Correct use

The EUCHNER enabling switch ZS...AS1 is operated as a slave on the safety bus *AS-Interface Safety at Work*. The enabling switch is a manually operated command switch, which allows work to be carried out in the danger area of automated production systems in the **manual operating mode**. Special technical regulations apply to this operating mode; these rules are defined in the Machinery directive and in various European standards.

For application and use according to UL requirements, an isolating transformer or power supply with max. secondary overcurrent of 3 A is to be used.

Important:

- The user is responsible for the integration of the device in a safe overall system. For this purpose the overall system must be validated, e.g. in accordance with EN ISO 13849-2.
- If the simplified method according to section 6.3 EN ISO 13849-1:2008 is used for validation, the Performance Level (PL) may be reduced if several devices are connected one after the other.
- The enabling switch user must assess and document remaining risks.
- If a product data sheet is included with the product, the information on the data sheet applies in case of discrepancies with the operating instructions.

Incorrect use

The enabling signal must not be simulated by fixing the switching contact in stage 2.

⚠ Safety precautions ⚠

Enabling switches fulfill a personal protection function. Incorrect use or tampering can lead to severe injuries to personnel.

- ⚠ All the safety and accident prevention regulations for the specific application, e.g. guidelines of the employers liability insurance associations, safety requirements of the VDI (EN ISO 10218-1, VDI 2854), EN 60204, EN 12100, EN ISO 13849, EN 61062, DIN VDE 0106 part 100, etc., must be observed.
- ⚠ No commands for potentially hazardous conditions are allowed to be initiated with enabling switches alone.
- ⚠ The safety function of enabling switches must **not** be bypassed (bridging of contacts), manipulated or otherwise rendered ineffective. The enabling switch must be protected against attempts by the operator to bypass its function.
- ⚠ Enabling switches may be used only by authorized persons who can recognize hazards in time and who are able to take appropriate action immediately.
- ⚠ Every person present in the danger area must carry his/her own enabling switch on his/her person.
- ⚠ A complete safety-oriented system generally consists of several signaling devices, sensors, evaluation units and concepts for safe shutdown. The manufacturer of a machine or installation is responsible for correct and safe overall function.
- ⚠ All safety instructions and requirements stated in the Operating Instructions of the AS-Interface safety monitor used must be observed.
- ⚠ Mounting, electrical connection and setup only by authorized personnel.

Function

▶ Function on the AS-Interface bus

The EUCHNER enabling switch ZS...AS1 features a slave connection to the safety bus *AS-Interface Safety at Work*. It allows work to be carried out in the danger area of automated production systems in the **manual operating mode**.

The switching element of the enabling switch has two NO contacts (E1, E2).

When the enabling switch is operated, each ZS...AS1 transmits a switch-specific, unique safety code sequence comprising 8x4 bits over the AS-Interface bus. This code sequence is evaluated by an AS-Interface safety monitor. NO contact E1 is represented via the AS-Interface input bits D0 and D1, and NO contact E2 via the AS-Interface input bits D2 and D3.

The enabling switch must be correspondingly configured in the AS-Interface safety monitor (refer to the operating instructions of the AS-Interface safety monitor used).

Enabling switch ZSB...AS1 additionally features plus and minus buttons. These buttons are represented by parameter bits P0 (plus button) and P1 (minus button). They can be polled by the master once per cycle (parameter write).

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

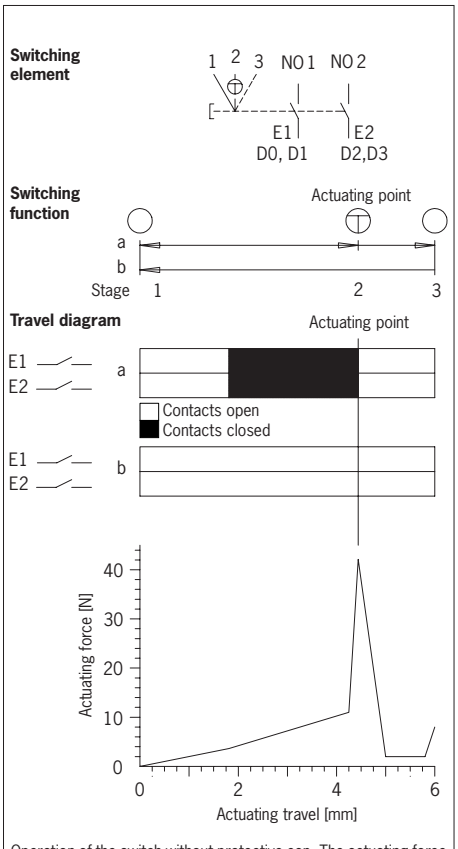
▶ Functions of the enabling switch

Stage 1: Off function, pushbutton not pressed

Stage 2: Enabling function, pushbutton pressed to center position (actuating point)

Stage 3: Off function, pushbutton pushed to end stop

The enabling function is cancelled by releasing the pushbutton or pressing it beyond the actuating point. The enabling function does not reactivate when returning from stage 3 to stage 1.



Operation of the switch without protective cap. The actuating force with protective cap is dependent on the ambient temperature.

Figure 1: Function of the switching element

Mounting

A suitable holder must be used for the ZS...AS1 enabling switch, e.g. the EUCHNER holder order no. 052406.

Electrical connection

⚠ In the installation of a system, the cables and wires used (except earth conductors) that can be touched without opening or removing a cover, or are laid on conductive parts external to the device, must be either double insulated or have reinforced insulation between core and surface, or be surrounded by a metal sheath of adequate current-carrying capacity in case of a short between core and sheath.

Hazards due to crushing or cutting of the connection cable must be prevented by laying the cable appropriately, e.g. in a protective sleeve.

The safety switch is connected to the bus system with a 4-core connecting cable with M12 plug connector via a passive AS-Interface distribution box with a yellow AS-Interface cable.

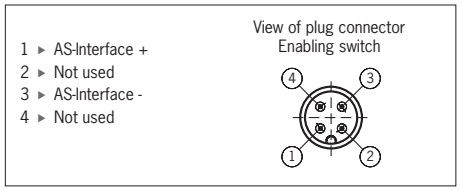


Fig. 2: Terminal assignment M12 plug connector

Setup

The enabling switch is logically integrated in the safety function in the AS-Interface safety monitor configuration. The *Dual-channel dependent* module is used for this purpose.

The *Dual-channel independent* module can also be used after an appropriate risk assessment. Max. category 1 according to EN ISO 13849-1 can be achieved with this module. Fault detection is not possible in this case.

▶ Setting the AS-Interface address

The AS-Interface address of the safety switch is set using an AS-Interface programming device. Addresses 1 to 31 are valid.

The unit is programmed by connecting the programming device to the M12 plug connector on the enabling switch with a programming cable.

The default setting for the address on delivery is 0.

▶ Configuration in the AS-Interface safety monitor (refer to the operating instructions for the AS-Interface safety monitor)

The enabling switch is configured in the AS-Interface safety monitor with the AS-Interface address set as follows, for example:

- Dual-channel dependent
- Synchronization time: typ. 3 s

It may be necessary to set the synchronization time to higher values. This depends on the application and the actuating speed of the enabling switch.

▶ With or without start-up test (corresponding to risk analysis)

In the operating mode with start-up test, it is necessary to operate the enabling switch to perform the start-up test prior to restarting.

Function test

Check the enabling switch (enabling function at stage 2, both contacts open at stage 1 and 3) by performing a functional check.

Service and inspection

No servicing is required, but to ensure trouble-free long-term operation, regular inspection of the electrical and mechanical function is required.

⚠ In the event of functional faults or damage, the enabling switch must be replaced. Repairs are only to be made by the manufacturer!

Note: The year of manufacture can be seen in the bottom, right corner of the rating plate.

Exclusion of liability under the following circumstances

- incorrect use
- non-compliance with safety regulations
- electrical connection not performed by authorized personnel
- function tests not performed

EC declaration of conformity

The manufacturer named below herewith declares that the product fulfills the provisions of the directive(s) listed below and that the related standards have been applied.

EUCHNER GmbH + Co. KG
Kohlhammerstraße 16
70771 Leinfelden-Echterdingen, Germany

Directives and standards applied:

- Machinery directive 2006/42/EC
- EMC directive 2004/108/EC
- EN 60947-5-8:2006

Leinfelden, November 2010
Dipl.-Ing. Michael Euchner
Director
Duc Binh Nguyen
Authorized representative empowered to draw up documentation

The signed EC declaration of conformity is included with the product.

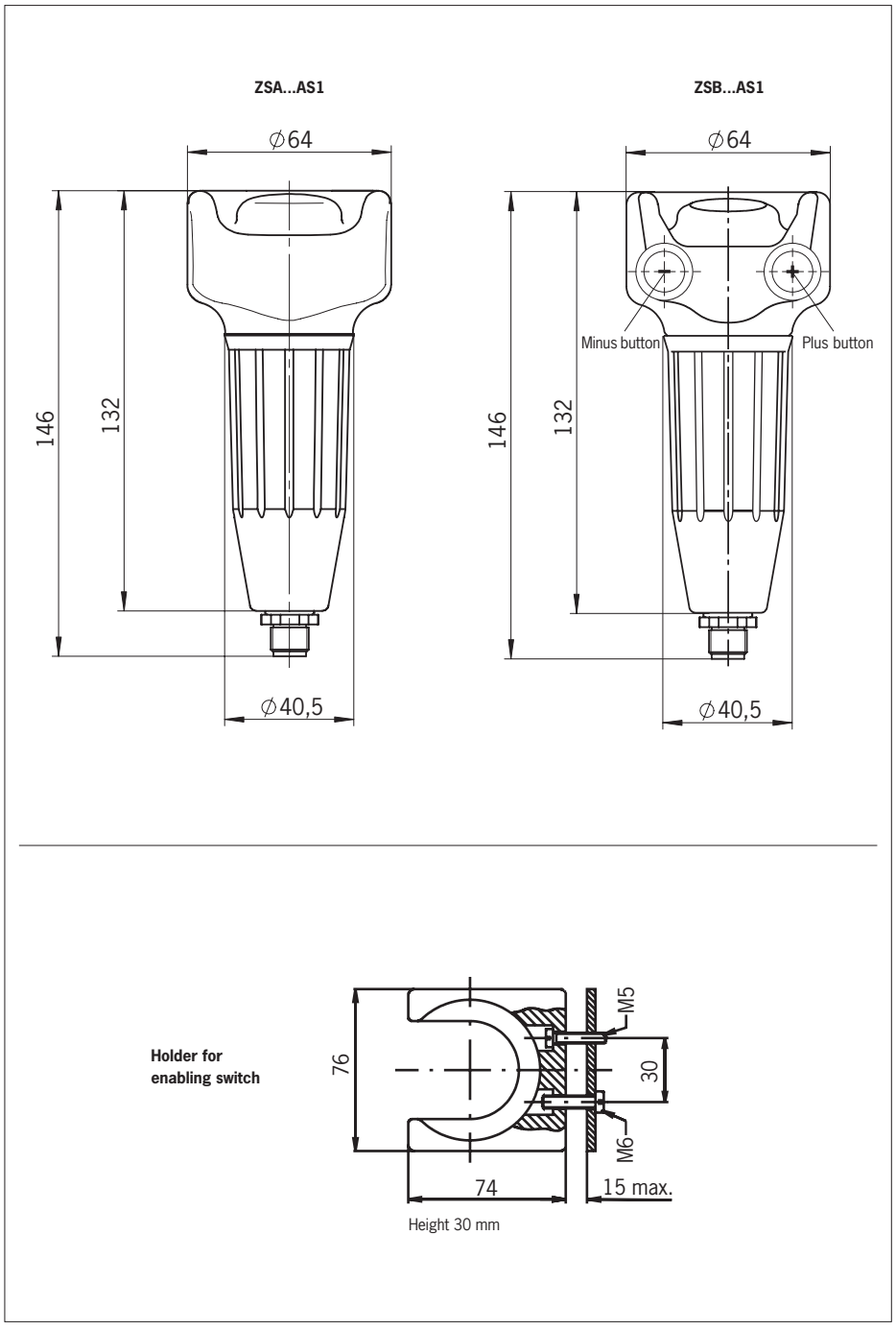


Figure 3: Dimensional drawing ZS...AS1 enabling switch and holder for enabling switch

Technical data

Parameter	Value
Housing material	Polyamide, color black
Protective cap material	CR, color black
Weight	Approx. 0.2 kg
Deg. of prot. acc. to IEC 60529	(mating connector plugged and screwed tight)
ZSA...AS1	IP 67
ZSB...AS1	IP 65
Mechanical life min.	
Position 1-2-1	$1x10^5$ cycles
Position 1-2-3-1	$1x10^5$ cycles
Ambient temperature	-5 ... +50 °C
Degree of contamination (external, acc. to EN 60947-1)	3 (industrial)
Installation position	Any
Impact strength	> 100 N
Switching elements	2 NO contacts
Connection	M12 plug connector, 4-pin
AS-Interface data	EA code: 0 ID code: B
ZSA...AS1	Acc. to AS-Interface specification 2.1
ZSB...AS1	Acc. to AS-Interface specification 3.0
Total current consumption, max.	45 mA
Valid AS-Interface addresses	1 - 31
AS-Interface inputs	Acc. to AS-Interface Safety at Work
NO contact E1	D0, D1
NO contact E2	D2, D3
Plus button (only ZSB...AS1)	Parameter bit P0
Minus button (only ZSB...AS1)	Parameter bit P1
Reliability values according to EN ISO 13849-1	
B_{10d}	5×10^5