

MSI-2H Safety Relays



Two-hand relay in accordance with EN 574 type III C, depending on the wiring up to cat. 4 (ISO 13849-1) and protective door monitors in accordance with IEC-, EN 60204-1 stop category 0

These instructions contain information on the approved purpose and are part of the delivery contents. Leuze electronic GmbH + Co.KG is not liable for damages that result from improper use. Proper use also includes knowledge of the information contained in these instructions.

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1 Product description

The MSI-2H serves as two-hand relay acc. to EN 574, Type III C as well as link between 2-channel protective door monitoring and machine control system.

1.1 System overview

- two-channel control with cross circuit monitoring
- Simultaneity monitoring, 0.5 s
- Monitoring of external contactors in the feedback circuit
- 2 release circuits, 1 NC contact as signal circuit
- LED displays Power, K1 and K2
- Operating voltage 24 V AC/DC
- Housing width, 22.5 mm

1.2 Application possibilities

- Two-hand relay in accordance with EN 574, Type III C
- Two-channel protective door monitoring in accordance with EN 13849-1 up to category 4

2 Safety

Before using the two-hand relay, a risk evaluation must be performed according to valid standards and regulations.


For mounting, operating and testing, this document as well as all applicable national and international standards and regulations must be observed, printed out and handed to the affected personnel.

↳ Before working with the two-hand relay, completely read and understand the documents applicable to your task.

In particular, the following national and international legal regulations apply for the start-up, technical inspections and work with two-hand relays:


- Machinery directive 2006/42/EC
- Use of Work Equipment Directive 89/655/EEC supplemented by Directive 95/63 EC
- Accident-prevention regulations and safety rules
- Other relevant standards
- Standards

2.1 Symbols

	Warning sign – This symbol indicates possible dangers. Please pay especially close attention to these instructions!
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2.2 Proper use

The two-hand relay must only be used after it has been selected in accordance with the respectively applicable instructions and relevant standards, rules and regulations regarding labor protection and occupational safety, and after it has been **installed on the machine, connected, commissioned, and checked by a competent person.**

 WARNUNG
Improper or inappropriate use can result in danger to the life and limbs of the machine operator or in damage to property.

- The machine control must be designed so that the switch command of the two-hand relay is appropriately processed in a fail-safe manner.
- MSI-2H is suitable for use as an E-STOP relay for shutting down in an uncontrolled manner (IEC 60204, stop category 0).
- The mechanical and electrical installation is to be performed by trained specialists.
- The voltage supply to the system must be switched off before and during installation.
- For contact multiplication of the release circuit, switching elements with positive-guided contacts must be used.
- The safety interface device must be tested regularly by competent personnel.
- Two switching contacts must always be looped into the switch-off circuit of the machine. To prevent welding, relay switching contacts must be fused/protected externally according to the technical data.
- The MSI-2H must be exchanged after a maximum of 20 years. Repairs or the exchange of parts subject to wear and tear do not extend the service life.
- The control of the machine or system that is to be safeguarded must be electrically influenceable. A switch-off command initiated by an MSI must result in an immediate shutdown of the dangerous movement.
- The "Reset" acknowledgment button for unlocking the start/restart interlock must be mounted in such a way that the entire danger zone can be seen from its mounting location.
- Message outputs (state outputs) must not be used for switching safety-relevant signals.
- Depending on external wiring, dangerous voltages may be present at the switching outputs. In addition to the supply voltage, these must be switched off and safeguarded against being switched back on prior to all work on the MSI-2H.

- In the event of changes to the MSI-2H, all warranty claims against the manufacturer of the safety interface device are rendered void.

HINWEIS

Also observe the safety and warning notices in the documentation of the connected protective devices.
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2.3 Foreseeable misuse

Any use other than that defined under the „Approved purpose“ or which goes beyond that use is considered improper use!

e.g.

- The two-hand relay is not suited for applications in explosive or easily flammable atmospheres.

2.4 Competent personnel

Prerequisites for competent personnel:

- has a suitable technical education
- he knows the instructions for the two-hand relay and the machine
- has been instructed by the responsible person on the mounting and operation of the machine and of the two-hand relay

2.5 Responsibility for safety

Manufacturer and operating company must ensure that the machine and implemented two-hand relay function properly and that all affected persons are adequately informed and trained.

The manufacturer of the machine is responsible for:

- safe implementation of the two-hand relay
- imparting all relevant information to the operating company
- adhering to all regulations and directives for the safe starting-up of the machine

The company operating the machine is responsible for:

- instructing the operating personnel
- maintaining the safe operation of the machine
- adhering to all regulations and directives for occupational safety and safety at work
- regular testing by competent personnel

2.6 Disposing

For disposal observe the applicable national regulations regarding electronic components.

3 Function

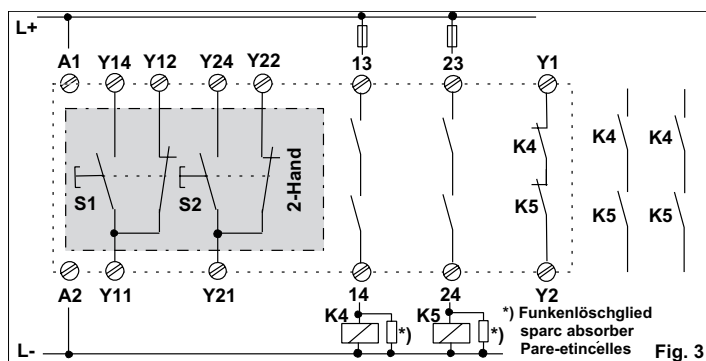
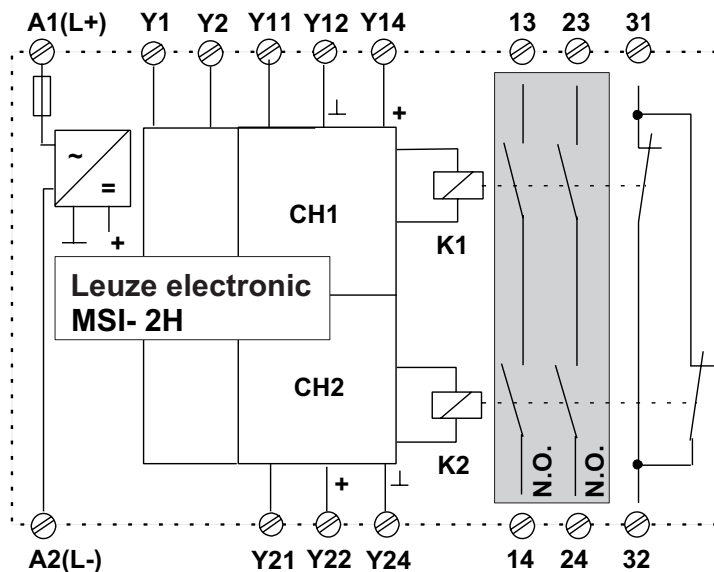


Figure 3.1: Connection example 1

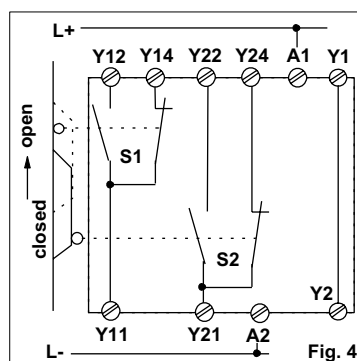


Figure 3.2: Connection example 2

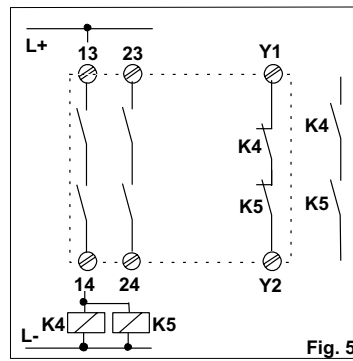


Figure 3.3: Connection example 3

Two-hand relay type III C, safety category 4

(see figure 3.1)

After the supply voltage is applied to A1 and A2 and with closed feedback circuit Y1-Y2, relays K1 and K2 pick up upon simultaneous actuation of the two-hand buttons S1 and S2. The release circuits 13-14 and 23-24 close, signal circuit 31-32 opens. The dangerous movement is enabled. As soon as at least one of the two buttons is again released, K1 and K2 drop out. The dangerous movement is stopped. A restart cannot occur until both two-hand buttons have been released and feedback circuit Y1-Y2 has been closed for at least 150 ms. Due to the low input currents, gold-plated button contacts are to be used.

Sliding safety guard monitoring with 2 positive-opening position switches and automatic start

(see figure 3.2)

After the supply voltage is applied to A1 and A2 and with closed protective doors (position switches S1 and S2 closed), relays K1 and K2 pick up and lock. Upon opening of the safety guard, S1 and S2 open, relays K1 and K2 go dead and drop out. The MSI-2H remains in this state until the safety guard is closed again.

Simultaneity monitoring

K1 and K2 pick up only if both two-hand buttons or Safety Switches are actuated in a time window of 0.5 s. If actuation of the second button occurs with a delay of more than 0.5 s, K1 and K2 remain in the normal position. Before reactivating, both buttons must be released.

Cross circuit monitoring

In the event of a cross connection or short circuit to ground in input circuits Y11 and Y21, output relays K1 and K2 are switched off via an electronic fuse. The MSI-2H is again ready for operation approx. 2 s after the cause of the malfunction has been eliminated.

Contactor monitoring (EDM),

(see figure 3.3)

For function monitoring of the external contactors, NC contacts of these contactors are looped into feedback circuit Y1-Y2 in series.

4 Start-up

WARNUNG

- ↳ Prior to the initial start-up on a power-driven machine, a competent person must inspect the connection of the connected protective device at the MSI-2H as well as the integration of the complete system in the machine control.
- ↳ Before switching on the supply voltage for the first time, it must be ensured that the outputs of the MSI have no effect on the machine. The switching elements that ultimately bring the dangerous machine into motion must be safely switched off or disconnected and protected against being restarted.
- ↳ The same safety measures apply after each function change, after repairs or during maintenance work

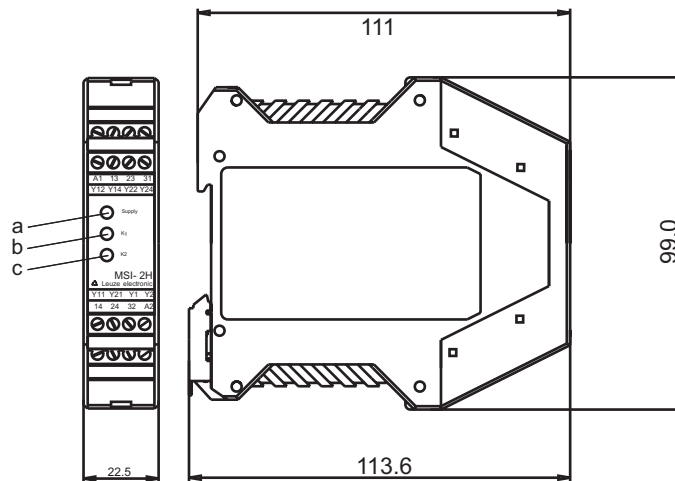
4.1 Electrical installation / installation instructions

WARNUNG

The general safety notices in Chapter 2 are to be observed.

- Protection rating of housing IP 40, terminals IP 20 → Installation in housing with IP 54 is mandatory!
- The current supply and connections 13; 14; 23; 24; 31; 32 must be equipped with safe electrical isolation to the mains voltage.
- To prevent capacitive influences, the control line to the two-hand buttons is not to be laid directly next to power cables.
- Finger-safe acc. to DIN VDE 0106 part 100
- To prevent welding of the output contacts, an external fuse of max. 5 A quick-action or 3.15 A delay-action must be interposed.
- Maximum stripped length of the connection cables: 8 mm

4.2 Display and control elements



- a = Supply voltage on (green LED)
- b = Relay K1 picked up
- c = Relay K2 picked up

4.3 Tests

The test prior to the first start-up as well as regular tests by competent persons are intended to ensure that the protective devices and any other protective components are correctly selected and provide the required protection when properly used acc. to the local regulations, particularly the machinery and work equipment directive (and, in Germany, the Ordinance on Industrial Safety and Health (Betriebssicherheitsverordnung - BetrSichV) as well).

- ↪ Test the effectiveness of the protective devices on the machine in all operating modes that can be set on the machines.
- ↪ Test the protective device according to the local regulations and standards, e.g. ISO 13855, BetrSichV,
- ↪ Observe the regulations regarding the instruction of the operating personnel by competent persons before they begin their work. Training is the responsibility of the operating company.

5 Technical data MSI-2H

Safety category	Two-hand relay type III C acc. to EN 574, up to category 4 acc. to ISO 13849-1
Stop category	Stop 0 acc. to IEC 60204-1
Operating voltage U_b	24 V AC/DC, -15 % to +10 %
Residual ripple (DC) / frequency (AC)	2.4 VSS / 50 - 60 Hz
Power consumption	2.1 W (AC) / 1.9 W (DC)
External safeguarding for supply circuit	1 A delay-action
Output contacts	2 normal open contacts (N/O), 1 normal closed contact (N/C) AgSnO ₂ , gold flash plated
Switching capacity of the contacts acc. to EN 60947-5-1	AC-15: 230V / 6A *) DC-13: 24V / 6A **) DC-13: 24V / 3A *) *) 3600 switching cycles/h, **) 360 switching cycles/h
Max. continuous current per current path	3 A
External contact fuse protection per current path	5 A quick-action or 3.15 A delay-action
Max. switching frequency	3600 switching cycles/h
Mechanical life time	10 x 10 ⁶ switching cycles
Pickup delay	50 ms
Regression delay, reaction time	20 ms
Time window simultaneity monitoring	Max. 0.5 s
Recovery time	<150 ms
Electronic fuse response/recovery time	2 s / 2 s
Control voltage/current on Y11, Y21, Y2	24V DC / 60 mA
Admissible input line resistance	< 70 W
Cat. in accordance with ISO 13849	4
PL	e
PFH _d	3.8 x 10 ⁻⁸
B10 _d (low load 20%)	20.0 million switching cycles DC 1: 400000 AC 1: 400000 DC 13: 400000 AC 15: 400000
MTTF _d	70 years
T _M	20 years
DC	99%
Operating temperature	-25° to +55° C

Air clearance and creepage distance	DIN VDE 0110-1:04.97: 4 kV
Interference emission	EN 50081-1, -2
Interference rejection	EN 50082-2
Protection rating	Housing IP 40, terminals IP 20
Connection cross-sections	1 x 0.2 to 2.5 mm ² , fine-wired or 1 x 0.25 to 2.5 mm ² , fine-wired with wire-end sleeves 2 x 0.5 to 1.5 mm ² , fine-wired with Twin wire-end sleeves 1 x 0.2 to 2.5 mm ² , single-wired or 2 x 0.25 to 1.0 mm ² , fine-wired with wire-end sleeves 2 x 0.2 to 1.5 mm ² , fine-wired 2 x 0.2 to 1.0 mm ² , single-wired
Dimensions (H x W x D)	99 x 22.5 x 111.5 mm
Weight	200 g
Order No.	549912



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Angewandte EG-Richtlinie(n):	Applied EC Directive(s):	Directive(s) CE appliquées:
2006/42/EG 2004/108/EG 2006/95/EG	2006/42/EC 2004/108/EC 2006/95/EC	2006/42/CE 2004/108/CE 2006/95/CE
Angewandte Normen:	Applied standards:	Normes appliquées:
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