EUCHNER

Operating Instructions

Safety Systems with Interlocking

ESL-IH-AR

EN

Contents

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1. About this document

1.1. Scope

These operating instructions are valid for all ESL-IH-AR. These operating instructions, the document *Safety information* and any enclosed data sheet form the complete user information for your device.

1.2. 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.

1.3. Key to symbols

Symbol/depiction	Meaning
	Printed document
	Document is available for download at www.euchner.com
DANGER **WARNING** **CAUTION**	Safety precautions **Danger** of death or severe injuries **Warning** about possible injuries **Caution** slight injuries possible
NOTICE **Important!**	**Notice** about possible device damage **Important** information
Tip	Useful information

1.4. Supplementary documents

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

Document title (document number)	Contents	
Safety information (2525460)	Basic safety information	
Operating instructions (2119138)	(this document)	
Possibly enclosed data sheet	Item-specific information about deviations or additions	

Important!

Always read all documents to gain a complete overview of safe installation, setup and use of the device. The documents can be downloaded from www.euchner.com. For this purpose enter the doc. no. in the search box.

2. Correct use

Safety systems series ESL-AR are interlocking devices without guard locking (type 4). The device meets the requirements according to EN IEC 60947-5-3. Devices with unicode evaluation possess a high coding level, devices with multicode evaluation possess a low coding level.

In combination with a movable guard and the machine control, this safety component prevents dangerous machine functions from occurring while the guard is open. A stop command is triggered if the guard is opened during the dangerous machine function.

This means:

- Starting commands that cause a dangerous machine function must become active only when the guard is closed.
- Opening the guard triggers a stop command.
- Closing a guard must not cause automatic starting of a dangerous machine function. A separate start command must be issued. For exceptions, refer to EN ISO 12100 or relevant C-standards.

Before the device is used, a risk assessment must be performed on the machine, e.g. in accordance with the following standards:

- EN ISO 13849-1
- EN ISO 12100
- IEC 62061

Correct use includes observing the relevant requirements for installation and operation, particularly based on the following standards:

- EN ISO 13849-1
- EN ISO 14119
- EN 60204-1

The safety system ESL can be combined only with the intended modules in the ESL system family.

On the modification of system components, EUCHNER provides no warranty for function.

Several devices are only allowed to be connected in series using devices intended for series connection with the ESL. Check the operating instructions for the related device. Combination with devices from other manufacturers is not allowed.

A maximum of 20 devices are allowed to be operated in a switch chain.

	**Important!** - The user is responsible for the proper integration of the device into a safe overall system. For this purpose, the overall system must be validated, e.g. in accordance with EN ISO 13849-2.

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3. Description of the safety function

Devices from this series feature the following safety functions:

Monitoring of the guard position
(interlocking device according to EN ISO 14119)

- Safety function:
  - The safety outputs are switched off when the guard is open (see chapter *6.3. Switching states on page 8*).
- Safety characteristics: category, Performance Level, PFH_D (see chapter *11. Technical data on page 23*).

4. Exclusion of liability and warranty

In case of failure to comply with the conditions for correct use stated above, or if the safety regulations are not followed, or if any servicing is not performed as required, liability will be excluded and the warranty void.

5. General safety precautions

Safety systems fulfill personnel protection functions. Incorrect installation or tampering can lead to fatal injuries to personnel.

Check the safe function of the safeguard particularly

- after any setup work
- after the replacement of a system component
- after an extended period without use
- after every fault

Independent of these checks, the safe function of the safeguard should be checked at suitable intervals as part of the maintenance schedule.

WARNING

Danger to life due to improper installation or due to bypassing (tampering). Safety components fulfill a personnel protection function.

- Safety components must not be bypassed, turned away, removed or otherwise rendered ineffective. On this topic pay attention in particular to the measures for reducing the possibility of bypassing according to EN ISO 14119:2013, section 7.
- The switching operation may be triggered only by handle modules designated for this purpose.
- Prevent bypassing by means of replacement handle modules (only for multicode evaluation). For this purpose, restrict access to handle modules and to keys for releases, for example.
- Mounting, electrical connection and setup only by authorized personnel possessing the following knowledge:
  - specialist knowledge in handling safety components
  - knowledge about the applicable EMC regulations
  - knowledge about the applicable regulations on operational safety and accident prevention.

Important!

Prior to use, read the operating instructions and keep these in a safe place. Ensure the operating instructions are always available during mounting, setup and servicing. For this reason you should archive a printed copy of the operating instructions. You can download the operating instructions from www.euchner.com.

6. Function

The safety system ESL-AR monitors the position of movable guards. The safety outputs are switched on/off when the latch on the handle module is moved to/removed from the actuating range on the interlocking module.

The interlocking module detects the position of the latch and thereby the position of the guard. The combination also serves as a mechanical door stop at the same time.

Whether the device learns the complete handle module code (unicode) or not (multicode) depends on the respective version.

- **Devices with unicode evaluation**: The handle module must be assigned to the interlocking module by a teach-in operation so that it is detected by the system. This unambiguous assignment ensures a particularly high level of protection against tampering. The system thus possesses a high coding level.
- **Devices with multicode evaluation**: Unlike systems with unicode evaluation, on multicode devices a specific code is not requested but instead it is only checked whether the handle module is of a type that can be detected by the system (multicode detection). There is no exact comparison of the handle module with the taught-in code in the interlocking module (unicode evaluation). The system possesses a low coding level.

When the guard is closed, the handle module is moved toward the interlocking module. When the operating distance is reached, power is supplied to the handle module by the interlocking module and data are transferred.

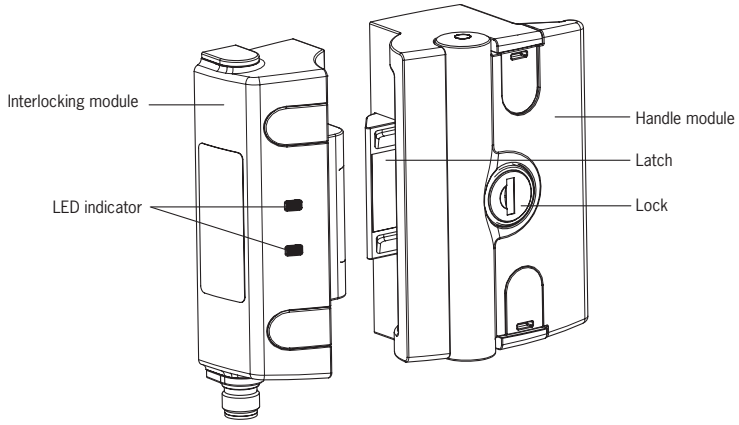
If a permissible code is detected, the safety outputs are switched on.

The safety outputs are switched off when the guard is opened.

In the event of a fault in the interlocking module, the safety outputs are switched off and the DIA LED illuminates red. The occurrence of faults is detected at the latest on the next demand to close the safety outputs (e.g. on starting).

6.1. Components

The system consists of the following components: coded handle module (transponder) and interlocking module.



6.2. Door monitoring output

The door monitoring output is switched on as soon as a valid handle module is detected in the actuating range.

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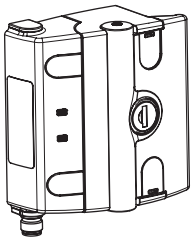
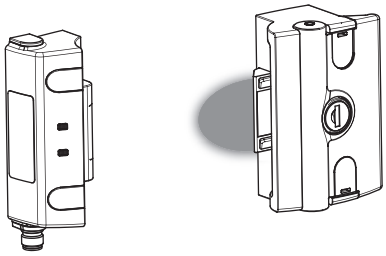
6.3. Switching states

The detailed switching states for your switch can be found in the system status table. All safety outputs, monitoring outputs and display LEDs are described there.

	Guard closed (handle module in the actuating range and permissible code detected)	**Guard open (handle module not in the actuating range)**
		
Safety outputs FO1A and FO1B	on	off
Monitoring output OD	on	off

7. Mounting

CAUTION

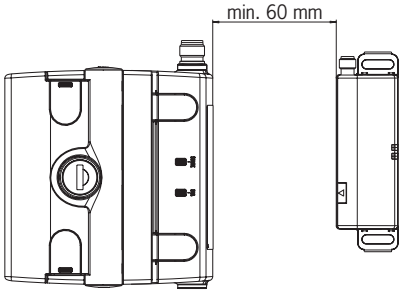
Safety systems must not be bypassed (bridging of contacts), turned away, removed or otherwise rendered ineffective.

- Observe EN ISO 14119:2013, section 7, for information about reducing the possibilities for bypassing an interlocking device.
- The device is not suitable for use on sliding doors.
- When mounting, take care not to trap the cables between the device and the profile.
- Permanently connect the interlocking module and handle module to the guard so that they cannot be detached, e.g. using non-removable screws.

NOTICE

Risk of damage to equipment and malfunctions as a result of incorrect installation.

- When mounting several transponder-coded safety switches, observe the stipulated minimum distance to avoid mutual interference.



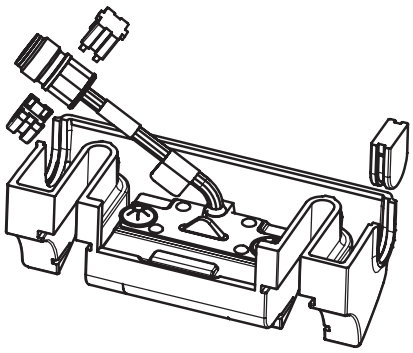
7.1. Changing the connection

The plug connector position can be adapted to suit the installation. This change must be performed before assembly:

1. Press the plug connector with the plastic inserts out of the profile slot.

➡ To adjust only the cable exit for angled plug connectors, align the plug and the inserts accordingly and press the plug back into the profile slot.

2. Remove the connection cap on the opposite side.
3. For angled plug connectors, align the plug and the inserts accordingly.
4. Press the plug into the profile slot on the opposite side.
5. Seal the other opening with the connection cap.



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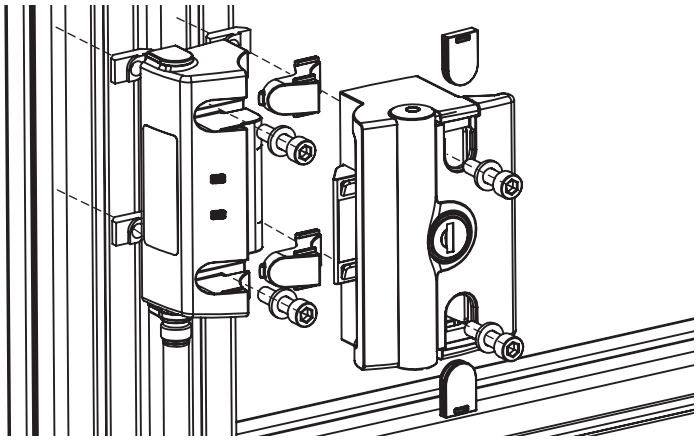
7.2. Attachment to the door profile

With two-leaf hinged doors, one of the two door leaves must also be latched mechanically.

1. Fasten the ESL using 4 M6 screws and washers.

➡ Please note that the gap dimension between handle module and interlocking module is 0 - 3 mm; the max. vertical offset is ±1 mm.

2. Tighten the screws to a torque of max. 10 Nm.
3. Fit the enclosed cover caps to protect against tampering.



8. Electrical connection

The following connection options are available:

- Separate operation
- Series connection with Y-distributors or the passive distribution module AC-DP-…-SA-… from EUCHNER (only with M12 plug connector)
- Series connection, e.g. with wiring in the control cabinet
- Operation on an AR evaluation unit

WARNING

In the event of a fault, loss of the safety function due to incorrect connection.

- To ensure safety, both safety outputs must always be evaluated.
- Monitoring outputs must not be used as safety outputs.
- Lay the connecting cables with protection to prevent the risk of short circuits.

CAUTION

Risk of damage to equipment or malfunctions as a result of incorrect connection.

- Do not use a control system with pulsing or switch off the pulsing function in your control system. The device generates its own test pulses on the safety outputs. A downstream control system must tolerate these test pulses, which may have a length of up to 1 ms. The test pulses are also output when the safety outputs are switched off. Depending on the inertia of the downstream device (control system, relay, etc.), this can lead to short switching processes.
- The inputs on an evaluation unit connected must be positive switching, as the two outputs on the interlocking module deliver a level of +24 V in the switched-on state.
- All the electrical connections must either be isolated from the mains supply by a safety transformer according to IEC 61558-2-6 with limited output voltage in the event of a fault, or by other equivalent isolation measures (PELV).
- All electrical outputs must have an adequate protective circuit for inductive loads. The outputs must be protected with a free-wheeling diode for this purpose. RC interference suppression units must not be used.
- Power devices which are a powerful source of interference must be installed in a separate location away from the input and output circuits for signal processing. The cable routing for safety circuits should be as far away as possible from the cables of the power circuits.
- To avoid EMC interference, the physical environmental and operating conditions at the installation site of the device must comply with the requirements according to the standard EN 60204-1:2006, section 4.4.2 (EMC).
- Please pay attention to any interference fields from devices such as frequency converters or induction heating systems. Observe the EMC instructions in the manuals from the respective manufacturer.

Important!

If the device does not appear to function when operating voltage is applied (e.g. green STATE LED does not flash), the device must be returned unopened to the manufacturer.

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8.1. Information about cULus

Important!

- This device is intended to be used with a *Class 2* power source in accordance with UL1310. As an alternative an LV/C (Limited Voltage/Current) power source with the following properties can be used:
  - This device shall be used with a suitable isolating source in conjunction with a fuse in accordance with UL248. The fuse shall be rated max. 3.3 A and be installed in the max. 30 V DC power supply to the device in order to limit the available current to comply with the cULus requirements. Please note possibly lower connection ratings for your device (refer to the technical data).
- For use and applications as per the requirements of cULus [1], a connecting cable listed under the UL category code CYJV2 or CYJV must be used.

1) Notice on the scope of the UL approval: only for applications as per NFPA 79 (Industrial Machinery). The devices have been tested as per the requirements of UL508 and CSA/ C22.2 no. 14 (protection against electric shock and fire).

8.2. Safety in case of faults

- The operating voltage U_B is reverse polarity protected.
- The safety outputs are short circuit-proof.
- A short circuit between the safety outputs is detected by the switch.
- A short circuit in the cable can be excluded by laying the cable with protection.

8.3. Fuse protection for power supply

The power supply must be provided with fuse protection depending on the number of switches and current required for the outputs. The following rules apply:

Max. current consumption of an individual switch I_{max}

I_{max} = I_{UB} + I_{OD} + $I_{FO1A+FO1B}$

I_{UB} = Switch operating current (40 mA)

I_{OD} = Load current of monitoring output (max. 50 mA)

$I_{FO1A+FO1B}$ = Load current of safety outputs FO1A + FO1B (2 x max. 150 mA)

Max. current consumption of a switch chain ΣI_{max}

$\Sigma I_{max} = I_{FO1A+FO1B} + n \times (I_{UB} + I_{OD})$

n = Number of connected switches

8.4. Requirements for connecting cables

CAUTION

Risk of damage to equipment or malfunctions as a result of incorrect connecting cables.

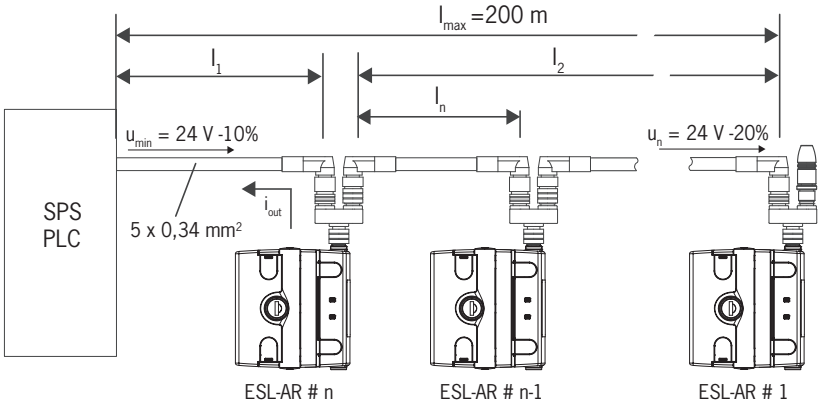
- Use connection components and connecting cables from EUCHNER.
- On the use of other connection components, the requirements in the following table apply. EUCHNER provides no warranty for safe function in case of failure to comply with these requirements.

Observe the following requirements with respect to the connecting cables:

Parameter	Value	Unit
Conductor cross-section, min.	0.14 … 0.34	mm²
R max.	150	Ω/km
C max.	120	nF/km
L max.	0.65	mH/km
Recommended cable type	LIYY 8x or 5x0.34 mm²	

8.5. Maximum cable lengths

Switch chains are permitted up to a maximum overall cable length of 200 m taking into account the voltage drop as a result of the cable resistance (see table below with example data and case example).



n Max. number of devices	I_{OUT} (mA) Possible output current per channel FO1A/FO1B	l_1 (m) Max. cable length from the last device to the control system
5	10	150
	25	100
	50	80
	100	50
6	10	120
	25	90
	50	70
	100	50
10	10	70
	25	60
	50	50
	100	40

8.5.1. Determining cable lengths using the example table

Example: 6 switches are to be used in series. Cabling with a length of 40 m is routed from a safety relay in the control cabinet to the last device (#6). Cables with a length of 20 m each are connected between the individual ESL devices.

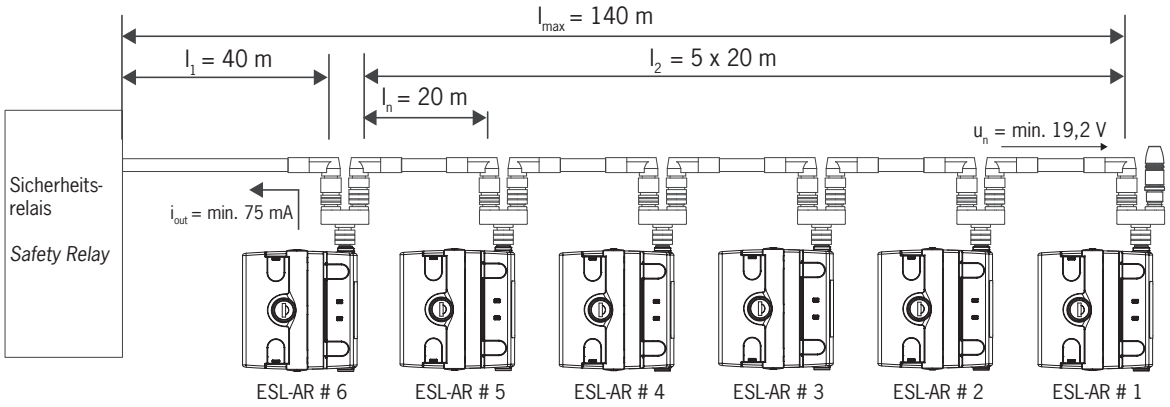


Figure 1: Circuit example with six ESL-AR

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A safety relay is connected downstream that consumes 75 mA at each of the two safety inputs. This operates over the whole temperature range with a voltage of 19.2 V (corresponds to 24 V -20%).

All the relevant values can now be determined using the example table:

1. Select the corresponding section in column n (max. number of switches). In this case: 6 switches.
2. In column I_{OUT} (possible output current per channel FO1A/FO1B), find a current greater than or equal to 75 mA. In this case: 100 mA.

➡ It is then possible to determine the maximum cable length from the last switch (#6) to the control system from column I_1. In this case, a length of 50 m is permitted.

Result: The desired cable length I_1 of 40 m is below the permitted value from the table. The overall length of the switch chain I_{max} of 140 m is less than the maximum value of 200 m.

➡ The planned application is therefore functional in this form.

8.6. Connector assignment of safety system ESL-I-AR

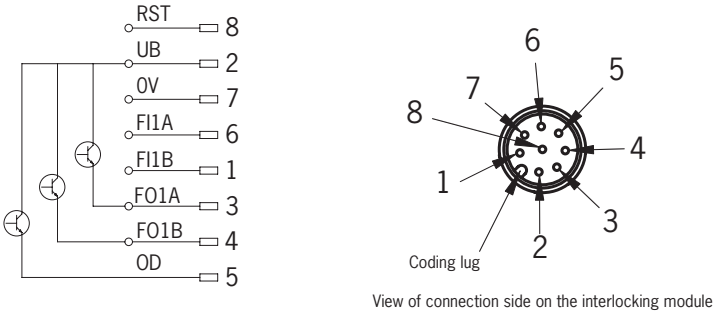


Figure 2: Connector assignment interlocking module ESL-I-AR

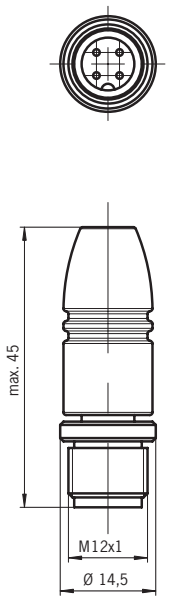
Pin	Designation	Description	Conductor coloring
1	FI1B	Enable input for channel 2	WH
2	UB	Power supply, DC 24 V	BN
3	FO1A	Safety output, channel 1	GN
4	FO1B	Safety output, channel 2	YE
5	OD	Monitoring output	GY
6	FI1A	Enable input for channel 1	PK
7	0V	Ground, DC 0 V	BU
8	RST	Reset input	RD

8.7. Connector assignment of Y-distributor

Connector assignment of interlocking module ESL-I-AR (8-pin plug) and Y-distributor (8-pin socket)

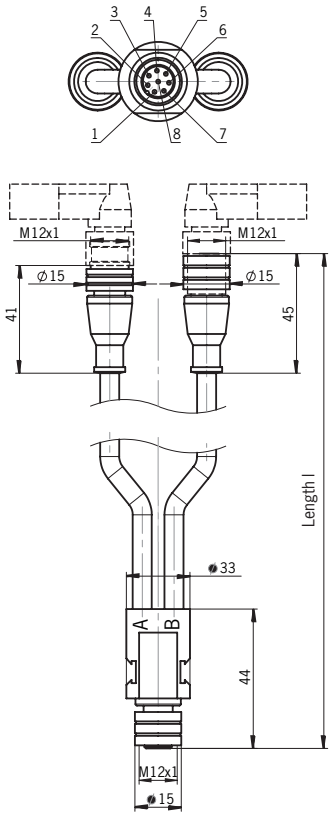
Pin	Function
X1.1	FI1B
X1.2	U_B
X1.3	FO1A
X1.4	FO1B
X1.5	OD
X1.6	FI1A
X1.7	0 V
X1.8	RST

Strapping plug 097645
4-pin, plug
(figure similar)

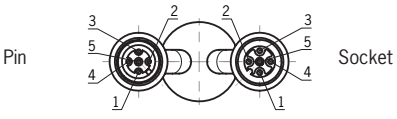


Y-distributor with connecting cable 111696 or 112395

Socket



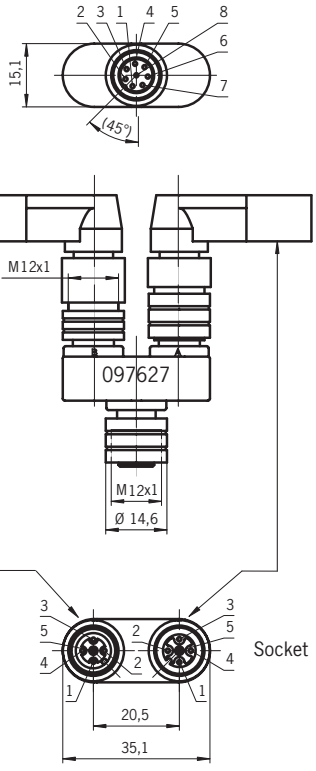
Order no.	Length l [mm]
111696	200
112395	1,000



Pin	Function	Pin	Function
X2.1	U_B	X3.1	U_B
X2.2	FO1A	X3.2	FI1A
X2.3	0 V	X3.3	0 V
X2.4	FO1B	X3.4	FI1B
X2.5	RST	X3.5	RST

Y-distributor
097627

Socket



Pin	Function	Pin	Function
X2.1	U_B	X3.1	U_B
X2.2	FO1A	X3.2	FI1A
X2.3	0 V	X3.3	0 V
X2.4	FO1B	X3.4	FI1B
X2.5	RST	X3.5	RST

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8.8. Connection of a single AR device

If a single AR device is used, connect the device as shown in *Figure 3*. Monitoring outputs can be routed to a control system.

The switch can be reset via the RST input. To do this, a voltage of 24 V is applied to the RST input for at least 3 seconds. The RST input must be connected to 0 V if it is not used.

WARNING

In the event of a fault, loss of the safety function due to incorrect connection.

- To ensure safety, both safety outputs (FO1A and FO1B) must always be evaluated.

Important!

The example shows only an excerpt that is relevant for connection of the ESL system. The example illustrated here does not show complete system planning. The user is responsible for safe integration into the overall system. Detailed application examples can be found at www.euchner.com. Simply enter the order number of your switch in the search box. You will find all available connection examples for the device in *Downloads*.

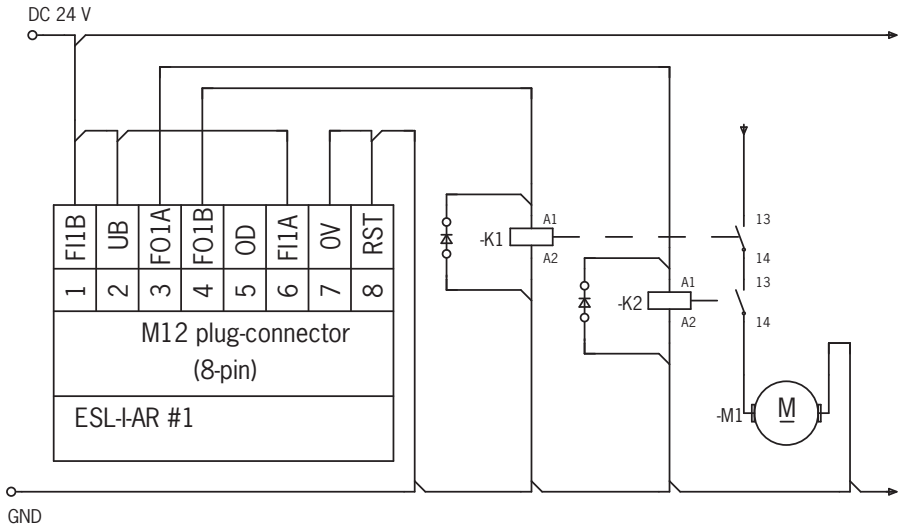

Figure 3: Connection example for separate operation of an ESL-I-AR

8.9. Connection of several devices in a switch chain

Important!

- An AR switch chain may contain a maximum of 20 devices.
- The example shows only an excerpt that is relevant for connection of the ESL system. The example illustrated here does not show complete system planning. The user is responsible for safe integration into the overall system. Detailed application examples can be found at www.euchner.com. Simply enter the order number of your switch in the search box. All available connection examples for the device can be found under *Downloads*.

The series connection is shown here based on the example of the version with plug connector M12. The switches are connected one behind the other with the aid of pre-assembled connecting cables and Y-distributors. If a safety door is opened or if a fault occurs on one of the switches, the system shuts down the machine. A higher-level control system cannot, however, detect which safety door is open or on which switch a fault has occurred with this connection technology. A special AR evaluation unit is required for this purpose (see chapter *8.10. Notes on operation on an AR evaluation unit on page 18*).

The series connection can also be realized via additional terminals in a control cabinet.

The safety outputs are permanently assigned to the respective safety inputs of the downstream switch. FO1A must be routed to FI1A and FO1B to FI1B. If the connections are interchanged (e.g. FO1A to FI1B), the device will switch to the fault state.

Always use the RST input in series connections. All switches in a chain can be reset at the same time with this reset input. To do this, a voltage of 24 V must be applied to the RST input for at least 3 seconds. If the RST input is not used in your application, it should be connected to 0 V.

Note the following on this aspect:

- A common signal must be used for all switches in the chain. This can be a changeover switch or the output of a control system. A pushbutton is not suitable because the reset must always be connected to GND during operation (see switch S1 in *Figure 4 on page 17*).
- Reset must always be performed simultaneously for all switches of the chain.

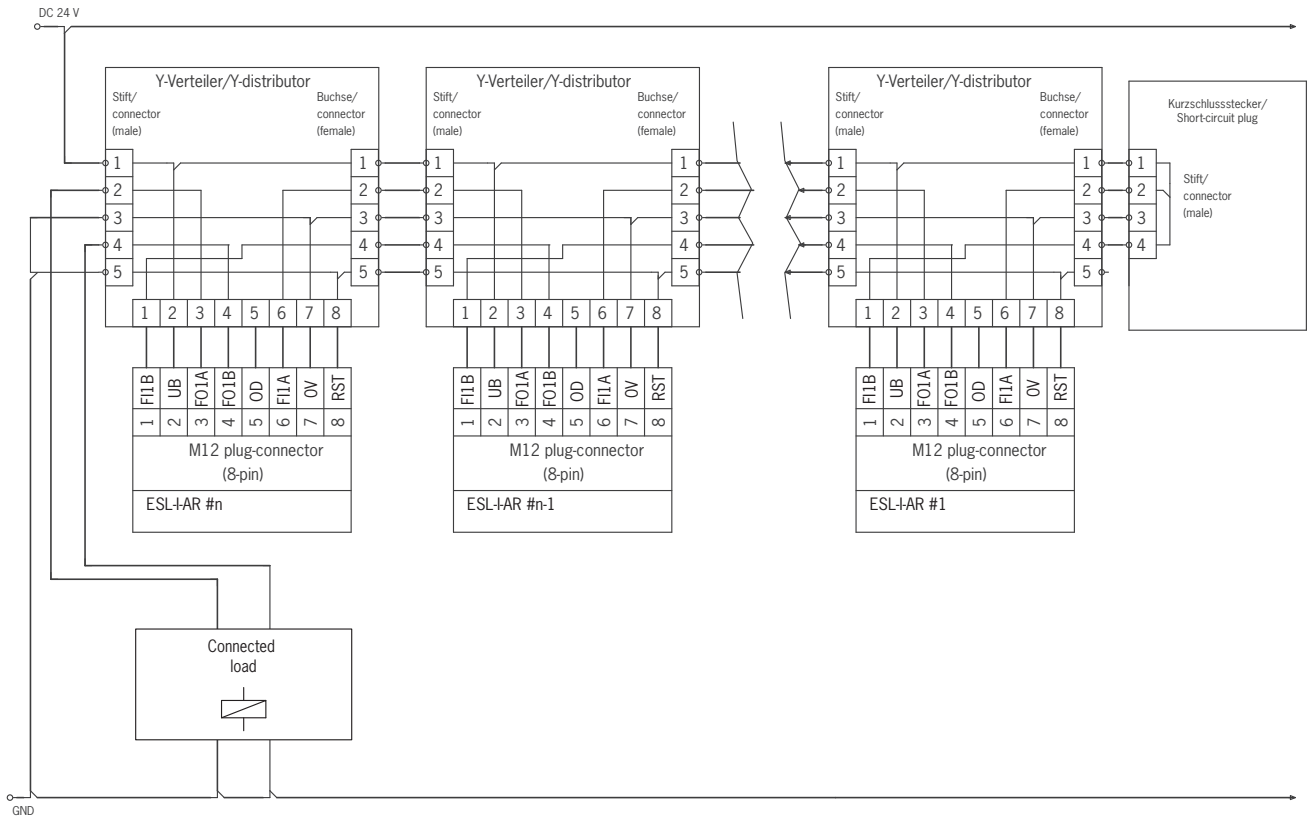

Figure 4: *Connection example for series connection of several ESL-AR devices*

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8.10. Notes on operation on an AR evaluation unit

The devices can be operated on an AR evaluation unit. Please refer to the operating instructions for the relevant AR evaluation unit for more information.

8.11. Notes on operation with safe control systems

Please observe the following requirements for connection to safe control systems:

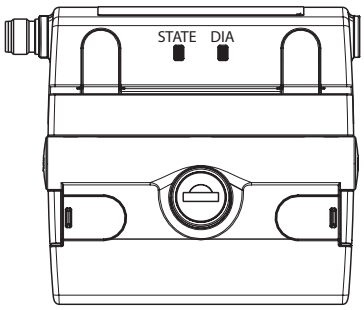
- Use a common power supply for the control system and the connected devices.
- A pulsed power supply must not be used for U_B. Tap the supply voltage directly from the power supply unit. If the power supply is connected to a terminal of a safe control system, this output must provide sufficient electrical current.
- Always connect inputs FI1A and FI1B directly to a power supply unit or to outputs FO1A and FO1B of another EUCHNER AR device (series connection). Pulsed signals must not be present at inputs FI1A and FI1B.
- The safety outputs (FO1A and FO1B) can be connected to the safe inputs of a control system. Prerequisite: the input must be suitable for pulsed safety signals (OSSD signals, e.g. from light grids). The control system must tolerate test pulses on the input signals. This normally can be set up by parameter assignment in the control system. Observe the notes of the control system manufacturer. For the pulse duration of your device, please refer to chapter *11. Technical data on page 23*.

A detailed example of connecting and setting the parameters of the control system is available for many devices at www.euchner.com, in the area *Downloads/Applications/ESL*. The features of the respective device are dealt with there in greater detail.

9. Setup

9.1. LED displays

LED	Color
STATE	green
DIA	red



9.2. Teach-in function for handle module (only for unicode evaluation)

The handle module must be assigned to the interlocking module using a teach-in function before the system comprising interlocking module and handle module forms a functional unit.

During a teach-in operation, the safety outputs are switched off, i.e. the system is in the safe state.

Monitoring output OD indicates a HIGH signal during teach-in operation as long as a handle module that is ready for teach-in is located in the actuating range.

Tip!

It is recommended to perform the teach-in operation prior to mounting. Mark interlocking modules and handle modules that belong together to avoid confusion. For devices to be connected in series, we recommend performing the teach-in operation separately for each device prior to series connection.

Important!

- The teach-in operation may be performed only if the device functions flawlessly. The red DIA LED must not be illuminated.
- The interlocking module disables the code for the previous handle module if teach-in is carried out for a new handle module. Teach-in is not possible again immediately for this device if a new teach-in operation is carried out. The disabled code is released again in the interlocking module only after a third code has been taught in.
- The interlocking module can be operated only with the last handle module taught-in.
- A new handle module can be taught-in only if the interlocking module recognizes a non-taught-in handle module when the operating voltage is switched on.
- If the handle module to be taught-in is within the actuating range for less than 30 s, it will not be activated and the most recently taught-in handle module will remain saved.

9.2.1. Preparing device for the teach-in operation and teaching-in handle module

1. Fit handle module.
2. Close the guard. Check for correct alignment and distance and readjust if necessary.
3. Apply operating voltage to the interlocking module.

➡ The green LED flashes quickly (approx. 5 Hz)
A self-test is performed during this time (approx. 10 s).
The teach-in operation starts, the green LED flashes (approx. 1 Hz). During the teach-in operation, the interlocking module checks whether the handle module is a disabled handle module. Provided this is not the case, the teach-in operation is completed after approx. 30 seconds and is positively acknowledged with an alternating red/green flashing sequence. The new code has now been stored, and the old code is disabled.

4. To activate the new handle module code from the teach-in operation in the interlocking module, the operating voltage to the interlocking module must then be switched off for min. 3 seconds. As an alternative, 24 V can be applied to the input RST for at least 3 seconds.

9.2.2. Teach-in function with series connection, replacing and teaching in device

It is recommended not to teach in the handle modules in the series connection but to teach them in one by one instead. Teach-in in a series connection works analogously to separate operation in principle. All ESL-AR in the chain can be taught in at the same time. The prerequisite is that the switch chain functions without problems and the following steps are followed. Further steps might have to be observed for mixed switch chains (e.g. for chains with CES and safety switches with guard locking). Observe the operating instructions for the other devices in the chain for this purpose.

Work on the wiring (e.g. during device replacement) should generally be performed in a de-energized state. On certain systems, it is nevertheless necessary to perform this work and subsequent teach-in during ongoing operation.

The RST input must be connected as shown in *Figure 4 on page 17* to permit this.

Proceed as follows:

1. Open the guard on which the interlocking module or handle module is to be replaced.
2. Mount the new interlocking module or handle module and prepare it for the teach-in operation (see chapter *9.2.1. Preparing device for the teach-in operation and teaching-in handle module on page 19*).
3. Close all guards in the chain.
4. Actuate the reset for at least 3 s (24 V on RST).

➡ The system restarts (approx. 10 s).

➡ On the interlocking module at which a new handle module is positioned, the green LED flashes at approx. 1 Hz and the handle module is taught-in. This takes approx. 30 s. Do not switch off during this time and do not actuate reset! The teach-in operation is complete when DIA/STATE flash alternately.

5. Actuate the reset for at least 3 s (24 V on RST).

➡ The system restarts and then continues to function in normal operation.

9.3. Functional check

⚠	**WARNING** Danger of fatal injury as a result of faults in installation and functional check. ‣ Before carrying out the functional check, make sure that there are no persons in the danger zone. ‣ Observe the valid accident prevention regulations.

9.3.1. Mechanical function test

It must be possible to insert the latch on the handle module easily into the interlocking module. Close the guard several times to check the function.

9.3.2. Electrical function test

After installation and any fault, the safety function must be fully checked. Proceed as follows:

1. Switch on operating voltage.

➡ The machine must not start automatically.

➡ The interlocking module carries out a self-test. The green STATE LED flashes for 10 s at 5 Hz. The green STATE LED then flashes at regular intervals.

2. Close all guards.

➡ The machine must not start automatically.

➡ The green STATE LED illuminates continuously.

3. Enable operation in the control system.
4. Open the guard.

➡ The machine must switch off and it must not be possible to start it as long as the guard is open.

➡ The green STATE LED flashes at regular intervals.

Repeat steps 2 - 4 for each guard.

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10. System status table

Operating mode	Handle module/door position	Safety outputs FO1A and FO1B	Monitoring output OD	LED indicator Output STATE (green)	LED indicator Output DIA (red)	State
Self-test	X	off	X	5 Hz (10 s)	○	Self-test after power-up
Normal operation	closed	on	on		○	Normal operation, door closed
	closed	off	on	1 x inverse	○	Normal operation, door closed, preceding device in the switch chain signals “door open” (only with series connection)
	open	off	off	1 x	○	Normal operation, door open
	open	off	off	2 x	○	Door open, no handle module taught-in (see setup for teach-in operation), only unicode
Teach-in operation (only unicode)	closed	off	on	1 Hz (30 s)	○	Teach-in operation
	X	off	X	↔	↔	Positive acknowledgment after completion of teach-in operation (DIA flashes in alternation with State)
Fault display	X	off	X	1		Error during teach-in (only unicode) ‣ Handle module removed from the actuating range prior to the end of the teach-in operation
	X	off	X	2 x		Input fault (e.g. missing test pulses, illogical switch state from preceding device in the switch chain)
	closed	off	on	3 x		Defective handle module (e.g. fault in code or code cannot be read)
	X	off	X	4 x		Output fault (e.g. short circuits, loss of switching ability)
	X	off	X	5 x		Disabled handle module
	X	off	X	off		Internal fault, e.g.: ‣ Component faulty ‣ Data error ‣ Impermissible pulsing on UB ‣ Voltage applied to the RST input for less than 3 s
	X	off	X	X	X	Internal fault

Key to symbols	
○	LED not illuminated
☀	LED illuminated
5 Hz (10 s)	LED flashes for 10 seconds at 5 Hz
3 x	LED flashes three times, and this is then repeated
∞	LED flashes continuously
X	Any state

After the cause has been remedied, faults (DIA LED flashes inversely) can generally be reset by opening and closing the guard. If the fault is still displayed afterward, use the reset function or briefly interrupt the power supply. Please contact the manufacturer if the fault could not be reset after restarting.

Important!

If you do not find the displayed device status in the system status table, this indicates an internal device fault. In this case, you should contact the manufacturer.

11. Technical data

NOTICE

If a data sheet is included with the product, the information on the data sheet applies.

11.1. Technical data for safety system ESL-IH-AR

Parameter		Value			Unit
		min.	typ.	max.	
Housing material		Die-cast aluminum, powder coated, black			
Dimensions		See dimension drawing			
Weight		0.4			kg
Ambient temperature at U_B = DC 24 V		- 20	-	+ 55	°C
Degree of protection		IP67			
Safety class		III			
Degree of contamination		3			
Installation orientation		Any			
Connection		M12 plug connector, 8-pin			
Operating voltage U_B (PELV, reverse polarity protected, regulated, residual ripple < 5%)		24 ± 15%			V DC
For the approval according to cULus the following applies		Operation only with UL class 2 power supply or equivalent measures			
Current consumption				40	mA
Switching load according to cULus		DC 24 V, class 2			
External fuse (operating voltage)		0.25	-	8	A
Safety outputs (FO1A/FO1B)		Semiconductor outputs, p-switching, short circuit-proof			
- Output voltage 1)					
HIGH	U (FO1A)	U_B-1.5	-	U_B	V DC
HIGH	U (FO1B)				
LOW	U (FO1A/FO1B)	0		1	
Switching current per safety output		1	-	150	mA
Utilization category acc. to EN IEC 60947-5-2		DC-13 24 V 150 mA Caution: Outputs must be protected by a free-wheeling diode in the case of inductive loads.			
Monitoring output OD		p-switching, short circuit-proof			
- Output voltage 1)		0.8 x U_B	-	U_B	V DC
- Max. load		-	-	50	mA
Assured release distance s_{AR} in door opening direction 2)		-	-	0	mm
Rated insulation voltage U_i		-	-	75	V
Rated impulse withstand voltage U_{imp}		-	-	0.8	kV
Rated conditional short-circuit current		100			A
Resilience to vibration		Acc. to EN IEC 60947-5-2			
Switching frequency		-	-	0.5	Hz
Repeat accuracy R		≤ 10			%
EMC protection requirements		Acc. to EN IEC 60947-5-3			
Ready delay		-	10	-	s
Risk time for single device		-	-	400	ms
Risk time delay per device		5			ms
Turn-on time		-	-	400	ms
Discrepancy time		-	-	10	ms
Test-pulse duration		1			ms
Reliability values acc. to EN ISO 13849-1					
Category		4			
Performance Level		PL e			
PFH_D		1.9×10^{-9} / h			
Mission time		20			years

1) Values at a switching current of 50 mA without taking into account the cable length.
2) For the calculation of safety parameters an s_{ar} of 0 mm in the opening direction of the door can be assumed.
3) Corresponds to the risk time according to EN 60947-5-3. This is the maximum OFF time for the safety outputs after pulling the handle module.

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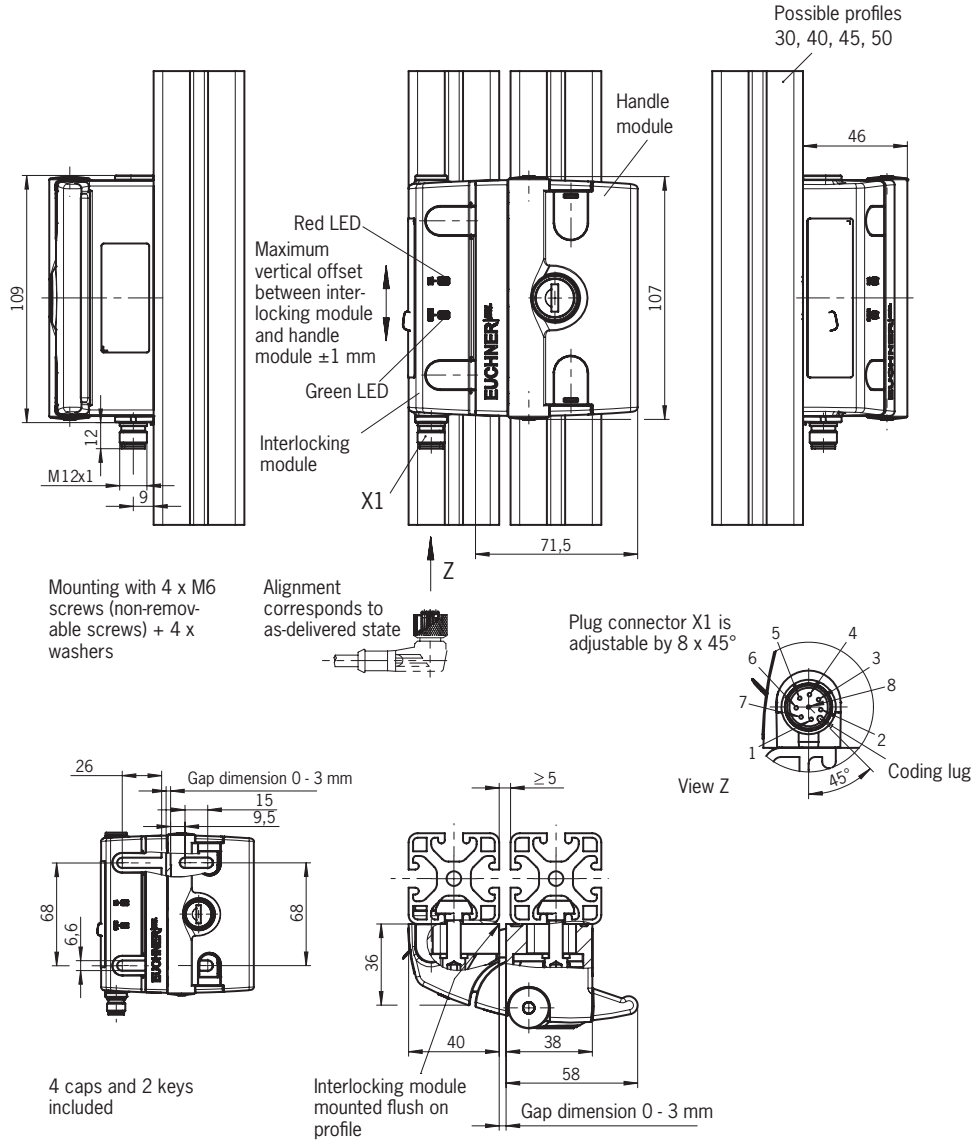
11.1.1. Dimension drawing for safety system ESL-IH-AR



12. Ordering information and accessories

Tip!

Suitable accessories, e.g. cables or assembly material, can be found at www.euchner.com. To order, enter the order number of your item in the search box and open the item view. Accessories that can be combined with the item are listed in *Accessories*.

13. Inspection and service

WARNING

Loss of the safety function because of damage to the device.
- In case of damage, the entire device must be replaced.
- Only accessories or spare parts that can be ordered from EUCHNER may be replaced.

Regular inspection of the following is necessary to ensure trouble-free long-term operation:
- Check the switching function (see chapter *9.3. Functional check on page 21*)
- Check the secure mounting of the devices and the connections
- Check for soiling

No servicing is required. Repairs to the device are only allowed to be made by the manufacturer.

NOTICE

The year of manufacture can be seen in the lower right corner of the rating plate. The current version number in the format (VX.X.X) can also be found on the device.

14. Service

If servicing is required, please contact:

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

Service telephone:

+49 711 7597-500

E-mail:

support@euchner.de

Internet:

www.euchner.com

EN

15. Declaration of conformity

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EUCHNER
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EU-Konformitätserklärung
EU declaration of conformity
Déclaration UE de conformité
Dichiarazione di conformità UE
Declaración UE de conformidad

Original DE
Translation EN
Traduction FR
Traduzione IT
Traducción ES

2117339-05-11/19

Die nachfolgend aufgeführten Produkte sind konform mit den Anforderungen der folgenden Richtlinien (falls zutreffend):
The beneath listed products are in conformity with the requirements of the following directives (if applicable):
Les produits mentionnés ci-dessous sont conformes aux exigences imposées par les directives suivantes (si valable)
I prodotti sotto elencati sono conformi alle direttive sotto riportate (dove applicabili):
Los productos listados a continuación son conforme a los requisitos de las siguientes directivas (si fueran aplicables):

I:	Maschinenrichtlinie	2006/42/EG
	Machinery directive	*2006/42/EC*
	Directive Machines	*2006/42/CE*
	Direttiva Macchine	*2006/42/CE*
	Directiva de máquinas	*2006/42/CE*
II:	Funkanlagen-Richtlinie (RED)	2014/53/EU
	Radio equipment directive	*2014/53/EU*
	Directive équipement radioélectrique	*2014/53/UE*
	Direttiva apparecchiatura radio	*2014/53/UE*
	Directiva equipo radioeléctrico	*2014/53/UE*
III:	RoHS Richtlinie	2011/65/EU
	RoHS directive	*2011/65/EU*
	Directive de RoHS	*2011/65/UE*
	Direttiva RoHS	*2011/65/UE*
	Directiva RoHS	*2011/65/UE*

Die Schutzziele der Niederspannungsrichtlinie 2014/35/EU und EMV Richtlinie 2014/30/EU werden gemäß Artikel 3.1 der Funkanlagen-Richtlinie eingehalten.
The safety objectives of the Low-voltage directive 2014/35/EU and EMC Directive 2014/30/EU comply with article 3.1 of the Radio equipment directive.
Les objectifs de sécurité de la Directive basse tension 2014/35/UE et Directive de CEM 2014/30/EU sont conformes à l'article 3.1 de la Directive équipement radioélectrique.
Gli obiettivi di sicurezza della Direttiva bassa tensione 2014/35/UE e Direttiva CEM 2014/30/UE sono conformi a quanto riportato nell´articolo 3.1 della Direttiva apparecchiatura radio.
Los objetivos de seguridad de la Directiva de bajo voltaje 2014/35/UE y Directiva CEM 2014/30/UE cumplen con el artículo 3.1 de la Directiva equipo radioeléctrico.

Folgende Normen sind angewandt:	a:	EN 60947-5-3:2013
Following standards are used:	b:	EN ISO 14119:2013
Les normes suivantes sont appliquées:	c:	EN ISO 13849-1:2015
Vengono applicate le seguenti norme:	d:	EN 50581:2012 (RoHS)
Se utilizan los siguientes estándares:	e:	EN 50364:2018
	f:	EN 300 330 V2.1.1

Bezeichnung der Bauteile *Description of components* *Description des composants* *Descrizione dei componenti* *Descripción de componentes*	**Type** *Type* *Type* *Tipo* *Typo*	**Richtlinie** *Directives* *Directive* *Direttiva* *Directivas*	**Normen** *Standards* *Normes* *Norme* *Estándares*	**Zertifikats-Nr.** *No. of certificate* *Numéro du certificat* *Numero del certificato* *Número del certificado*
Sicherheitsschalter *Safety Switches* *Interrupteurs de sécurité* *Finecorsa di sicurezza* *Interruptores de seguridad*	ESL-I-... ESL-H-...	I, II, III	a, b, c, d, e, f	UQS 117318

Genehmigung der umfassenden Qualitätssicherung (UQS) durch die benannte Stelle 0035
Approval of the full quality assurance system by the notified body 0035
Approbation du système d'assurance qualité complet par l'organisme notifié 0035
Approvazione del sistema di garanzia di qualità totale da parte dell'organismo notificato 0035
Aprobación del sistema de aseguramiento de calidad total por parte del organismo 0035 notificado

TÜV Rheinland Industrie Service GmbH
Alboinstr. 56
12103 Berlin
Germany

Die alleinige Verantwortung für die Ausstellung dieser Konformitätserklärung trägt der Hersteller:
This declaration of conformity is issued under the sole responsibility of the manufacturer:
La présente déclaration de conformité est établie sous la seule responsabilité du fabricant:
La presente dichiarazione di conformità è rilasciata sotto la responsabilità esclusiva del fabbricante:
La presente declaración de conformidad se expide bajo la exclusiva responsabilidad del fabricante:

EUCHNER GmbH + Co. KG
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CE

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Leinfelden, November 2019

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