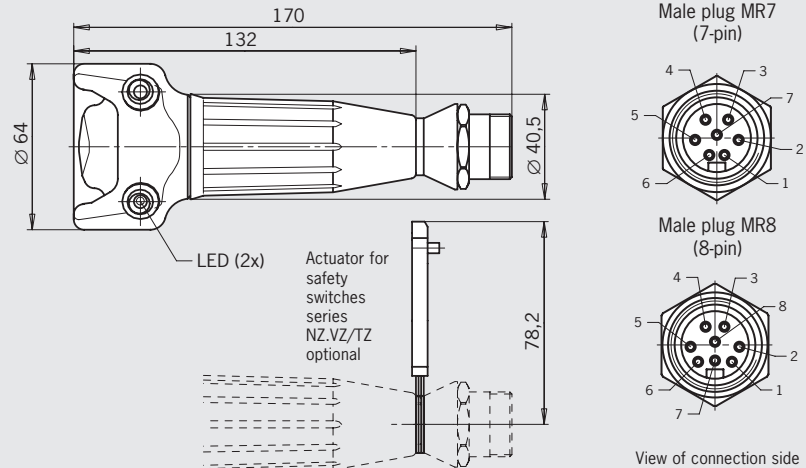
Ordering table

Design	Connection	Cable length	Version	Switching element
				2220: 2 NO/NC ⊖¹⁾
G1 3-stage	MR7 Plug connectors (7-pin)	-	2 LEDs (gn)	085114 ZSA085114C1968
		-	2 LEDs (gn) With actuator for safety switch NZ.VZ/TZ	072887 ZSA072887-C1932
	MR8 plug connector (8-pin)	-	2 LEDs (gn + ye)	086681 ZSA086681C1979
		-	With actuator for safety switch NZ.VZ/TZ	

1) Only closed in middle position, a normally open contact and a positively driven contact are combined internally.

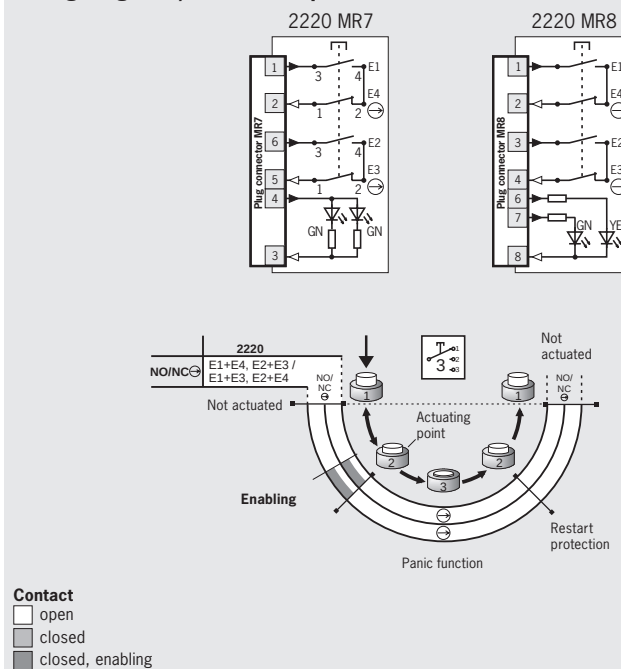
ZSA, 3-stage function Plug connectors

Dimension drawings



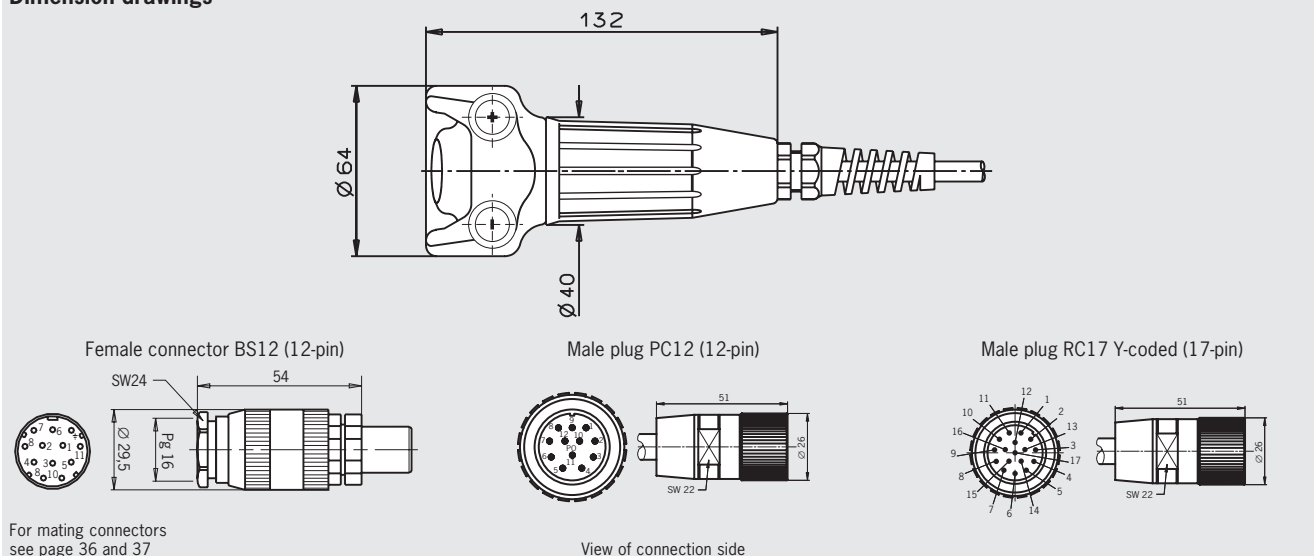
For mating connectors
see page 39

Wiring diagrams/function sequence

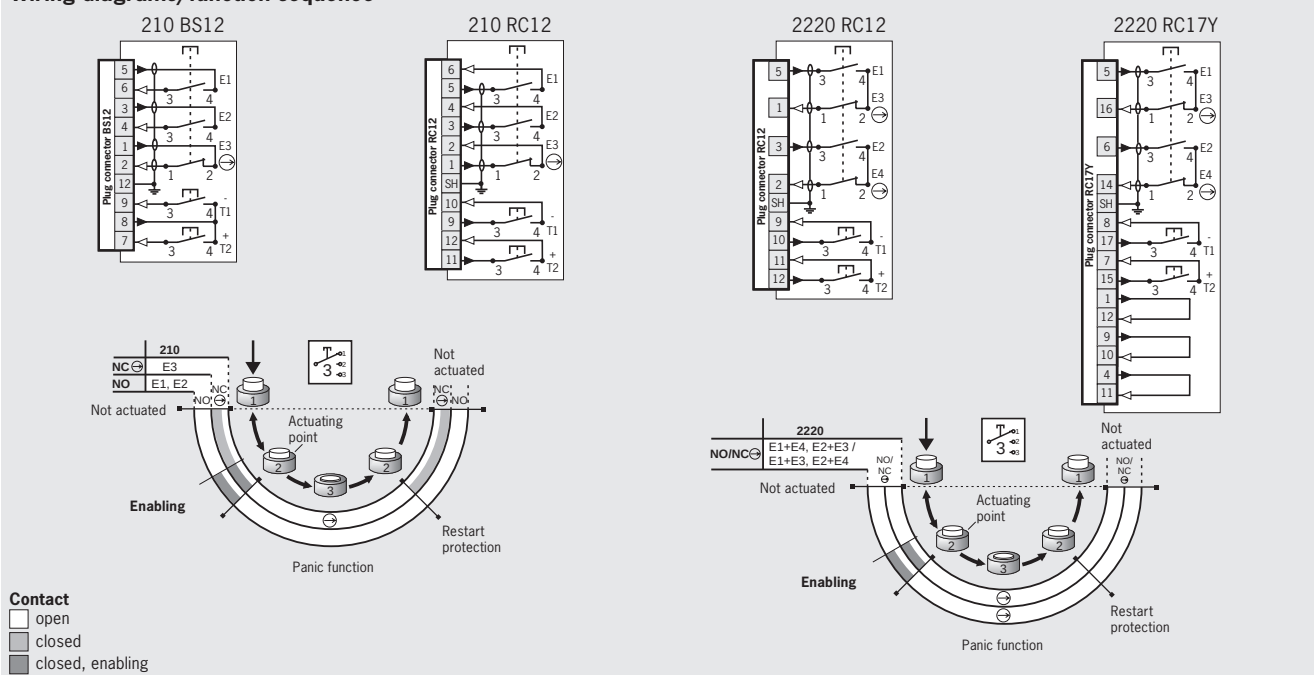


ZSB, 3-stage function Plug connectors

Dimension drawings



Wiring diagrams/function sequence



Ordering table

Design	Connection	Cable length	Version	Switching element	
				210: 2 NO + 1 NC $\ominus$	2220: 2 NO/NC $\ominus$ 1)
G1 3-stage	BS12 Plug connectors (12-pin)	5 m straight	2 buttons (+ and -)	079832 2) ZSB079832	On request
	RC12 Plug connectors (12-pin)	5 m straight	2 buttons (+ and -), Screen on plug housing	073264 ZSB2A2G05C	On request
		5 m straight	2 buttons (+ and -), Direct connection TZ...C1803 Screen on plug housing	On request	077040 2) ZSB077040
		10 m straight	2 buttons (+ and -) Screen on plug housing	073265 ZSB2A2G10C	On request
	RC17 plug connector Y-coded (17-pin)	5 m straight	2 buttons (+ and -) Screen on plug housing	On request	092996 2) 3) ZSB2B4G05C-C2044

1) Only closed in middle position, a normally open contact and a positively driven contact are combined internally.

2) No BG type examination

3) No cULus type examination



Enabling switch ZSR

- ▶ 3-stage function
- ▶ Single or dual-channel version
- ▶ Housing G2
- ▶ Straight connection cable
- ▶ Plug connector optional
- ▶ Including holder



3-stage function

Enabling function is only active in the second stage (middle position, actuating point). If the button is released or pushed further (panic function), the enabling is removed (dependent on the wiring, see function sequence).

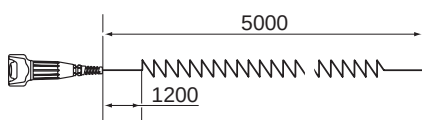
Cable

The high quality connection cables (individual screening of the safety contacts) are available straight.

Switching elements (see also page 8)

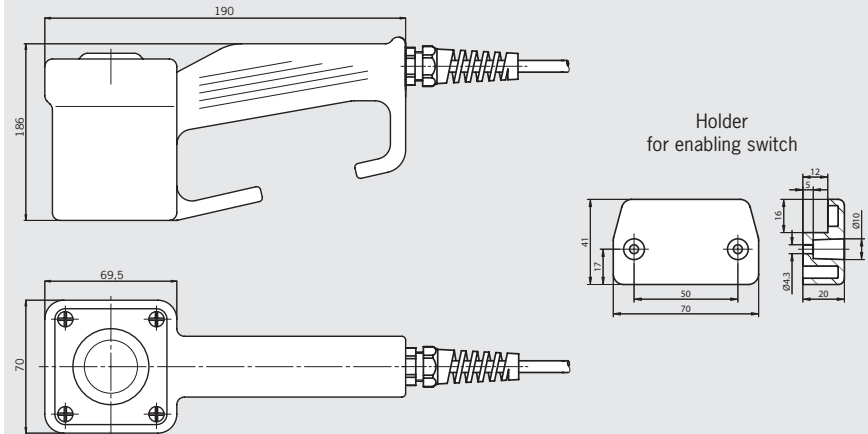
- ▶ **111** 1 NO + 1 NC $\ominus$ + 1 NC
- ▶ **210** 2 NO + 1 NC $\ominus$
- ▶ **220** 2 NO + 2 NC $\ominus$
- ▶ **1110** 1 NO/NC $\ominus$ ¹⁾
- ▶ **2210** 1 NO/NC $\ominus$ ¹⁾
1 NO (additional auxiliary contact)

Cable lengths (coiled cable pulled out straight)

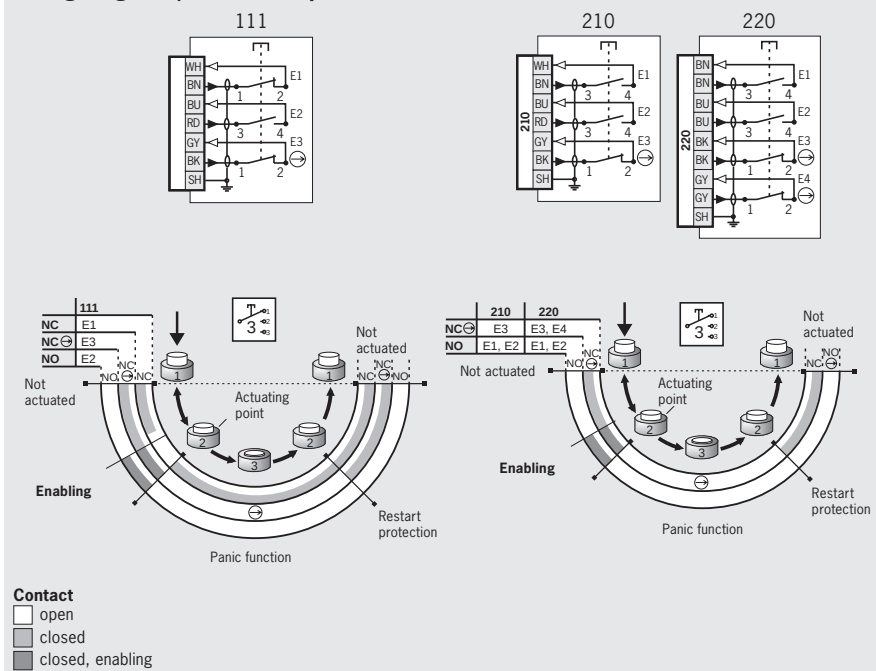


ZSR, 3-stage function Flying lead

Dimension drawings



Wiring diagrams/function sequence



Ordering table

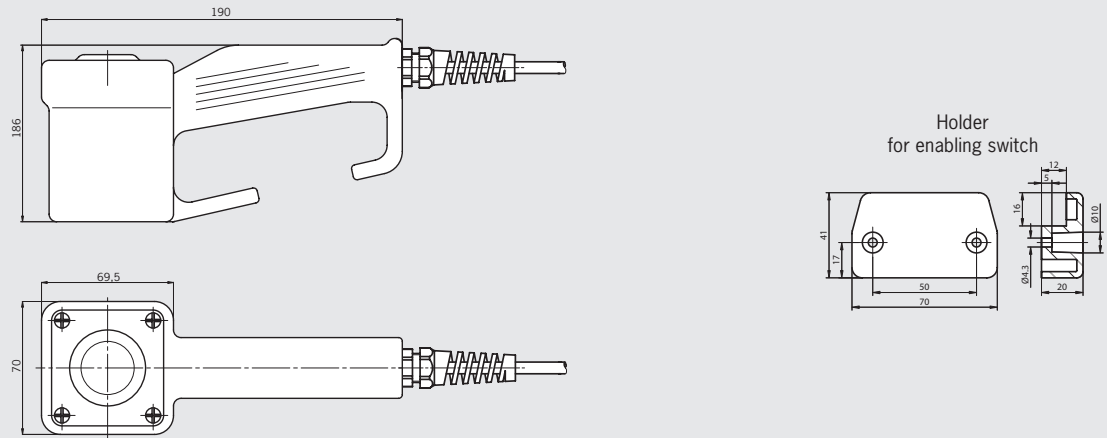
Design	Connection/ Cross section	Cable length	Switching element		
			111: 1 NO + 1 NC $\ominus$ + 1 NC	210: 2 NO + 1 NC $\ominus$	220: 2 NO + 2 NC $\ominus$
G2 3-stage	Flying lead 6 x 0.34 mm ²	5 m straight	055423 ZSR2A1G05A	055427 ZSR2A2G05A	-
		10 m straight	055424 ZSR2A1G10A	055428 ZSR2A2G10A	-
		5 m coiled	055425 ZSR2A1S05A	055429 ZSR2A2S05A	-
	Flying lead 8 x 0.34 mm ²	5 m straight	-	-	097609 ZSR2A4G05A
		5 m coiled	-	-	104085 ZSR2A4S05A

1) Only closed in middle position, a normally open contact and a positively driven contact are combined internally.



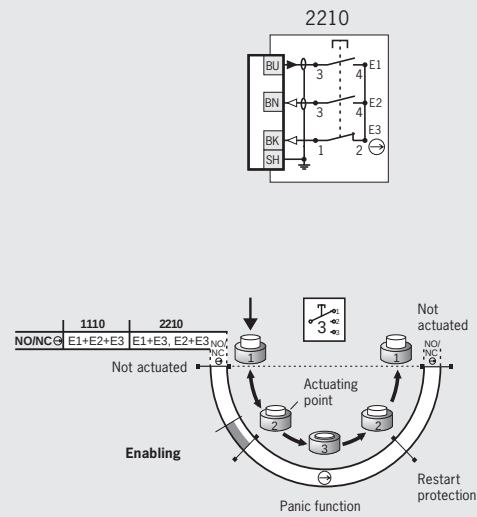
ZSR, 3-stage function Flying lead

Dimension drawings



For mating connectors
see page 39

Wiring diagrams/function sequence



Contact
□ open
■ closed
■ closed, enabling

Ordering table

Design	Connection/ cross section	Cable length	Switching element	
			1110: 1 NO/NC ⊖ ¹⁾	2210: 1 NO/NC ⊖ ¹⁾ + 1 NO
G2 3-stage	Flying lead 3 x 0.75 mm ²	5 m straight	On request	055431 ZSR2B2G05A
		10 m straight	On request	055432 ZSR2B2G10A

1) Only closed in middle position, a normally open contact and a positively driven contact are combined internally.





Enabling switch ZSB

- ▶ 3-stage function
- ▶ Dual-channel version
- ▶ Housing G3
- ▶ Coiled connection cable
- ▶ Two illuminated buttons
- ▶ Including holder



3-stage function

Enabling function is only active in the second stage (middle position, actuating point). If the button is released or pushed further (panic function), the enabling is removed (dependent on the wiring, see function sequence).

Cable

The high quality connection cables (individual screening of the safety contacts) are available coiled.

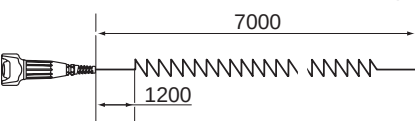
Illuminated + and – buttons

These buttons can be configured individually. For example for moving axes in positive or negative direction.

Switching elements (see also page 8)

- ▶ 210 2 NO + 1 NC ⊖

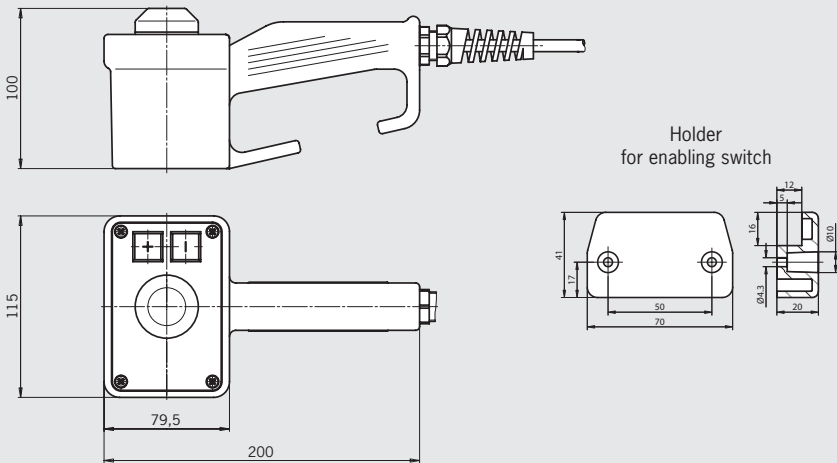
Cable lengths (coiled cable pulled out straight)



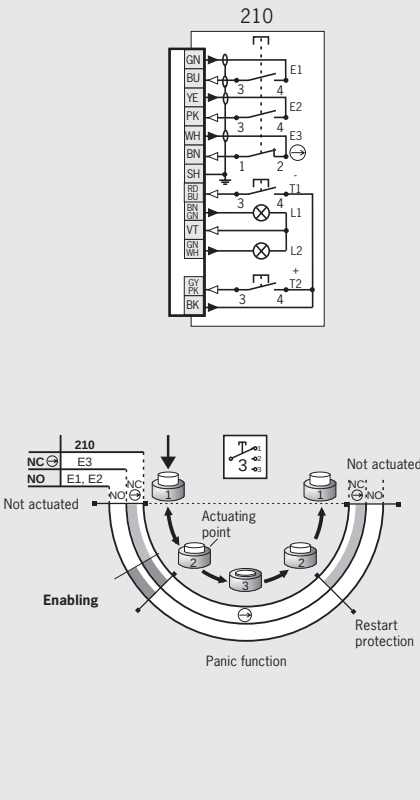
ZSB, 3-stage function

Flying lead

Dimension drawings



Wiring diagrams/function sequence



Ordering table

Design	Connection/ Cross section	Cable length	Version	Switching element
				210: 2 NO + 1 NC ⊖
G3 3-stage	Flying lead 8 x 0.5 mm ² + 8 x 0.14 mm ²	7 m coiled	2 illuminated buttons (+ and -)	054784 ZSB054784

Enabling switch ZSB

- ▶ 3-stage function
- ▶ Dual-channel version
- ▶ Housing G3
- ▶ Connection cable straight or coiled
- ▶ Plug connector
- ▶ Two illuminated buttons



3-stage function

Enabling function is only active in the second stage (middle position, actuating point). If the button is released or pushed further (panic function), the enabling is removed (dependent on the wiring, see function sequence).

Cable

The high-quality connection cables (individual screening of the safety contacts) are available straight or coiled.

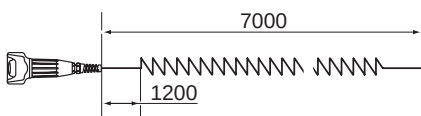
Illuminated + and - buttons

These buttons can be configured individually. For example for moving axes in positive or negative direction.

Switching elements (see also Page 8)

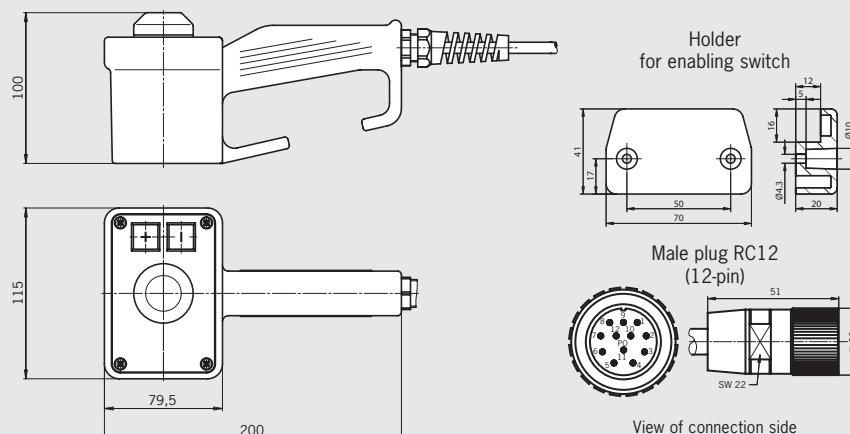
- ▶ 220 2 NO + 2 NC ⊖
- ▶ 2220 2 NO/NC ⊖¹⁾

Cable lengths (coiled cable pulled out straight)



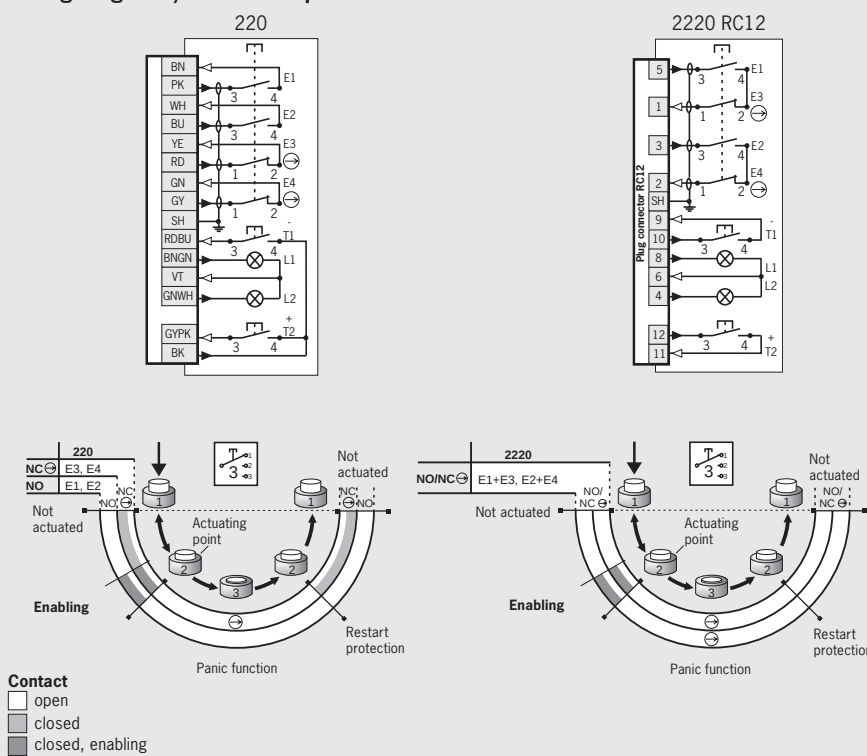
ZSB, 3-stage function Plug connector

Dimension drawings



For mating connectors
see page 37 and 38

Wiring diagrams/function sequence



Ordering table

Design	Connection	Conductor length	Version	Switching element	
				220: 2 NO + 2 NC ⊖	2220: 2 NO/NC ⊖ ¹⁾
G3 3-stage	Flying lead 4 x 0.5 mm ² + 4 x 0.5 mm ² + 8 x 0.14 mm ²	7 m coiled	2 illuminated buttons (+ and -)	100570 ZSB100570	On request
	RC12 Plug connector (12-pin)	5 m straight	2 illuminated buttons (+ and -)	-	077029 ZSB077029
		12 m straight	2 illuminated buttons (+ and -)	-	085058 ZSB085058

1) Only closed in middle position, a normally open contact and a positively driven contact are combined internally.

Enabling switch ZSB

- ▶ 3-stage function
- ▶ Dual-channel version
- ▶ Housing G3
- ▶ Connection cable straight or coiled
- ▶ Plug connector
- ▶ Two illuminated buttons
- ▶ Key-operated switch or selector switch optional
- ▶ Including holder



3-stage function

Enabling function is only active in the second stage (middle position, actuating point). If the button is released or pushed further (panic function), the enabling is removed (dependent on the wiring, see function sequence).

Cable

The high-quality connection cables (individual screening of the safety contacts) are available straight or coiled.

Illuminated + and - buttons

These buttons can be configured individually. For example for moving axes in positive or negative direction.

Key switch

For individual use, e.g. as operating mode selector switch.

Selector switch (12-stage)

For the selection of different axes or ranges. All outputs are open between the switch positions on the selector switch (break-before-make switching)!

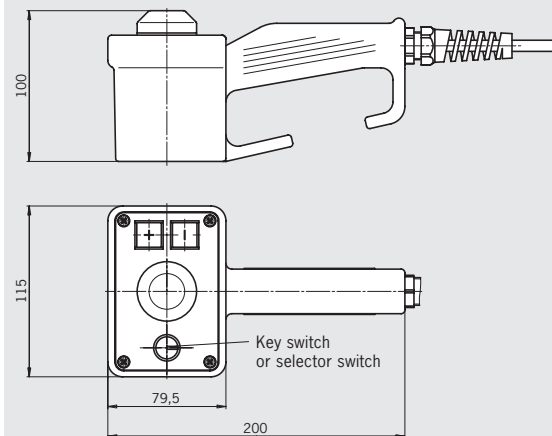
Switching elements (see also Page 8)

- ▶ 210 2 NO + 1 NC $\ominus$
- ▶ 2220 2 NO/NC $\ominus$ ¹⁾

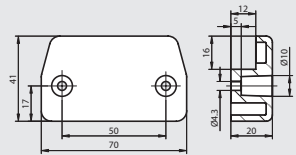
ZSB, 3-stage function

Flying lead, key operated switch or selector switch

Dimension drawings



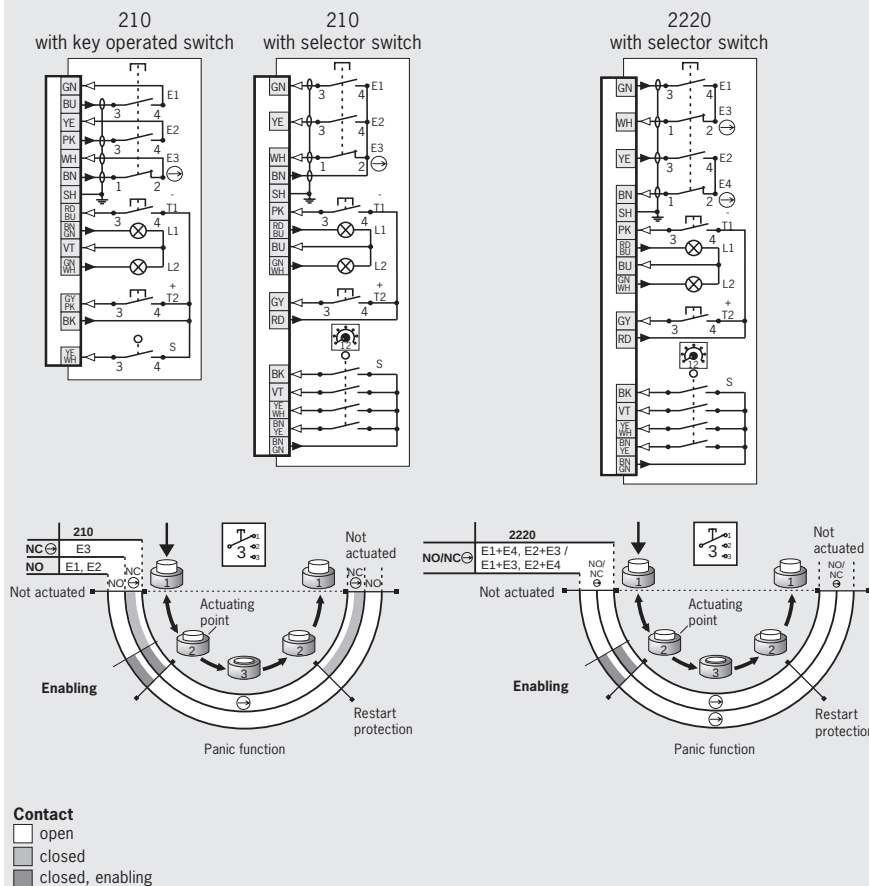
Holder for enabling switch



Switching table for selector switch (210 and 2220)

Pos.	BNYE	YEWH	VT	BK
1	0	0	0	0
2	0	0	0	1
3	0	0	1	0
4	0	0	1	1
5	0	1	0	0
6	0	1	0	1
7	0	1	1	0
8	0	1	1	1
9	1	0	0	0
10	1	0	0	1
11	1	0	1	0
12	1	0	1	1

Wiring diagrams/function sequence



Ordering table

Design	Connection/ cross section	Cable length	Version	Switching element	
				210: 2 NO + 1 NC $\ominus$	2220: 2 NO/NC $\ominus$ ¹⁾
G3 3-stage	Flying lead 8 x 0.5 mm ² + 8 x 0.14 mm ²	3 m straight	2 illuminated buttons (+ and -) 1 key operated switch	077027 ZSB077027	On request
		10 m straight	2 illuminated buttons (+ and -) 1 selector switch	070894 ZSB070894	087821 ZSB087821

1) Only closed in middle position, a normally open contact and a positively driven contact are combined internally.

Enabling switch ZSB

- ▶ 3-stage function
- ▶ Dual-channel version
- ▶ Housing G3
- ▶ Straight connection cable
- ▶ Plug connector
- ▶ Two illuminated buttons
- ▶ Key switch
- ▶ Including holder



3-stage function

Enabling function is only active in the second stage (middle position, actuating point). If the button is released or pushed further (panic function), the enabling is removed (dependent on the wiring, see function sequence).

Cable

The high quality connection cables (individual screening of the safety contacts) are available straight.

Illuminated + and - buttons

These buttons can be configured individually. For example for moving axes in positive or negative direction.

Key switch

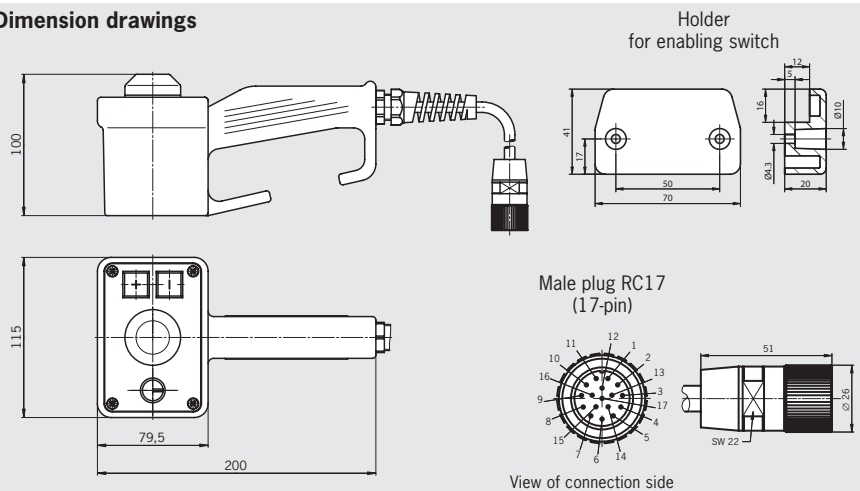
For individual use, e.g. as operating mode selector switch.

Switching elements (see also Page 8)

- ▶ 210 2 NO + 1 NC ⊖

ZSB, 3-stage function Plug connector, key-operated switch

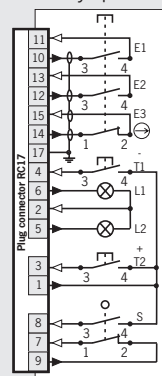
Dimension drawings



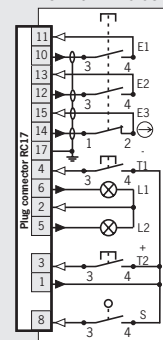
For mating connectors
see page 37

Wiring diagrams/function sequence

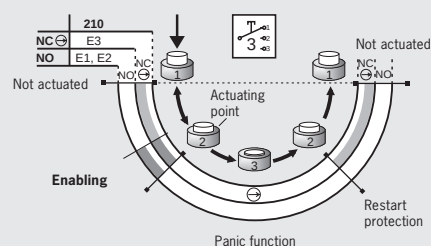
210 with key operated switch



210 with E2-closing



Contact
☐ open
☒ closed
☒ closed, enabling



Ordering table

Design	Connection	Cable length	Version	Switching element
				210: 2 NO + 1 NC ⊖
G3 3-stage	RC17 Plug connector (17-pin)	3 m straight	2 illuminated buttons (+ and -) 1 key-operated rotary switch (1NO)	070904 ZSB070904
		5 m straight	2 illuminated buttons (+ and -) 1 key-operated rotary switch (1NO)	072645 ZSB072645
		12 m straight	2 illuminated buttons (+ and -) 1 key-operated rotary switch (1NO)	072403 ZSB072403
		12 m straight	2 illuminated buttons (+ and -) 1 key-operated rotary switch (1NO, 1NC)	090262 ZSB090262
		3 m straight	2 illuminated buttons (+ and -) 1 key-operated rotary switch (1 NO) E2-closing ¹⁾	077059 ZSB077059
		5 m straight	2 illuminated buttons (+ and -) 1 key-operated rotary switch (1 NO) E2-closing ¹⁾	072711 ZSB072711

1) No key available



Enabling switch ZSB

- ▶ 3-stage function
- ▶ Dual-channel version
- ▶ Housing G3
- ▶ Straight connection cable
- ▶ Plug connector
- ▶ Two illuminated buttons
- ▶ Key switch
- ▶ Emergency stop device
- ▶ Including holder



3-stage function

Enabling function is only active in the second stage (middle position, actuating point). If the button is released or pushed further (panic function), the enabling is removed (dependent on the wiring, see function sequence).

Cable

The high quality connection cables (individual screening of the safety contacts) are available straight.

Illuminated + and – buttons

These buttons can be configured individually. For example for moving axes in positive or negative direction.

Key switch

For individual use, e.g. as operating mode selector switch.

Emergency stop device

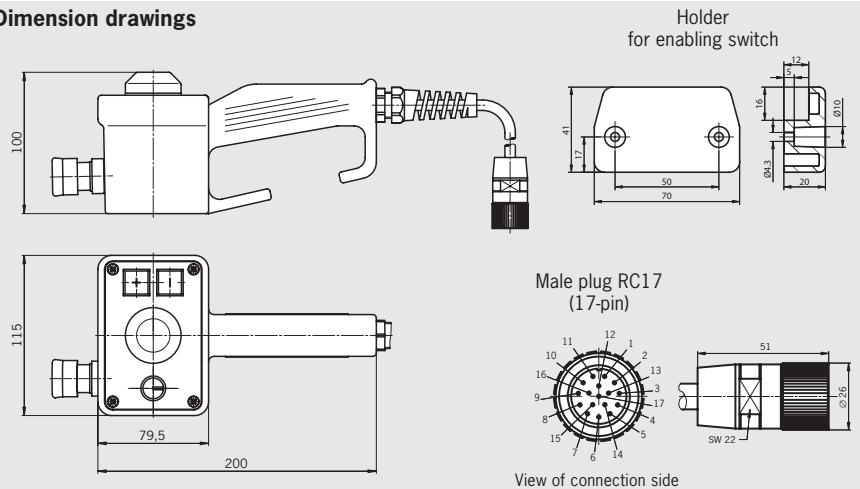
Enabling switch with dual-channel emergency stop device on the switch housing, for various wiring concepts. Red emergency stop button.

Switching elements (see also Page 8)

- ▶ **2220** 2 NO/NC $\ominus$ ¹⁾

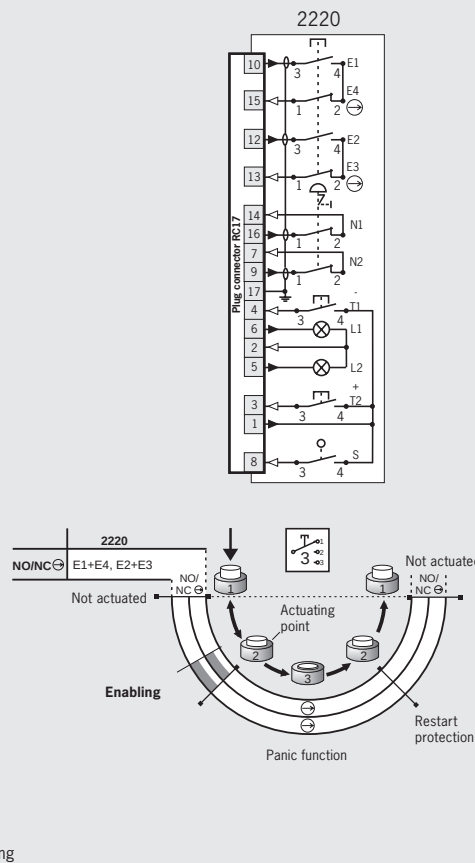
ZSB, 3-stage function Plug connector, key operated switch, emergency stop device

Dimension drawings



For mating connectors
see page 37

Wiring diagrams/function sequence



Ordering table

Design	Connection	Cable length	Version	Switching element
				2220: 2 NO /NC $\ominus$
G3 3-stage	RC17 Plug connector (17-pin)	5 m straight	2 illuminated buttons (+ and -) 1 key-operated rotary switch (1 NO) 1 emergency stop device	090489 ZSB090489

Selection table for accessories

Holders for hand-held enabling switches														
Actuator for safety switches NZ.VZ and TZ with separate safety function														
Accessories for installation in enabling switch housing G3 and HBE														
Key-operated switch 2-stage														
Illuminated pushbutton														
Selector switch 12-stage														
EMERGENCY STOP device														
Plug connector														
BD43-pin + PE														
SS43-pin + PE														
C16-16-pin + PE														
SD1211-pin + PE														
BS1211-pin + PE														
RC1212-pin														
RC1717-pin														
UT2323-pin														
Holder	Actuator	Key-operated switch	Accessories			Plug connector								Page
			Illumin. push button	Selector switch	EMERGENCY STOP	BD4	SS4	C16-1	SD12	BS12	RC12	RC17	UT23	
•	•													64
		•	•	•	•									65
						•	•	•	•	•				66
											•	•		67
													•	68

Holders for hand-held enabling switches/actuator for safety switches NZ.VZ/TZ with separate safety function

- ▶ Magnetic holder
- ▶ Screw holder
- ▶ Screw holder with cable hook
- ▶ Actuator for mounting on the hand-held enabling switch

Magnetic holder for housing G1

The enabling switches can be attached at any time to any part of the machine due to the magnets fastened to the holder. In this way the enabling switch can be positioned in the activity area as necessary.

Screw holder for housing G1

The holder can be securely fastened to parts of the machine with a wall thickness of max. 15 mm using two screws.

Screw holder for housing G1 with cable hook

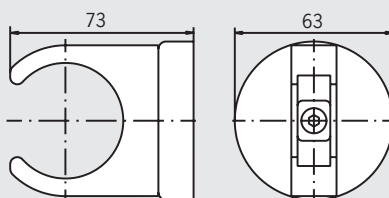
A holder with an additional cable hook for hanging a wound-up cable.

Actuator for safety switch

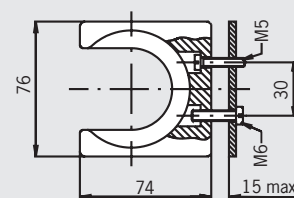
Suitable for fitting, e.g. to the hand-held enabling switch kit. Safe position sampling of the enabling switch can be achieved by fitting the actuator and the use of an appropriate safety switch (NZ.VZ or TZ). By suitable integration of this combination, the signal from the safety switch can be used, e.g., as an operating mode selector switch when the actuator is removed (removal of the enabling switch). Suitable for the kit ZSA.

Magnetic holder

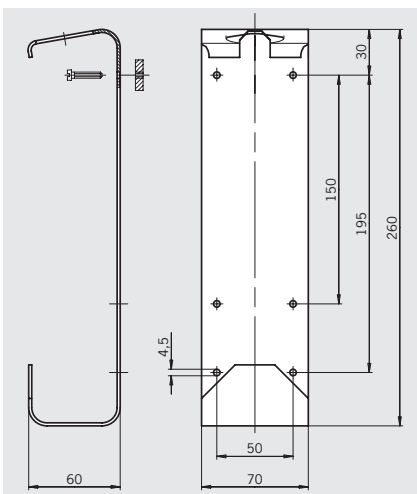
Dimension drawings



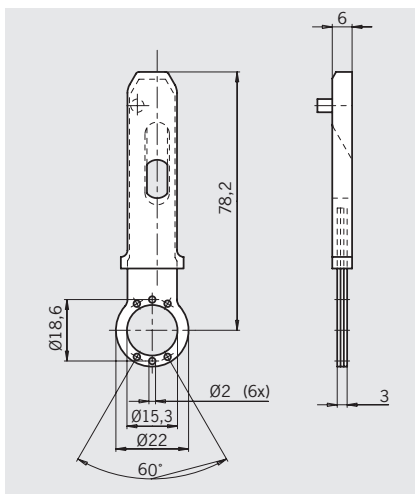
Screw holder



Screw holder with cable hook



Actuator for safety switches series NZ.VZ and TZ



Ordering table

Item	Version	
Magnetic holder		059340 Magnetic holder
Screw holder	M5 x 25	052406 Holder complete
	with cable hook M4 x 20	047820 Cable holder
Actuators NZ/TZ		084833 Actuator-Z-G-C1932

Accessories for installation in enabling switch housing G3

- ▶ **Key-operated switch 2-stage**
- ▶ **Illuminated pushbutton**
- ▶ **Selector switch 12-stage**
- ▶ **EMERGENCY STOP device**

Key-operated switch 2-stage

As an option the key can be removed in both positions or in only one position. Replacement keys for the key-operated switch are available if required. Depending on the application, the key-operated switch can be used to activate the enabling switch or as an operating mode selector switch.

Illuminated pushbutton

The illuminated pushbutton is equipped with a white lamp and a transparent cover. Additional functions can be run directly at the enabling switch using the buttons.

EMERGENCY STOP device

The emergency stop switch can be fitted with two switching elements (available separately), for redundant evaluation. With the additional EMERGENCY STOP device, an EMERGENCY STOP function can be initiated directly at the enabling switch. At least one switching element must be ordered at the same time. Red emergency stop button.

Selector switch 12-stage

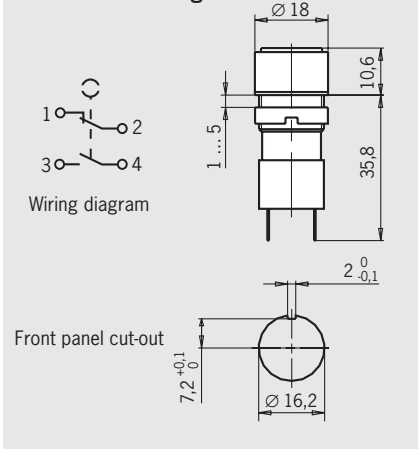
The 12-stage, binary coded selector switch is supplied complete with rotary knob with position indicator. As required the 2 - 12 adjustable detent positions can, e.g. be used for axis, speed or range selection.

Detent position	output			
	8	4	2	1
1	0	0	0	0
2	0	0	0	1
3	0	0	1	0
4	0	0	1	1
5	0	1	0	0
6	0	1	0	1
7	0	1	1	0
8	0	1	1	1
9	1	0	0	0
10	1	0	0	1
11	1	0	1	0
12	1	0	1	1

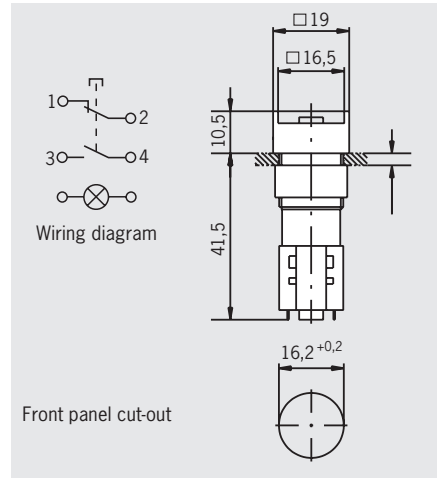
All outputs are open between the detent positions

Key-operated switch 2-stage

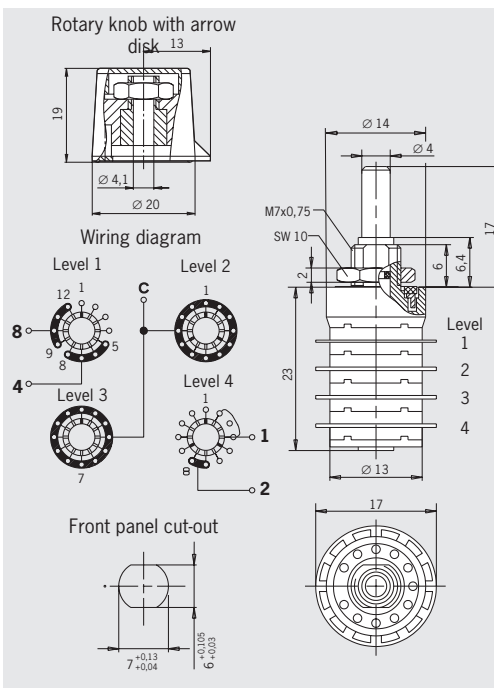
Dimension drawings



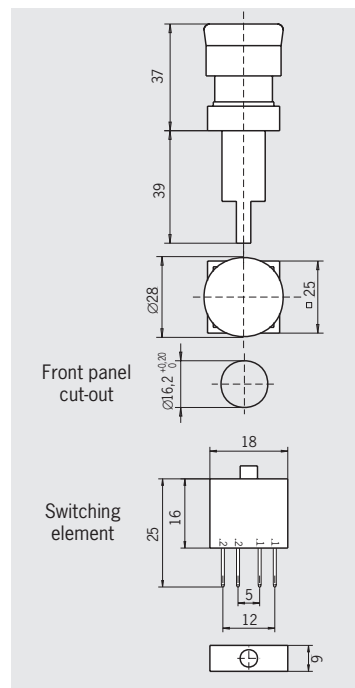
Illuminated pushbutton



Selector switch 12-stage



EMERGENCY STOP device



Ordering table

Item	Version	
Key-operated switch	Removal position: 0 1 NC +1 NO	072604 Key-operated switch
	Removal position: 0 + 1 1 NC + 1 NO	076930 Key-operated switch removal position 0/1
Replacement key for key-operated switch	–	075387 Key for key-operated switch
Illuminated pushbutton	Installation Ø 16.2 mm	070520 Illuminated pushbutton complete
Selector switch	12-stage	052874 Selector switch with rotary knob
EMERGENCY STOP device	Installation Ø 16.2 mm for max. 2 switching elements	083637 Emergency stop actuating element
Switching element for EMERGENCY STOP device	1 NC ⊖	083638 Emergency stop switching element 1 NC ⊖

Plug connector

- ▶ Female flange connector BD4
- ▶ Male plug SS4
- ▶ Female connector C16-1
- ▶ Male flange connector SD12
- ▶ Female connector BS12
- ▶ Extension cable

Female flange connector BD4

Female flange connector for male plug SS4 on the enabling switch.

Male plug SS4

Male plug for enabling switch for connection to safety switch TZ...C1662 (see catalog NZ/TZ).

Female connector C16-1¹⁾

Female connector for hand-held enabling switches.

Male flange connector SD12

Male socket for female connector BS12. For the connection of hand-held and HBE enabling switches.

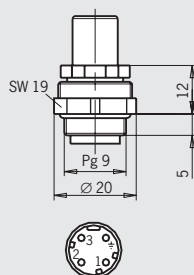
Female connector BS12

Female connector for male flange connector SD12. For connection, e.g. to enabling switch.

Female flange connector BD4

3-pin + PE

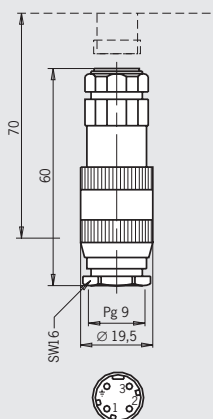
Dimension drawings



View of connection side, socket

Male plug SS4

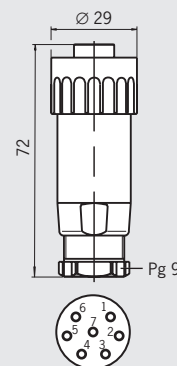
3-pin + PE



View of connection side, plug

Female connector C16-1

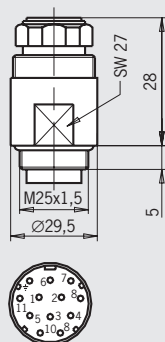
6-pin + PE



View of connection side, socket

Male flange connector SD12

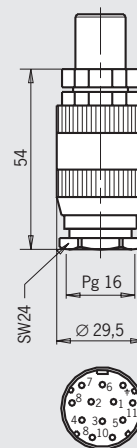
11-pin + PE



View of connection side, socket

Female connector BS12

11-pin + PE



View of connection side, socket

Ordering table

Item	Connection	Version	
BD4 3-pin + PE	Soldered contact	Female flange connector to male plug SS4 on enabling switch	002786 BD4
SS4 3-pin + PE	Soldered contact	Male plug to flange connector BD4 (e.g. TZ...C1662)	002787 SS4
C16-1 6-pin + PE	Crimp contact ¹⁾	Female plug	043861 Cable socket 6+PE
SD12 11-pin + PE	Soldered contact	Male flange connector to female connector BS12 on enabling switch	085648 SD12-M
BS12 11-pin + PE	Soldered contact	Straight female connector to male flange connector SD12	002763 BS12
BS12 11-pin + PE		Extension cable 5 m	071362 BS12
		Extension cable 10 m	079835 BS12

For information on crimp contacts see page 69.

1) Crimp contacts are included.

Plug connector

- ▶ Female flange connector RC12
- ▶ Male plug RC12
- ▶ Dummy plug RC12
- ▶ Female flange connector RC17
- ▶ Male plug RC17
- ▶ Dummy plug RC17

Female flange connector RC12¹⁾
For front panel mounting for connection of hand-held and P20 enabling switch. Fitted with soldered contacts. Rubber seal included.

Male plug RC12¹⁾
For connection, e.g. to enabling switches.

Dummy plug RC12¹⁾
For covering the flange connector RC12. As an option, bridges can be fitted to the individual contacts at the customer, or a pre-wired version (coded) used.
Coding: bridge from pin 1 to pin 2 and from pin 9 to pin 10.

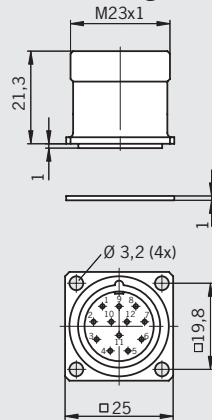
Flange connector RC17¹⁾
For front panel mounting for connection of enabling switches. Rubber seal included. Fitted with soldered contacts.

Male plug RC17¹⁾
For connection, e.g. to enabling switch.

Dummy plug RC17¹⁾
For covering the flange connector RC17. Optionally, individual contacts can be bridged at the customer.

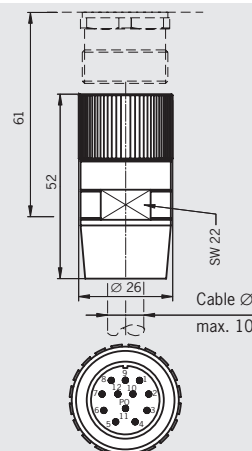
Female flange connector RC12
12-pin

Dimension drawings



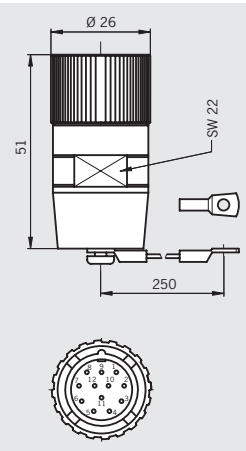
View of connection side, socket

Male plug RC12
12-pin



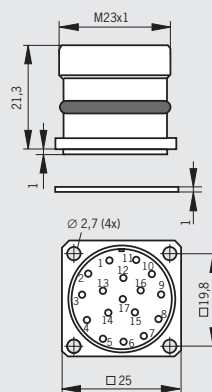
View of connection side, plug

Dummy plug RC12
12-pin



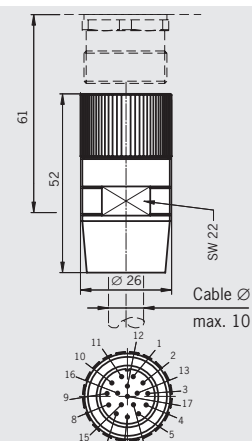
View of connection side, plug

Female flange connector RC17
17-pin



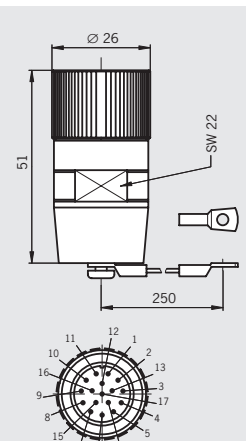
View of connection side, socket

Male plug RC17
17-pin



View of connection side, plug

Dummy plug RC17
17-pin



View of connection side, plug

Ordering table

Item	Connection	Version	
RC12 12-pin	Soldered connection	Female flange connector	073290 Female flange connector 12-pin
	Crimp contact ¹⁾	Male plug	073294 Plug connector 12-pin
	Crimp contact ¹⁾	Dummy plug (with bridges) e.g. in combination with ZS...C1770	073291 Dummy plug complete 12-pin
	Crimp contact ¹⁾	Dummy plug (without bridges)	073293 Dummy plug 12-pin
RC17 17-pin	Soldered connection	Female flange connector	077502 Female flange connector 17-pin
	Crimp contact ¹⁾	Male plug	096481 Plug connector 17-pin
	Crimp contact ¹⁾	Blanking plug (without bridges)	096159 Dummy plug 17-pin

For information on crimp contacts see page 69.

¹⁾ Crimp contacts are included.

Subject to technical modifications; no responsibility is accepted for the accuracy of this information.

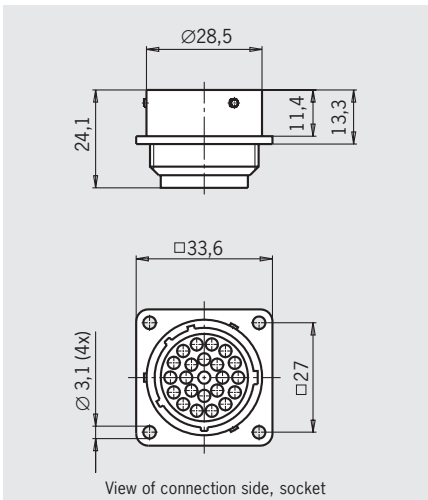
Plug connector

- ▶ Female flange connector UT23
- ▶ Dummy plug UT23 with chain

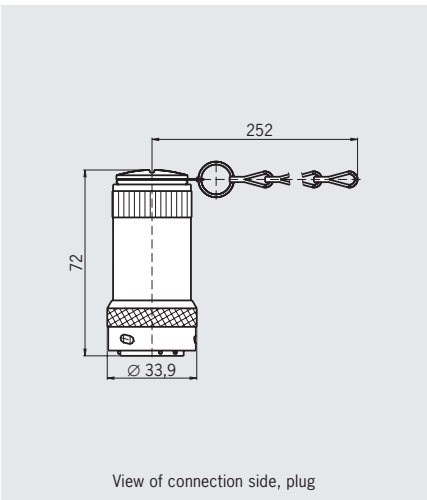
Female flange connector UT23 ¹⁾
Female flange connector for plug UT23 on enabling switch ...C1715.

Dummy plug UT23 with chain ¹⁾
Dummy plug for female flange connector UT23.

Female flange connector UT23
23-pin



Dummy plug UT23
with chain



Ordering table

Item	Connection	Version	
UT23 23-pin	Crimp contacts ¹⁾	Female flange connector for enabling switch ..C1725	074384 Flange connector / 23-pin / metal version
		Dummy plug with chain (3 bridges included)	083457 Short-circuit plug with chain

For information on crimp contacts see page 69.
1) Crimp contacts are included.

List of plug connector suppliers

We provide no guarantee for the completeness and correctness of the ordering data given. The data was valid in October 2004. The related manufacturers reserve the right to make changes without notice. The plug connectors and accessories listed are also available from other manufacturers.

► Plug connectors and accessories

Item	Version	Manufacturer's designation	
SVM5 5-pin	Female plug M12	99-0436-57-05 Cable socket	Binder www.binder-conector.de
	Female flange connector M12	09-3442-700-05 Flange connector with litz wires	
	Dummy plug M12	08-2425-000-000 Protective cap for socket with retaining strap	
C16-1 6-pin + PE	Female flange connector	T3107 500 Female receptacle	Amphenol-Tuchel www.amphenol-tuchel.com
	Female crimp contacts for C16-1, pack 100 ea.	VN02 016 0002 (1) Single contact, silver, 0.5-1.5 mm ²	
	Dummy plug	T6483 000 Protective cap for female receptacle	
MR 7, 8, 9, 10 and 12-pin	Straight female connector (7-pin), pre-assembled for built-in connector MR7	MIN-7FPX-.. Female plugs with cable	MENCOM www.mencomcorp.com
	Straight female connector (8-pin), pre-assembled for built-in connector MR8	MIN-8FPX-.. Female plugs with cable	
	Straight female connector (9-pin), pre-assembled for built-in connector MR9	MIN-9FP-.. Female plugs with cable	
	Straight female connector (10-pin), pre-assembled for built-in connector MR10	MIN-10FP-.. Female plugs with cable	
	Straight female connector (12-pin), pre-assembled for built-in connector MR12	MIN-12FP-.. Female plugs with cable	
HAN10 10-pin + PE	Flange connector 1 cable exit	19 20 010 0251 Socket housing 1 cable exit	Harting www.harting.com
	Socket contacts (built-in for flange connector)	09 20 010 3101 Contact insert, socket, crimp connection	
	Contact tubes for crimping	09 33 000 6220 Crimp contacts, socket, 0.5 mm ²	
	Dummy plug	09 20 010 5425 Cover	
RC17-Y coded 17-pin	Female flange connector, solder for male plug RC17Y)	RC-17S1Y122000 Flange plug connector 17-pin	Coninvers www.coninvers.com

► Crimp and extraction tools

For Plug connector	Function	Manufacturer's designation	
SR6 and SR11	Crimp tool	932 507-001 XCZ 0700	Hirschmann www.hirschmann.com
	Extraction tool	931 812-001 XWA 164	
C16-1	Crimp tool	TA0500 + TA0000163 + TA0002016001 Crimp pliers, crimp jaws and contact receptacle	Amphenol-Tuchel www.amphenol-tuchel.com
	Extraction tool	FG 0300 1461 Extraction tool	
RC12	Crimp tool	RC-Z 2378 Crimp pliers for machined contacts	Coninvers www.coninvers.com
	Extraction tool	RC-Z 2097 Extraction tool/insertion tool	
RC17	Crimp tool	RC-Z 2378 Crimp pliers for machined contacts	Coninvers www.coninvers.com
	Extraction tool	RC-Z 2274 Extraction tool	
UT23	Crimp tool	Y16RCM Crimp tool for machined contacts	Bundy www.bundy.com
	Extraction tool	RX2025GE1 Extraction tool	

Overview

Version								
Built-in version								
Hand-held version								
Switching elements								
Connection								
Tab connector								
Screw terminals								
Flying lead								
Plug connector								
Accessories for enabling switches								

Built-in version

Parameter	Value	Unit
Housing material	Polyamide, black	
Protective cap material	CR (neoprene), black	
Degree of protection acc. to IEC 60529 on the front panel	IP 65	
Ambient temperature	- 5 to + 60	°C
Installation position	Any	
Weight	ZSE / ZSG: Approx. 0.1 ZXE: Approx. 0.03	kg

Hand-held type G1

Parameter	Value	Unit
Housing material	Polyamide, black	
Protective cap material	CR (neoprene), black	
Degree of protection acc. to IEC 60529	IP 67 / IP 65 with additional function (button, LED)	
Ambient temperature	- 5 to + 50	°C
Weight	Approx. 0.4 (no cable)	kg

Hand-held type G2

Parameter	Value	Unit
Housing material	Polyamide, yellow	
Protective cap material	CR (neoprene), black	
Degree of protection acc. to IEC 60529	IP 65	
Ambient temperature	- 5 to + 50	°C
Weight	Approx. 1.1 (with 5 m straight cable)	kg

Hand-held type G3

Parameter	Value	Unit
Housing material	Polyamide, yellow	
Protective cap material	CR (neoprene), black	
Degree of protection acc. to IEC 60529	IP 65	
Ambient temperature	- 5 to + 50	°C
Weight	Approx. 1.5 (with 5 m straight cable)	kg

Switching elements

Parameter	Value	Unit
Switching principle	Slow-action switching contact	
Life	1 x 10 ⁵ cycles	
Function sequence	2-stage 3-stage	
Switching element	10 1110	
with 1 switching contact	1 S 1 NO/NC ⊖	
Switching elements	20 1210 2202 2220	
with 2 switching contacts	2 S 1 NO/NC ⊖ + 1 NO 2 NO/NC 2 NO/NC ⊖	
Switching elements	21 111 210 300	
with 3 switching contacts	2 NO + 1 NC 1 NO + 1 NC ⊖ + 1 NC 2 NO + 1 NC ⊖ 3 S	
Switching elements	121 220	
with 4 switching contacts	1 NO + 2 NC ⊖ + 1 NC 2 NO + 2 NC ⊖	
Min. switching current at 24 V	1 mA (ZXE switching element 2202: 5 mA)	

Tab connector connection, hand-held kit ZSA

Parameter	Value	Unit
Connection	Tab connection	
Version according to IEC 60760	2.8 x 0.8 mm	
Degree of protection acc. to IEC 60529	IP 00	
Rated impulse withstand voltage U_{imp}	2.5	kV
Rated insulation voltage U_i	250	V AC/DC
Conventional thermal current I_{th}	3	A
Short circuit protection acc. to IEC 60269-1 (control circuit fuse)	4	A gG
Utilization category acc. to EN 60947-5-1	AC-15	I_e 4 A U_e 230 V
	DC-13	I_e 3 A U_e 24 V

Screw terminal connection, ZXE

Parameter	Value	Unit
Connection	Screw terminals	
Version	4-pin	
Tightening torque, max.	0.15	Nm
Conductor diameter	single conductor	0.3 - 1.4 mm, AWG 22 - 16
Conductor nominal diameter	single conductor	1.5
	flexible conductor	1 mm ² , AWG 16
Conductor insulation stripping	5	mm ²
Degree of protection acc. to IEC 60529	IP 00	
Rated impulse withstand voltage U_{imp}	1.5	kV
Rated insulation voltage U_i	30 V AC/DC	
Conventional thermal current I_{th}	0.1	A
External fuse U (+LA) / U (+LB)	0.1 A gG	
Utilization category acc. to EN 60947-5-1	DC-13	I_e 0.1 A U_e 24 V

Connection using flying lead

Parameter	Value	Unit
Connection	Cable 3 x 0.75 mm ²	
	Cable 6 x 0.34 mm ²	
	Cable 8 x 0.34 mm ²	
	Cable 8 x 0.5 mm ² + 8 x 0.14 mm ²	
Version	Individual screening	2 x 0.75
	Without screen	1 x 0.75
	Additional elements	-
Rated impulse withstand voltage U_{imp}	2.5	kV
Rated insulation voltage U_i	250	V AC/DC
Short circuit protection acc. to IEC 60269-1 (control circuit fuse)	4	A gG
Utilization category enabling switches	AC-15	I_e 4 A U_e 230 V
according to EN 60947-5-1	DC-13	I_e 3 A U_e 24 V
Utilization category buttons and LEDs	AC-15	I_e 2 A U_e 230 V
according to EN 60947-1-5	DC-13	I_e 2 A U_e 24 V
		I_e 2 A U_e 24 V
		I_e 2 A U_e 24 V
		I_e 2 A U_e 24 V
		I_e 400 mA U_e 32 V
		I_e 400 mA U_e 32 V
		I_e 100 mA U_e 50 V
		I_e 100 mA U_e 50 V

Plug connector SS4 connection

Parameter	Value	Unit
Connection	Male connector	
Version	SS4 (3-pin + PE)	
Connection cable conductor cross-section	6 x 0.34	mm ²
Degree of protection acc. to IEC 60529	IP 67 ¹⁾	
Rated impulse withstand voltage U_{imp}	0.8	kV
Short circuit protection acc. to IEC 60269-1 (control circuit fuse)	2	A gG
Utilization category acc. to EN 60947-5-1	AC-15	I_e 2 A U_e 230 V
	DC-13	I_e 2 A U_e 24 V

Plug connector SVM5 connection

Parameter	Value	Unit
Connection	Male connector	
Version	SVM5 (5-pin)	
Connection cable conductor cross-section	6 x 0.34	mm ²
Degree of protection acc. to IEC 60529	IP 67 ¹⁾	
Rated impulse withstand voltage U_{imp}	0.8	kV
Short circuit protection acc. to IEC 60269-1 (control circuit fuse)	2	A gG
Utilization category according to EN 60947-5-1	AC-15	I_e 2 A U_e 24 V
	DC-13	I_e 2 A U_e 24 V

¹⁾ Only screwed tight with the related plug connector from page 66ff

Plug connector C16 connection

Parameter	Value		Unit
Connection	Male connector		
Version	C16 (6-pin + PE)		
Connection cable conductor cross-section	3 x 0.75	8 x 0.34	mm ²
Degree of protection acc. to IEC 60529	IP 67 ¹⁾		
Rated impulse withstand voltage U _{imp}	0.8		kV
Short circuit protection acc. to IEC 60269-1 (control circuit fuse)	2		A gG
Utilization category acc. to EN 60947-5-1	AC-15	I _e 2 A U _e 24 V	
	DC-13	I _e 2 A U _e 24 V	

Plug connector MR7 connection

Parameter	Value		Unit
Connection	Male connector		
Version	MR7 (7-pin)		
Connection cable conductor cross-section	No cable		
Degree of protection acc. to IEC 60529	IP 65 ¹⁾		
Rated impulse withstand voltage U _{imp}	0.8		kV
Short circuit protection acc. to IEC 60269-1 (control circuit fuse)	2		A gG
Utilization category enabling switch	AC-15	I _e 2 A U _e 24 V	
according to EN 60947-1-5	DC-13	I _e 2 A U _e 24 V	
Utilization category buttons and LEDs	AC-15	24 V 400 mA	
according to EN 60947-1-5	DC-13	24 V 100 mA	

Connection, plug connector MR8

Parameter	Value		Unit
Connection	Male connector		
Version	MR8 (8-pin)		
Connection cable conductor cross-section	No cable		
Degree of protection acc. to IEC 60529	IP 65 ¹⁾		
Rated impulse withstand voltage U _{imp}	0.8		kV
Short circuit protection acc. to IEC 60269-1 (control circuit fuse)	2		A gG
Utilization category enabling switch	AC-15	I _e 2 A U _e 24 V	
according to EN 60947-1-5	DC-13	I _e 2 A U _e 24 V	
Utilization category buttons and LEDs	AC-15	24 V 400 mA	
according to EN 60947-1-5	DC-13	24 V 100 mA	

Connection, plug connector MR10

Parameter	Value		Unit
Connection	Male connector		
Version	MR10 (10-pin)		
Connection cable conductor cross-section	No cable		
Degree of protection acc. to IEC 60529	IP 65 ¹⁾		
Rated impulse withstand voltage U _{imp}	0.8		kV
Short circuit protection acc. to IEC 60269-1 (control circuit fuse)	2		A gG
Utilization category enabling switch	AC-15	I _e 2 A U _e 24 V	
according to EN 60947-1-5	DC-13	I _e 2 A U _e 24 V	

Plug connector HAN10 connection

Parameter	Value		Unit
Connection	Male connector		
Version	HAN10 (10-pin + PE)		
Connection cable conductor cross-section	8 x 0.34		mm ²
Degree of protection acc. to IEC 60529	IP 65 ¹⁾		
Rated impulse withstand voltage U _{imp}	0.8		kV
Short circuit protection acc. to IEC 60269-1 (control circuit fuse)	2		A gG
Utilization category	AC-15	I _e 2 A U _e 230 V	
according to EN 60947-1-5	DC-13	I _e 2 A U _e 24 V	

¹⁾ Only screwed tight with the related plug connector from page 66ff

Plug connector RC12 connection

Parameter	Value		Unit
Connection	Male connector		
Version	RC12 (11-pin + PE)		
Connection cable conductor cross-section	8 x 0.5 + 8 x 0.14	6 x 0.34	mm ²
Degree of protection acc. to IEC 60529	IP 67 / IP 65 with additional elements ¹⁾		
Rated impulse withstand voltage U _{imp}	0.8		kV
Short circuit protection acc. to IEC 60269-1 (control circuit fuse)	2		A gG
Utilization category enabling switch	AC-15	I _e 2 A U _e 24 V	
according to EN 60947-1-5	DC-13	I _e 2 A U _e 24 V	
Utilization category buttons and LEDs	AC-15	24 V 400 mA	-
according to EN 60947-1-5	DC-13	24 V 100 mA	-

Plug connector BS12 connection

Parameter	Value		Unit
Connection	Female connector		
Version	BS12 (12-pin)		
Connection cable conductor cross-section	8 x 0.5 + 8 x 0.14		mm ²
Degree of protection acc. to IEC 60529	IP 65 ¹⁾		
Rated impulse withstand voltage U _{imp}	0.8		kV
Short circuit protection acc. to IEC 60269-1 (control circuit fuse)	2		A gG
Utilization category enabling switch	AC-15	I _e 2 A U _e 24 V	
according to EN 60947-1-5	DC-13	I _e 2 A U _e 24 V	
Utilization category buttons and LEDs	AC-15	24 V 400 mA	
according to EN 60947-1-5	DC-13	24 V 100 mA	

Plug connector RC17 connection

Parameter	Value		Unit
Connection	Male connector		
Version	RC17 (17-pin)		
Connection cable conductor cross-section	8 x 0.34	8 x 0.5 + 8 x 0.14	mm ²
Degree of protection acc. to IEC 60529	IP 67 or IP 65 with additional elements ¹⁾		
Rated impulse withstand voltage U _{imp}	0.8		kV
Short circuit protection acc. to IEC 60269-1 (control circuit fuse)	2		A gG
Utilization category enabling switch	AC-15	I _e 2 A U _e 24 V	
according to EN 60947-1-5	DC-13	I _e 2 A U _e 24 V	
Utilization category buttons and LEDs	AC-15	24 V 400 mA	
according to EN 60947-1-5	DC-13	24 V 100 mA	

Plug connector RC17 Y-coded connection

Parameter	Value		Unit
Connection	Male connector		
Version	RC17 Y-coded (17-pin)		
Connection cable conductor cross-section	8 x 0.5 + 8 x 0.14		xmm ²
Degree of protection acc. to IEC 60529	IP 67 or IP 65 with additional elements ¹⁾		
Rated impulse withstand voltage U _{imp}	0.8		kV
Short circuit protection acc. to IEC 60269-1 (control circuit fuse)	2		A gG
Utilization category enabling switch	AC-15	I _e 2 A U _e 24 V	
according to EN 60947-1-5	DC-13	I _e 2 A U _e 24 V	
Utilization category buttons and LEDs	AC-15	24 V 400 mA	
according to EN 60947-1-5	DC-13	24 V 100 mA	

Plug connector UT23 connection

Parameter	Value		Unit
Connection	Male connector		
Version	UT23 (23-pin)		
Connection cable conductor cross-section	6 x 0.34		mm ²
Degree of protection acc. to IEC 60529	IP 67 ¹⁾		
Rated impulse withstand voltage U _{imp}	0.8		kV
Short circuit protection acc. to IEC 60269-1 (control circuit fuse)	2		A gG
Utilization category	AC-15	I _e 2 A U _e 24 V	
according to EN 60947-1-5	DC-13	I _e 2 A U _e 24 V	

¹⁾ Only screwed tight with the related plug connector from page 66ff

Key switch

Parameter	Value	Unit
Housing material	PA black	
Ambient temperature	-25 to + 70	°C
Front degree of protection (installed)	IP 65	
Switching principle	Slow-action contact element	
Switching element	1 x NC + 1 x NO	
Max. switching current	250	mA
Switching voltage	30	V
Contact resistance	≤200	mΩ
Connection	Tinned circuit board connection	

Selector switch

Parameter	Value	Unit
Front degree of protection (installed)	IP 65	
Single-hole bushing mounting	M7 x 0.75	
Detent	Max. 12, stop can be adjusted as required from 2 to 12 detent positions	
Output code	Binary-coded	
Max. switching current	0.5	A
Max. switching voltage	AC 115 V, DC 24 V on installation in P2 or HB.. housing	
Max. breaking capacity	10	VA
Contact resistance	≤6 mΩ	
Connection	Soldered connection	

Illuminated pushbutton

Parameter	Value	Unit
Housing material	PA6 black	
Cover material	PC, transparent	
Ambient temperature	-25 to +70	°C
Front degree of protection (installed)	IP 65	
Switching principle	Snap-action contact element	
Switching element	NC + NO	
Max. switching current	4	A
Switching voltage	250 V, 12 ... 24 V on installation in P2 or HB.. housing	V
Contact resistance	≤200 mΩ	
Connection	Soldered connection	
Lighting	Incandescent lamp, white, 21 mA 24 V	

Emergency stop button

Parameter	Value	Unit
Color of actuating head	red	
Color of bottom shell	yellow	
Ambient temperature	-25 to +60	°C
Max. number of switching elements	2	
Degree of protection	IP 65	

Emergency stop switching element

Parameter	Value	Unit
Contact element	1 x positively driven contact	
Utilization category to IEC 947-5-1	DC-13 U _e 24 V I _e 3 A	
Connection	Soldered connection	

Plug connector series SS4 and BD4

Parameter	Value	Unit
Housing material	Brass matt chromium plated	
Number of pins	4 (3 + PE)	
Cable diameter	6 - 8	mm
Nominal voltage max.	250	V AC/DC
Degree of protection according to IEC 60529 (inserted)	IP 67	
Connection	Soldered connections 1.0 mm ²	

Plug connector series C16-1

Parameter	Value	Unit
Housing material	Polyamide 6.6	
Number of pins	7 (6 + PE)	
Cable diameter max.	9.5	mm
Nominal voltage max.	230	V
Degree of protection according to IEC 60529 (inserted)	IP 67	
Connection	Crimp contacts 0.5 - 1.5 mm ²	

Plug connector series BS12

Parameter	Value	Unit
Housing material	Brass matt chromium plated	
Number of pins	12 (11 + PE)	
Cable diameter	12 - 14	mm
Nominal voltage max.	250	V AC/DC
Degree of protection according to IEC 60529 (inserted)	IP 67	
Connection	Soldered connections 1.0 mm ²	

Plug connector series RC12

Parameter	Value	Unit
Housing material	Metal	
Number of pins	12 (screen on the housing)	
	Male plug	Flange connector
Cable diameter max.	10	mm
Connection	Crimp contacts 0.14 - 0.56 mm ²	Soldered connections 1.0 mm ²
Nominal voltage max.	230	V AC/DC
Degree of protection according to IEC 60529 (inserted)	IP 67	

Plug connector series RC17

Parameter	Value	Unit
Housing material	Metal	
Number of pins	17 (screen on the housing)	
	Male plug	Flange connector
Cable diameter max.	10	mm
Connection	Crimp contacts 0.14 - 0.56 mm ²	Soldered connections 1.0 mm ²
Nominal voltage max.	230	V AC/DC
Degree of protection according to IEC 60529 (inserted)	IP 67	

Plug connector series UT23

Parameter	Value	Unit
Housing material	Metal	
Number of pins	23	
Nominal voltage max.	230	V AC
Degree of protection according to IEC 60529 (inserted)	IP 67	
Connection	Crimp contacts 0.3 - 0.5 mm ²	

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