EUCHNER
More than safety.

Connection of MGB-L2..-AR to safety relay PNOZ s5

Content

Guard locking power on applied – spring released according to EN ISO 14119 (open-circuit current principle)

Safety function	Guard locking for process protection with interlocking according to EN ISO 14119
Reliability figures according to EN ISO 13849	Category 4, PL e

Components/modules used

EUCHNER

Description	**Order no./item designation Set**	**Order no./item designation Evaluation Units**
Safety system MGB, Guard locking with guard locking monitoring	105787 / MGB-L2H-AR-R-105787 105789 / MGB-L2HE-AR-R-105789 115255 / MGB-L2HE-ARA-L-115255 109956 / MGB-L2HE-AR-R-109956 121238 / MGB-L2H-ARA-R-121238 121239 / MGB-L2HE-ARA-R-121239 121246 / MGB-L2HE-ARA-L-121246	105797 / MGB-L2-AR-AA2A1-M-105797 115253 / MGB-L2-ARA-AG6A1-M-115253 109953 / MGB-L2-AR-AC3A1-M-109953 121237 / MGB-L2-ARA-AM3A1-M-R-121237 121244 / MGB-L2-ARA-AM3A1-M-L-121244

Tip: More information and downloads about the above mentioned EUCHNER products can be found at www.EUCHNER.de. Simply enter the order number into the search field.

Other

Description	**Items**
Safety relay	PNOZ s5 / 750 105

Functional description

General

The MGB-L2 is a guard locking device according to EN ISO 14119 using the open-circuit current principle. The two safe outputs of the MGB-L2 are connected to a PNOZ s5 safety relay.

In this example, an MGB with the version 2.0.0 or newer is used in the configuration “system family AR”. Please note that the circuit must be changed if older MGB versions are used.

Connections

Designation	Function	Use in this example
FO1A, FO1B	Safety outputs. HIGH when the safety guard is closed and locked.	Switch-off of at least one of the outputs leads to a direct switch-off of the safety contacts (13 – 14, 23 – 24, …) of the safety relay PNOZ s5. Important: The actual shutdown of the energy which is causing a hazard in a machine is not shown in the example and must be supplemented.
FI1A,FI1B	Inputs for series connection of AR devices from EUCHNER.	Connected to 24 V DC; function is not used. Important: DIP switches 1 and 2 in the MGB must be set in OFF position. It is essential to observe the MGB operating instructions for this purpose.
IMP (up to V2.2.2) IMP1 (from V3.0.0)	Control input for guard locking solenoid. Connect guard locking to 24 V DC to close.	Activated by switch S1. Important: According to EN ISO 14119, it shall be ensured that the hazard caused by a machine has disappeared before the guard locking can be released.
IMP2 (from V3.0.0)	Control input for guard locking solenoid, when dual channel control of the solenoid is used. Connect guard locking to 24 V DC to close.	Function is not used. Important: IMP1 and IMP2 are connected with a jumper. In this example has to remain plugged.
OD	Door monitoring output, HIGH, when the door is closed.	Function is not used.
OT	Bolt tongue monitoring output, HIGH when the door is closed and the bolt tongue is inserted in the locking module.	Function is not used.
OL	Guard locking monitoring output, HIGH when the door is closed and locked.	Function is not used.
OI	Diagnostics monitoring output, HIGH when the device is in the fault state.	Function is not used.
RST	Input for resetting the switch	Connected to ground. Function is not used.
X2:1, X2:2, X2:3, X2:4	Floating contacts of the installed emergency stop command device	Function is not used. Important: The emergency stop function must be integrated into the emergency stop chain of the safety control system in accordance with the risk analysis.
X3:1, X3:3	Control inputs for the LEDs in buttons S2 and S3	Function is not used.
X2:7, X3:2	Monitoring outputs for the installed buttons S2 and S3	Function is not used.

Safety assessment

The MGB-L2 features complete monitoring for faults in the safety-relevant parts and in the connected cables (clock pulses at outputs FO1A and FO1B). The safety relay PNOZ s5 achieves up to PL e according to the manufacturer's information (see the device's operating instructions for this purpose). The wiring corresponds to the circuit "Light beam device or safety switch with detection of shorts across contacts via ESPE" in the operating instructions of the PNOZ s5. Therefore, PL e in accordance with EN ISO 13849-1 can be achieved for locking mechanism position monitoring of guard locking of the MGB-L2.

In exceptional cases in accordance with the risk assessment, guard locking can also be used for safety-relevant purposes. More detailed information about this can be found in EN ISO 14119. In this case, locking mechanism position monitoring of guard locking also meets the requirements of PL e.

A safety assessment for control of guard locking is not part of this example and must be supplemented for the respective machine by the design engineer in accordance with the risk assessment.

Important: Switch-off of the energy and any necessary monitoring energy switch-off (feedback loop) of the hazard are not part of this document and must be added in accordance with the risk assessment for the machine. In this example, the safety evaluation unit without feedback loop and without start button is used. Please refer to the operating instructions of the safety evaluation unit for more information.

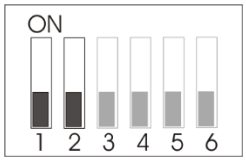
Device configuration for MGB

The device can be configured using DIP switches. To change the device settings, please refer to the operating instructions for the MGB.

Tip: The operation manual can be found at www.EUCHNER.de. Simply enter the order number into the search field.

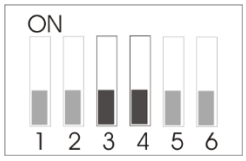
Setting DIP switches – system family AR

Switches 1 and 2 must be set to OFF position (normally the factory setting).



DIP switches – guard lock monitoring activated

Switches 3 and 4 must be set to OFF position (normally the factory setting).



Principle circuit diagram

In the example Automatic Reset of the PNOZ s5 is used

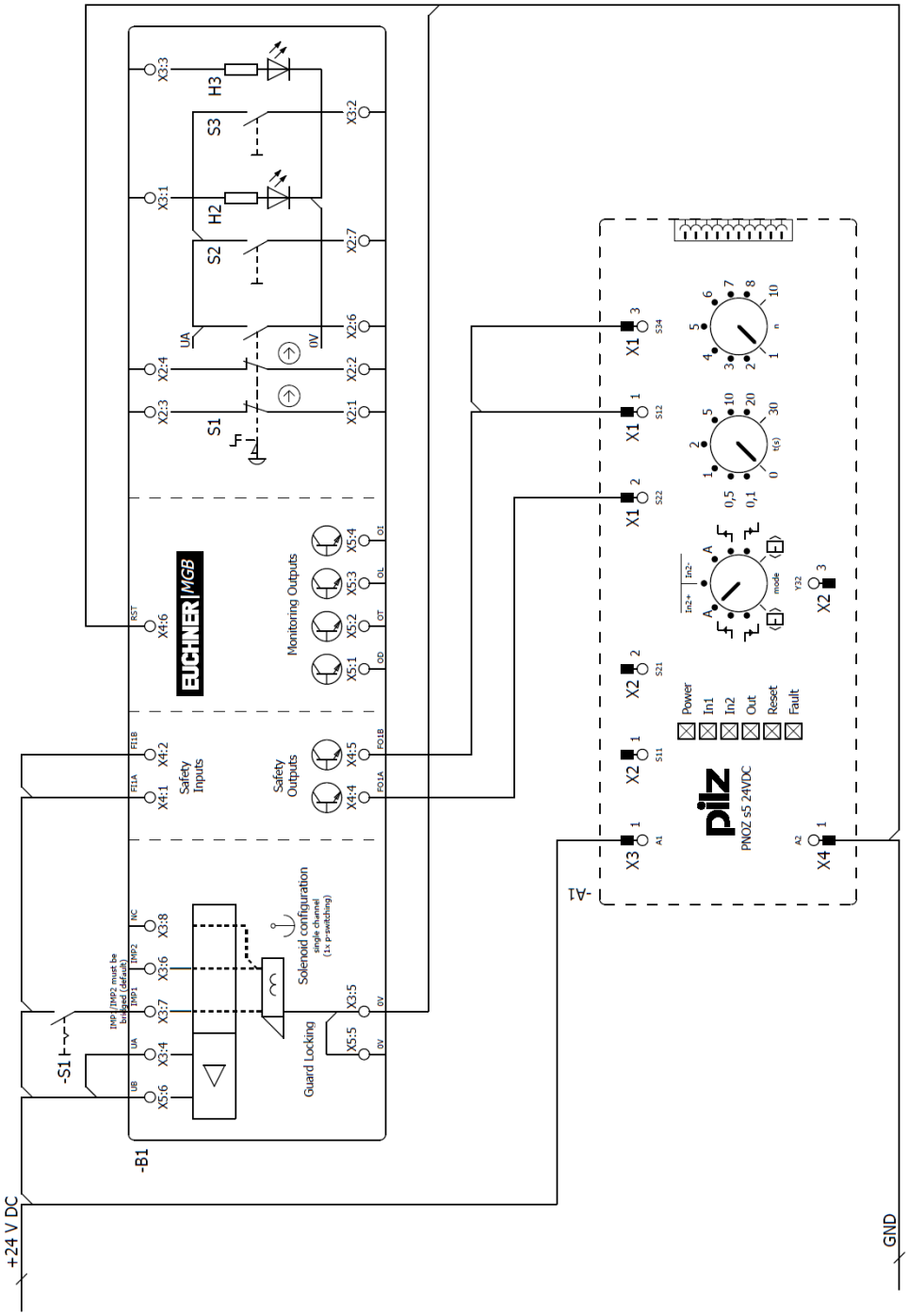
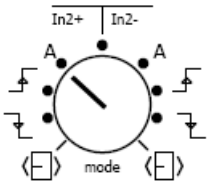


Figure 1

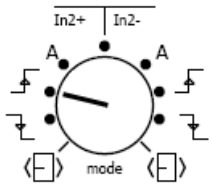
Setting of the operating mode selector switch “mode”

Only with the following settings does the safety relay PNOZ s5 operate correctly with a MGB-L2.

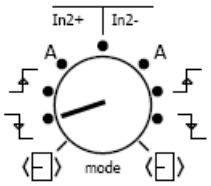
Automatic, manual start – without short circuit detection

Operating mode selector switch “mode”	Automatic, manual start
Without short circuit detection	

Monitored start rising edge – without short circuit detection

Operating mode selector switch “mode”	Monitored start, rising edge
Without short circuit detection	

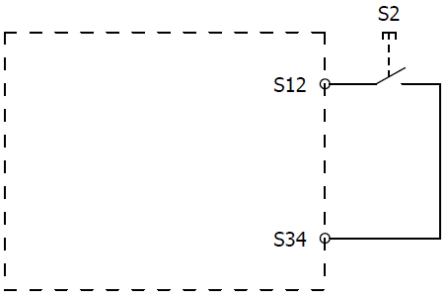
Monitored start falling edge – without short circuit detection

Operating mode selector switch “mode”	Monitored start falling edge
Without short circuit detection	

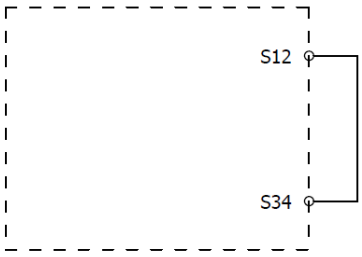
Setting of the Reset mode for PNOZ s5

Only with the following settings does the safety relay PNOZ s5 operate correctly with a MGB-L2.

Manual Reset



Automatic Reset



Important note – please observe carefully!

This document is intended for a design engineer who possesses the requisite knowledge in safety engineering and knows the applicable standards, e.g. through training for qualification as a safety engineer. Only with the appropriate qualification is it possible to integrate the introduced example into a complete safety chain.

The example represents only a part of a complete safety chain and does not fulfill any safety function on its own. In order to fulfill a safety function, the energy switch-off function for the hazard location and the software within the safety evaluation must also be considered, for example.

The introduced applications are only examples for solving certain safety tasks for protecting safety guards. The examples cannot be comprehensive due to the application-dependent and individual protection goals within a machine/installation.

If questions pertaining to this example remain open, please contact us directly.

In accordance with Machinery Directive 2006/42/EC, the design engineer of a machine or installation is obligated to perform a risk assessment and take measures to reduce the risk. When doing this, the engineer must comply with the applicable national and international standards. Standards generally represent the current state of the art. Therefore, the design engineer should continuously inform himself about changes in the standards and adapt his considerations to them. Relevant standards include EN ISO 13849 and EN 62061. This application must be regarded only as assistance for the considerations about safety measures.

The design engineer of a machine/installation is obligated to assess the safety technology himself. The examples must not be used for assessment, because only a small excerpt of a complete safety function was considered in terms of safety engineering here.

In order to be able to use the safety switch applications correctly on safety guards, it is indispensable to observe the standards EN ISO 13849-1, EN ISO 14119 and all relevant C-standards for the respective machine type. Under no circumstances does this document replace the engineer's own risk assessment, and it cannot serve as the basis for a fault assessment.

Particularly in case of a fault exclusion, it must be noted that this can be performed only by the design engineer of a machine or installation and requires a reason. A general fault exclusion is not possible. More information about fault exclusion can be found in EN ISO 13849-2.

Changes at products or within assemblies from third-party suppliers used in this example can lead to the function no longer being ensured or the safety assessment having to be adapted. In any event, the information in the operating instructions on the part of EUCHNER, as well as on the part of third-party suppliers, must be taken as the basis before this application is integrated into an overall safety function. If contradictions should arise between the operating instructions and this document, please contact us directly.

Use of brand and company names

All mentioned brand and company names are property of the respective manufacturers. The use is only for clear identification of compatible peripheral devices and environment of operation in combination with our products.