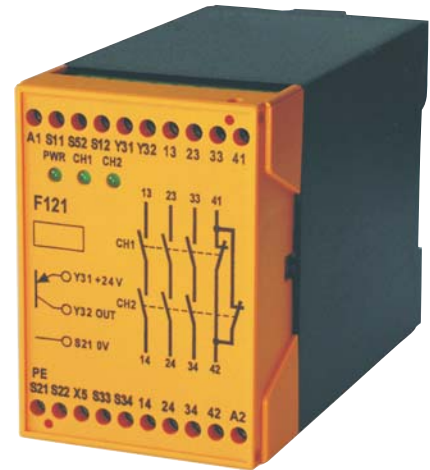


# Safety Relay F 121

## Emergency-Stop Relay, Safety Gate Monitor

### Features

- Safety-category 4 acc. to DIN EN954-1
- Stop-category 0
- Crossfault monitoring
- Monitored start (On-switch) or automatic start
- 5 outputs:
  - 3 Safety-contacts NO, 1 Auxiliary contact NC,
  - 1 Transistor output with short circuit protection
- LED's for Power-on and contact indication channel 1 and 2
- Case for DIN rail mounting TS35 and screw mounting possible



### General

Safety relays must be installed in machine controls to save life. It will be used in cutters, mixing machines, conveyors, printing machines, winding machines, packing machines, robots and metal processing machines etc.

### Short information

Cross fault monitoring

This feature can be realized by using a dual-channel E-Stop. In case of short circuit between the 2 channels the F121 will deactivate the outputs. This is achieved by an electronic protection circuit in the safety relay. After elimination of this short circuit, the F121 is ready for operating.

Monitored start

This function checks the start circuit and activates the F121 only if the E-stop switch is not pressed and the supply voltage is connected.

Autostart function


The F121 will be activated automatically with supply voltage if the E-Stop switch and the feedback loop (X5/S33) are closed.

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## Technical data

### Power supply

|   |   |
|---|---|
| Supply voltage  | : 230 V 50/60 Hz -20/+10 %,<br>: 24 V AC/DC -15/+10 % (not connected to PE) |
| Switch contact supply<br>for E-Stop circuit   | : 24 V DC Terminal S11(+), S21 (-)  |
| Power consumption   | : 4 W   |
| Operating temperature   | : -5...+55 °C   |
| Rated voltage   | : 250 V AC acc DIN VDE 0110-1 (01/89) and 0110-2 (01/89)                    |
| Test voltage  | : 2.5 kV  |
|  -conformity | : acc. to the council directive 89/336/EG, 73/23/EG and 89/392/EG           |

### Output

|                            |   |
|----------------------------|---|
| Relays                     | : 3 SPST NO; 1 SPST NC; (auxiliary contact)                                     |
| Switching capacity         | : < 250 V AC < 1500 VA < 6 A, < 24 V DC < 144 W < 3 A                           |
| Mechanical lifetime        | : 10 <sup>7</sup> switching cycles  |
| Contact material           | : AgCd 0.5 µ Au   |
| Contact protection         | : Safety Fuse max. 6 A slow blow<br>Auto circuit breaker max. C10 A quick break |
| Response time              |   |
| Manuel Start               | : < 60 ms      via start button   |
| Auto-Start                 | : < 600 ms     via supply voltage   |
| Release time               |   |
| E-Stop Button              | : < 20 ms   |
| loss of supply             | : < 250 ms  |
| with 24 V DC supply        | : < 15 ms      via E-Stop switch or light curtain                               |
| Recovery time              |   |
| Monitored start            | : > 5 s   |
| Auto start                 | : > 2 s   |
| with 24 V DC supply        | : > 0.1 s after E-Stop or light curtain operation                               |
| Utilisation category       | : AC-15: 250 V 6 A; DC-13: 24 V 3 A   |
| Transistor (status output) | : PNP short circuit protected max. 24 V DC; max. 20 mA                          |

|                       |  |
|-----------------------|--|
| <b>Case</b>           | : Standard case Lexan 500R, UL. file NoE45329, UL94-V0 |
| Dimensions            | : 55x75x110 mm (WxHxD)                                 |
| Weight                | : 230 V AC/370 g<br>24 V DC/290g                       |
| Electrical connection | : Screw terminals with pressure plate                  |
| Protection            | : Case IP40, Terminals IP20, acc. to BGV A3            |

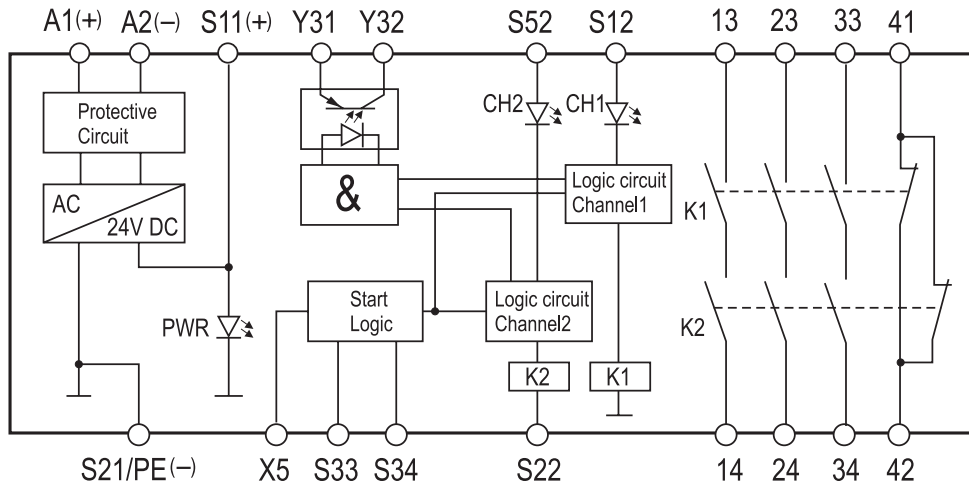
## Compendium of the DIN EN 60204-1

| Category | Short form classification  | System response <sup>1)</sup>  |
|----------|--|--|
| <b>B</b> | The safety referred sections of machine controls and/or their protection devices and their components must be arranged, selected and combined in agreement with the state of the art in a way that they can withstand expecting influences.  | If an error occurs, safety function may be lost. Some errors remain unidentified.  |
| <b>1</b> | Classification of B and the use of safety-relevant components and principles must be realized.   | As described for category B, but with a higher reliability of safety function.   |
| <b>2</b> | Additional to classification B safety functions must be checked in suitable time intervals by machine control. The time interval depends on the application and type of machine.   | If an error occurs safety function between the check distances may be lost. An error will be detected by check.  |
| <b>3</b> | Classification of B and the use of proven safety principles must be realized. The machine control has to be constructed in a way that<br>a.) an individual error won't cause the lost of safety function(s)<br>b.) it must be possible to recognize an error at any time with usable technical equipment.  | Any individual error won't cause the lost of the safety function. Some but not any error could be recognized. In case of different errors at the same time, safety function may be lost. |
| <b>4</b> | Classification of B and the use of proven safety principles must be realized. The machine control has to be constructed in a way that<br>a.) an individual error won't cause the lost of safety function(s)<br>b.) any individual error must be recognized with or before in the moment of starting the machine.<br>c.) alternatively to b). in case of different errors at the same time safety function has to work precise. | If errors occur, the safety function is preserved at any time. Errors could be recognized within a short time to prevent failure of safety operation.                                    |

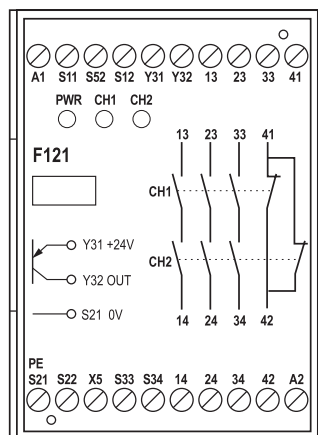
1)The risk evaluation indicates whether the full or partial loss of the Safety function(s), which results from the errors is portable

| Category | Stop-Function  |
|----------|--|
| <b>0</b> | Stop by immediate cut-off the energy input from the machine (i.e. a uncontrolled stopping) |
| <b>1</b> | Controlled stop of the machine and cut-off the energy when stop is finished.               |
| <b>2</b> | Controlled stop of the machine without cut-off the energy.                                 |

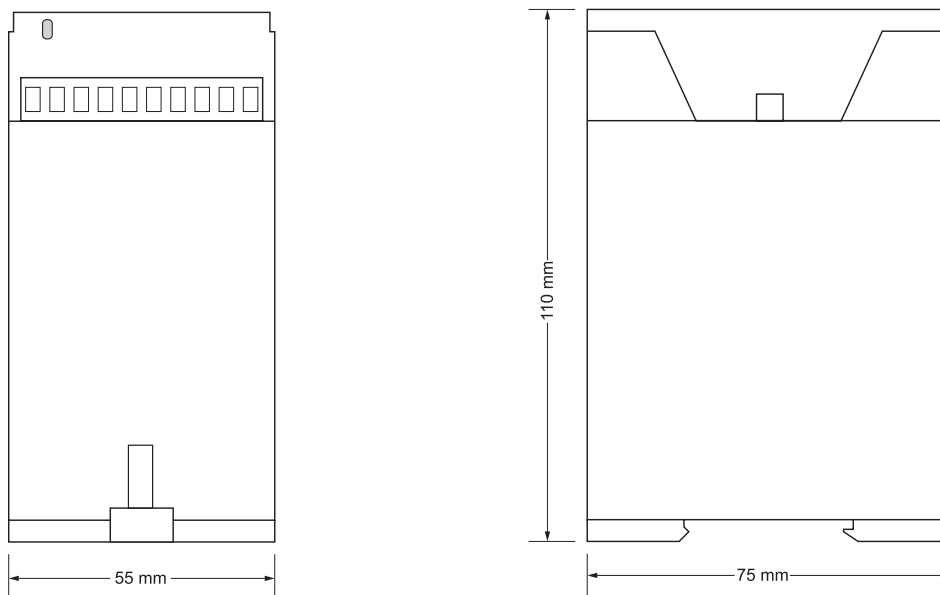
## Circuit diagram



## Front view



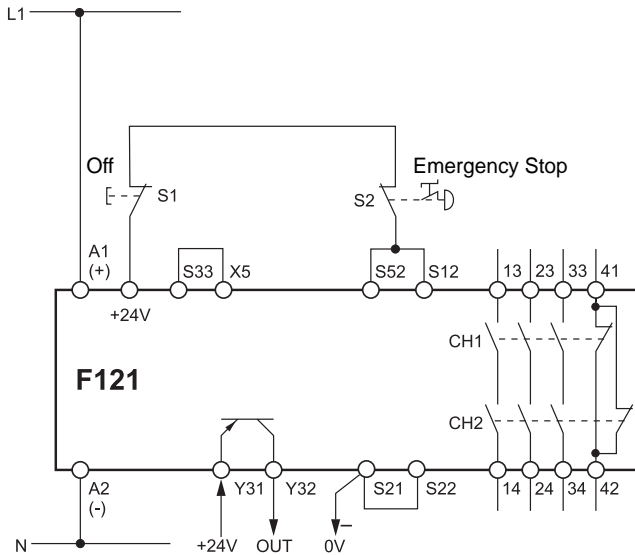
## Dimensions



TS35 DIN rail mounting  
acc. to DIN 46277 and DIN EN 50022

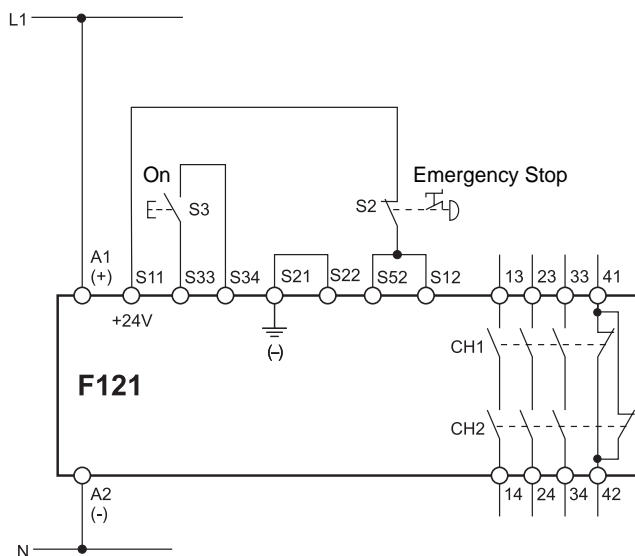
## Examples

Wiring example 1: Single channel E-Stop-circuit with Auto-Start and transistor status output.  
Circuit fulfills Safety category 2.



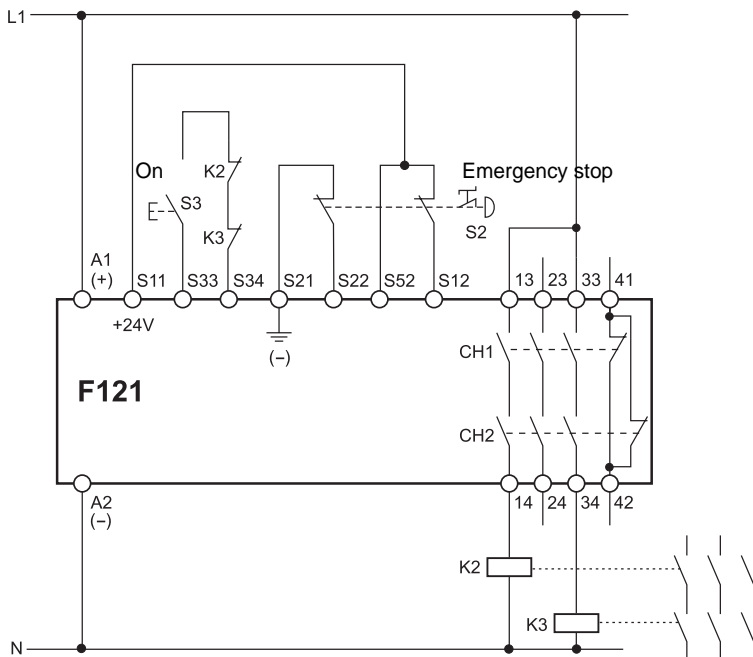
The F121 will be activated automatically by supply voltage if the E-Stop Switch and the OFF-switch are closed. The status output is active simultaneously. After switch off the supply voltage, open the OFF- or E-Stop switch, the F121 will be deactivated.

Wiring example 2: Single channel E-Stop-circuit with monitored Start-switch.  
Circuit fulfills Safety category 2.



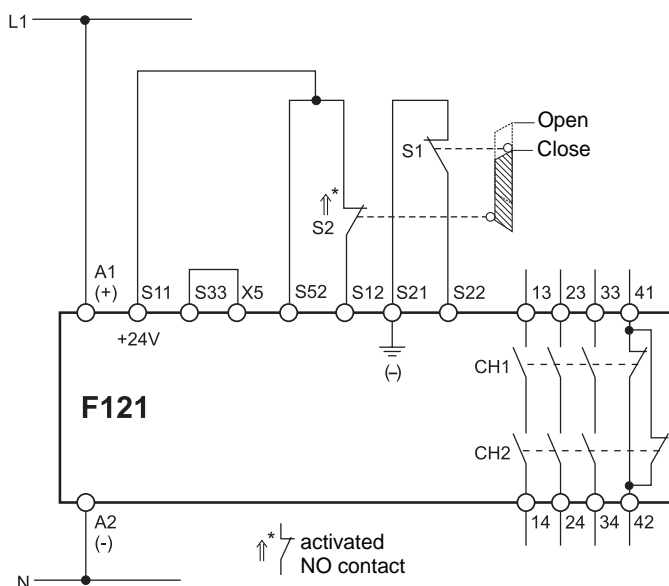
With monitored start only the ON-switch S3 will activate the F121. The E-Stop switch S2 will deactivate the F121.

Wiring example 3: Dual Channel E-Stop-circuit with crossfault monitoring, monitored ON-switch and contact extensions in combination with external relays with forced commutation contacts. Circuit fulfills Safety category 4.



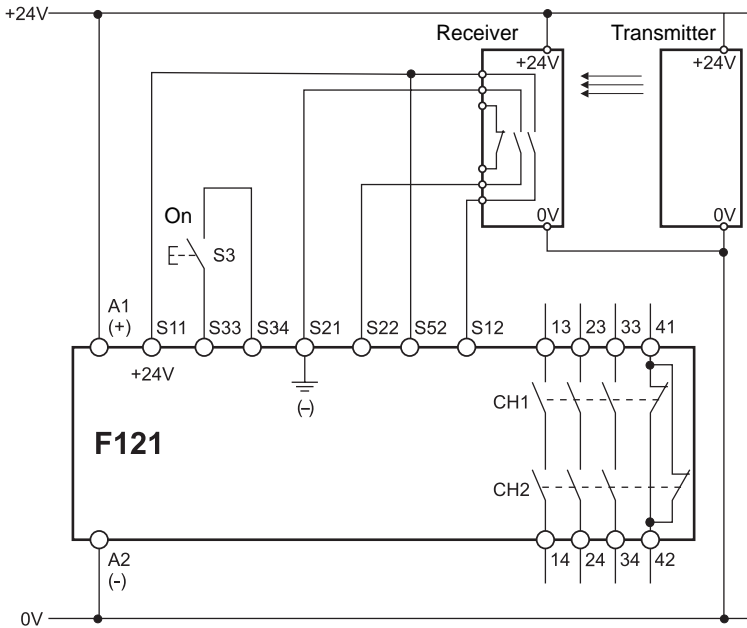
With closed E-Stop switch S2 the F121 can be activated by On-switch S3, if the auxiliary contacts of relays K2 and K3 are closed. The deactivation is made by the switch E-Stop S2. The crossfault monitoring is ensured by different polarized safe voltages at the contacts of the E-Stop switch.

Wiring example 4: Dual Channel E-Stop circuit with Auto-Start for sliding protective doors and crossfault monitoring. Circuit fulfills Safety category 4



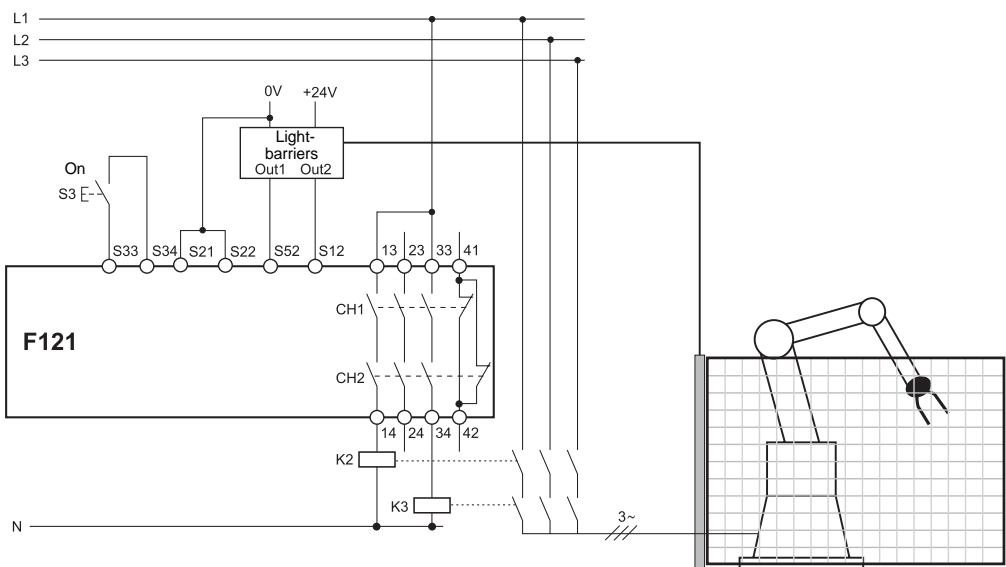
With closed sliding protective door the F121 can be activated with the supply voltage. Opening the door the F121 will be deactivated. When closing the door again, the F121 will be activated. When the switches S1 and S2 are installed, it must be ensured that the switch S1 switches on at the same time as S2 or later.

**Wiring example 5:** Dual Channel E-Stop-circuit with monitored On-switch and crossfault monitoring for Safety light barriers with relay output.  
Circuit fulfills Safety category 4.



If the light barrier B1 is not interrupted, the ON-switch (S3) activates the F121. If the light beam is interrupted, the device switches off. Activating the S3 will start the F121 again. The crossfault monitoring is ensured with different polarized safe voltage at the contacts of the light barrier receiver.

**Wiring example 6:** Dual Channel E-Stop-circuit with monitored On-switch and crossfault monitoring for Light curtains. The F121 can be supplied by the light curtain.  
Circuit fulfills Safety Category 4.



After operation of the ON-Switch S3 the F121 is activated. If the light beam of the light curtain is interrupted, the relay will be deactivated. After the release of the light beam the device can be activated again with the ON-Switch S3. The crossfault monitoring is ensured, because the function of the outputs of the light curtain are checked internally permanently. With shorted lines the voltage of the outputs drops down and safe deactivation of the F121 will be set.

## Ordering code

F121 -

### F121 Emergency-Stop-Relay

Safety category 4

Stop-category 0

3 Relay contacts NO

1 Relay contact NC

1 Transistor output

Utilisation category AC15, 230 V 6 A, AC13, 24 V 3 A

Utilisation category AC15, 230 V 6 A, AC13, 24 V 3 A

PNP 24 V DC max. 20 mA

### 1. Supply voltage

01 230 V AC

04 24 V AC/DC\*

\* it is not permitted to connect the PE to this version