

Magnus RFID S

Safety sensors

RFID PL e, SIL 3



INSTALLAZIONE, USO E MANUTENZIONE
INSTALLATION, USE AND MAINTENANCE
INSTALLATION, UTILISATION ET MAINTENANCE
INSTALLATION, BEDIENUNG UND WARTUNG
INSTALACIÓN, USO Y MANTENIMIENTO



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Safety sensor series Magnus MRFID S
Translation of the original operating instructions



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1 About these operating instructions

1.1 Validity

Variants of the following basic types are described:


- MRFID S

Data sheets can be requested additionally from ReeR for customer-specific sensors. The information in the data sheet for customer-specific types, if they differ from the operating instructions.


The operating instructions are to be made available to the person who is installing the safety sensor.

The operating instructions are to be kept in a legible condition and accessible at all times.

Definition of symbols:



► **Warning**
Failure to comply can result in malfunctions or interference.
Failure to comply can result in injury and/or damage to the machine.



► **Information**
Identifies available accessories and useful additional information.

1.2 Number key safety sensor

MRFID (1) (2) (3) (4) (5)

(1)	S = Sensor, A = Actuator, C = Sensor + Actuator Combo
(2)	S = 22mm
(3)	C = Actuator low coded, I = Individual high coding, U = Unique high coding
(4)	A = Automatic, M = Manual
(5)	M = M12 pigtail, 1 = 1 m cable, 3 = 3 m cable, 5 = 5 m cable, 10 = 10 m cable

1.3 Number key actuator

MRFID A S

2 Intended use

The safety sensors MRFID S and actuator MRFID A S may be used exclusively for monitoring movable, separating safety guards.

This can be done in conjunction with a ReeR safety relay or comparable safety controller. The sensor can also be used without additional safety relay/controller, due to the integrated evaluation logic in the sensor as well as EDM input.

The overall control concept in which the security sensor is incorporated is to be validated, for example, according to EN ISO 13849-2.

3 Approvals



[PROXIMITY SWITCH]
E469760




SLG Prüf- und
Zertifizierungs GmbH

(tested in accordance with
ECOLAB standard)

Tested chemical resistance to the following cleaning detergents:


- Distilled water
- P3-topax 66
- P3-topactive 200
- P3-topax 52
- P3-topax 990

4 Safety information



- Make sure that the safety sensors are mounted only by specially trained, authorized, qualified personnel and put into service safely.
- Only install and commission the device if you have read and understood the operating instructions and are familiar with the applicable regulations on occupational safety and accident prevention.
- The safety sensor may only be operated exclusively by the actuator which is properly mounted on the guard. Actuation when not mounted on the guard is prohibited.
- Operate the safety sensors only if they are in undamaged condition.
- Make sure that the safety sensors are used exclusively to protect against hazards.
- Make sure that all applicable safety requirements for the respective machine are complied with.
- Make sure that all applicable laws and regulations are complied with.
- Residual risks are not known when the instructions in this manual are adhered to.

5 Warning against misuse



- Inexpert or improper use or tampering in combination with the use of safety sensors can lead to hazards for personnel or damage to machine or system parts.
Also observe the relevant notes relating to EN ISO 14119.
- Make sure that no external component causes current or voltage peaks which are higher than the specified electrical data of the safety relay. Current or voltage peaks are produced for example by capacitive or inductive loads.
- Exceeding the electrical data of the safety sensor (e.g. in case of faulty wiring or shorts) can damage it irreparably.
- Operation of the safety sensor is only allowed with the appropriate actuator and with the approved control options (see Technical specifications).

6 Disclaimer

No liability can be accepted for damage or outages resulting from non-compliance with this instruction manual. For damage resulting from the use of spare parts or accessories unapproved by the manufacturer, any further liability of the manufacturer is excluded.

Any unauthorized repairs, modifications and additions are not permitted for safety reasons and the manufacturer is also not liable for any resulting damage.

7 Function

Coded, electronic safety sensor, which is operated by a non-contact coded actuator.

Safety sensors are suitable for the following ReeR safety relays:

Admiral	AD SR1 / AD SRM
Mosaic	M1
	MI8O2
	MI8
	MI12T8
	MI16

7.1 Coding variants

The various versions of the safety sensors arise from the different encodings designated as type keys under point 1.2. Depending on the variant, a corresponding manipulation protection is achieved.

Coded

The safety sensor accepts any Magnus actuator of type MRFID A S.

Type 4; low level coding level according to EN ISO 14119.

Individual

The safety sensor accepts one Magnus actuator of type MRFID A S. This actuator is configured individually by the safety sensor.

A non-matching actuator in the sensor range will result in an error.

The process for teaching-in a new actuator can be carried out unlimited times and is described in detail under "Commissioning" on page 10.

Type 4; high level coding level according to EN ISO 14119.

Unique

The safety sensor only accepts the Magnus actuator supplied. The pair, consisting of sensor and actuator cannot be separated. If a component was lost and is no longer functional, both components must be replaced.

Type 4; high level coding level according to EN ISO 14119.

7.2 Safety outputs

The safety sensor provides 2 short-circuit proof PNP safety outputs (OSSD), which have a max. load of 400 mA per channel.

The safety outputs switch ON under the following conditions:

- the correct actuator is detected in the operating range (safety guard closed)
- a high signal is present at both safety inputs
- the EDM input is set correctly
- no error is detected

The safety outputs switch OFF under the following conditions:

- There is no actuator or the wrong actuator in the detection zone
- Signal is low at one of the two inputs
- An error is detected

The two safety outputs can be connected under the following conditions to the inputs of a safety controller:

- the input must be appropriate (OSSD signals) for clocked safety signals; the controller must tolerate test pulses on the inputs (see Technical specifications on page 27). Please refer to the instructions of the controller manufacturer.

Wiring examples can be found on page 33.

7.3 Safety inputs

The safety sensor provides 2 safety inputs.

- Connect the safety inputs of +24 V DC for single use of the sensor.
- When using the sensor in a series connection, the safety inputs of the first sensor can be connected to +24 V DC. The safety inputs of the following sensors are connected to the safety outputs of the previous sensor. Please also refer to point 11.1 "Series connection" on page 10.
- Pulses with a duration of max. 900 µs are tolerated on the safety inputs.

Wiring examples can be found on page 33.

7.4 EDM input

The EDM input can be configured as "automatic" or "monitored" (see number key).

If the EDM input is not required, the "automatic" variant must be selected and connected to +24 V DC.

EDM input: automatic

For contactor monitoring, the open contactors must be connected to the EDM input.

For series connection of multiple sensors all EDM inputs must be connected to +24 V DC. The monitor for the contactors must be connected to the last sensor of the line.

Wiring examples can be found on page 33.

EDM input: monitors (start button)

Connect the EDM input to an external start button on your machine control.

The EDM input is only recognized as properly set if, after the sensor activation and after setting the safety inputs, at least one valid start pulse is detected. The valid start pulse is detected when after a rising edge, a falling edge between 30ms and 5s is detected.

Wiring examples can be found on page 33.

7.5 Diagnostic output

The diagnostic output is positive switching, short-circuit protected and transmits the various sensor states with different signals, for example, to a PLC.

The pulsed signals correspond to the timing of the yellow LED.

The various symbols are described in more detail under point 7.6.

7.6 LED displays, flash codes and clocking diagnostic output

Sensor non-actuated	
LED green	off
LED red	off
LED yellow	on
Diagnostic output	0 V
Safety outputs	0 V
Note	Voltage is applied

Actuator in the detection area (sensor activated), all inputs correctly set	
LED green	on
LED red	off
LED yellow	off
Diagnostic output	24 V DC
Safety outputs	24 V
Note	Actuator in the detection area

Actuator in the detection area (sensor actuated), safety inputs not set (low level)	
LED green	flashes ¹⁾
LED red	off
LED yellow	off
Diagnostic output	24 V DC
Safety outputs	0 V
Note	Set safety inputs

Actuator in the detection area (sensor actuated), safety inputs set (high level), waits for start pulse	
LED green	rapid flashes ²⁾
LED red	off
LED yellow	off
Diagnostic output	24 V DC
Safety outputs	0 V
Note	Press Start button

Actuator at the reception limit	
LED green	off
LED red	off
LED yellow	flashes ¹⁾
Diagnostic output	24 V DC clocked
Safety outputs	Previous state
Note	Readjust sensor

Teach-in process	
LED green	off
LED red	off
LED yellow	rapid flashes ²⁾
Diagnostic output	24 V DC clocked
Safety outputs	0 V
Note	Disconnect voltage to complete teach-in

Fault condition	
LED green	off
LED red	flashes ¹⁾
LED yellow	off
Diagnostic output	0 V
Safety outputs	0 V
Note	See "Troubleshooting" on page 9.

¹⁾ Flashing: The pulse intervals of the LED ratio is 1:1.

²⁾ Rapid flashing: The pulse intervals of the LED ratio is 1: 4.

7.7 Boundary area monitoring

If the actuator is in the boundary area of the switching distances with corresponding offset values of the sensor, it is transmitted to a PLC or indicated by the LED (see point 7.6).

8 Technical specifications

See Technical specifications on page 27.

9 Assembly

- Safety sensor and actuator
 - do not use as a beat
 - external fields can affect switching distances
- Installation of the safety sensor and the associated actuator is allowed only when de-energized.
- Make sure that the markings on the sensor and actuator face each other congruently.
- The mounting position is arbitrary. However, security sensor and actuator must be mounted parallel and opposite each other.
- Note the specified installation tolerances and the approved control options.

The specified operating distance around the free zone must be maintained free of electrically and magnetically conductive metallic materials.



Matching spacer plates for mounting on metal parts are available under the order no. MRFID SP B (10 mm) from ReeR.

- The mounting distance between two systems of the safety sensor and actuator must be min. 15 cm.
- Attach safety sensor and actuator to the protective device so that they cannot be removed.
- Use only M4 screws with flat head (e.g. M4 cheese head screws ISO 4762) for installation of the safety sensor and actuator. Tightening torque max. 0.7 Nm. Use non-ferromagnetic material (e.g. brass) screws.



We recommend using the screw covers included to secure the mounting screws against easy disassembly.

- The safety sensor must be mounted on flat surfaces.
- The connecting cable of the safety sensor must be protected against mechanical damage.
- Consider the requirements of EN ISO 14119 during installation.

- Also consider the requirements of EN 60204-1, in particular regarding the proper laying of cable. It is recommended to lay the sensor cable so that it is covered.

10 Adjustment

- The stated operating distances (see Technical specifications from page 27) are only valid for mounting on non-metallic material if the safety sensor and actuator are mounted in parallel opposite each other. Other arrangements may lead to different switching states.

11 Electrical connection



The electrical connections must be made without voltage applied and may be performed by authorized personnel only.

- Connect the safety sensor according to the specified wire colors and pin assignment (see "Circuit diagram and pin assignment" on page 31).



Matching cable sets (type no.: MRFID EC...C...) and an installation wrench are available directly from ReeR for safety sensors with connectors. We also offer options for easy wiring in series connection. T-distributor (Item no.: MRFID T...) and connecting cable (Item no.: MRFIDEC.L-MRFIDEC.S). (For more information see point



- Both safety outputs must always be evaluated to ensure safety.
- Since the diagnostic output is not a safety output, it may not be used for safety-relevant information and monitoring functions.

- Make sure that the required minimum input voltage of the downstream safety relay is not undershot. Observe the voltage drop at the safety sensor and the connecting cable.

11.1 Series connection

The safety sensors enable a series connection with up to 30 sensors while achieving up to PLe with correct wiring.

For a series connection please note that a time delay accumulates for each additional sensor. The relevant technical specifications can be found in the table from page 27.

Configuration of EDM input -> see point 7.4

Wiring examples can be found on page 33.

The maximum number of safety sensors, as well as the total length of the sensors line is load-dependent.

Increasing line length and increasing current load (load + sensors) in the series connection increases the system voltage drop.

If the level voltage falls below the permissible value of 21.6V, an additional power supply must be admitted. The ReeR T-distributor MRFID TC A can be used for this purpose.

11.2 Information about power supply

- The sensor must be directly or indirectly powered with a SELV/PELV power supply.
- For use and applications complying the requirements¹⁾, the power supply must be classified "for use in class 2 circuits".

¹⁾ Notice regarding the scope of the UL approval: The devices have been tested in accordance with the requirements of UL508 and CSA/C22.2 no. 14 (protection against electric shock and fire).

11.3 Note for use in safety control systems

- Do not use external test pulses.

The device generates its own test pulses on the safety outputs. A downstream control system must be able to tolerate these test pulses, which may have a length up to 300 µs. Depending on the inertia of the connected device (controller, relay, etc.), this can lead to short switching processes.

- The inputs of a connected evaluation unit must be positive-switching, as the two outputs on the safety switch in the ON state deliver a level of +24 V DC.

12 Commissioning

During commissioning, you must make sure of the following points:

- safety sensor and actuator mounted in the correct position and firmly
- integrity of the power supply lines

Magnus MRFID S

After installation or after any fault detection, a complete check of the safety function must be performed.

12.1 Teach-in variant "individual"

The first permitted actuator is detected immediately after the supply voltage is applied, if it is located in the detection range of the sensor.

Each additional teach-in process must be done as described in the following:

1. Apply the supply voltage to the safety sensor.
2. Bring an allowable actuator into the detection range of the sensor.
3. Actuator is detected, red LED flashes six times.
4. After 10s the LED switches to yellow flashing.
5. Switch off power supply within the next 2 min.
6. Re-apply power supply, the programming procedure is finished and the actuator will be accepted.
7. If an actuator is re-taught, the safety sensor disables the code of the previous process, so this is no longer permitted.
8. Do not remove the actuator during the process, as long as it is located in the detection area.

If the teach-in procedure is terminated, the supply voltage must be switched off and the process restarted. The teaching-in of actuators to a security sensor can be undertaken an unlimited number of times, as long as the code of the actuator is not locked in the sensor.

13 Maintenance

If the safety sensor is correctly installed and properly used, no maintenance measures are requested.

We recommend periodically carrying out a visual and functional test:

- Check the safety sensor and actuator for tightness.
- Check the connection cable for damage.



Damaged or faulty equipment must be replaced with original. In variant "unique", the safety sensor and actuator must be replaced.

For the "individual" variant, a teach-in process must be performed after replacement of the safety sensor OR the actuator.

13.1 Accessories


Suitable components for sensor variants with M12 pigtail connector: set of M12 cables with plastic nut with the item number MRFID EC C8 10.


An assembly wrench with preset torque is available for ensuring an optimal connection between sensor and cable set.


For easy wiring in series connection of several safety sensors we recommend our T-distributors:


- MRFID TC B serial
- MRFID TC A diagnostics / EDM
- MRFID TC C feed supply voltage
- MRFID TP terminator and connecting lines:
- MRFID EC S4 male / female straight 4-pole
- MRFID EC L4 male / female angled 4-pole
- MRFID EC S8 male / female straight 8-pole and cable sets:
- MRFID EC C4 female straight 4-pole
- MRFID EC C8 female straight 8-pole


14 Troubleshooting


Safety output faults	
Flash code	
Cause	Short circuit between safety outputs to ground or to +24 V DC. Wire breakage
Remedy	- Switch off supply voltage. - Eliminate short/wire break at the output. - Re-apply supply voltage.


Safety input faults	
Flash code	
Cause	- Short circuit between safety inputs, to ground or to +24V DC. - Wiring breakage.
Remedy	- Switch off supply voltage. - Eliminate short/wire break at the output. - Re-apply supply voltage.

Safety input faults	
Flash code	
Cause	- EDM automatic: Error on connected safety relay. - EDM manual: Start pulse does not take place in the defined area. - All variants: Wire breakage.
Remedy	- Switch off supply voltage. - Check safety relay or set start pulse correctly, check for broken wire. - Re-apply supply voltage.

Error overvoltage or undervoltage	
Flash code	
Cause	The supply voltage has not been applied in the defined region.
Remedy	- Switch off supply voltage. - Ensure correct supply voltage and reconnect it.

Temperature outside the acceptable range	
Flash code	
Cause	The defined temperature range has been exceeded or undershot.
Remedy	- Switch off supply voltage. - Ensuring proper ambient temperature. - Re-apply supply voltage.

Incorrect actuator	
Flash code	
Cause	Incorrect actuator in the detection range of the sensor.
Remedy	- Use correct actuator.

Internal device error	
Flash code	
Cause	Internal device error.
Remedy	- Switch off power supply and re-connect.

If the errors described can not be resolved, the device must be replaced to ensure the safety function.

15 Dismantling

Dismantle the safety sensor in a powered down state.

16 Disposal

Dispose of packaging and used parts according to the regulations of the country in which the device is installed.

17 Information about production date



The date of manufacture can be seen on the safety sensor housing in the format "calendar week/year":
E.g. "37/14" = week 37/year 2014