

Altech Corp.[®]



SMART Safety Sensor for Smart Factories – Non-contact Safety Sensor SRF

With innovative diagnostic system for the intelligent factory of the future

Industry 4.0 in safety technology



The SRF (Safety RFID) is a non-contact safety sensor, that monitors moveable safety guards, such as doors, flaps and hoods. This particularly compact sensor protects employees from injuries by shutting down or not starting up machines when the safety guard is not properly closed.

With its innovative diagnostic system, the SRF makes safety circuits suitable for Industry 4.0.

The system provides a multitude of diagnostic data of each sensor, even in a series connection, to support smart production.

Diagnostic data is fed into the machine control system via I/O Link or alternatively displayed on a smartphone by way of NFC technology. In this way, 20 different diagnostic information of each sensor can be retrieved and made available.

This diagnostic data delivers cost-effective predictive maintenance in a simple way. Through its advanced fault recognition capability, costly machine shutdowns can be prevented.

This way, your machinery and plant will work even more efficiently!



Innovative

- New innovative Daisychain Diagnostics (DCD)
- Reading diagnostics information through Android smartphone via NFC interface
- Transmission of data via I/O Link interface
- Simple and specific maintenance thanks to pre-failure monitoring
- Cost reduction by eliminating machine downtimes
- Connecting the sensor information of six different diagnostic circuits
- Support of an energy-optimised application: Voltage levels known at any time

Safe

- Safe sensors in Cat. 4, PL e or SIL CL 3
- Safe serial connection of SRF up to PL e, Cat. 4 / SIL CL 3
- Coded and unique actuator

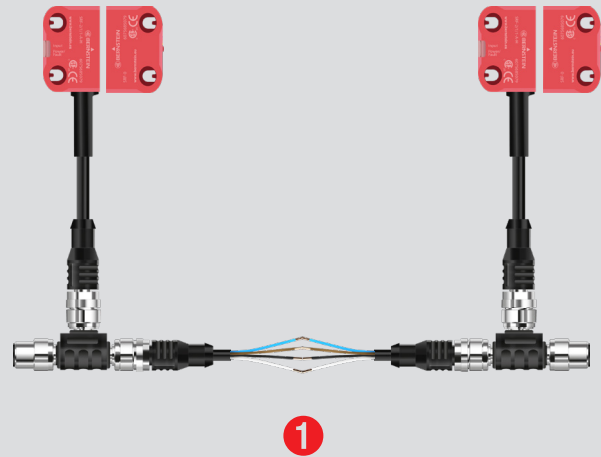
Versatile

- Protection class of IP69
- Local reset button (optional)
- Compact design
- Diagnostics system DCD (optional)
- PNP diagnostics
- Fault tolerant output (optional)
- Single and series connection possible
- Connection via M12 plug

SRF

Benefits and advantages

- **Cost-saving:** thanks to a four-wire unshielded standard connection cable from sensor to sensor 1
- **Compact:** small in size, flexible in use
- **Safe:** up to PL e – even in series connection, with high default protection (according to ISO 14119)
- Series connection of the sensors through internal safety electronics without compromising the safety level



Coding types

- Low coding level:
Coded sensor with only one possible code
- High coding level:
Coded sensor with more than 1000 different codes
- Unique coding: High coding level – but no spare actuator accepted

Diagnostics (not safety related)

- PNP diagnostics:
Signalling contact as PNP NO output that indicates whether the safety guard is closed
- DCD System:
Detailed diagnostic system DCD that submits a complete status image of a sensor, even in series connection (see also page 6 and 7)

Reset function

Local reset of the sensor to enable restart of the machine.

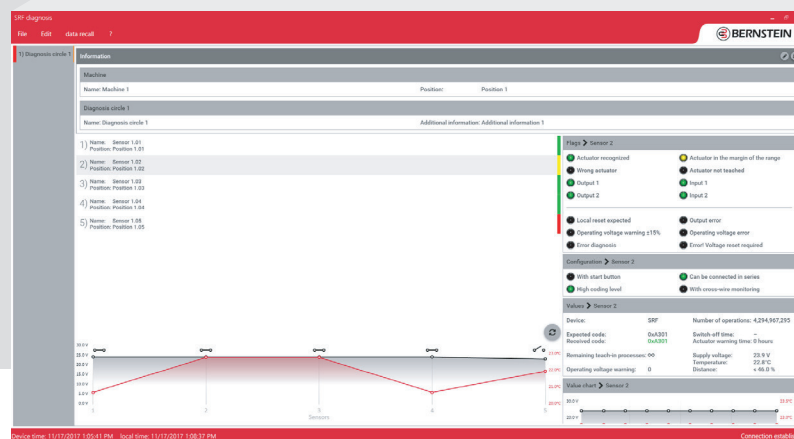
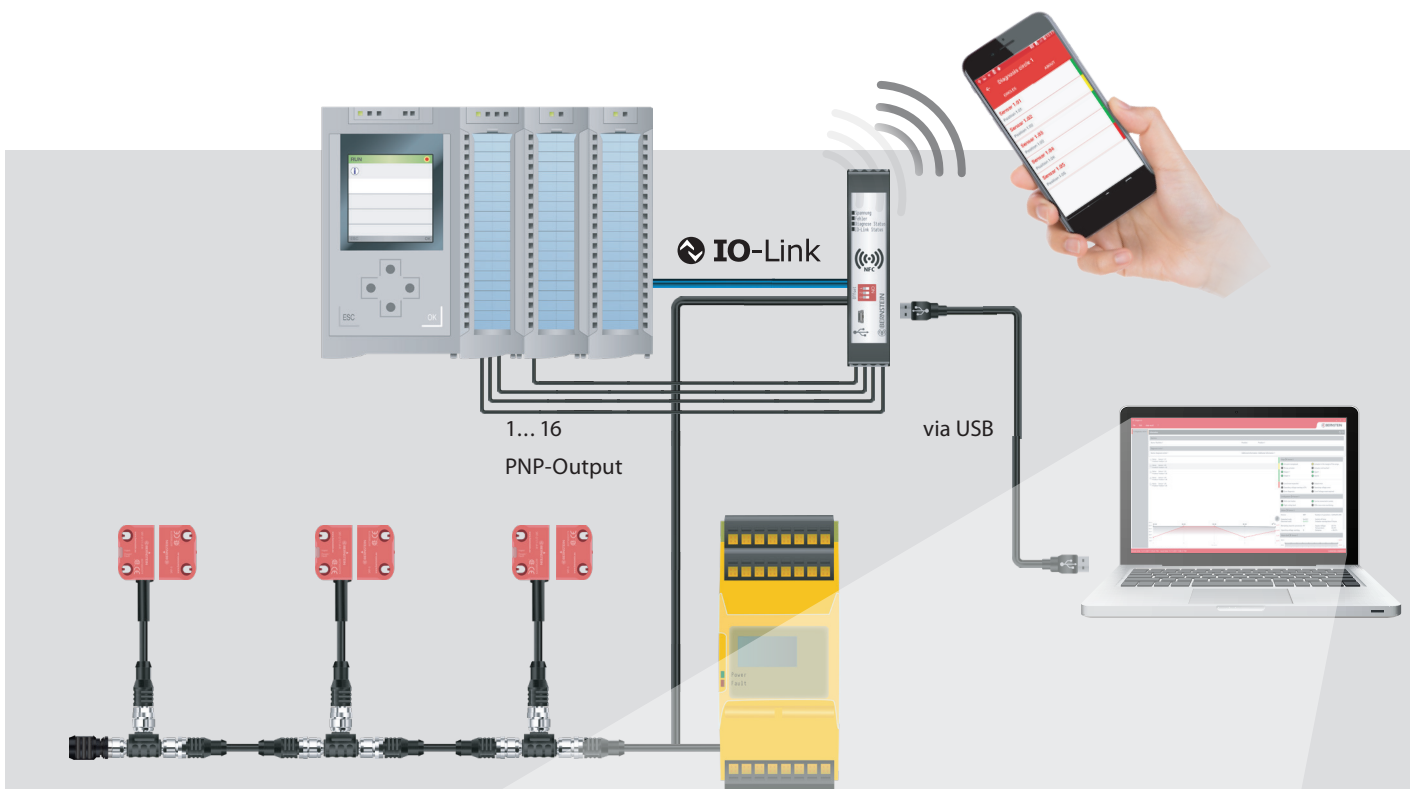
Fault tolerant outputs

The fault tolerant outputs prevent an unexpected machine stop and allow to run down the machine in a controlled manner.

This is how it works: If an error is detected at one output, the sensor indicates this with a flash code –whilst simultaneously transmitting the information via the DCD system. After 20 minutes, the second still intact output, will switch off.

Diagnostics Benefits and advantages

- Comprehensive diagnostics information for each sensor and for the entire system
- Diagnostic data simply retrievable
- Time and cost savings during commissioning, maintenance and fault investigation
- Protection against unexpected machine stops through pre-fault detection
- Display of diagnostic data on smartphones via NFC
- Simple troubleshooting through reading out the fault memory via NFC also in case of missing power supply



Diagnostic system DCD

In order to use the comprehensive diagnostic functions, sensors with DCD system are necessary. These are marked with a "5" in the type code: SRF-5/...

All the diagnostic information are not safety relevant!

The diagnostic data will be provided as follows:

- Directly via I/O Link or a I/O Link Master with gateway (for ex. Profinet, Ethercat etc.)
- Via the "SRF App" for Android for simple visualisation of the diagnostic information
- Via laptop with USB interface

As the diagnostic data is very extensive, it is divided into basic and extended information. This allows simplified data processing when used with superior control systems. The following information is available:

Basic information

| Information | Meaning |
|--|---|
| Actuator detected | Actuator detected / Actuator not detected |
| Wrong actuator | Actuator code OK / Actuator code not OK |
| Actuator code not taught-in | Actuator code saved / Actuator code not saved |
| Actuator at the edge of the detection area | Actuator distance OK / Actuator at the edge of the detection area |
| Safety input 1 | On / Off |
| Safety input 2 | On / Off |
| Safety output 1 | On / Off |
| Safety output 2 | On / Off |
| Local reset | Local reset expected / Local reset not expected |
| Operating voltage warning | Operating voltage is OK / The operating voltage is +/- 5 % to the end of the voltage range |
| Operating voltage 24V | Operating voltage is OK / Operating voltage outside specification (24 V +/- 20 %) |

Extended diagnostics information

| Information | Meaning |
|--|--|
| Additional sensor functions | Display of the additional function of the sensor, e. g. local reset, coding level, etc. |
| Number of remaining actuator teach-in operations | Depending on the sensor type, the number of teach-in cycles of new actuators is limited. This value shows the remaining number of teach-in cycles. |
| Received actuator code | Indication of the actuator code |
| Time "actuator in detection limit" | Indicates the time in hours since the actuator is located at the edge of the detection area |
| Output error switch-off time | The remaining time in minutes until the sensor switches off the safety outputs, after an error has been detected on one output channel. |
| Operating voltage warning | Information on the frequency of operating voltage warnings |
| Sensor temperature | Indicates the sensor temperature in °C |
| Supply voltage applied | Indicates the applied supply voltage in volts (V) |
| Actuator distance | Indicates the actuator distance in % to the maximum sensing distance. |

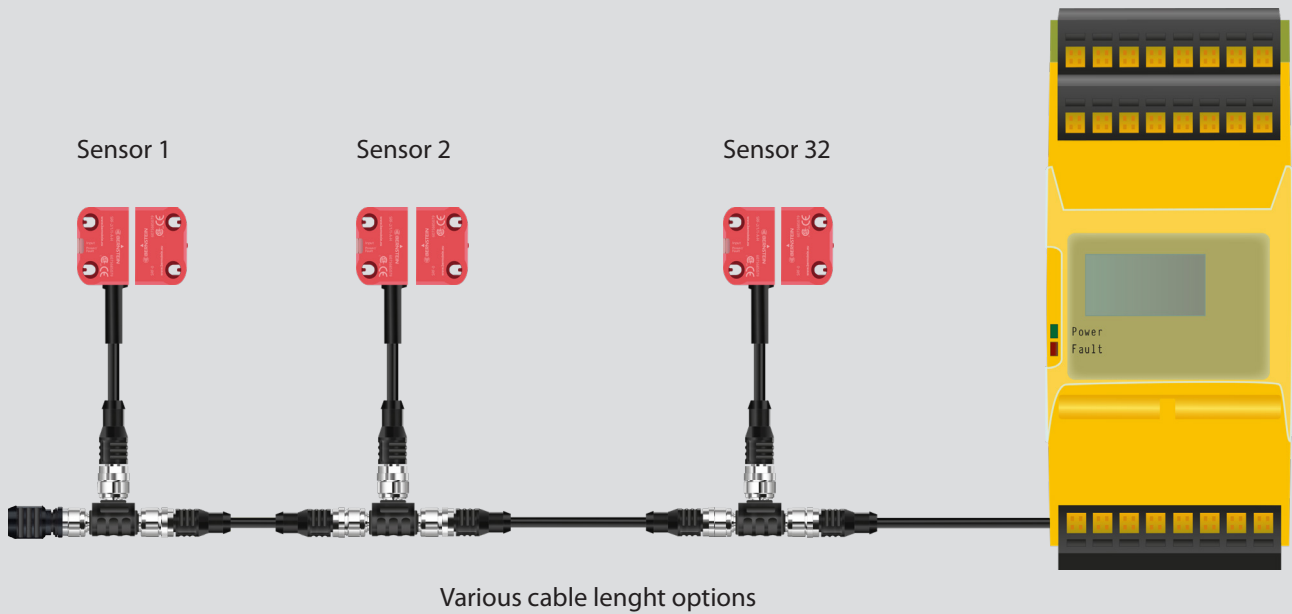
Moreover, there is a fault memory which stores system-relevant data in order to simplify troubleshooting.

Information that are available in the fault memory

| Information | Meaning |
|--|---|
| Operating voltage 24V | Operating voltage outside specification (24 V +/- 20 %) |
| Wrong actuator | Actuator code OK/ Actuator code not OK |
| Actuator at the edge of the detection area | Actuator distance OK / actuator at the edge of the detection area |
| Status safety output 1 | On / Off |
| Status safety output 2 | On / Off |

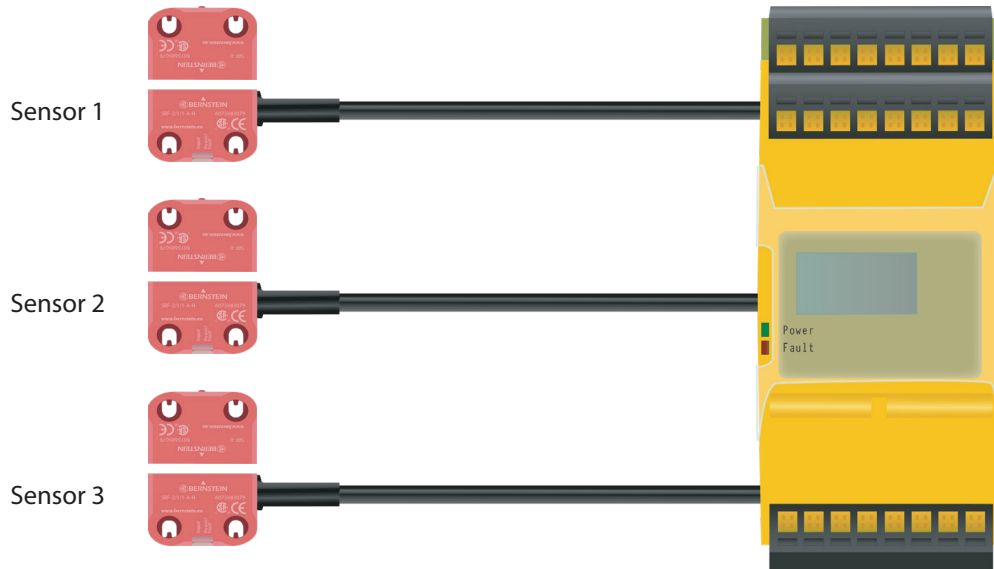
The error messages are stored in the diagnostics module using a time stamp and can be retrieved via all interfaces if needed. Thanks to the NFC function, this information can be read even if there is no voltage on the diagnostic module. This unique feature allows efficient troubleshooting and accelerates restart of defective machines.

SRF for series connection



| Article number | Designation | Unique | High coding level | Low coding level | PNP diagnostics | Daisy chain diagnostics (DCD) | Reset input | M12 8-pin connection with 25 cm cable |
|----------------|---------------|--|-------------------|------------------|-----------------|-------------------------------|-------------|---------------------------------------|
| 6075685094 | SRF-4/1/1-E-U | x | | | x | | | x |
| 6075685095 | SRF-4/1/1-E-H | | x | | x | | | x |
| 6075685096 | SRF-4/1/1-E-L | | | x | x | | | x |
| 6075685097 | SRF-4/2/1-E-U | x | | | x | | x | x |
| 6075685098 | SRF-4/2/1-E-H | | x | | x | | x | x |
| 6075685099 | SRF-4/2/1-E-L | | | x | x | | x | x |
| 6075685100 | SRF-5/1/1-E-U | x | | | | x | | x |
| 6075685101 | SRF-5/1/1-E-H | | x | | | x | | x |
| 6075685102 | SRF-5/1/1-E-L | | | x | | x | | x |
| 6075685080 | SRF-5/2/1-E-U | x | | | | x | x | x |
| 6075685103 | SRF-5/2/1-E-H | | x | | | x | x | x |
| 6075685104 | SRF-5/2/1-E-L | | | x | | x | x | x |
| 6075687078 | SRF-0 | Actuator SRF, suitable for all coding levels (not included, please order separately) | | | | | | |

SRF for single connection

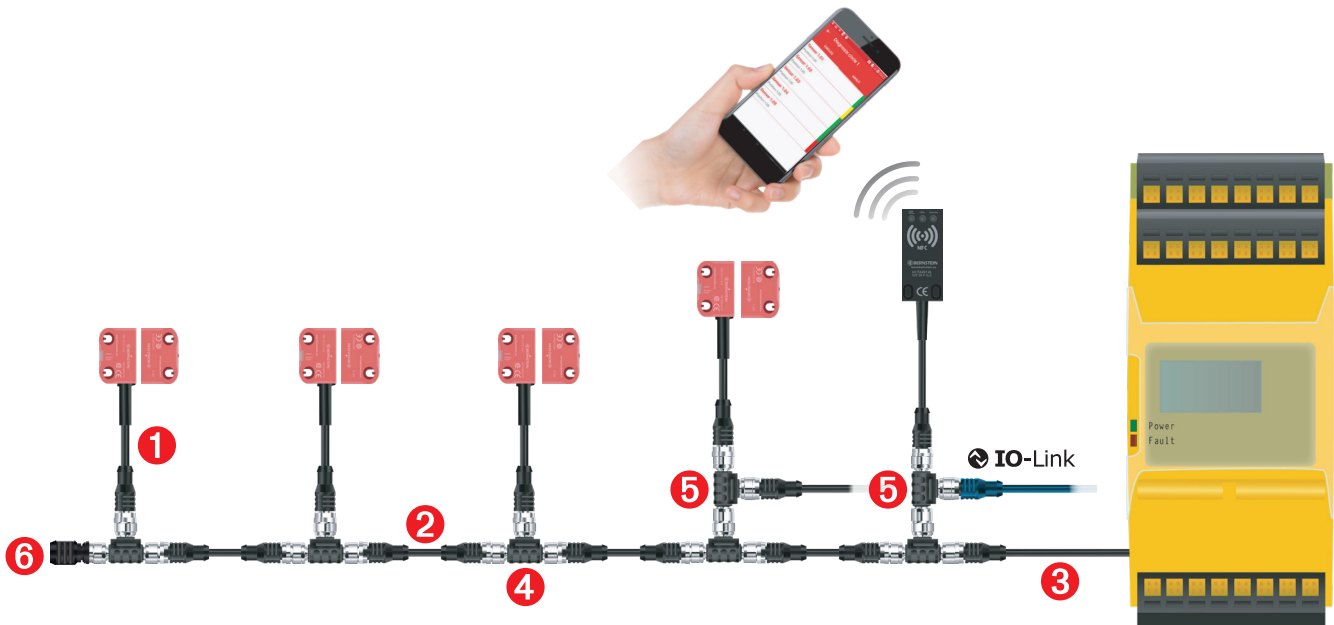


| Article number | Designation | Unique | High coding level | Low coding level | PNP diagnostics | M12 5-pin connection with 25 cm cable | 2 m cable with open cable end | |
|----------------|---------------|--|-------------------|------------------|-----------------|---------------------------------------|-------------------------------|--|
| 6075685117 | SRF-2/1/1-A-U | x | | | x | | x | |
| 6075685079 | SRF-2/1/1-A-H | | x | | x | | x | |
| 6075685118 | SRF-2/1/1-A-L | | | x | x | | x | |
| 6075685119 | SRF-2/1/1-E-U | x | | | x | x | | |
| 6075685120 | SRF-2/1/1-E-H | | x | | x | x | | |
| 6075685121 | SRF-2/1/1-E-L | | | x | x | x | | |
| 6075687078 | SRF-0 | Actuator SRF, suitable for all coding levels (not included, please order separately) | | | | | | |

Diagnostic module



| Article number | Designation | Enclosures | Number of diagnostic circuits | Digital output | Interfaces | | |
|----------------|-----------------|--|-------------------------------|----------------|------------|-----|---------|
| | | | | | I/O Link | NFC | USB 2.0 |
| 6075619122 | SRF DI-C-0/1-T | DIN rail housing 22,5 mm | 1 | - | x | x | x |
| 6075619123 | SRF DI-C-8/1-T | DIN rail housing 22,5 mm | 1 | 8 | x | x | x |
| 6075619124 | SRF DI-C-16/1-T | DIN rail housing 22,5 mm | 1 | 16 | x | x | x |
| 6075619125 | SRF DI6-C-0/1-T | DIN rail housing 22,5 mm | 6 | - | x | x | x |
| 6075689126 | SRF DI-F-0/2 | Rectangular sensor enclosure (use directly at the machine) | 1 | - | x | x | |



Connection cable and connecting cable

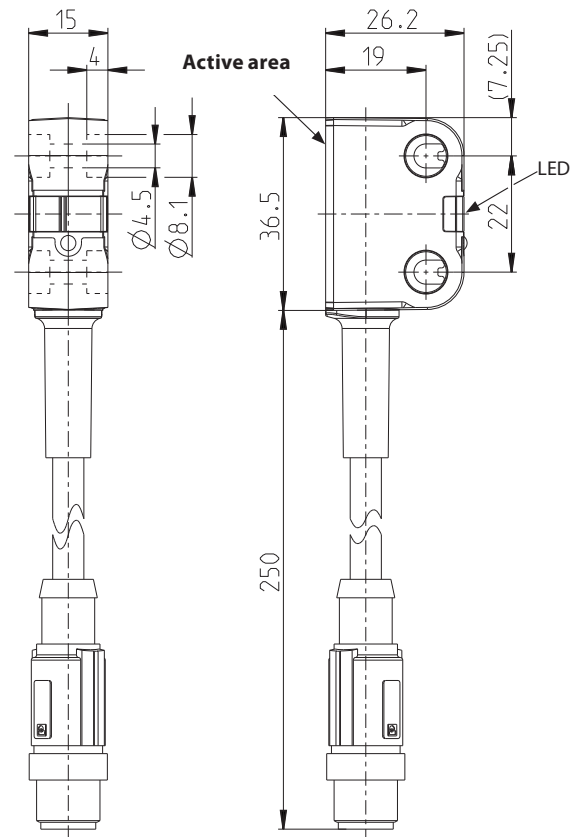
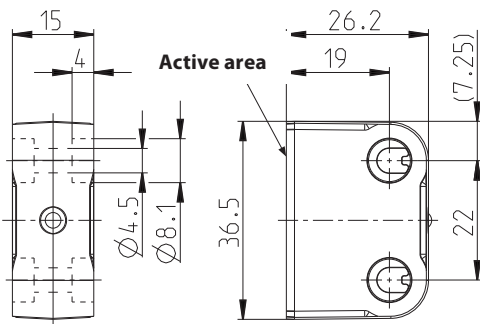
| Pos.-Nr. | Article number | Designation | Description | Plug alignment | Plug 1 | Plug 2 | Number of plugs | Cable length in meter |
|----------|----------------|--------------------|------------------|----------------|--------|--------|-----------------|-----------------------|
| 1 | 6075689085 | S1W-M12A8/BW-1PU | Connecting cable | straight | M | F | 8 | 1 |
| 1 | 6075689086 | S1W-M12A8/BW-2PU | Connecting cable | straight | M | F | 8 | 2 |
| 2 | 6075689087 | S1W-M12C4/AW-2PU | Connecting cable | straight | M | F | 4 | 2 |
| 2 | 6075689088 | S1W-M12C4/AW-5PU | Connecting cable | straight | M | F | 4 | 5 |
| 2 | 6075689089 | S1W-M12C4/AW-10PU | Connecting cable | straight | M | F | 4 | 10 |
| 3 | 6075689090 | SFW-M12C4/AW-0,5PU | Connection cable | straight | F | | 4 | 0,5 |
| 3 | 6075689091 | SFW-M12C4/AW-2PU | Connection cable | straight | F | | 4 | 2 |

T adapter, termination plug and fixing screws

| Pos.-Nr. | Article number | Designation | Description |
|----------|----------------|-----------------------|---|
| 4 | 6075989082 | ATS-M12/4-M12/8 | T adapter for series connection |
| 5 | 6075989083 | ATD-M12/8-M12/4 | T adapter for connection of I/O link and reset button |
| 6 | 6075689084 | AEP-M12/4 | Termination plug M12 |
| | 6075689127 | AT-CLIP-M12 | Fixing clip for T adapter |
| | 6075689128 | One-way screw M4 x 16 | 10 x Fixing screws M4 x 16 One-way screw |

Technical data

SRF



Electrical data

- Rated operational voltage U_e : 24 V
- Output current of the safety outputs I_e : 100 mA
- Output current of the message output I_e : 10 mA

Mechanical data

- Housing: PA66 + PA6, red, self-extinguishing
- Mounting holes: Ø 4,5 (for M4 screws)
- Displays: 1 × LED red/green operating status
1 × LED yellow actuation status
- Ambient temperature: -25 °C to +70 °C
- Protection class: IP69

Safety data sheet

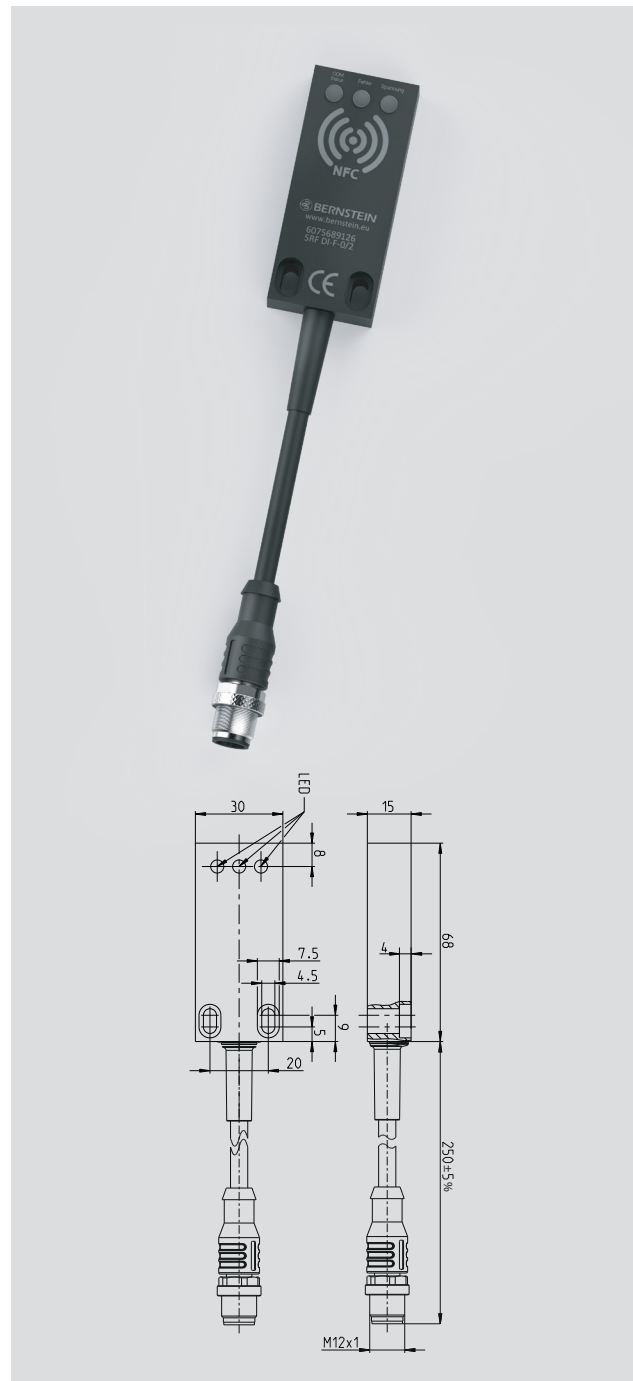
- PL e / Kat. 4 (according to EN ISO 13849-1)
- SIL CL 3 (according to DIN EN 62061)
- $PFH_D = 6 \times 10^{-9}$ 1/h
- Mission time T_M : 20 years
- Switching distance:
 - Rated operating distance S_n : 13 mm
 - Assured switching distance – On S_{ao} : 10 mm
 - Assured switching distance – Off S_{ar} : 25 mm
 - Hysteresis: 2 mm
- Switch-off delay t_a : max. 100 ms
- Ready delay t_v : max. 2 s

Technical data Diagnostic module



Cabinet module

- Rated operational voltage U_e : 24 V DC
- I/O Link protocol: V1.1
- Output current per signal output I_e : 50 mA
- Ambient temperature: 0 °C to +60 °C
- Protection class: IP20



Field module

- Rated operational voltage U_e : 24 V DC
- I/O Link protocol: V1.1
- Output current per signal output I_e : –
- Ambient temperature: -25 °C to +70 °C
- Protection class: IP69

Type code

SRF

| Product type | | Reset function | | Safety output rating | | Connection | | Coding | |
|--------------|---|----------------|---|----------------------|---|------------|---|--------|---|
| SRF- | 5 | / | 1 | / | 1 | - | E | - | H |

| Product type | | Connection | |
|--------------|--|------------|--------------------------------|
| 0 | Actuator | A | 2 m long cable with open end |
| 2 | Parallel wiring with PNP diagnostics | E | 25 cm cable with M12 connector |
| 4 | Series connection with PNP diagnostics | | |
| 5 | Series connection with DCD system | | |

| Reset function | | Coding | |
|----------------|---------------|--------|---------|
| 1 | Without reset | U | Unicode |
| 2 | With reset | H | High |
| | | L | Low |

| Safety output rating | |
|----------------------|---|
| 1 | Output current of the safety outputs = 100 mA |

Diagnostics modules

| Product type | | Construction | | Number of PNP outputs | | Interfaces | | Connection | |
|--------------|----|--------------|---|-----------------------|---|------------|---|------------|---|
| SRF | DI | - | C | - | 8 | / | 1 | - | T |

| Product type | | Interfaces | |
|--------------|---|------------|----------------------|
| DI | Diagnostics module for a diagnostics chain | 0 | No more interfaces |
| DI6 | Diagnostics module for 6 diagnostics chains | 1 | I/O Link + NFC + USB |
| | | 2 | I/O Link + NFC |

| Construction | | Connection | |
|--------------|--|------------|-------------------------------|
| F | Small angular enclosure for field mounting | T | Connection terminals |
| C | Top hat rail housing for cabinet mounting | E | 25cm cable with M12 connector |

| Number of PNP outputs | |
|-----------------------|--------------|
| 0 | 0 × PNP Out |
| 8 | 8 × PNP Out |
| 16 | 16 × PNP Out |

Notes

A large grid of small dots for taking notes, consisting of 20 columns and 30 rows of dots.

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