

# FF-SRS5988 Dual Channel Emergency Stop Module

## FEATURES

- Complies with EU Directive for machines 98/37/EC, IEC 204, EN 60204-1, DIN VDE 0113
- Dual channel input
- Output: six NO contacts and one NC contact
- Dual voltage device 24 Vdc/ 120 Vac or 24 Vdc/230 Vac
- Switching current from 1 mA to 10 A (5 µm gold plated contacts allow low current)
- Line fault detection and detection of blocked start push-button
- Automatic start or manual start modes
- Selectable cross fault detection in emergency stop control circuit
- LED indicates power and the status of the two output channels (internal relays)
- Mechanical life up to thirty million operations
- Electrical life up to one million operations
- Voltage drop protection
- Removable terminal strips for ease of maintenance
- 100 mm / 3.93 in width

## APPLICATIONS

- Emergency stop circuits on machines
- Door protection
- Conveyors/transfer lines
- Use with Type 3 or Type 4 Electro-sensitive Protective Equipment for:
  - Point-of operation protection
  - Perimeter/zone guarding protection



The FF-SRS5988 Emergency Stop modules are designed to be used in emergency stop circuits when danger to personnel or machinery is present. This device offering six NO and one NC output contacts has two safety relays with positive-guided contacts to ensure redundancy.

In the **manual start mode**, the module accepts input from the safety device (light curtain, safety mat, safety switches, etc.) between S11/S12 and S21/S23 after activation of the push-button between S33 and S34; then, the normally open safety contacts (13/14...63/64) will close and the normally closed contact (81/82) will open.

In the **automatic start mode**, the module accepts input from the safety device (light curtain, mat, safety switches, etc.) between S11/S12 and S21/S23 (Y1 and Y2 are jumpered if external relay monitoring is not needed); then, the normally open safety contacts (13/14...63/64) will close and the normally closed contact (81/82) will open.

In either mode, if the safety device is actuated (emergency stop condition occurs), the normally open contact will open immediately and the normally closed contact will close. This emergency stop condition is relayed via the safety contacts of the module to the machine control circuitry to arrest dangerous motion and/or remove power.

Cross fault monitoring is used when two independent safety inputs are provided to this module to increase the overall safety level of the solution (see typical application examples).

## WARNING

### MISUSE OF DOCUMENTATION

- The information presented in this product sheet (or catalogue) is for reference only. DO NOT USE this document as system installation information.
- Complete installation, operation and maintenance information is provided in the instructions supplied with each product.

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

# FF-SRS5988 Dual Channel Emergency Stop Module

## SPECIFICATIONS

- Dual channel Emergency Stop circuits



<b>Input</b>		
Nominal voltage (Dual voltage device)	120 Vac (-20 %, +10 %) / 24 Vdc (-10 %, +20 %)	230 Vac (-20 %, +10 %) / 24 Vdc (-10 %, +20 %)
Nominal power consumption	DC: 3 W / AC: 6 VA	
Nominal frequency	50 to 60 Hz	
Start time	Manual START function: 30 ms	Automatic START function: 1 s
Nominal voltage at S11 / at S21	23 Vdc (provided by control module) / 0 V	
Input current between S11/S12 and S21/S23	110 mA <sub>dc</sub>	
Minimum voltage at S12/A4 and at S22/A4	21 Vdc when activated	
Cable resistance between S11/S12 and S21/S23	68 Ω (max.)	
<b>Output</b>		
Contact complement	6 NO contacts, 1 NC contact	
Response time	Opening of inputs (S11/12; S21/23): 30 ms	Opening in supply circuit: 50 ms
Contact type	Safety relay, positive-guided	
Switching capability	Power factor = 1 with resistive load	
Current Range (min. to max.)	1 mA to 10 A (see note 1)	
Voltage Range (min. to max.)	0,1 to 250 Vac/dc	
Switching Capability per AC15 (EN 60947-5-1)	NO contacts: 5 A / 230 V; NC contact: 2 A / 230 V	
Typical Electrical Life Expectancy	Power factor = 1 at 230 Vac/dc (see note 2)	
3 A	1 000 000 operations	
5 A	500 000 operations	
10 A	220 000 operations	
Typical Power Factor (cos φ)	Limitation Factor (see note 3)	
0,3	0,45	
0,5	0,7	
0,7	0,85	
1	1	
Operating frequency	600 switching cycles/hour (max.)	
Output contact fuse rating	Time delay 6 A (max.)	
Mechanical life	Thirty million switching operations	
<b>General</b>		
Temperature range	-15 °C to +55 °C (5 °F to 131 °F) at 90% humidity (max.)	
Sealing	Housing IP 40; Terminals IP 20	
Housing material	Thermoplastic	
Vibration resistance	Amplitude 0,35 mm; Frequency 10 to 55 Hz	
Wire/conductor connection	1 x 4 mm <sup>2</sup> solid (max.) [12 AWG] or 2 x 1,5 mm <sup>2</sup> (max.) [16 AWG] stranded wire with sleeve DIN 46288	
Wire/conductor attachment	Removable block terminals with M 3,5 screws; wire contacts are enclosed to prevent electrical shock	
Mounting	Quick install rail mounting EN 50022-35, width: 35 mm / 1.38 in	
Weight	840 g / 1.85 lbs	

### ORDERING INFORMATION

FF-SRS5988□

└── P = 120 Vac / 24 Vdc  
 └── R = 230 Vac / 24 Vdc

#### Note 1: Contact damage

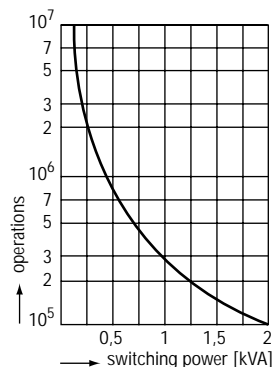
To ensure the 1 mA capability during the lifetime of the contact, never exceed 300 mA or 60 V.

**Note 2:** Install arc suppression device across load to avoid module contact arcing and ensure specified relay life expectancy.

**Note 3:** Total operations = Operations at power factor 1 multiplied by the limitation factor. If the power factor is 0,5 at 230 Vac, 3 A (1 000 000 operations), the limitation factor is 0,70. 1 000 000 x 0,70 = 700 000 total operations.

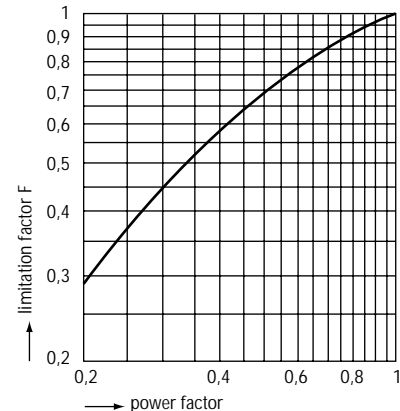
### CONTACT LIFE FOR 100% RESISTIVE LOAD (TYPICAL)

(note 2) power factor = 1 (cos φ)

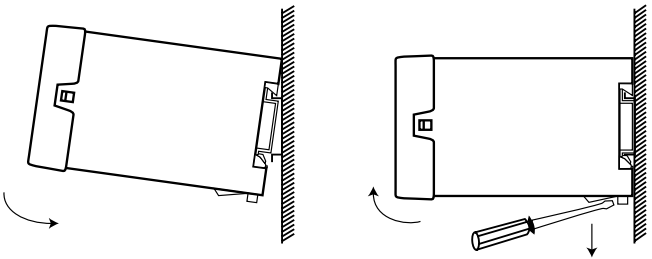


### LIMITATION FACTOR FOR INDUCTIVE LOADS

(note 3) power factor < 1 (cos φ)

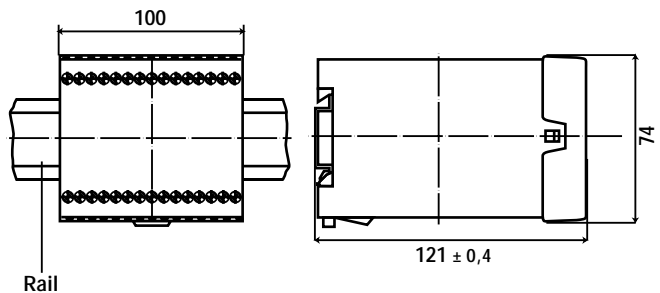


**INSTALLATION DIAGRAM**

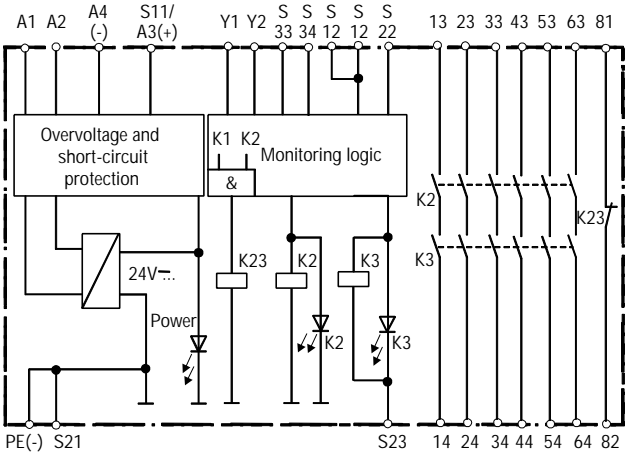


**MOUNTING DIMENSIONS**

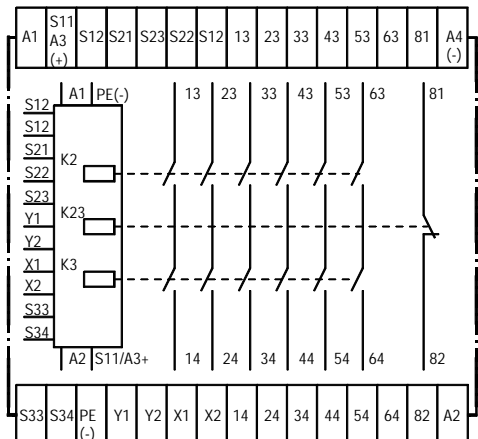
Width: 100 mm/3.93 in; Height: 74 mm/2.91 in; Depth: 121 mm/4.76 in



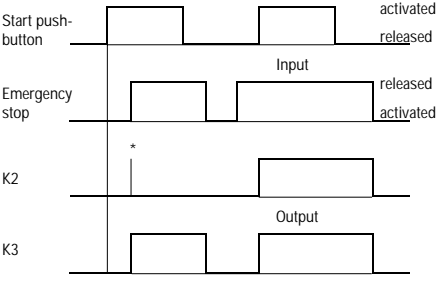
**INTERNAL CIRCUITRY**



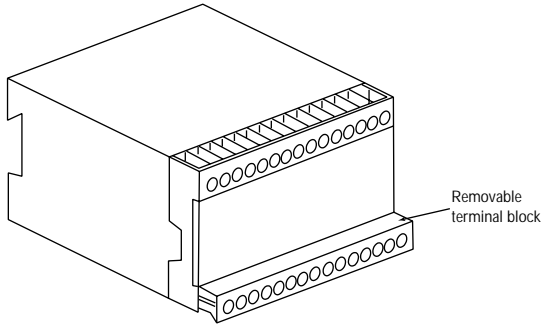
**WIRING DIAGRAMS**



**FUNCTIONAL DIAGRAM**



**REMOVABLE TERMINAL BLOCKS**



**Functional description**

If the safety device is actuated (emergency stop condition occurs), the internal relays K2 and K3 de-energize, the normally open safety contacts 13/14...63/64 will open immediately and the normally closed monitoring contact 81/82 will close. This emergency stop condition is relayed via the safety contacts of the module (and optional external safety contactors K4 and K5) to the machine control circuitry to arrest dangerous motion and/or remove power.

**\* Line fault Detection on Start push-button:**

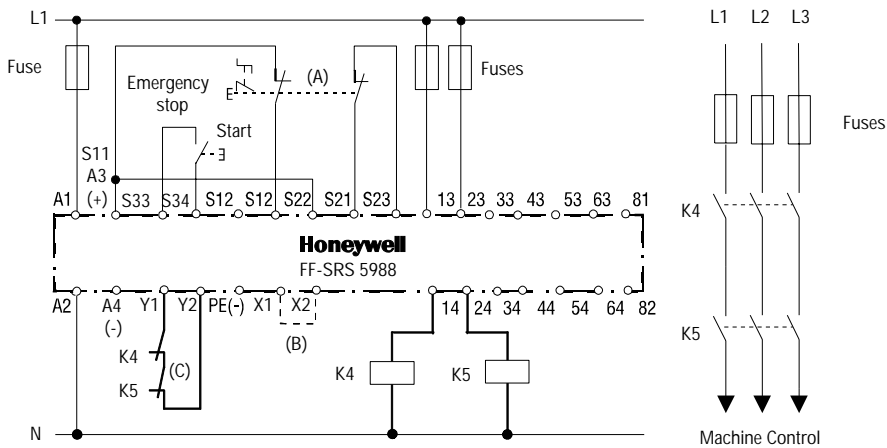
If the start push button is closed before voltage is applied to S12 and S23 the safety contacts of the module cannot close. This additional feature ensures the detection of a line fault via the start push-button or a blocked start push button. In case of a push-button failure the module can not be restarted.

**SETTING OF START MODE**

Start Mode	Jumper between X1/X2	Start push-button between S33/S34	This module offers the possibility to function in the automatic start mode or manual start mode
Manual start mode	• not connected •		Insert the start push-button between terminals S33/S34 for manual start mode.
Automatic start mode	• connected •	• •	Insert a jumper between X1/X2 for automatic start mode to function

## APPLICATION EXAMPLES

### Dual-channel emergency stop circuitry (with cross fault monitoring, manual start mode, external contactors)

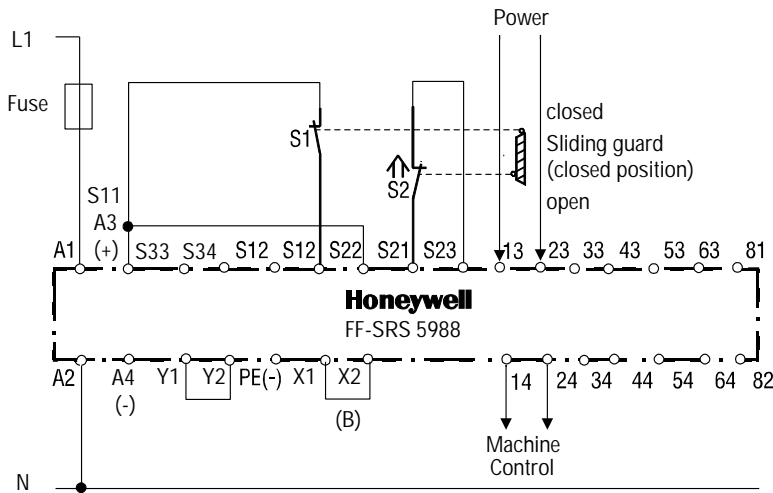


### Dual-channel safety door monitoring (with cross fault monitoring, automatic start mode)

Protective gates are designed to limit or block access to the moving parts of dangerous machinery. These gates can be equipped with locking or interlocking devices, usually safety limit switches or any other safety sensors/switches.

The FF-SRS5988 Emergency Stop module monitors the status of these safety sensor positions. When the protective gate is open, the initiation of dangerous motion is prevented. When the door is closed again, the next machine cycle can start, but only after initiating an external manual restart sequence.

After opening the door, the two external safety switch contacts S1 and S2 will open (as illustrated above) and the two internal safety relays K2 and K3 will de-energize. The normally open safety outputs 13/14...63/64 will open relaying the stop condition to the machine control circuitry. After closing the door, S1 and S2 close and the internal relays K2 and K3 will energize. The six normally open safety contacts will close and an external manual restart sequence may then be initiated (allowing the machine to operate).



#### APPLICATION NOTES

##### Note (A): Dual channel safety devices:

This may be an emergency stop push-button in series with dual output safety switching devices (OSSD) such as safety light curtains (FF-SB, FF-LS), single beam (FF-SPS4), modular safety light curtain (FF-SCAN), safety mat (FF-SM), safety laser scanner (FF-SE), or safety limit switches (i.e. 2CLS, GK).

##### Note (B): Start modes:

Manual start mode: Insert start push-button between S33/S34; no jumper must be set between X1/X2

Automatic start mode: Insert jumper between X1/X2

##### Note (C): External contactors:

With switching currents higher than 10 A, the output contacts should be reinforced by external contactors with positive guided contacts (K4 and K5). The proper operation of the external contactors must be monitored by looping their normally closed contacts into the Final Switching Device (FSD) monitoring loop (Y1/Y2). If no external contactors are used, Y1/Y2 has to be jumpered to let the module function.