

## Interlock Switches

# Non contact Switches

## Ferrogard 1, 2, 20 & 21



### Description

The Ferrogard range of magnetically actuated safety switches offers Non contact reliability together with tolerance to misalignment. They are designed to be installed so that when a guard door is opened, the action of the magnetic actuator being removed from the switch opens the N.C. safety contacts which are intended for the isolation of control power to a machine primary control element.

The FRS1, FRS2, FRS20, FRS21 are rectangular housings. Sealed to IP67 (NEMA6P), these Ferrogards are ideal for wet environments.

Unlike some magnetic switches the Ferrogards have protected safety contacts to help ensure that they do not fail to danger. In addition, some versions have independent auxiliary signal contacts to indicate the guard condition.

All Ferrogards have internal non-resettable overload protection on the safety contact. They should be protected by an external fuse rated as shown in the Specifications table.

### Features

- Non contact actuation
- High tolerance to misalignment
- High switching current (up to 2A AC, 1A DC)
- Plastic rectangular housing (IP67)
- Cable or Quick Disconnect (QD) connections

### Specifications

Standards	EN954-1, ISO13849-1, IEC/EN60204-1, NFPA79, EN1088, ISO14119, ANSI B11.19, AS4024.1	
Category	Cat. 1 Device per EN954-1 Dual channel interlocks suitable for Cat. 3 or 4 systems	
Approvals	CE marked for all applicable directives and cULus	
Reed Contacts	Safety Auxiliary	
Operating Distance – Make	12mm (0.47in) 15mm (0.59in)	
Operating Distance – Break	23mm (0.91in) 26mm (1.02in)	
Closing Time	3.0ms 0.5ms	
Dropout Time	2.1ms 0.3ms	
Bounce Time	0.7ms 0.7ms	
Initial Contact Resistance	15mΩ	10mΩ
Initial Capacitance, Terminal to Terminal	0.65pF 0.2pF	
Initial Insulation Resistance, Terminal to Terminal	1 x 10 <sup>6</sup> Ω	1 x 10 <sup>6</sup> Ω
Safety Contact Switching Capability	AC DC	250VAC 2A max 24VDC 1A max
Safety Contact External Fusing	AC DC	≤1.6A quick blow ≤0.8A quick blow
Auxiliary Contact Switching Capability	300VDC, 250VAC, 0.5A including inrush 15VA/10W suitable for AC/DC circuits	
Min Initial Breakdown Voltage	600VAC 600VAC	
Operating Temperature	-10°C to +65°C (14° to 149°F)	
Enclosure Protection	IP67 (NEMA6P)	
<b>Cable</b>		
FRS 1	0.75mm <sup>2</sup> (18 AWG) 2 wire Jacket OD 5.6mm (0.22in)	
FRS 2	0.50mm <sup>2</sup> (20 AWG) 4 wire Jacket OD 6.5mm (0.26in)	
FRS 20	0.50mm <sup>2</sup> (20 AWG) 4 wire Jacket OD 6.5mm (0.26in)	
FRS 21	0.50mm <sup>2</sup> (20 AWG) 6 wire Jacket OD 7.5mm (0.3in)	
Quick Disconnects	M12 x 1, 4 pin or 6 pin	
Case Material	Red moulded ABS Plastic	
Mounting	Any position M4 mounting security screws included	
Weight (not including cable)	Sensor Actuator	
	FRS 1	35g (0.08lbs) 85g (0.19lbs)
	FRS 2	40g (0.09lbs) 85g (0.19lbs)
	FRS 20	43g (0.09lbs) 85g (0.19lbs)
	FRS 21	43g (0.09lbs) 85g (0.19lbs)
Electrical Life	1 x 10 <sup>6</sup> at the rated load	
Mechanical Life	10 x 10 <sup>6</sup>	
Vibration	7g, 10 to 200Hz	
Shock	50g	

**Product Selection**

Safety Contact Switching Capability	Safety Contacts	Auxiliary Contacts	Connection	Housing Material	Type	Catalogue Number			
250V AC 2A	1 N.C.	None	2m Cable	ABS Plastic	FRS 1	440N-G02001			
			4m Cable			440N-G02004			
			6m Cable			440N-G02022			
			8m Cable			440N-G02041			
			10m Cable			440N-G02015			
		1 N.O.	2m Cable		440N-G02002				
			4m Cable		440N-G02014				
			6m Cable		440N-G02038				
			8m Cable		440N-G02033				
			10m Cable		440N-G02019				
	2 N.C.	None	15m Cable		440N-G02043				
			20m Cable		440N-G02040				
			4 Pin Micro QD		440N-G02093				
			4m Cable		440N-G02085				
			4 Pin Micro QD		440N-G02097				
		1 N.O.	2m Cable		440N-G02055				
			4m Cable		440N-G02061				
			6m Cable		440N-G02060				
			10m Cable		440N-G02059				
			6 Pin Micro QD		440N-G02098				
24V DC 1A	1 N.C.	1 N.O.	2m Cable	FRS 2	440N-G02092				
			4 Pin Micro QD		440N-G02094				
	2 N.C.	None	4 Pin Micro QD	FRS 20	440N-G02090				
			1 N.O.	2m Cable	FRS 21	440N-G02058			
		4m Cable		440N-G02077					
		6m Cable		440N-G02083					
		6 Pin Micro QD		440N-G02099					
		Mating cable, 4-pin straight 2m. See page 15-10 for details and additional lengths.					889D-F4AC-2		
		Mating cable, 4-pin straight 5m. See page 15-10 for details and additional lengths.					889D-F4AC-5		
		Mating cable, 4-pin straight 10m. See page 15-10 for details and additional lengths.					889D-F4AC-10		
Mating cable, 6-pin straight 2m. See page 15-11 for details and additional lengths.					889R-F6ACA-2				
Mating cable, 6-pin straight 5m. See page 15-11 for details and additional lengths.					889R-F6ACA-5				
Mating cable, 6-pin straight 10m. See page 15-11 for details and additional lengths.					889R-F6ACA-10				

**Note:** Contacts are described with the guard door closed, that is, actuator in place. Switch is shipped complete with actuator.

**Accessories**

Description	Page Number	Catalogue Number
Replacement Actuator	—	440N-A02005

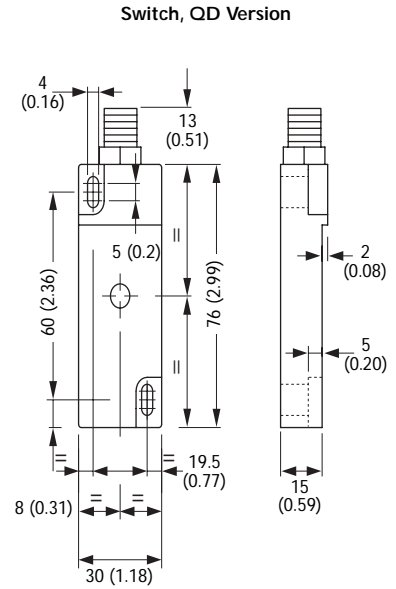
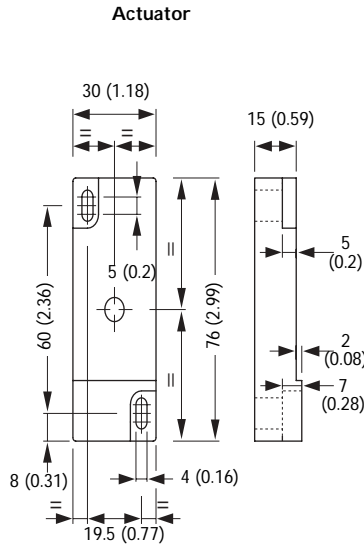
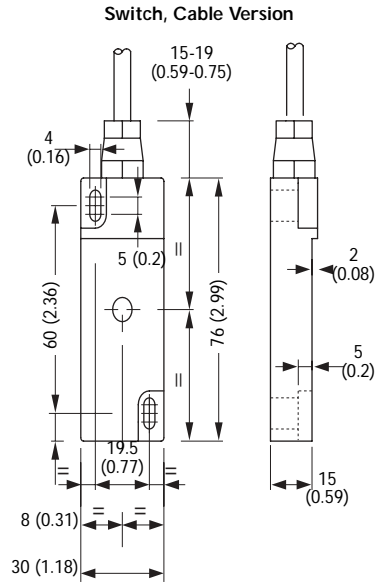
Interlock Switches

**Non contact Switches**

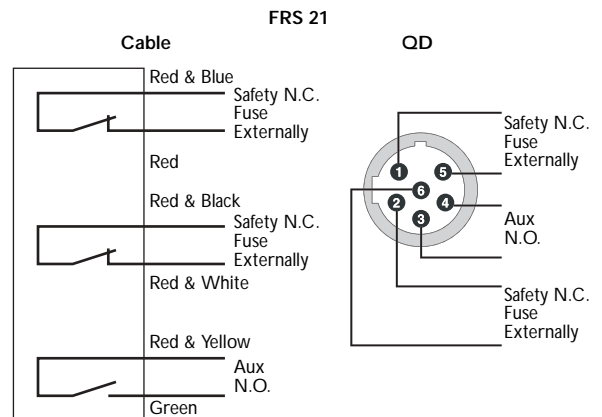
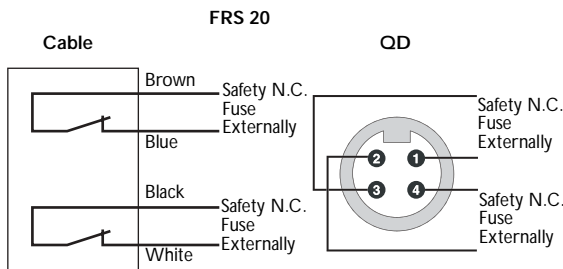
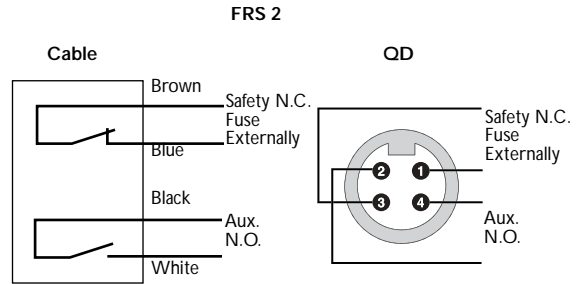
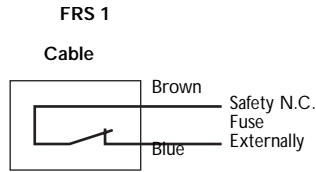
**Ferrogard 1, 2, 20 & 21**

**Approximate Dimensions—mm (inches)**

*Dimensions are not intended to be used for installation purposes.*



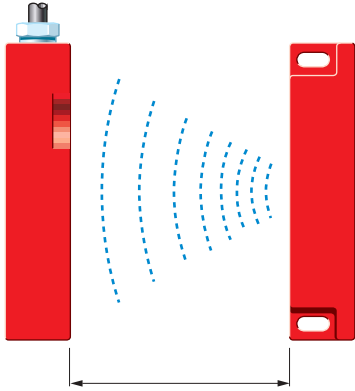
**Typical Wiring Diagrams**



**Application Details**

**Operating Principle**

Encapsulated in the Ferrogard is a unique high power industrial reed, capable of switching up to 15A. The reed switch is de-rated by a non resettable overload protection fuse. On presenting the actuator to the switch, the high intensity magnetic field from the actuator causes the contacts to close. On removing the actuator (opening the door), the safety contacts open.



**Typical Operating Curve**

When the actuator is aligned with the switch, the sensing distance is 10mm (0.39). As the amount of misalignment increases, the sensing distance decreases. Beyond 4mm (0.16), the switch will not actuate in the presence of the actuator.

