

INSTALLATION INSTRUCTIONS FOR THE MAGNETICALLY ACTUATED SAFETY INTERLOCK SWITCHES FFS SERIES

50026830

Issue 2



⚠️ WARNING

IMPROPER INSTALLATION

- Consult with local safety agencies and their requirements when designing a machine-control link, interface, and all control elements that affect safety.
- Strictly adhere to all installation instructions.

Failure to comply with these instructions could result in death or serious injury

GENERAL INFORMATION

When installed on a machine guard, and the switch and actuator are within the specified operating range, the safety contacts will be closed and the auxiliary contacts will be open. (See table for switching distances).

When the actuator moves out of the operating range, the safety contacts will open. The auxiliary contacts will close for indication.

The FF series safety switches and actuators are designed to approach each other from most angles. When the switch is closed, the targets on the printed face of the switch must align.

MOUNTING INFORMATION

The FF safety switches can approach each other from most angles. When the switch is closed, targets on the printed face must align. See Figure 1.

Figure 1. Switch Alignment (FFS and FF6)

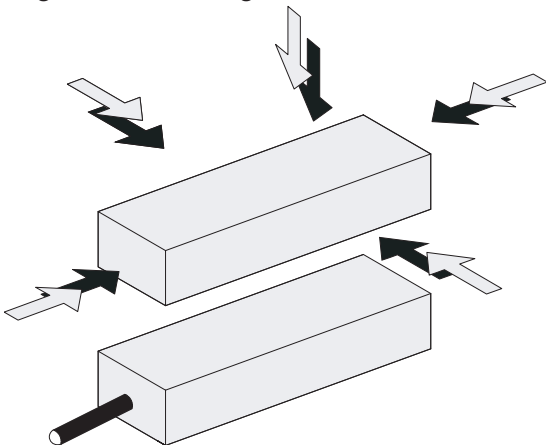


Figure 2. Switch Alignment (FF2 and FF3)

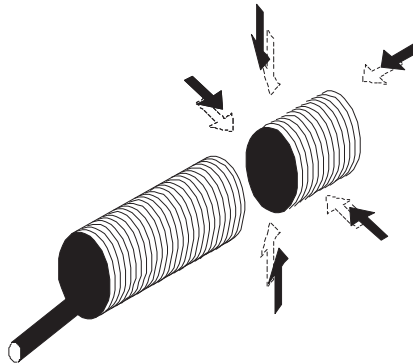
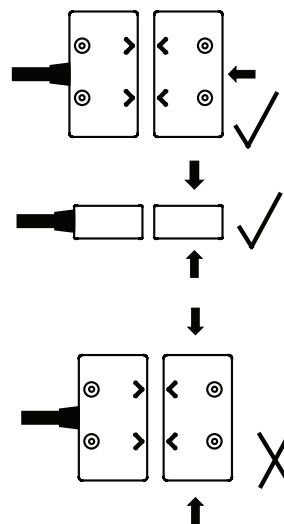


Figure 3. Switch Alignment (FF5)



Mount the switch on the machine frame and the actuator on the opening edge of the door. Always try to mount the switch on non-ferrous material. **Ferrous material may reduce the switching distance.** Be sure to use tamper-proof screws. Do not use the safety switch as a door stop. Leave a minimum of 50 mm [1.97 in] between any adjacent switches. See Figures 4 and 5.

Figure 4. Do Not Use the Safety Switch as a Door Stop

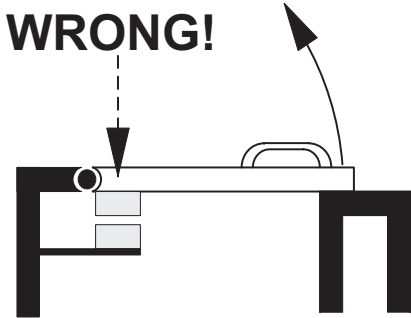
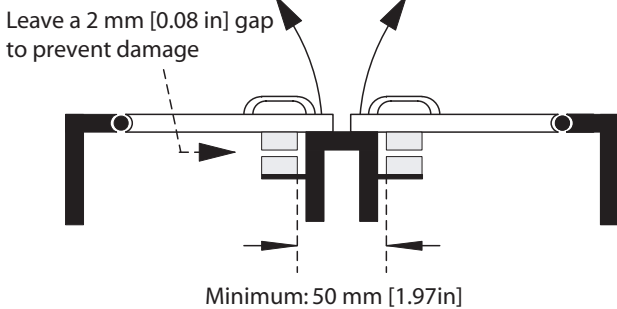


Figure 5. Minimum Distance Between Switches



When fixing the safety switch to a sliding door (A), ensure that when the door is opened (B) it is not easily accessible, helping prevent the system being overridden. See Figure 6.

Figure 6. Placement for Sliding Doors

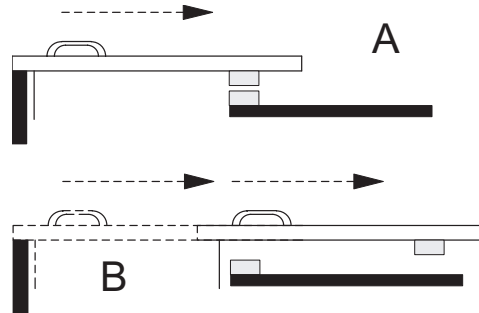


TABLE 1. SPECIFICATIONS

Type	FF2-10-AC FF2-11-AC	FF2-10-DC FF2-11-DC	FF3-20-AC FF3-21-AC	FF3-20-DC FF3-21-DC	FF5	FF5-SS
Contact arrangement	1NC (FF2-10-AC) 1NC/1NO (FF2-11-AC)	1NC (FF2-10-DC); 1NC/1NO (FF2-11-DC)	2NC (FF3-20-AC) 2NC/1NO (FF3-21-AC)	2NC (FF3-20-DC); 2NC/1NO (FF3-21-DC)	Max: 2NC safety and 1NO auxiliary	Max: 2NC safety and 1NO auxiliary
Safety contact rating	230 Vac/2 A	30 Vdc/1 A inductive/resistive	230 Vac/2 A	30 Vdc/1 A inductive/resistive	24 Vdc/0.3 A inductive/resistive	24 Vdc/0.3 A inductive/resistive
Safety contact operating distance	10 mm [0.4 in] ON; 30 mm [1.18 in] OFF	10 mm [0.4 in] ON; 30 mm [1.18 in] OFF	10 mm [0.4 in] ON; 30 mm [1.18 in] OFF	10 mm [0.4 in] ON; 30 mm [1.18 in] OFF	6 mm [0.24 in] ON; 17 mm [0.67 in] OFF	6 mm [0.24 in] ON; 17 mm [0.67 in] OFF
Safety contact close/drop/bounce	3 ms/2.1 ms/ 0.7 ms	3 ms/2.1 ms/ 0.7 ms	3 ms/2.1 ms/ 0.7 ms	3 ms/2.1 ms/ 0.7 ms	3 ms/2.1 ms/ 0.7 ms	3 ms/2.1 ms/ 0.7 ms
Auxiliary contact rating	15 W/10 VA	15 W/10 VA	15 W/10 VA	15 W/10 VA	24 Vdc/0.3 A inductive/resistive	24 Vdc/0.3 A inductive/resistive
Auxiliary contact operating distance	7 mm [0.28 in] OFF; 14 mm [0.55 in] ON	7 mm [0.28 in] OFF; 14 mm [0.55 in] ON	7 mm [0.28 in] OFF; 14 mm [0.55 in] ON	7 mm [0.28 in] OFF; 14 mm [0.55 in] ON	6 mm [0.24 in] OFF; 17 mm [0.67 in] ON	6 mm [0.24 in] OFF; 17 mm [0.67 in] ON
Auxiliary contact close/drop/bounce	0.5 ms/0.3 ms/ 0.7 ms	0.5 ms/0.3 ms/ 0.7 ms	0.5 ms/0.3 ms/ 0.7 ms	0.5 ms/0.3 ms/ 0.7 ms	0.5 ms/0.3 ms/ 0.7 ms	0.5 ms/0.3 ms/ 0.7 ms
Internal fuse	ac: 2 A fast acting	dc: 1 A fast acting	ac: 2 A fast acting	dc: 1 A fast acting	not applicable	not applicable
External fuse (cust. supplied)	ac: 1.6 A fast acting	dc: 0.8 A fast acting	ac: 1.6 A fast acting	dc: 0.8 A fast acting	dc: 0.2 A fast acting	dc: 0.2 A fast acting
IP rating	IP67	IP67	IP67	IP67	IP67	IP67
Vibration/shock	50 Hz to 100 Hz/ 10 g	50 Hz to 100 Hz/ 10 g	50 Hz to 100 Hz/ 10 g	50 Hz to 100 Hz/ 10 g	50 Hz to 100 Hz/ 10 g	50 Hz to 100 Hz/ 10 g
Operating temperature	-10°C to 55°C [14°F to 131°F]	-10°C to 55°C [14°F to 131°F]	-10°C to 55°C [14°F to 131°F]	-10°C to 55°C [14°F to 131°F]	-10°C to 55°C [14°F to 131°F]	-10°C to 55°C [14°F to 131°F]
Mounting and fixture	Target to target	Target to target	Target to target	Target to target	Target to target	Target to target
Construction	Red ABS resin filled	Red ABS resin filled	Red ABS resin filled	Red ABS resin filled	Red ABS resin filled	316 stainless steel, resin filled

TABLE 2. SPECIFICATIONS

Type	FF6 ac	FF6 dc	FF6-SS ac	FF6-SS dc
Contact arrangement	Max: 2NC safety and 1NO auxiliary	Max: 2NC safety and 1NO auxiliary	1NC safety	Max: 2NC safety and 1NO auxiliary
Safety contact rating	230 Vac/2 A	30 Vdc/1 A inductive/resistive	230 Vac/2 A	30 Vdc/1 A inductive/resistive
Safety contact operating distance	10 mm [0.4 in] ON; 30 mm [1.18 in] OFF	10 mm [0.4 in] ON; 30 mm [1.18 in] OFF	10 mm [0.4 in] ON; 30 mm [1.18 in] OFF	10 mm [0.4 in] ON; 30 mm [1.18 in] OFF
Safety contact close/drop/bounce	3 ms/2.1 ms/0.7 ms	3 ms/2.1 ms/0.7 ms	3 ms/2.1 ms/0.7 ms	3 ms/2.1 ms/0.7 ms
Auxiliary contact rating	15 W/10 VA	15 W/10 VA		15 W/10 VA
Auxiliary contact operating distance	7 mm [0.28 in] OFF; 20 mm [0.79 in] ON	7 mm [0.28 in] OFF; 20 mm [0.79 in] ON		7 mm [0.28 in] OFF; 20 mm [0.79 in] ON
Auxiliary contact close/drop/bounce	0.5 ms/0.3 ms/0.7 ms	0.5 ms/0.3 ms/0.7 ms		0.5 ms/0.3 ms/0.7 ms
Internal fuse	ac: 2 A fast acting	dc: 1 A fast acting	ac: 2 A fast acting	dc: 1 A fast acting
External fuse (cust. supplied)	ac: 1.6 A fast acting	dc: 0.8 A fast acting	ac: 1.6 A fast acting	dc: 0.8 A fast acting
IP rating	IP67	IP67	IP67	IP67
Vibration/shock	50 Hz to 100 Hz/ 10 g	50 Hz to 100 Hz/ 10 g	50 Hz to 100 Hz/ 10 g	50 Hz to 100 Hz/ 10 g
Operating temperature	-10°C to 55°C [14°F to 131°F]	-10°C to 55°C [14°F to 131°F]	-10°C to 55°C [14°F to 131°F]	-10°C to 55°C [14°F to 131°F]
Mounting and fixture	Target to target	Target to target	Target to target	Target to target
Construction	Red ABS resin filled	Red ABS resin filled	316 stainless steel, resin filled	316 stainless steel, resin filled

TABLE 3. SPECIFICATIONS

Type	FFS-11-03	FFS-20-03	FFS-11-QD	FFS-20-QD
Contact arrangement	Max: 1NC safety and 1NO auxiliary	Max: 2NC safety	Max: 1NC safety and 1NO auxiliary	Max: 2NC safety
Safety contact rating	230 Vac/2 A 30 Vdc/2 A	230 Vac/2 A 30 Vdc/2 A	230 Vac/2 A 30 Vdc/2 A	230 Vac/2 A 30 Vdc/2 A
Safety contact operating distance	7 mm [0.28 in] ON; 12 mm [0.47 in] OFF	7 mm [0.28 in] ON; 12 mm [0.47 in] OFF	7 mm [0.28 in] ON; 12 mm [0.47 in] OFF	7 mm [0.28 in] ON; 12 mm [0.47 in] OFF
Safety contact close/drop/bounce	3 ms/2.1 ms/0.7 ms	3 ms/2.1 ms/0.7 ms	3 ms/2.1 ms/0.7 ms	3 ms/2.1 ms/0.7 ms
Auxiliary contact rating	15 W/10 VA	–	15 W/10 VA	–
Auxiliary contact operating distance	7 mm [0.28 in] OFF; 12 mm [0.47 in] ON	–	7 mm [0.28 in] OFF; 12 mm [0.47 in] ON	–
Auxiliary contact close/drop/bounce	0.5 ms/0.3 ms/0.7 ms	–	0.5 ms/0.3 ms/0.7 ms	–
Internal fuse	Not applicable	Not applicable	Not applicable	Not applicable
External fuse (cust. supplied)	3 A/230 Vac, 1 A/30 Vdc	3 A/230 Vac, 1 A/30 Vdc	3 A/230 Vac, 1 A/30 Vdc	3 A/230 Vac, 1 A/30 Vdc
IP rating	IP67	IP67	IP67	IP67
Supply voltage	24 Vdc	24 Vdc	24 Vdc	24 Vdc
Vibration/shock	50 Hz to 100 Hz/ 10 g	50 Hz to 100 Hz/ 10 g	50 Hz to 100 Hz/ 10 g	50 Hz to 100 Hz/ 10 g
Operating temperature	-10°C to 55°C [14°F to 131°F]	-10°C to 55°C [14°F to 131°F]	-10°C to 55°C [14°F to 131°F]	-10°C to 55°C [14°F to 131°F]
Mounting and fixture	Target to target	Target to target	Target to target	Target to target
Construction	Blue ABS resin filled	Blue ABS resin filled	Blue ABS resin filled	Blue ABS resin filled

DIMENSIONS mm [in]

Figure 7. FF2 Series

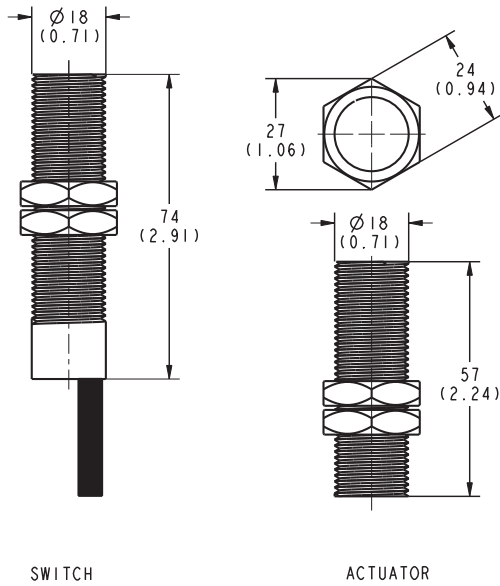


Figure 8. FF3 Series

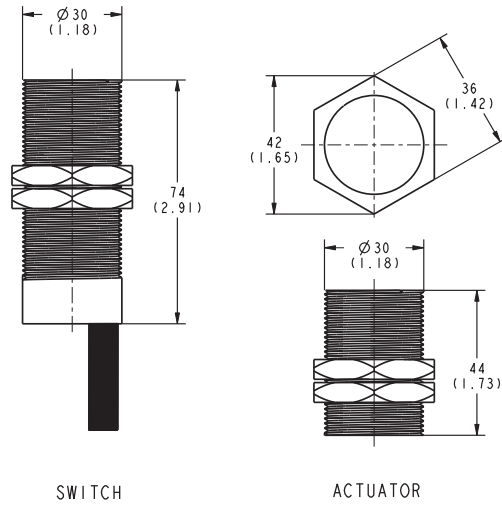


Figure 9. FF6 Stainless Steel, Pre-Wired

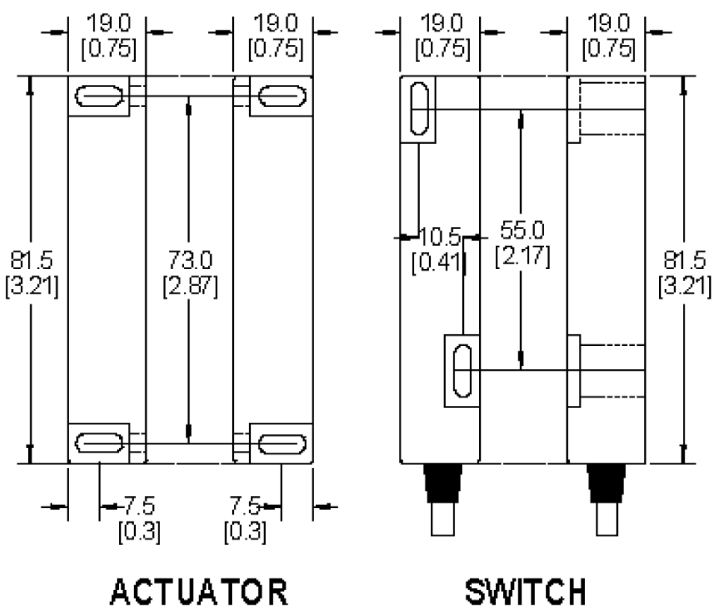


Figure 10. FF5 Series

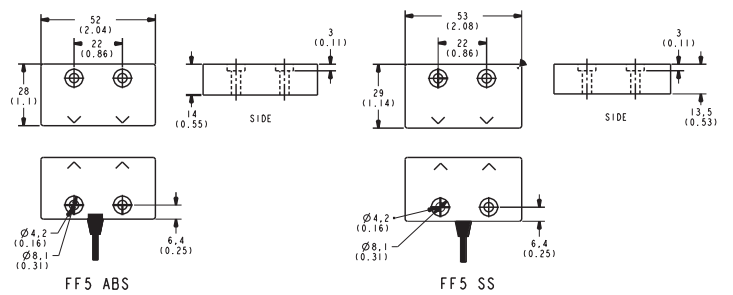


Figure 11. FF6 Pre-Wired

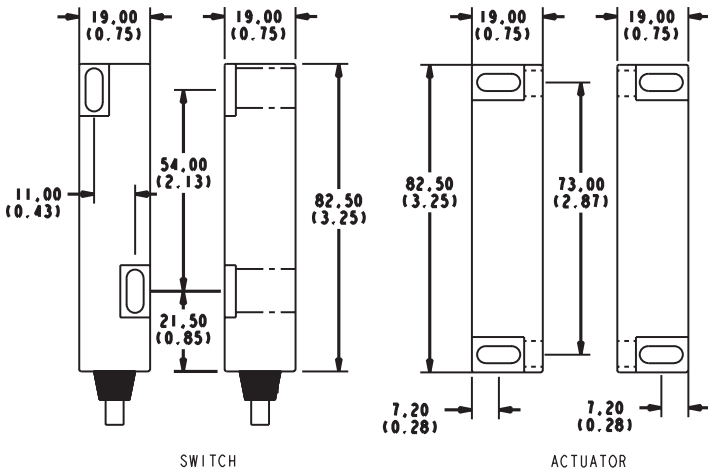


Figure 12. FF6 Series Quick Connect

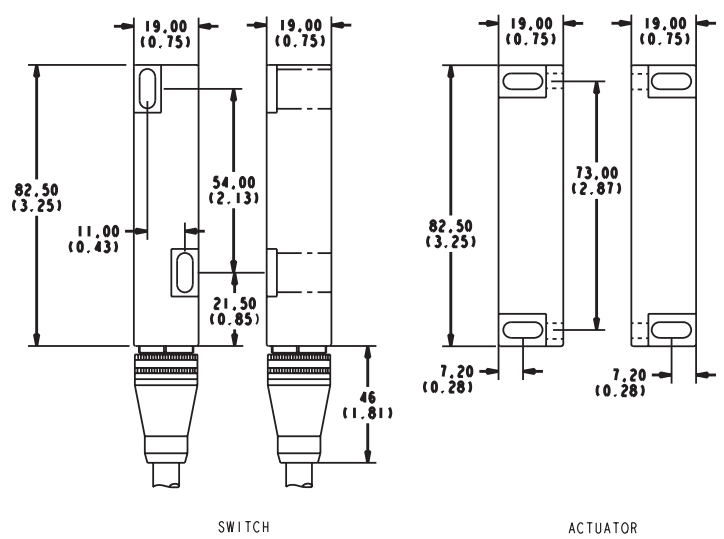


Figure 13. FFS Pre-Wired

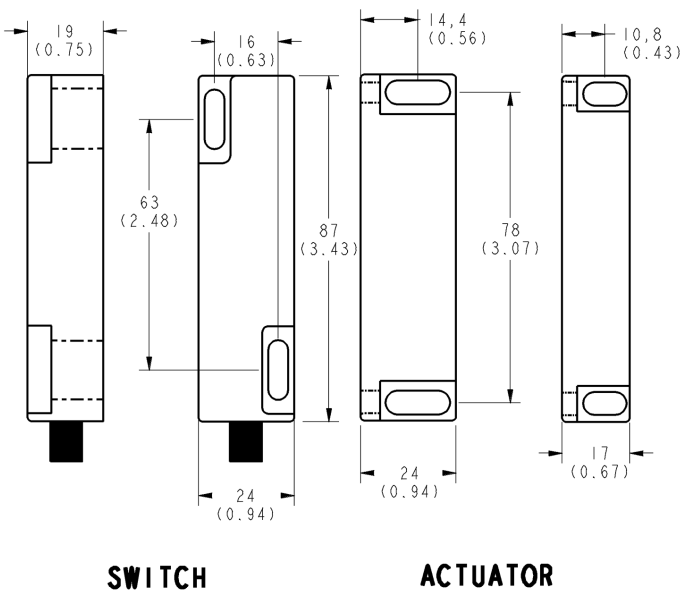
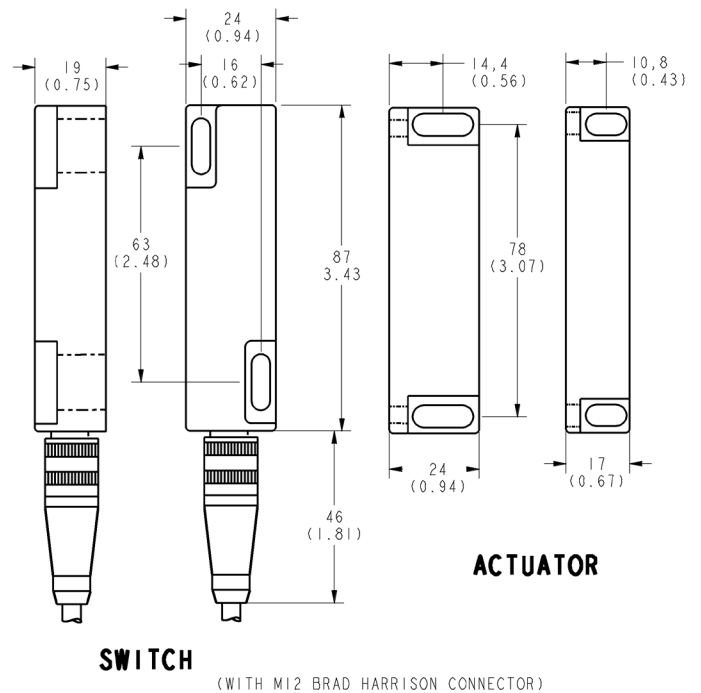


Figure 14. FFS Quick Connect



CONTACTS AND CONNECTIONS

Figure 15. FF2-10

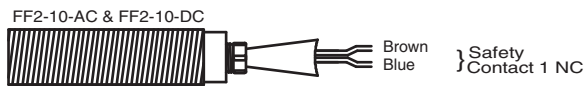


Figure 16. FF3-20

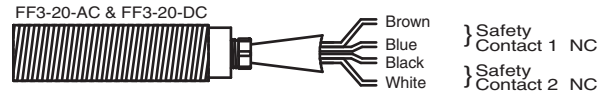


Figure 17. FF2-11

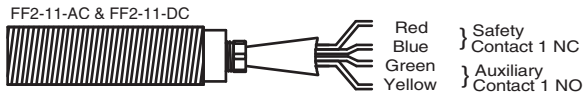


Figure 18. FF3-21

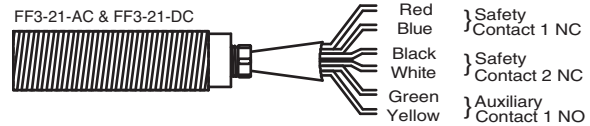


Figure 19. FF5

The safety contact must be fused externally. dc switch – external fuse = 0.2 A fast acting

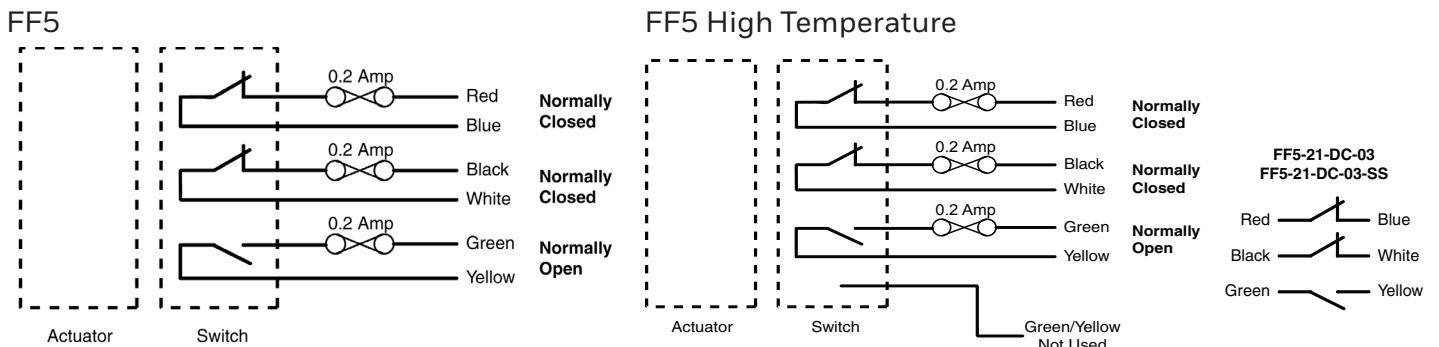
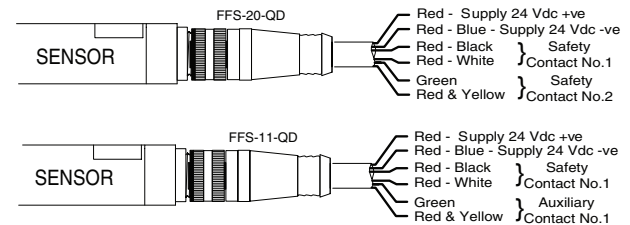
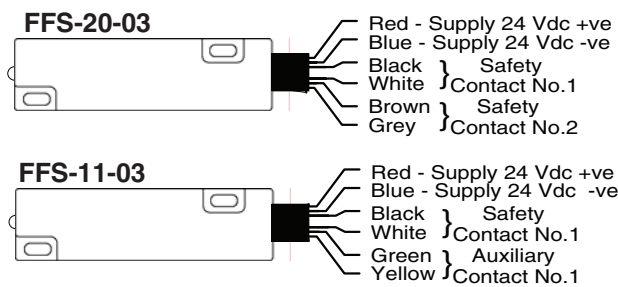
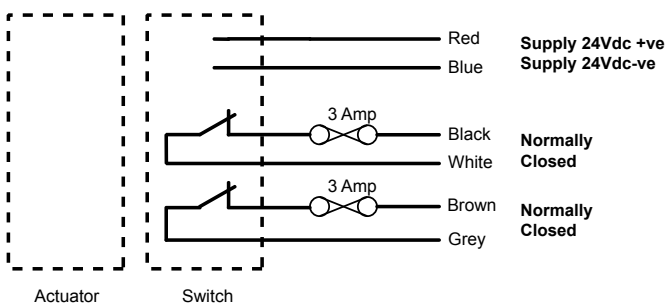


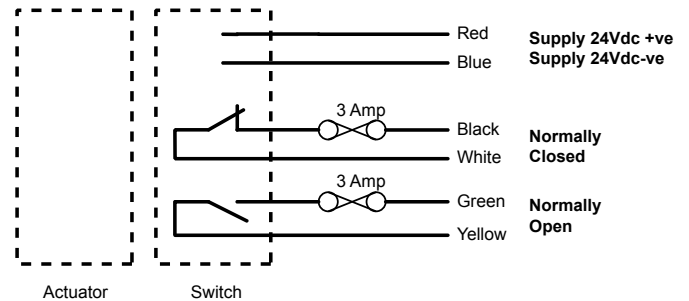
Figure 20. FFS



FFS-20-03 Connections



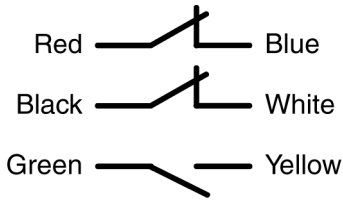
FFS-11-03 Connections



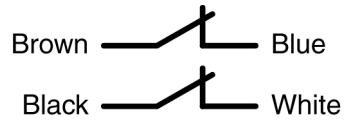
NOTE: Contact configurations show under closed condition for guard device.

CONTACTS AND CONNECTIONS

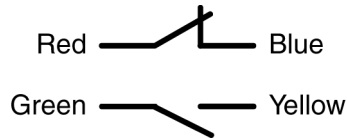
FF6-21-ABS (ac & dc)
FF6-21-SS (dc only)



FF6-20 ABS (ac & dc)
FF6-20 SS (dc only)



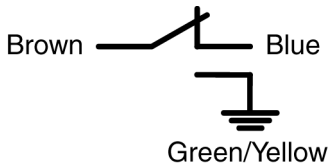
FF6-11 ABS (ac & dc)
FF6-11 (dc only)



FF6-10 ABS (ac & dc)
FF6-10 SS (ac & dc)



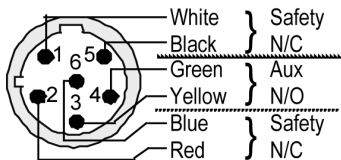
FF6-10-03-SS



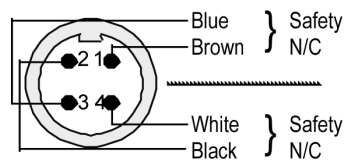
NOTE: Contact configurations show under closed condition for guard device.

QUICK DISCONNECT CONNECTIONS

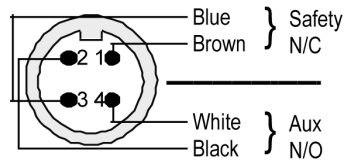
FF6-21-AC-QD05
FF6-21-DC-QD05



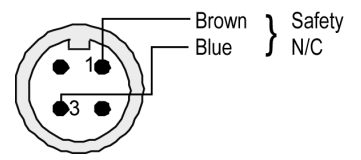
FF6-20-AC-QD05
FF6-20-DC-QD05



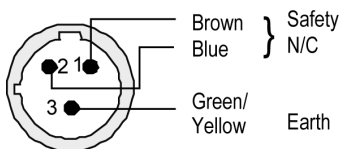
FF6-11-AC-QD05
FF6-11-DC-QD05



FF6-10-AC-QD05
FF6-10-DC-QD05



FF6-10-AC-SS-QD05



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Latin America	+1 305 805 8188
Europe	+44 1344 238258
Japan	+81 (0) 3-6730-7152
Singapore	+65 6355 2828
Greater China	+86 4006396841

Honeywell Sensing and Safety Technologies

830 East Arapaho Road
Richardson, TX 75081
sps.honeywell.com/ast