Application Sheet
Safety Solutions Packages – Protective Guards

⚠ 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.

INTRODUCTION

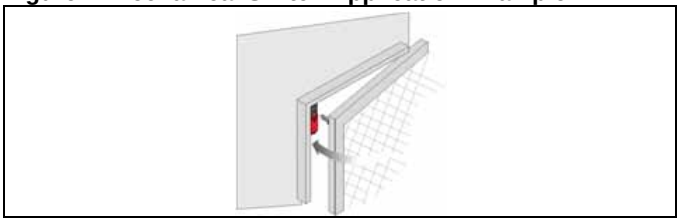
Honeywell is aware of the issues that may accompany the use of industrial safety products like safety switches and safety control modules (also known as safety relays). Lack of familiarity with the products, the applicable standards and conventions, as well as potentially complex wiring, can make product application intimidating.

This application sheet will help busy engineers to apply industrial safety products by providing detailed block and wiring diagrams that will make it easier to install five common safety switch/safety control module configurations in machine protective guard applications. Safety products covered include key-operated interlock switches (both non-solenoid and solenoid) non-contact magnetic switches, emergency stop modules and standstill modules.

POTENTIAL MECHANICAL SWITCH APPLICATIONS

Mechanical switches provide single protective guard access control in a wide variety of potential applications such as those found in pick and place packaging/assembly equipment, plastic molding equipment and food and beverage packing and process machinery (see Figure 1).

Figure 1. Mechanical Switch Application Example



The following potential applications use the products shown in Figures 2 and 3:

- **Application 1** (page 3): Connecting one key-operated safety interlock switch to one emergency stop module (Category 3)
- **Application 2** (page 4): Connecting two key-operated safety interlock switches to one emergency stop module (Category 4)
- **Application 3** (page 5): Connecting one key-operated solenoid safety interlock switch to one emergency stop module and one standstill monitor (Category 3)

Figure 2. Safety Products Used in Applications 1 and 2
(See back page for other products with the same contact block configurations.)

Non-Solenoid Key-Operated Safety Switch Series	
GKM Series Miniature Safety Key-Operated Interlock Switches 	GK Series Key-Operated Safety Interlock Switches 
GKN Series Key-Operated Safety Interlock Switches 	GKE Series Dual Entry Key-Operated Safety Interlock Switches 
Safety Control Module	
FF-SRS6025 Dual Channel Emergency Stop Module 	

Figure 3. Safety Products Used in Application 3
(See back page for other products with the same contact block configurations.)

Solenoid Key-Operated Safety Switch Series	
GKR/L Series Solenoid Key Operated Safety Interlock Switches 	GKS Series Multi-Entry Trapped Key-Operated Safety Interlock Switches 
Safety Control Modules	
FF-SRS6025 Dual Channel Emergency Stop Module 	FF-SR0 Series Standstill and Low Speed Modules 

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Mechanical Safety Switch Product Information on the Web

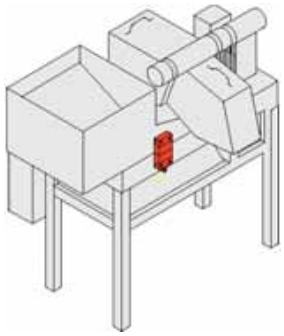
- Key-Operated Safety Interlock Switches:
  - Interactive catalog
  - Product sheets and installation instructions
- FF-SRS6025 and FF-SR0 Series Safety Control Modules:
  - Interactive catalog
  - Product sheets and installation instructions

POTENTIAL NON-CONTACT SAFETY SWITCH APPLICATIONS

Non-contact safety switches use magnetic actuators. When the protective guard is closed, the switch's NC (Normally Closed) contacts close. When the protective guard is opened, the magnetic actuator moves away from the switch, allowing the switch's contacts to open (see Figure 4.)

Non-contact safety switches are less prone to misalignment issues than mechanical switches. Sealed versions also provide protective guard access control for harsh duty environments such as high pressure washdown.

Figure 4: Non-Contact Safety Switch Application Example



The following potential applications use the products shown in Figure 5:

- **Application 4** (page 6): Connecting two non-contact safety switches to one safety control module (Category 3)
- **Application 5** (page 7): Connecting two non-contact safety switches to one safety control module (Category 4)

Figure 5: Safety Products Used in Applications 4 and 5
(See back page for other products with similar contact block configurations.)

Non-Contact Switch Series
FF5 Series Magnetically Actuated Non-Contact Safety Switches 
FFS Series Electronic Standalone Non-Contact Safety Switches 
Safety Control Module
FF-SRS6025 Dual Channel Emergency Stop Module 

Product Information on the Web

FF5 Series and FFS Series Non-Contact Safety Switches:

- Interactive catalog
- Product sheet and installation instructions

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POTENTIAL APPLICATION 1

Connecting One Key-Operated Safety Interlock Switch to One Emergency Stop Module (Category 2 per EN 954)

NOTICE

- The FF-SRS6025 must be configured with cross fault detection and automatic restart.
- Refer to product documentation for fuse rating and type.

Applicable Standards

- EN 292
- EN954-1
- EN418-1
- EN60204
- EN811
- EN1088
- EN201
- EN294

Description

A GK, GKM, GKE or a GKN Series Key-Operated Safety Interlock Switch is connected to an FF-SRS6025 Emergency Stop Module to provide single protective guard access in applications where machine stop times are rapid or near instantaneous. (Where equipment or machinery has momentum or requires a run down time period, use the GKR/GKL Series or GKS Series Solenoid Key-Operated Safety Interlock Switches instead.) Depending on the level of the machine risk assessment, the emergency stop module will generate a machine motion stop or emergency stop condition.

The key-operated safety switch monitors the protective guard position through two NC (normally closed) contacts connected to the emergency stop module. When the protective guard is opened, the emergency stop module's NO (Normally Open) safety outputs open and the machine stops. When the protective guard is closed, and start validation is given by the operator activating a pushbutton, the emergency stop module is activated and the NO safety outputs close.

Figure 6: Block Diagram

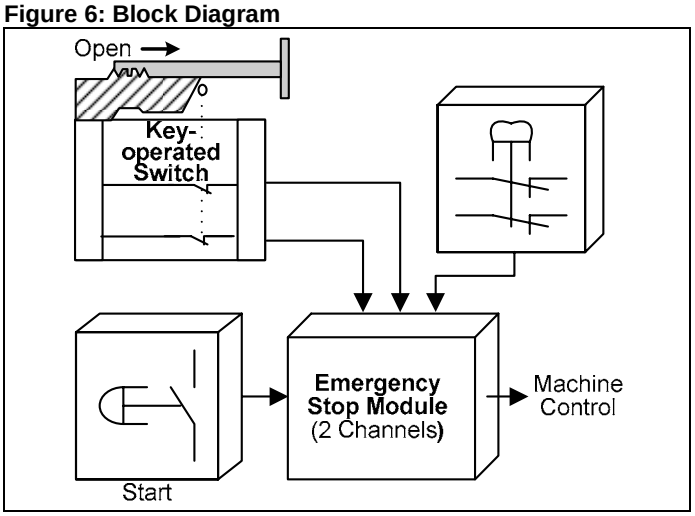
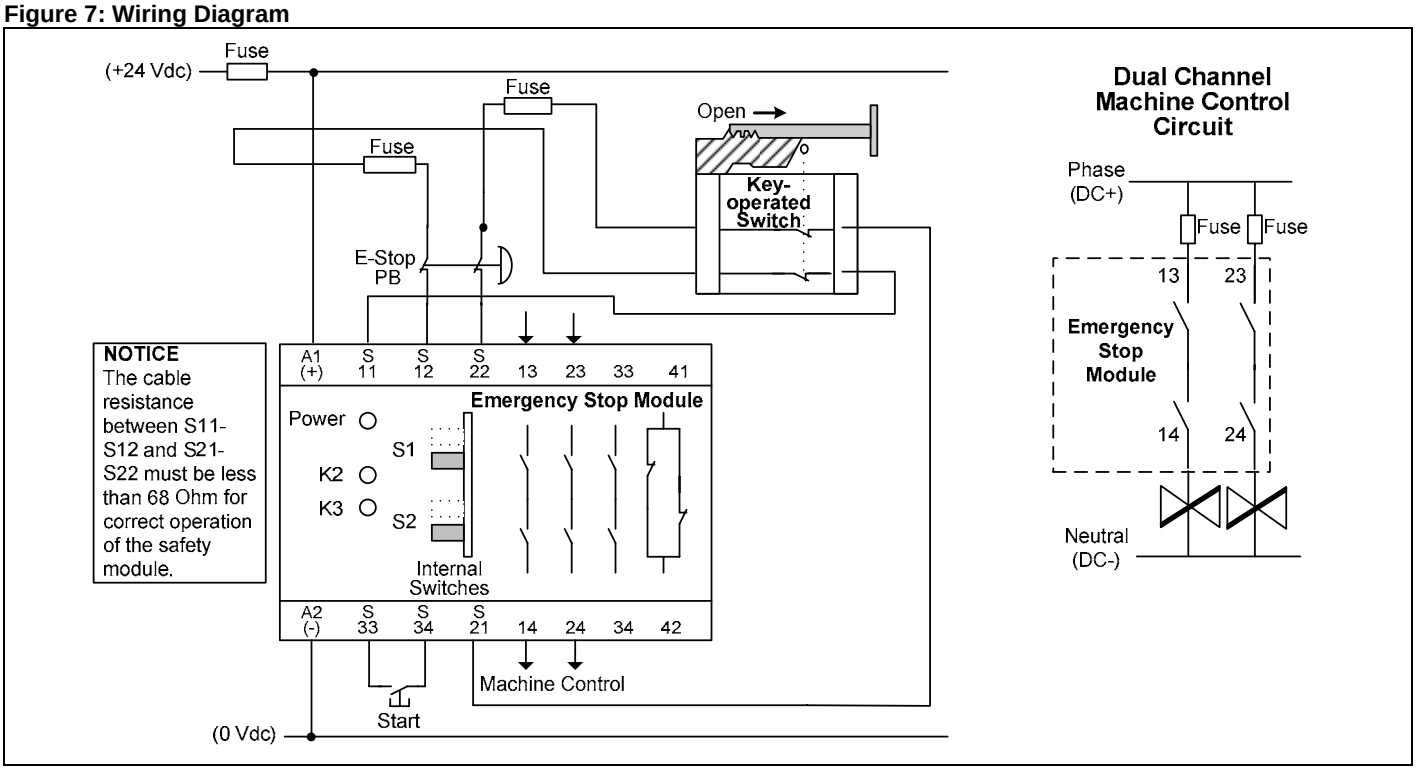


Figure 7: Wiring Diagram



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POTENTIAL APPLICATION 2
Connecting Two Key-Operated Safety Interlock Switches to One Emergency Stop Module (Category 4 per EN 954)

NOTICE
- The FF-SRS6025 must be configured with cross fault detection and automatic restart.
- Refer to product documentation for fuse rating and type.

Applicable Standards
- EN 292
- EN954-1
- EN418-1
- EN60204
- EN811
- EN1088
- EN201
- EN294

Description
Two GK, GKM, GKE or GKN Series Key-Operated Safety Interlock Switches are connected to one FF-SRS6025 Emergency Stop Module to provide single protective guard access in applications where machine stop times are rapid or near instantaneous. (Where equipment or machinery has momentum or requires a run down time period, use the GKR/GKL Series or GKS Series Solenoid Key-Operated Safety Interlock Switches instead.) Depending on the level of machine risk assessment, the safety control module will generate a machine motion stop or emergency stop condition.

The two key-operated safety interlock switches monitor the protective guard position through each switch's set of two NC (Normally Closed) contacts connected to the emergency stop module. When the protective guard opens, the emergency stop module's NO (Normally Open) safety contacts open. When the protective guard is closed, and start validation is given by the operator activating a pushbutton, the emergency stop module's NO safety contacts close.

Figure 8. Block Diagram

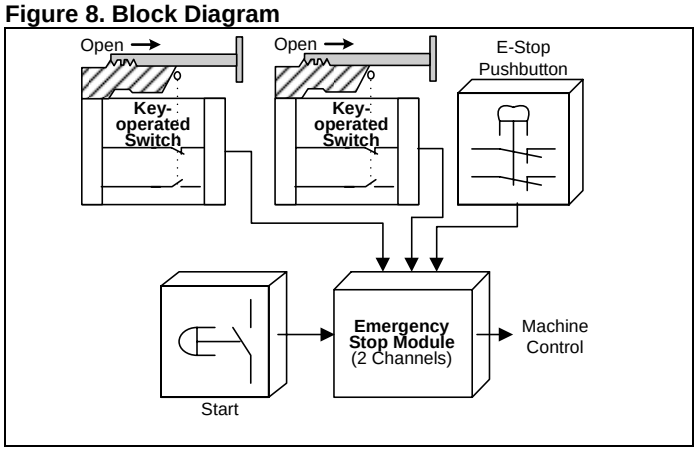
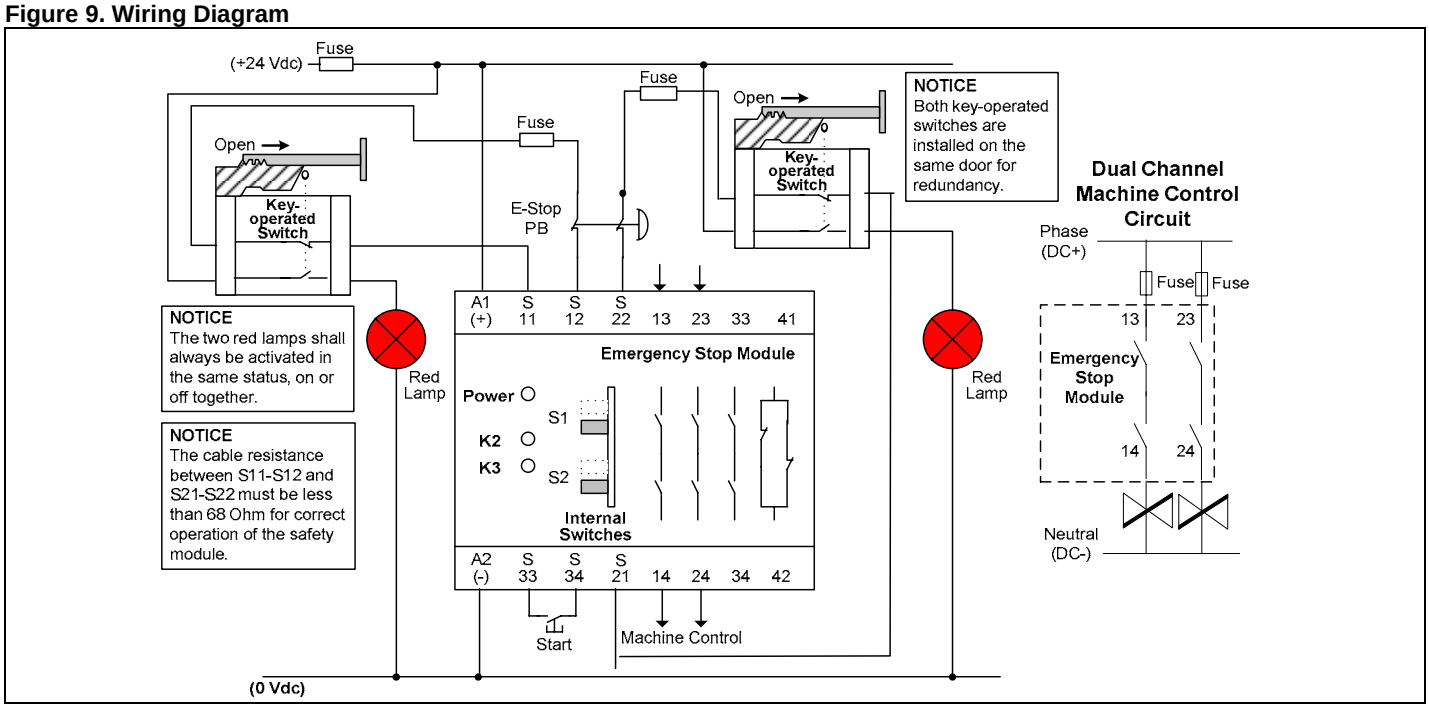


Figure 9. Wiring Diagram



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POTENTIAL APPLICATION 3
Connecting One Key-Operated Solenoid Safety Interlock Switch to One Emergency Stop Module and One Standstill Monitor (Category 3 per EN 954)

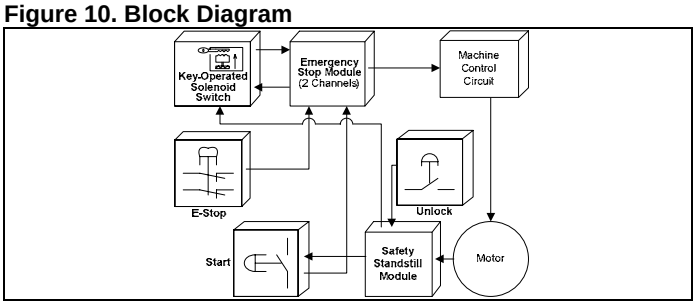
Description
One GKR/GKL Series Key-Operated Solenoid Safety Switch or one GKS Series Multi-Entry Trapped Key-Operated Safety Switch is connected to one FF-SRS6025 Emergency Stop Module and one FF-SR0 Series Standstill Module to provide single protective guard access in applications where access to the dangerous area is forbidden until full machine stop. The standstill module detects the hazardous motion (motor rotation) and keeps the door locked until motor full stop.

The operator activates the "OFF" pushbutton to stop the motor. When the motor reaches full stop, activation of the "UNLOCK" pushbutton energizes the solenoid, allowing the protective guard to be opened. An E-stop pushbutton will also immediately stop the motor via the emergency stop module. Motor start is allowed when the protective guard is closed and after actuation of the "ON" push button.

NOTICE
- The FF-SRS6025 Emergency Stop Module must be configured with cross fault detection and automatic restart.
- Refer to product documentation for fuse rating and type.

Applicable Standards
- EN292
- EN954-1
- EN418-1
- EN60947-5-1
- EN60204
- EN811
- IEC945-5-5
- IEC945-5-1-3
- EN1088
- EN201
- EN294
- EN1037

Figure 10. Block Diagram



Other Possible Solutions
Use a FF-SRE6029 Safety Control Module instead of safety contactors K4 and K5. Add an unlock memory to avoid the activation of the pushbutton while opening the protective guard.

Figure 11. Wiring Diagram for the SR05936 Standstill Module

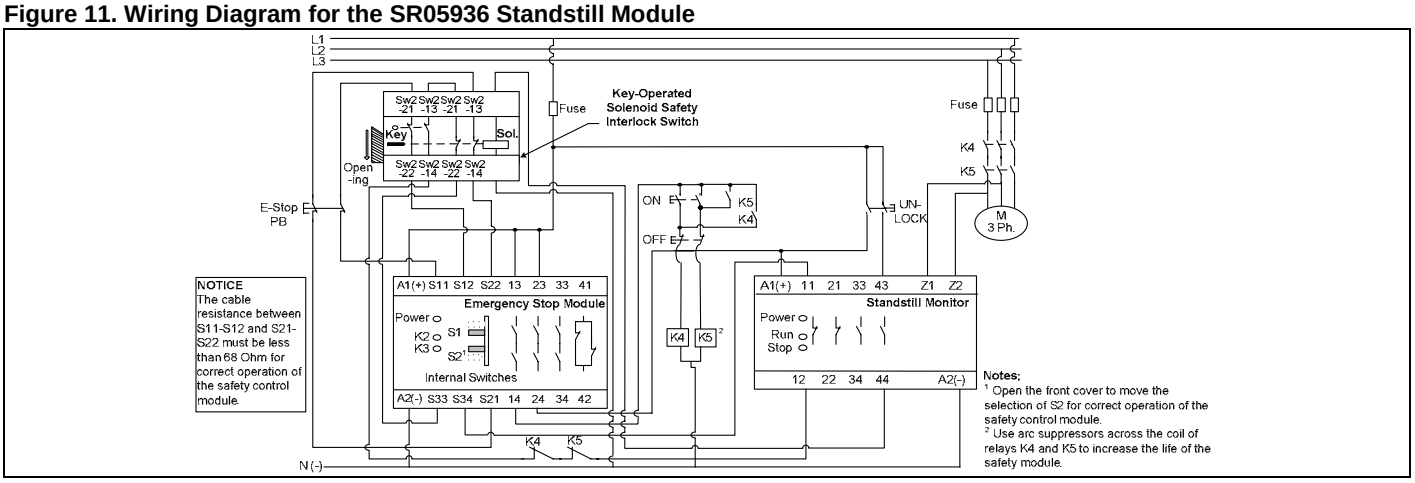
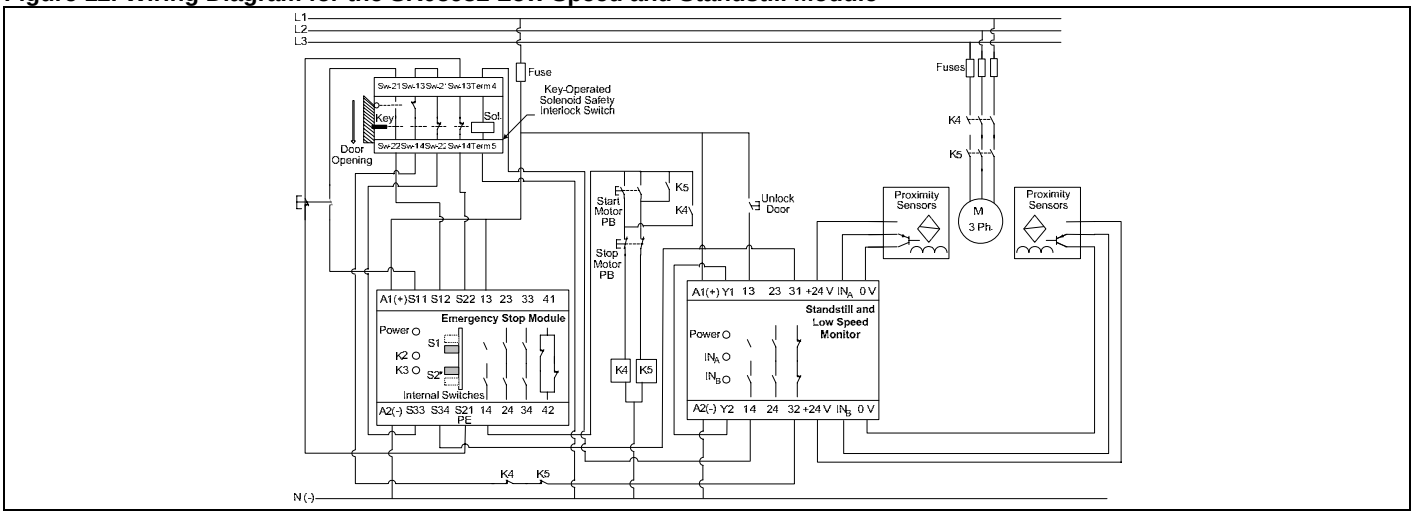


Figure 12. Wiring Diagram for the SR05932 Low Speed and Standstill Module



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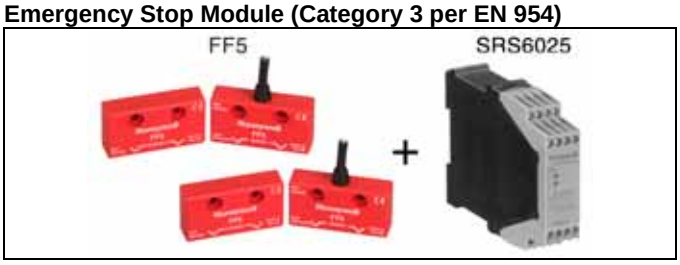
POTENTIAL APPLICATION 4
Connecting Two Non-Contact Safety Switches to One Emergency Stop Module (Category 3 per EN 954)



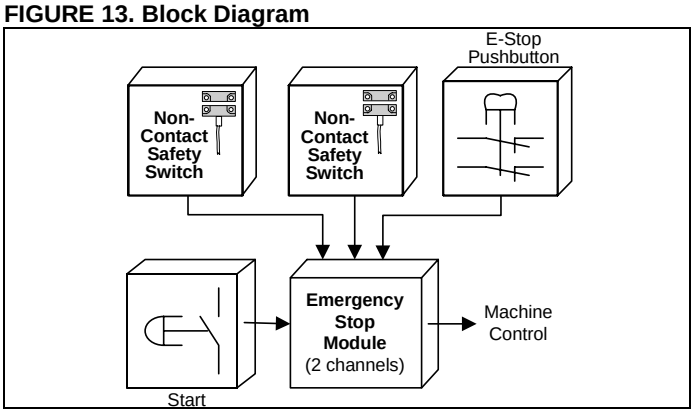
Description
Two FF5 Series Magnetically Actuated Non-Contact Safety Switches are connected to one FF-SRS6025 Emergency Stop Module to provide single protective guard access in applications where machine stop times are rapid or near instantaneous. (Where equipment or machinery has momentum or requires a run down time period, use the GKR/GKL Series or GKS Series Solenoid Key-Operated Safety Interlock Switches instead.) Depending on the level of machine risk assessment, the safety control module will generate a machine motion stop or emergency stop condition.

When the protective guard opens (coded magnet removed from switch face), the two non-contact safety switches send safety signals to the emergency stop module. This machine is deactivated and the emergency stop module's NO (Normally Open) safety outputs open and the machine is stopped. When the protective guard is closed and start validation is given by the operator activating a pushbutton, the emergency stop module's NO safety outputs close.

NOTICE
- The FF-SRS6025 must be configured with cross fault detection.
- Refer to product documentation for fuse rating and type.

Applicable Standards
- EN292
- EN954-1
- EN418-1
- EN60204
- EN811
- EN1088
- EN201
- EN294

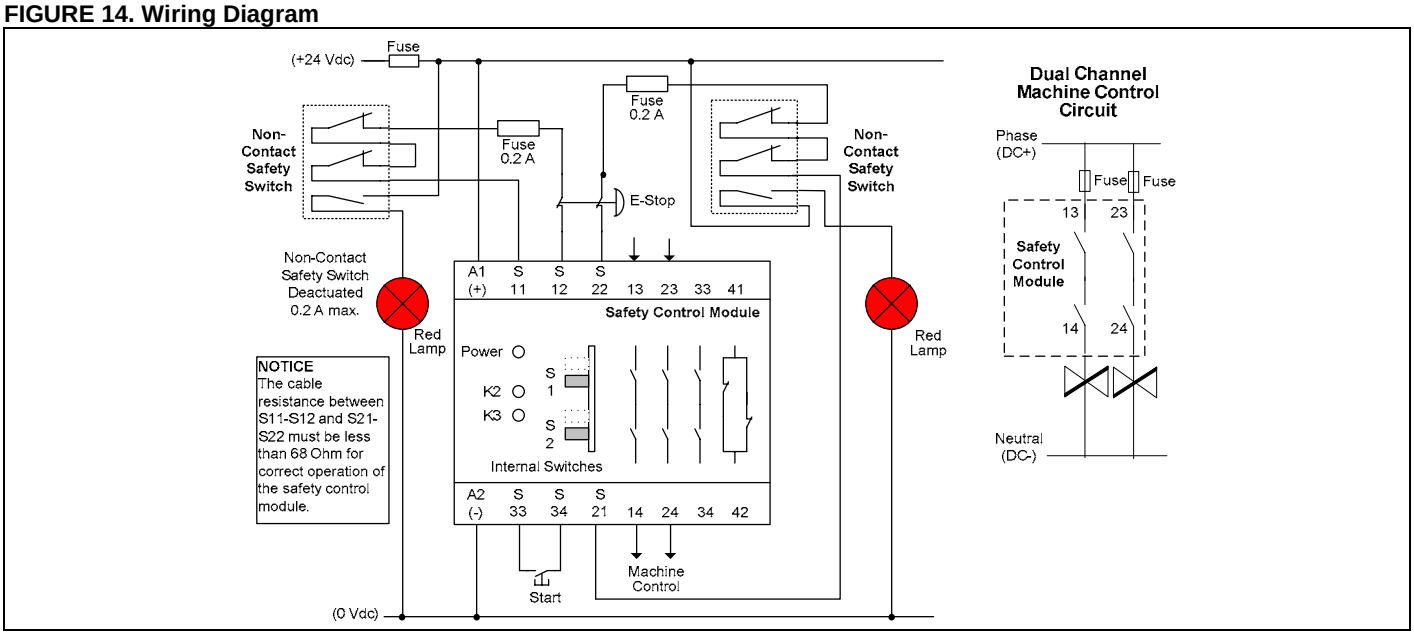
FIGURE 13. Block Diagram



Other Possible Solutions
Use several emergency pushbuttons or replace the FF5 Series with key-operated safety interlock switches. Connect the safety contacts of each device in series between S11/S12 and S21/S22 (68 Ohm maximum resistance).

Use the FF-SRS5935 or FF-SRS5988 Emergency Stop Modules or the FF-SRD5985 Safety Door Monitor instead of the FF-SRS6025 Emergency Stop Module. (See back page.)

FIGURE 14. Wiring Diagram



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POTENTIAL APPLICATION 5
Connecting Two Non-Contact Safety Switches to One Emergency Stop Module (Category 4 per EN 954)

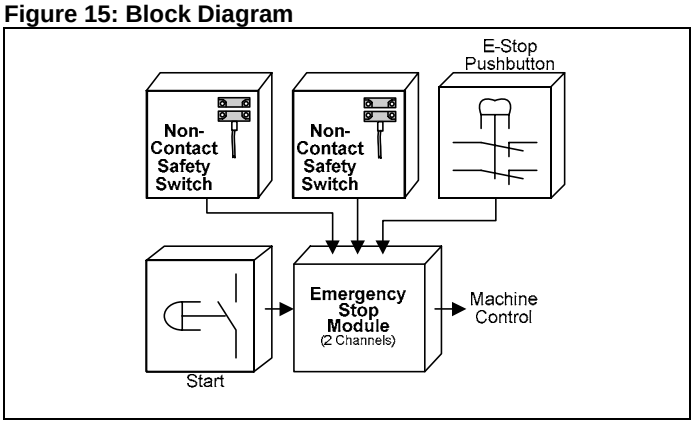
Description
Two FFS Series Electronic Standalone Non-Contact Safety Interlock Switches are connected to one FF-SRS6025 Emergency Stop Module to provide single protective guard access in applications where machine stop times are rapid or near instantaneous. (Where equipment or machinery has momentum or requires a run down time period, use the GKR/GKL Series or GKS Series Solenoid Key-Operated Safety Interlock Switches instead.) Depending on the level of the machine risk assessment, the safety control module will generate a machine motion stop or emergency stop condition.

When the protective guard opens (coded magnet removed from switch face), the two non-contact safety switches send safety signals to the emergency stop module. This machine is deactivated and the emergency stop module's NO (Normally Open) safety outputs open and the machine is stopped. When the protective guard is closed and start validation is given by the operator activating a pushbutton, the emergency stop module's NO safety outputs close.

NOTICE
- The FF-SRS6025 must be configured with cross fault detection.
- The two non contact safety switches must be separated in order to avoid common mode mechanical failure.
- Refer to product documentation for fuse rating and type.

Applicable Standards
- EN292
- EN954-1
- EN418-1
- EN60204
- EN811
- EN1088
- EN201
- EN294

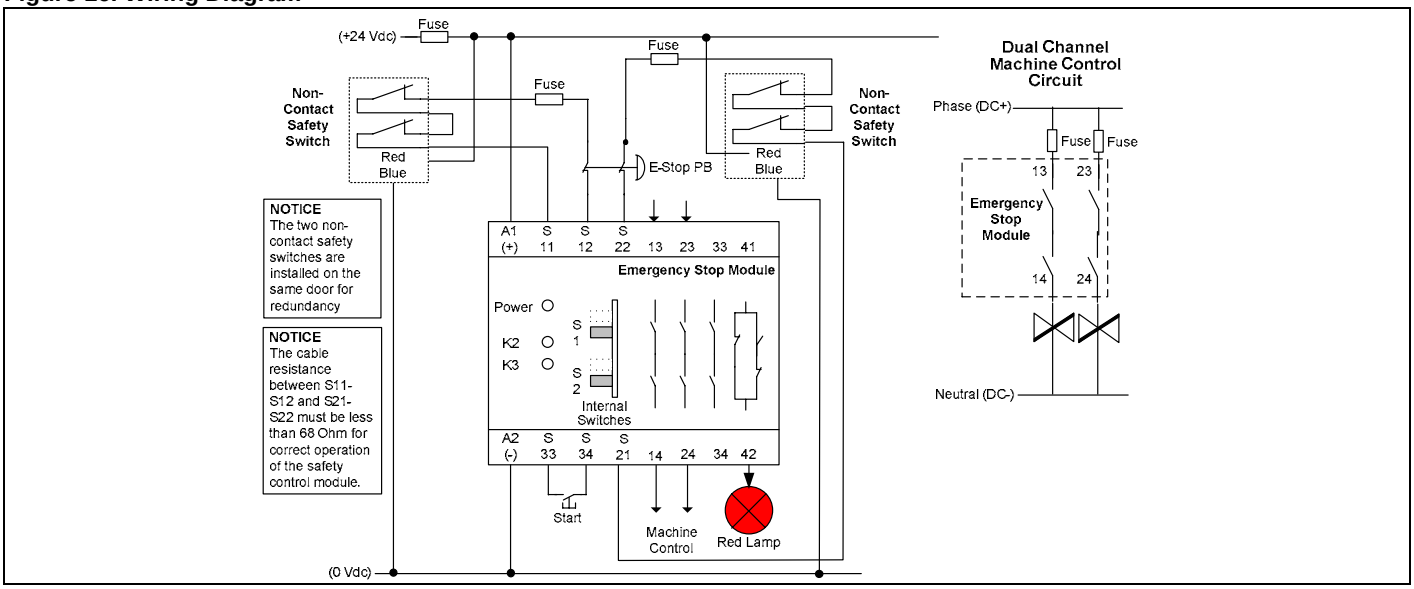
Figure 15: Block Diagram



Other Possible Solutions
Use several emergency pushbuttons or replace the FF5 Series with key-operated safety interlock switches. Connect the safety contacts of each device in series between S11/S12 and S21/S22 (68 Ohm maximum resistance).

Use the FF-SRS5935 or FF-SRS5988 Emergency Stop Modules instead of the FF-SRS6025 Emergency Stop Module. (See back page.)

Figure 16. Wiring Diagram



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OTHER POSSIBLE SOLUTIONS

The products shown in Figures 16 and 17 have the same contact configurations as those used in Applications 1 through 5 and may be wired in the same fashion to create the same or similar applications.

Figure 17. Other Safety Switches

1CPS Series and 2CPS Series Cable Pull Safety Switches

FF2 Series, FF3 Series and FF6 Series Magnetically Actuated Non-Contact Safety Switches

Figure 18. Other Safety Modules

FF-SRS5935 and FF-SRS5988 Dual Channel Emergency Stop Modules

Other Possible Solutions Product Information on the Web

- 1CPS Series and 2 CPS Series Cable Pull Safety Switches:
  - Interactive catalog
  - Product and installation instructions
- FF Series Non-Contact Safety Switches:
  - Interactive catalog
  - Product and installation instructions
- Safety Modules:
  - Interactive catalog
  - Product and installation instructions

WARRANTY/REMEDY

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Honeywell's standard product warranty applies unless agreed to otherwise by Honeywell in writing; please refer to your order acknowledgement or consult your local sales office for specific warranty details. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace, at its option, without charge those items it finds defective. **The foregoing is buyer's sole remedy and is in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose. In no event shall Honeywell be liable for consequential, special, or indirect damages.**

While we provide application assistance personally, through our literature and the Honeywell web site, it is up to the customer to determine the suitability of the product in the application.

Specifications may change without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

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Honeywell serves its customers through a worldwide network of sales offices, representatives and distributors. For application assistance, current specifications, pricing or name of the nearest Authorized Distributor, contact your local sales office or:

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