

## A Very Smart Choice

### The SMART Non-contact Safety Sensor SRF

With an innovative diagnostic system




- **Very compact:** small in size, flexible in use
- **Very Smart:** suitable for Industry 4.0 with its intelligent diagnostic system
- **Cost Saving:** four-wire unshielded standard connection cable from sensor to sensor
- **Very Safe:** up to PL e – even in series connection with high defeat protection

Actual size shown



1... 16 PNP-Output

 IO-Link

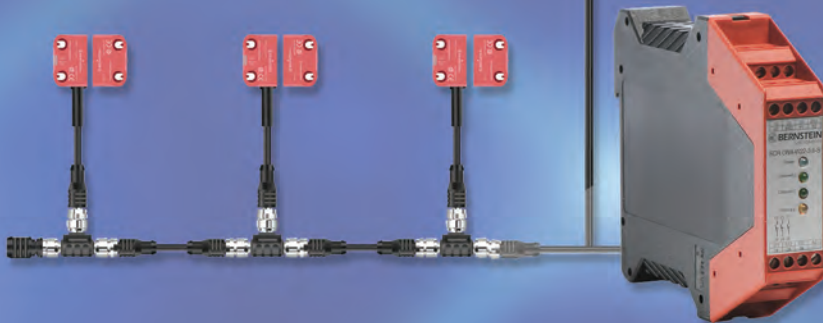
via USB

Diagnostics on computer or smartphone



### Benefits & Features

- M12 Plug-In Installation
- Up to 32 Switches in Series
- Cat 4 / PLe / SIL CL3
- PNP or Daisy Chain Diagnostics
- IO-Link and NFC Communications
- Low, High or Unique Coding
- Protection Class IP69



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The SRF (Safety RFID) is a non-contact safety sensor that monitors movable safety guards, such as doors, gates, panels and hoods.

This compact sensor protects operators from injuries by shutting down or preventing the start up of machines when the safety guards are not properly closed.

### Sensor and Actuator

The sensor and actuator feature a compact housing design which has a diagnostic LED and protection rating of IP69. One actuator part number is used for all the coding types and is programmable without additional devices. The actuators are sold separately.

### M12 Connection in Series

The sensors are designed to be used in series and feature an M12 connection system which provides plug in installation convenience; saving time, wiring errors and labor. Individual sensors are connected to a "main line" using a "T" connector. The "main line" uses a four conductor unshielded cable, which offers additional cost savings.

### Safety Rating

The SRF offers a safety rating of up to PLe, Cat.4 / SIL CL 3 even when multiple switches are used in series, via redundant OSSD outputs.

### Diagnostics

There are two different levels of diagnostics available. PNP diagnostics offer a PNP NO output that indicates whether the safety guard is opened or closed. DCD (Daisy Chain Diagnostics) offer much more detailed information providing over 20 different types of diagnostic information, via an internal bus system that can be accessed at the end of the series cable. This data can be accessed by the machine's control system via I/O Link and/or can be displayed on a Android Smartphone or tablet using NFC (Near Field Communication) technology. Both levels of diagnostic systems operate independently of the safety outputs.

### Fault Tolerant Outputs

The SRF also offers "Fault Tolerant Outputs", which prevent unnecessary machine shutdowns. If both OSSD safety outputs are lost, caused by an unsafe condition (such as a door being opened), the machine will immediately shut down. However, if only one output is lost (caused by a fault in the sensor or wiring), the sensor will indicate the condition with a flashing code and transmit the information via the DCD system (if used). After 20 minutes the machine will be shut down.

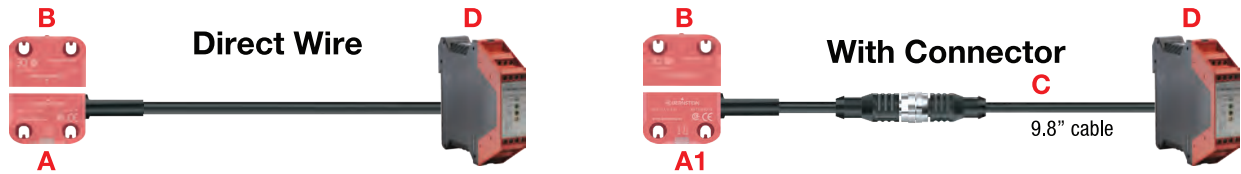
### Local Reset Function

It is possible, with special versions, to install a button to reset the start function of the safety relay near the safety sensor using a "T" connector.

### Sensor / Actuator Coding

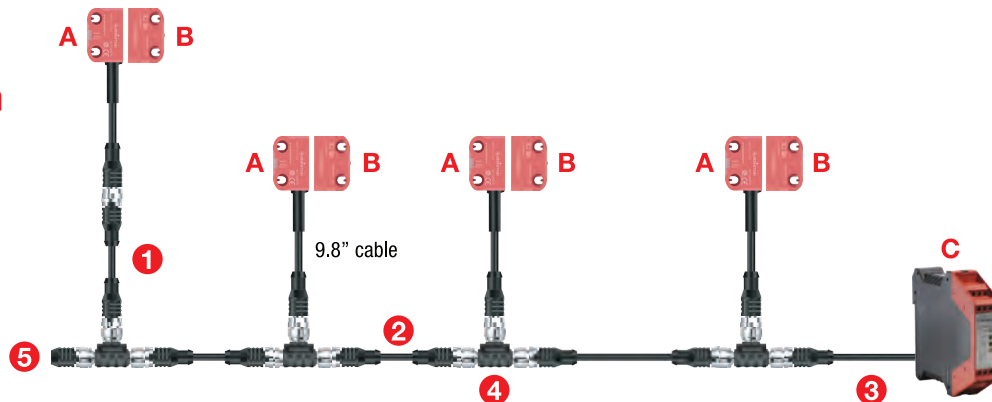
The sensors are offered with three different coding levels. Low Level Coded sensors are activated with any SRF actuator. High level coded sensors are pair with one specific actuator. Unique level coded sensors can only be paired once. After pairing, the sensor cannot be activated with any other actuator. The pairing procedure does not require any additional equipment.

## Single Installation



Switches (with 9.8" cable & M12 connector)							
Position	Part Number	Description	Coding			Diagnostics PNP	Cable Termination
			Low	High	Unique		
A	607.5685.118	SRF-2/1/1-A-L	X			X	Open Ended - 6.5'
A	607.5685.079	SRF-2/1/1-A-H		X		X	Open Ended - 6.5'
A	607.5685.117	SRF-2/1/1-A-U			X	X	Open Ended - 6.5'
A1	607.5685.121	SRF-2/1/1-E-L	X			X	9.8" Cable to M12
A1	607.5685.120	SRF-2/1/1-E-H		X		X	9.8" Cable to M12
A1	607.5685.119	SRF-2/1/1-E-U			X	X	9.8" Cable to M12
Actuator (for all coding levels - sold separately)							
B	607.5687.078	SRF-0					
Accessories							
Position	Part Number	Description	Type				
C	607.5689.092	SFW-M12B5/AW-2PU	Sensor Extension Cable Female to Open 5 Pin 2M (6.5')				
C	607.5689.093	SFW-M12B5/AW-5PU	Sensor Extension Cable Female to Open 5 Pin 5M (16.4')				
D	607.5111.020	SCR-0N4-W22-3.6-S	Safety Controller Relay				

## Series Installation



Switches (with 9.8" cable & M12 connector)							
Position	Part Number	Description	Coding			Diagnostics PNP	Cable Length
			Low	High	Unique		
A	607.5685.096	SRF-4/1/1-E-L	X			X	9.8"
A	607.5685.095	SRF-4/1/1-E-H		X		X	9.8"
A	607.5685.094	SRF-4/1/1-E-U			X	X	9.8"
Actuator (for all coding levels - sold separately)							
B	607.5687.078	SRF-0					
Accessories							
Position	Part Number	Description	Type				
1	607.5689.085	S1W-M12A8/BW/BW-1PU	Sensor Extension Cable Male to Female 8 Pin 1M (3.2')				
1	607.5689.086	S1W-M12A8/BW/BW-2PU	Sensor Extension Cable Male to Female 8 Pin 2M (6.4')				
2	607.5689.087	S1W-M12C4/AW-2PU	Series Line Extension Cable Male to Female 4 Pin 2M (6.4')				
2	607.5689.088	S1W-M12C4/AW-5PU	Series Line Extension Cable Male to Female 4 Pin 5M (16.4')				
2	607.5689.089	S1W-M12C4/AW-10PU	Series Line Extension Cable Male to Female 4 Pin 10M (32.8')				
3	607.5689.090	SFW-M12C4/AW-0.5PU	Controller Connection Cable Female to Open 4 Pin .5M (1.6')				
3	607.5689.091	SFW-M12C4/AW-2PU	Controller Connection Cable Female to Open 4 Pin 2M (3.2')				
4	607.5989.082	ATS-M12/4-M12/8	T Adapter at end of switch				
5	607.5689.084	AEP-M12/4	End of Series Line Terminator				
-	607.5689.127	AT-CLIP-M12	M12 Mounting Clip for T Adapter				
C	607.5111.020	SCR-0N4-W22-3.6-S	Safety Controller Relay				

## Series Installation with DCD (Daisy Chain Diagnostics) for I/O Link (Serial Communication Protocol) & NFC (Near Field Communication)



Switches (with 9.8" cable & M12 connector)								
Position	Part Number	Description	Coding			Diagnostics		Cable Length
			Low	High	Unique	PNP	DCD	
A	607.5685.102	SRF-5/1/1-E-L	X				X	9.8"
A	607.5685.101	SRF-5/1/1-E-H		X			X	9.8"
A	607.5685.100	SRF-5/1/1-E-U			X		X	9.8"
Actuator (for all coding levels - sold separately)								
B	607.5687.078	SRF-0						
Accessories								
Position	Part Number	Description	Notes					
1	607.5689.085	S1W-M12A8/8W/BW-1PU	Sensor Extension Cable Male to Female 8 Pin 1M (3.2')					
1	607.5689.086	S1W-M12A8/8W/BW-2PU	Sensor Extension Cable Male to Female 8 Pin 2M (6.4')					
2	607.5689.087	S1W-M12C4/AW-2PU	Series Line Extension Cable Male to Female 4 Pin 2M (6.4')					
2	607.5689.088	S1W-M12C4/AW-5PU	Series Line Extension Cable Male to Female 4 Pin 5M (16.4')					
2	607.5689.089	S1W-M12C4/AW-10PU	Series Line Extension Cable Male to Female 4 Pin 10M (32.8')					
3	607.5689.090	SFW-M12C4/AW-0.5PU	Controller Connection Cable Female to Open 4 Pin .5M (1.6')					
3	607.5689.091	SFW-M12C4/AW-2PU	Controller Connection Cable Female to Open 4 Pin 2M (3.2')					
4	607.5989.082	ATS-M12/4-M12/8	T Adapter at end of switch					
6	607.5689.084	AEP-M12/4	End of String Terminator					
-	607.5689.127	AT-CLIP-M12	M12 Mounting Clip for T Adapter					
C	607.5111.020	SCR-ON4-W22-3.6-S	Safety Controller Relay					
D	607.5689.126	SRF DI-F 0/2	Field Module for NFC Communication					
E	607.5619.122	SRF DI-C-0/1-T	Diagnostic Module with I/O Link + NFC + USB					

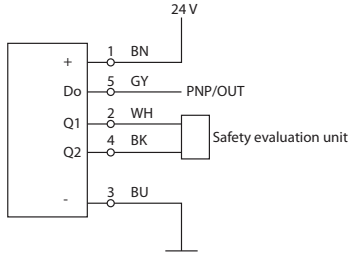
### Information available from each sensor includes:

- Actuator detected
- Wrong actuator
- Actuator code not taught
- At edge of detection area
- Safety input 1
- Safety input 2
- Safety output 1
- Safety output 2
- Local reset
- Operating voltage warning
- Operating voltage status
- Coding level
- Teach in operation remaining
- Received actuator code
- Time span of edge or operation
- Fault tolerance time remaining
- Frequency of voltage faults
- Sensor temperature
- Supply voltage applied
- Actuator distance in %
- Operating Voltage \*
- Actuator status \*
- Edge of operation \*
- Status of safety outputs \*

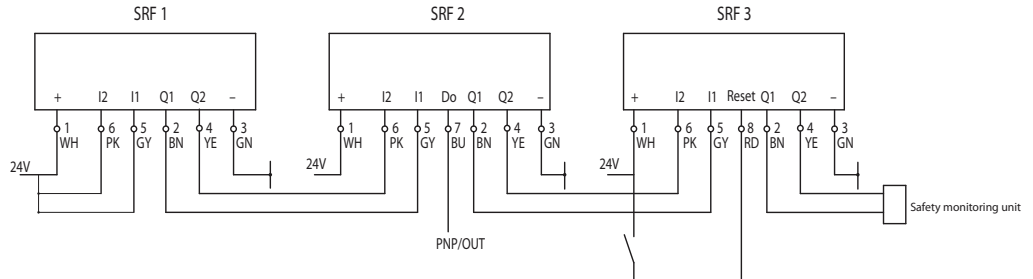
\* This information is stored in the sensor with a time stamp and is available even if there is a loss of power.

## Connection Diagrams

### Single Connection



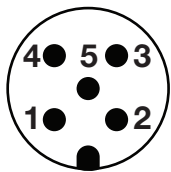
### Series Connection



Call Altech for versions with local reset

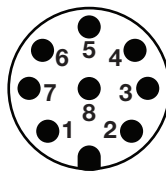
## Connector Types

### Single Connection From Sensor to Controller



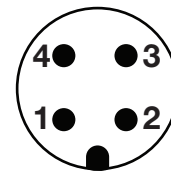
- Color Code**  
 1 Brown (24V+)  
 2 White (OSSD1)  
 3 Blue (0V)  
 4 Black (OSSD2)  
 5 Grey (PNP/OUT)

### Series Connection From Sensor to Series Line



- Color Code**  
 1 White  
 2 Brown  
 3 Green  
 4 Yellow  
 5 Grey  
 6 Pink  
 7 Blue  
 8 Red

### Series Connection Series Main Line



- Color Code**  
 1 Brown (24V+)  
 2 White (OSSD1)  
 3 Blue (0V)  
 4 Black (OSSD2)

## Technical Information

Electrical Data		Outputs Q1,Q2	
Rated supply voltage (Ue)	24 V (+25 %, -20 %)	Voltage level	to Type 3 EN 61131-2
Polarity	Reverse polarity protection	Switching element function	PNP NO
Rated isolation voltage (Ui)	75 V DC	Rated operating current (Ie)	100 mA
Rated impulse withstand (Uimp)	500 V	Leakage current (Iir)	≤ 1 mA DC
Rated conditional short-circuit current	100 A	Switching elements	Sustained short-circuit and overload protection
No-load current (Io)	≤ 50 mA	Voltage drop (Ud)	≤ 3 V
Transponder frequency	125 kHz	Type of short circuit protection	thermal / digital (clocking)
Repeatability (R)	0,1 x Sn	Utilization category	DC-13
Switching frequency	≤ 1 Hz	Output PNP/OUT	
Switch-off delay max (ta)	100 ms+7 ms x following SRF	Rated operating current (Ie)	10 mA
Time (tv)	max. 2 s	Switching elements	Sustained short-circuit and overload protection
EMC	to EN IEC 60947-5-3 & EN 61326-3-1	Voltage drop (Ud)	≤ 3 V
		Type of short circuit protection	current limited
Sensing distances (Only in conjunction with actuator SRF-0)		Mechanical Data	
Rated sensing distance (Sn)	Typical - 13 mm	Enclosure	PA66 + PA6, red
Assured sensing distance - ON (Sao)	Minimum - 10 mm	Tension relief	TPE black
Hysteresis (H)	Typical - 2 mm	Mounting	2 holes Ø 4,5 (for M4 screws)
Assured sensing distance - OFF (Sar)	Maximum - 25 mm	Indication	1 x LED red/green operating state; 1 x LED yellow actuating state
Safety data		Shock and Vibration	
Up to PL (according to EN ISO 13849-1)	PL e	according to EN IEC 60947-5-2	
Category	4	Ambient temperature	
PFHd (according to DIN EN 62061)	6 x 10 <sup>-9</sup> 1/h	-25 °C - +70 °C	
SIL CL	3	Storage temperature	
Service life	20 years	-25 °C - +70 °C	
		Maximum relative humidity	
		93 % at 40 °C without condensation	
		Altitude	
		≤ 2000 m NHN	
		Protection type	
		IP69	
		Protection class	
		III (according to EN IEC 61558)	

## Keyed Interlock Switches



Safety switches with separate keyed actuators provide a failsafe switch function, indicating the position of guarding access points. These are typically used on hard guarding gates, panels and doors. The switches are normally mounted on the fixed frame of the machine. The actuator key mounts on the door. When the door is closed the key is inserted into the switch, closing the normally closed safety contacts.

## Keyed Safety Solenoid Locking Switches



Due to inertia some machines may continue to run after their power is removed. This can create a situation where it is possible to access the hazardous areas of the machine when they are still in a dangerous state. The solution to this problem is to lock the hard guarding access door closed until the machine is given enough time to wind down. The SLK and SLM series have a built in solenoid which can lock (or unlock) the activation key into the switch, preventing the door or gate from being opened.

## Safety Hinged Switches



Safety Hinged Switches combine the function of a load bearing hinge with a Category 4 (Ple) rated safety switch. They are easy to install and tamper resistant. Since they do not use an actuation key, there are no alignment or bend radius issues and they cannot be defeated with an extra key. The SHS series is available with 1 NC or 1 Changeover contact. The new SHS3 offers 2 NC/1 NO contacts. Safety Hinged switches are available with the cable attached or with an M12 connector.

## Safety Rope Pull Switches

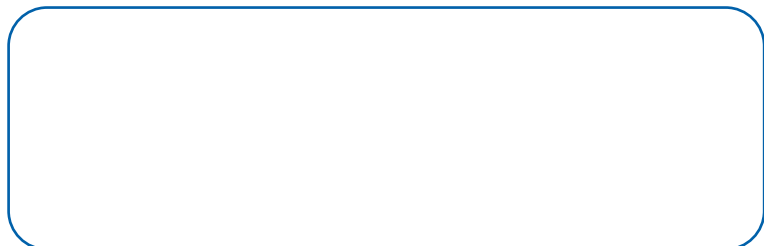


Safety Rope Pull Switches are designed to provide access to e-stop capabilities over the entire length of the rope. We offers two versions of Safety Rope Pull Switches. The SR has a plastic body and is designed for use with extruded rail systems. The SRM has a metal body and is designed for use in more rugged applications like machine and conveyor systems. These switches may be used to control power circuits directly or as part of a safety circuit chain. They feature a latching operation with manual reset button and optional built in e-stop button. Standard Rope Pull Switches are used to control signals and are typically used for safety and initiation applications.

Learn More @ [www.altechcorp.com](http://www.altechcorp.com)

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