



Connection of MGBS-P-L1-AR.. to Safety Relays ESM-BA..1

EN

from V1.0.0

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## 1. About this document

### 1.1. Version

Version	Date	Change/addition	Chapter
01-11/19	20.11.2019	Prepared	All

### 1.2. Scope

This document describes the connection of the MGBS-P-L1-AR-.. to the safety relays in the series ESM-BA..1.

### 1.3. Target group

Design engineers and installation planners for safety devices on machines, as well as setup and servicing staff possessing special expertise in handling safety components.

### 1.4. Supplementary documents

The overall documentation for this application consists of the following documents:

Document title (document number)	Contents	
Operating instructions (2527246)	Operating instructions safety system MGBS-P-L-AR... unicode/multicode	
Possibly enclosed data sheets	Item-specific information about deviations or additions	

### 1.5. Notice

This application is based on the MGBS-P-L-AR.. operating instructions and the operating instructions for the safety relays ESM-BA..1. Please refer to the operating instructions for technical details and other information.

## 2. Components/modules used

### 2.1. EUCHNER

Description	Order number / item number
Safety system MGBS-P-L-AR.. guard locking with guard lock monitoring	159086 / MGBS-P-L1-AR-U-R-AEE-SH-159086
	159170 / MGBS-P-L1-AR-U-R-AEE-SH-159170
	159171 / MGBS-P-L1-AR-U-R-AZE-SH-159171
	159169 / MGBS-P-L1-AR-U-R-AZE-SH-159169
	161205 / MGBS-P-L1-AR-U-R-AZE-SH-161205
	161206 / MGBS-P-L1-AR-U-R-AEE-SH-161206
Safety system MGBS-P-L-AR.. including handle module and guard locking with guard lock monitoring	160520 / MGBS-P-L1HE-AR-U-R-SH-160520
	160521 / MGBS-P-L1HE-AR-U-L-SH-160521
	161557 / MGBS-P-L1HE-AR-U-L-SH-161557
	161563 / MGBS-P-L1H-AR-U-R-SH-161563
	161564 / MGBS-P-L1H-AR-U-L-SH-161564
Safety relay	085610 / ESM-BA201
	097226 / ESM-BA201P
	085613 / ESM-BA301
	097230 / ESM-BA301P
	097224 / ESM-BA701
	097225 / ESM-BA701P

Tip: More information and downloads about the aforementioned EUCHNER products can be found at [www.euchner.com](http://www.euchner.com). Simply enter the order number in the search box.

## 3. Functional description

### 3.1. MGBS-P-L-AR-..

The MGBS-P-L-AR-.. is a guard locking device in accordance with EN ISO 14119 according to the closed-circuit current principle. The safety outputs are switched off when guard locking is released (monitoring of the locking element).

Guard locking according to EN ISO 14119 actuated by spring force – released by power-ON (closed-circuit current principle)	
Safety function	Guard locking for personnel protection acc. to EN ISO 14119
Reliability values according to EN ISO 13849	Category 4, PL e

In this example, the two safe outputs (FO1A and FO1B) of the MGBS-P-L-AR-.. are connected to a safety relay ESM-BA..1.

## 4. Safety assessment

The MGBS-P-L-AR-.. features complete monitoring for faults in the safety-relevant parts and in the cables connected (short circuit monitoring by means of pulsed signals on the outputs FO1A and FO1B).

The safety relay ESM-BA..1 achieves PL e, depending on the number of annual switching cycles and the load on the enable paths (see the device's operating instructions for this purpose). The wiring corresponds to the circuit *Dual-channel emergency stop circuit with pnp semiconductor outputs / OSSD outputs with short circuit detection* in the operating instructions for the ESM-BA..1. In combination with the safety sensors that detect a short circuit for the connected cables (here MGBS-P-L-AR-..), the wiring corresponds to PL e.

The safety assessment on safety functions, e.g. emergency stop or acknowledgment button, and the control of guard locking are not part of this example and must be added for the respective machine by the design engineer in accordance with the risk assessment.



### Important!

Shutdown of the energy and any necessary monitoring of the shutdown of the energy (feedback loop) causing 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 used for more information.

## 5. Overview of the connections

Pin	Designation	Function	Use in this example
1	IMP	Operating voltage of guard locking solenoid, 24 V DC	Deactivation of the guard locking by switch S1. Important: According to EN ISO 14119, it must be ensured that the hazard posed by a machine is no longer present before the guard locking can be opened.
2	FI1A	Enable input, channel 1	Connection to power supply 24 V DC for use as a separate device.
3	FI1B	Enable input, channel 2	Connection to power supply 24 V DC for use as a separate device.
4	FO1A	Safety output, channel 1	Switching off this safety output will result in the direct shutdown of the enable paths (13 – 14, 23 – 24, ...) of the safety relay ESM-BA..1. Important: The actual shutdown of the energy causing a hazard in a machine is not shown in the example and must be added.
5	FO1B	Safety output, channel 2	
6	UB	Operating voltage of electronics, controls and indicators, 24 V DC	Connection to power supply 24 V DC
7	RST	Reset input	Function is not used
8	OD	Door monitoring output	Function is not used
9	OI	Diagnostic output	
10	S1.A1	EMERGENCY STOP (channel A)	Function is not used
11	S1.A2	EMERGENCY STOP (channel A)	
12	FE	Function earth (must be connected to meet the EMC requirements)	Connection to ground potential
13	S1.B1	EMERGENCY STOP (channel B)	Function is not used
14	S1.B2	EMERGENCY STOP (channel B)	
15	S2	Pushbutton S2 (illuminated)	Function is not used
16	H2	LED H2	Function is not used
17	S3	Pushbutton S3 (illuminated)	Function is not used
18	H3	LED H3	Function is not used
19	0 V	Operating voltage of electronics, controls and indicators, 0 V guard locking solenoid	Connection to power supply 0 V DC

Table 1: Terminal assignment and contact description

**6. Basic circuit diagram**

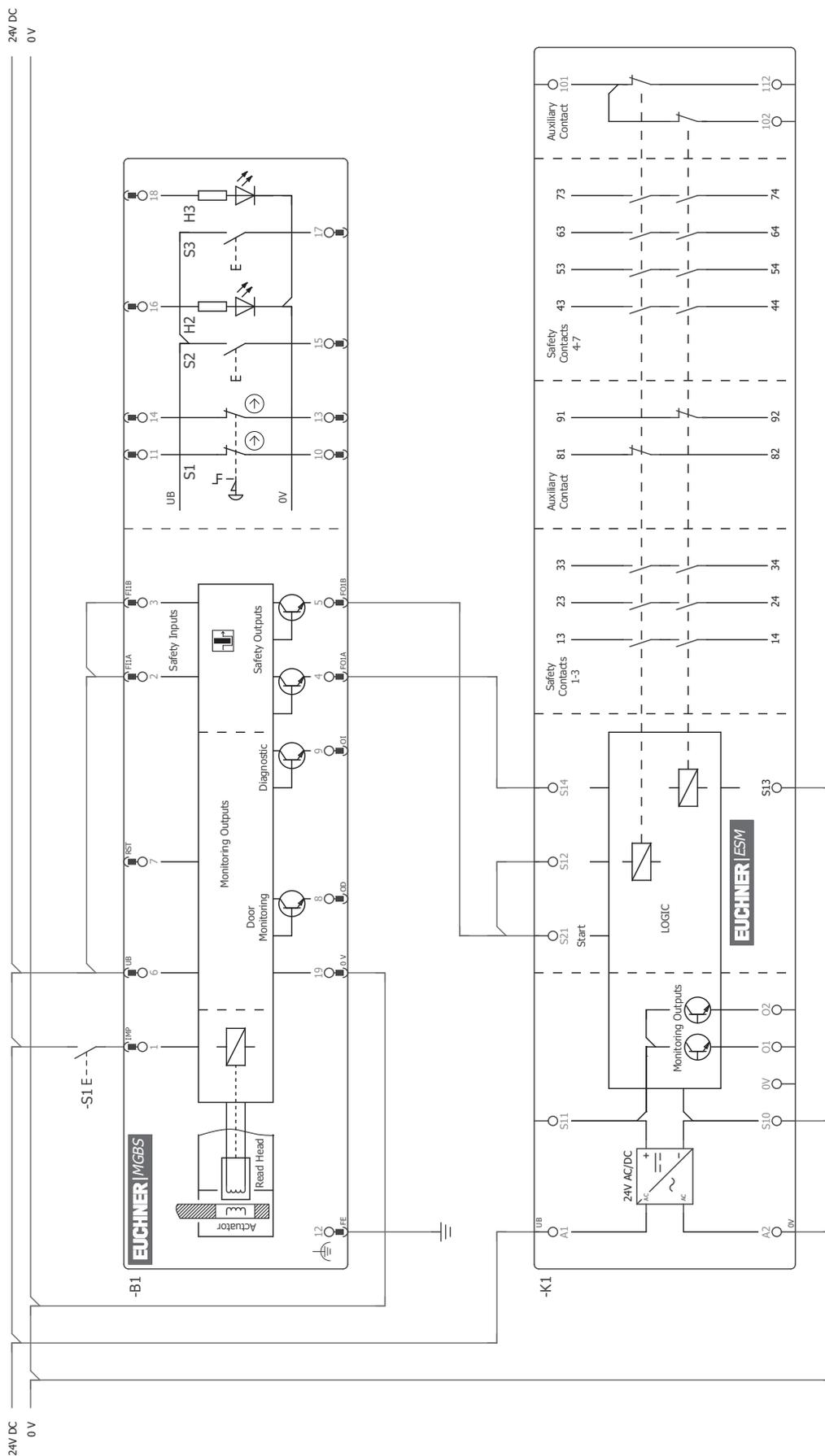


Figure 1: Basic circuit diagram (shown with the ESM-BA701)

## 7. Wiring of the starting behavior on the ESM-BA..1

With the following settings, the safety relay ESM-BA..1 operates correctly in combination with the MGBS-P-L-AR..

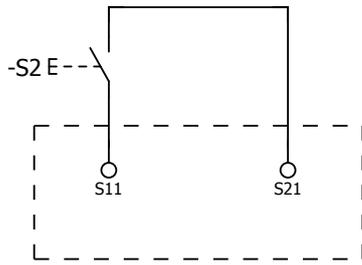


Figure 2: Manual start

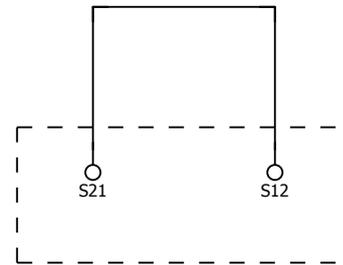


Figure 3: Automatic start

## **8. 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 example provided into a complete safety chain.

The example represents only 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 danger zone and the software must also be considered in the safety evaluation, for example.

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

**If questions concerning this example remain open, please contact us directly.**

According to the Machinery Directive 2006/42/EC, the design engineer of a machine or installation has the obligation to perform a risk assessment and take measures to reduce the risk. While doing this, the engineer must comply with the applicable national and international safety 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 for functional safety 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 has the obligation to assess the safety technology himself. The examples must not be used for an 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 doors, 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.

In particular in relation to a fault exclusion, it must be noted that a fault can be excluded only by the machine's or installation's design engineer and this action requires justification. A general fault exclusion is not possible. More information about fault exclusion can be found in EN ISO 13849-2.

Changes to 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 used 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 names and company names**

All brand names and company names stated are the property of the related manufacturer. They are used only for the clear identification of compatible peripheral devices and operating environments in relation to our products.



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