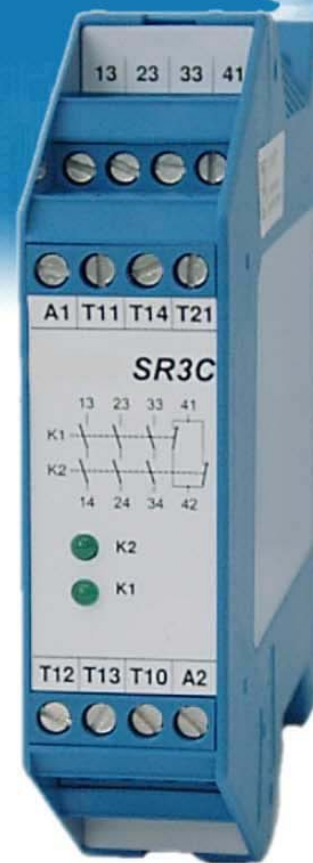
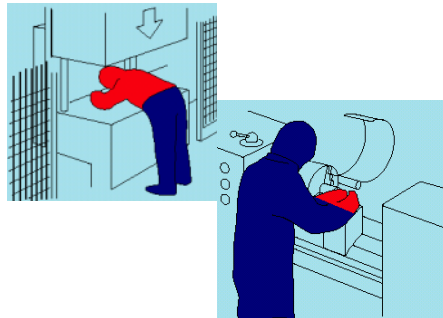




Machinery Safety



Safety Relays Safety Switches





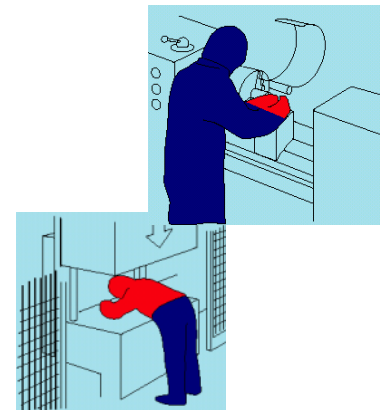
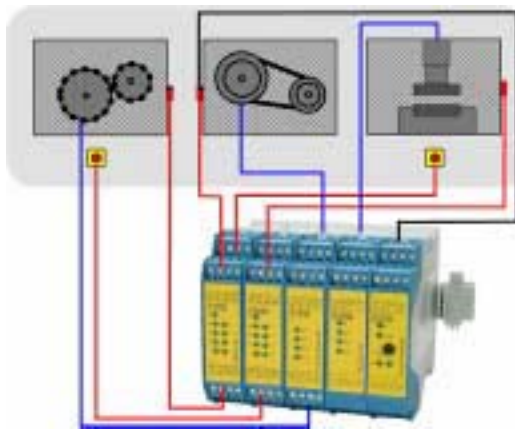
Safety Relays

| | |
|---|-------------|
| Safety Emergency Stop Relay SRLC | 4-3 |
| Low cost emergency stop relay, 2 safety contacts, safety category 3 | |
| Safety Emergency Stop Relay SR2C | 4-5 |
| Emergency stop relay, 2 safety contacts, safety category 4 | |
| Safety Emergency Stop Relay SR3C (AC/DC 24V) | 4-7 |
| Emergency stop relay, 3 safety contacts, safety category 4 | |
| Safety Emergency Stop Relay SR3C (AC115/230V) | 4-9 |
| Emergency stop relay, 3 safety contacts, safety category 4 | |
| Safety Expansion Unit SREC | 4-11 |
| 3 additional safety contacts, safety category 3 | |
| Time-Delayed Safety Expansion Unit SRTC | 4-13 |
| 3 additional time-delayed safety contacts, safety category 3 | |
| Time-Delayed Emergency Stop Relay SR4C | 4-15 |
| Combines non-time-delayed and time-delayed contacts in just one compact housing | |
| Safety Emergency Stop Relay SR1 | 4-17 |
| Emergency stop relay, 3 safety contacts, safety category 3 | |
| Safety Two-Hand Control Unit S2HC | 4-19 |
| Very compact universal two-hand safety relay, safety category 4 / III C | |
| Compact Power Supply NTSR | 4-21 |
| 22.5mm housing, optional for all DC24V safety relays „SR“ | |



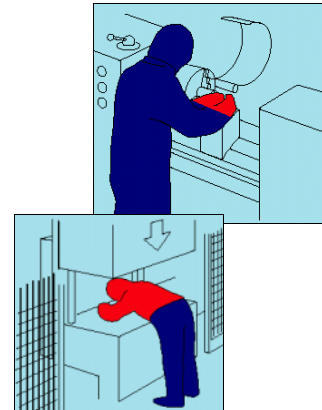
Plug & Play Safety System - Safety Switches

| | |
|--|-------------|
| Talos Plug & Play Safety Relay System - Safety Switches | 4-23 |
|--|-------------|





For machinery safety we offer a growing selection of safety switches and safety emergency stop relays, designed, manufactured and certified according the latest national and international safety regulations.



Safety Warnings

It is intended for qualified personnel familiar with the installation, commissioning or maintenance of the machine equipped with control devices.

The user manuals do not substitute the machine's operating instructions. This must provide separate coverage of the controller functions used in the particular application and explain the effect these have on the machine.

Particular attention must be paid to the safety concept underlying the overall project. Supplementary safety precautions ensuring defined, safe operating statuses irrespective of the control and operating equipment must be taken in all areas where, in conjunction with automation components, faults are able to cause material damage or personal injury.

Pertinent accident prevention regulations must be observed. Emergency stop circuits to EN 60204 (VDE0133) must remain in effect in all operating modes and must not result in any undefined restart when released.

Reliable electrical isolation in the form of a transformer to VDE0551 must be provided when using 24VDC EPC control devices.

Apart from the measures described in the installation sheets, no action must be carried out inside the device.



SRLC is the low cost emergency stop relay for all applications where there is only the chance of slight injury or where access to the danger zone is negligible. The switch-off of the safety contacts results in the disconnection of the supply voltage. Internal error monitoring is done by the reconnection via the start button.

- ∅ STOP category: 0
- ∅ Up to safety category: 3
- ∅ Control: single or dual-channel
- ∅ Force guided safety contacts: 2
- ∅ Redundancy and cyclical monitoring
- ∅ According to EN 60204-1, IEC 60204-1, EN 954-1



4

Application / Installation

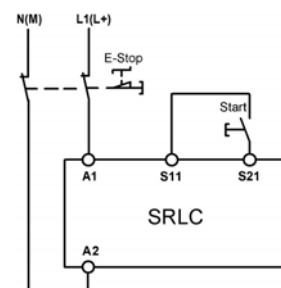
The device is designed according to EN 60204-1 (IEC 60204-1) for safety circuits and it may be applied up to safety category 3 according to EN954-1. The force guided safety contacts will be opened by pressing the emergency stop button and so the machine is switched off safely. It is ensured that the occurrence of a single fault does not result in a loss of the safety function and that every internal fault will be recognized by the cyclical self monitoring at the latest when the device is switched off and shall be switched on again. Only a fault in the emergency stop switch will not be recognized. The switch must be checked periodically as prescribed in a maintenance plan.

According to EN 60204-1 the unit is designed to be used in switch cabinets with a minimum environmental protection of IP54. The mounting is made on a 35 mm DIN-rail.

Provided that the system has been installed properly, no maintenance at the device is necessary.

Dual-Channel Emergency Stop (without fault monitoring of the emergency stop button and the supply lines)

The emergency stop button, equipped with two NC contacts, is looped into the supply lines A1 and A2. A single fault does not lead to a loss of the safety function, however, not every fault is recognized by the SRLC. This behaviour is admissible up to safety category 3 according to EN954-1. The start button for the controlled reconnection of the device is looped into S11 and S21.



Dual-channel emergency stop application

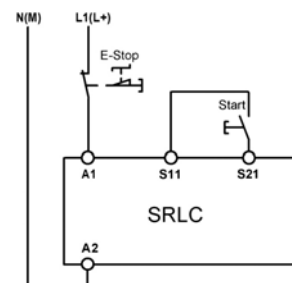
Safety Warnings



- Installation and operation must be carried out by qualified personnel only.
- The electrical installation must be performed after disconnecting the device and the machine from the mains supply.
- The wiring must be carried out according to the instructions of this operating manual, or the safety function may be lost.
- Opening the device, any manipulation of the device and the avoidance of the safety facilities are not permitted.
- All relevant safety regulations and standards must be attended to.
- Non-observance of the safety regulations may cause death, severe injuries or substantial damage to property.

Single-Channel Emergency Stop (up to Category 1)

In accordance with EN 954-1, the SRLC can be used with a single-channel emergency stop button for applications up to safety category 1. The supply voltage to A1 is disconnected by pressing the emergency stop button. The start button for the controlled reconnection of the device is looped into S11 and S21.



Single-channel emergency stop application

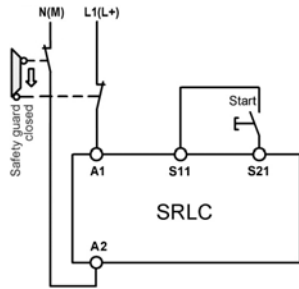


Safety Emergency Stop Relay SRLC



Safety Guard Monitoring

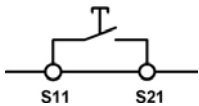
This application conforms to the dual-channel emergency stop, however, the emergency stop button is replaced by one or two limit switches which monitor the guard door. The limit switches must have positive opening NC contacts, i.e. in case of need they must cut off the electric connection by forcibly opening the switching contacts.



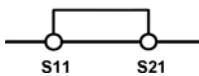
Safety guard application

Start Performance

SRLC provides an input for a start push-button. When the start button is pressed the safety contacts are closed. Depending on the application it can be wired as follows:



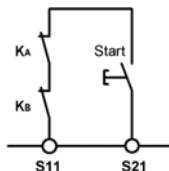
Manual start, up to category 3



Automatic start (e.g. for safety gate application), up to category 3.

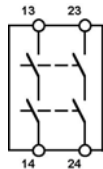
Feedback circuit

The feedback circuit monitors contactors or the extension modules SREC or SRTC which are connected to the emergency stop relay. K_A , K_B are force guided contacts of the connected contactor or extension module, up to category 3.

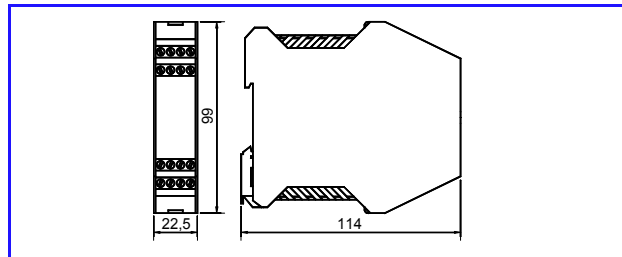


Safety Contacts

SRLC provides two force guided, redundant safety contacts (13-14, 23-24, NO).



| Technical Data | |
|--|---|
| Conforms to standards | VDE 0113 part 1: 1998-11, EN 60204-1:1997, IEC 60204-1:1997, EN 954-1:1996 |
| Operating voltage | AC 230V, AC 115V, AC/DC 24V At AC/DC 24V an insulating transformer acc. to EN 60742 must be used. |
| Allowable tolerance | +/-10% |
| Power consumption | approx. 4VA / 2W |
| Control voltage at S11 | DC 24V |
| Control current | approx. 40mA |
| Safety contacts | 2 NO |
| Switching voltage max. | AC 250V |
| Contact rating of safety contacts (13-14, 23-24) | AC: 250V, 1500VA, 6A for AC-12 230V, 4A for AC-15 DC: 24V, 30W, 1,25A for DC-12 24V, 30W, 2A for DC-13 |
| Minimum current | 24V/20mA |
| External fuses for safety cont. | 4A slow-blow or 6A quick-blow |
| Wire width | max. 2,5mm ² |
| Length of control lines | max. 1000m at 0,75mm ² |
| Contact material | AgNi |
| Service life | mech. approx. 1x10 ⁷ , elec. 1x10 ⁵ switching cycles |
| Rated impulse withstand voltage | 2,5kV (control voltage/contacts) |
| Dielectric strength | 4kV acc. to DIN VDE 0110-1:1997-04 |
| Protection | IP20 |
| Temperature range | DC 24V: -15°C to +60°C AC 230V/115V: -15°C to +40°C |
| Weight | approx. 230g |
| Mounting | DIN-rail acc. to EN 50022-35 |



| Order No. | Type |
|-----------|-----------------|
| 472160 | SRLC, AC 230V |
| 472161 | SRLC, AC 115V |
| 472162 | SRLC, AC/DC 24V |

SR2C is an all-purpose emergency stop device which ensures the quick and safe deactivation of the moving parts of a machine in case of danger. Preferred applications include single and dual-channel emergency stop circuits and dual-channel safety gate or safety guard monitoring.

- ∅ STOP category: 0
- ∅ Up to safety category: 4
- ∅ Control: single or dual-channel
- ∅ Force guided safety contacts: 2
- ∅ Redundancy and cyclical monitoring
- ∅ Short-circuit monitoring and earth fault monitoring
- ∅ According to EN 60204-1, IEC 60204-1, EN 954-1



Application / Installation

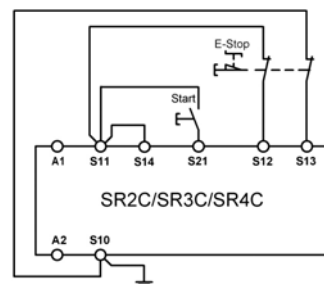
The device is designed according to EN 60204-1 (IEC 60204-1) for safety circuits and it may be applied up to safety category 4 according to EN954-1, provided that the start button is not replaced by a link. The force guided safety contacts will be opened by pressing the emergency stop button and so the machine is switched off safely. It is ensured that the occurrence of a single fault does not result in a loss of the safety function and that every fault will be recognized by the cyclical self monitoring at the latest when the device is switched off and shall be switched on again.

According to EN 60204-1 the unit is designed to be used in switch cabinets with a minimum environmental protection of IP54. The mounting is made on a 35 mm DIN-rail.

Provided that the system has been installed properly, no maintenance is necessary.

Dual-Channel Emergency Stop with Short-Circuit Monitoring and Earth Fault Monitoring (up to Category 4)

To activate the cross short-circuit monitoring, S11 and S14 must be connected. The emergency stop button has to be looped into the lines S11-S12 and S10-S13. The start button connects S11 with S21. To activate the detection of earth faults, S10 needs to be connected to earth ground. After connecting the power supply to A1 and A2, the safety contacts can be actuated with the start button.



Dual-channel emergency stop application with short-circuit and earth fault monitoring

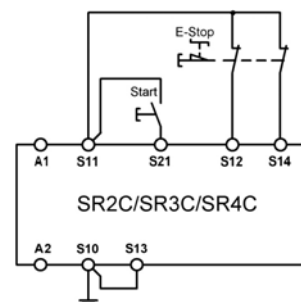
Safety Warnings



- Installation and operation must be carried out by qualified personnel only.
- The electrical installation must be performed after disconnecting the device and the machine from the mains supply.
- The wiring must be carried out according to the instructions of this operating manual, or the safety function may be lost.
- Opening the device, any manipulation of the device and the avoidance of the safety facilities are not permitted.
- All relevant safety regulations and standards must be attended to.
- Non-observance of the safety regulations may cause death, severe injuries or substantial damage to property.

Dual-Channel Emergency Stop, only with Earth Fault Monitoring, no Short-Circuit Monitoring (up to Category 3)

This application allows to reduce the wiring to the emergency stop button by one line, but the cross short-circuit monitoring is disabled. The terminals S10 and S13 are connected, the emergency stop button is looped into the lines S11-S12 and S11-S14. The start button connects S11 and S21. The earth fault monitoring is enabled by connecting S10 to earth ground.



Dual-channel emergency stop application with earth fault monitoring

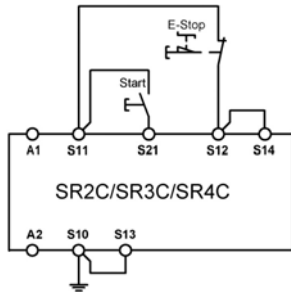


Safety Emergency Stop Relay SR2C



Single-Channel Emergency Stop (up to Category 1)

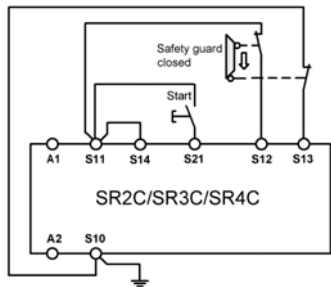
If the risk assessment acc. to EN 954-1 permits, the SR2C may be operated as an emergency stop relay with a single-channel push button. For this purpose, S10 and S13 as well as S12 and S14 must be connected. The single-channel emergency stop button is looped into the line S11-S12/S14. The earth fault monitoring is operative if S10 is connected to earth ground.



Single-channel emergency stop application with earth fault monitoring

Dual-Channel Safety Guard Monitoring with Short-Circuit Monitoring and Earth Fault Monitoring (up to Category 4)

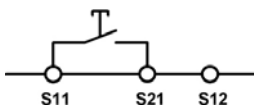
This application conforms to the dual-channel emergency stop, however, the emergency stop button is replaced by two limit switches which monitor the guard door. The limit switches must have positive opening NC contacts, i.e. in case of need they must cut off the electric connection by forcibly opening the switching contacts.



Dual-channel safety guard application with short-circuit monitoring and earth fault monitoring

Start Performance

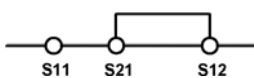
SR2C provides an input for a start push-button. When the start button is pressed the safety contacts are closed. Depending on the application and the demanded safety category it can be wired as follows:



Monitored manual start, up to category 4; it is monitored that the start button has been opened before the emergency button is closed.



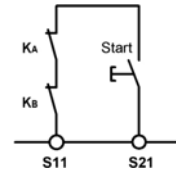
Manual start without monitoring, up to category 3



Automatic start (e.g. for safety gate application), up to category 3. Maximum allowable time difference when closing the safety switches at S12 and S13: S12 prior to S13: 50ms; S13 prior to S12: any time (infinite)

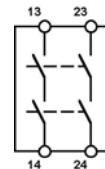
Feedback Circuit

The feedback circuit monitors contactors or the extension modules SREC or SRTC which are connected to the emergency stop relay. K_A, K_B are force guided contacts of the connected contactor or extension module, up to category 3.

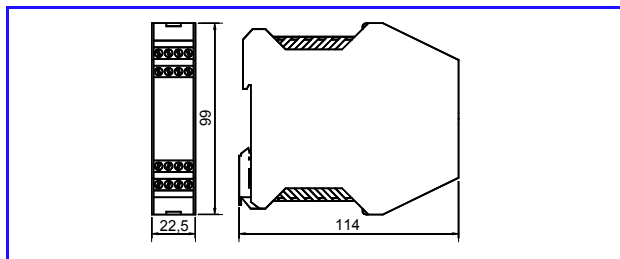


Safety Contacts

SR2C provides two force guided, redundant safety contacts (13-14, 23-24, NO).



| Technical Data | |
|--|---|
| Conforms to standards | VDE 0113 part 1: 1998-11, EN 60204-1:1997, IEC 60204-1:1997, EN 954-1:1996 |
| Operating voltage | AC 230V, AC 115V, AC/DC 24V At AC/DC 24V an insulating transformer acc. to EN 60742 must be used. |
| Allowable tolerance | +/-10% |
| Power consumption | approx. 2VA / 4W |
| Control voltage at S11 | DC 24V |
| Control current | approx. 40mA |
| Safety contacts | 2 NO |
| Switching voltage max. | AC 250V |
| Contact rating of safety contacts (13-14, 23-24) | AC: 250V, 1500VA, 6A for AC-12 230V, 4A for AC-15 DC: 24V, 30W, 1,25A for DC-12 24V, 30W, 2A for DC-13 |
| Minimum current | 24V/20mA |
| External fuses for safety cont. | 4A slow-blow or 6A quick-blow |
| Wire width | max. 2,5mm ² |
| Length of control lines | max. 1000m at 0,75mm ² |
| Contact material | AgNi |
| Service life | mech. approx. 1x10 ⁷ , elec. 1x10 ⁵ switching cycles |
| Rated impulse withstand voltage | 2,5kV (control voltage/contacts) |
| Dielectric strength | 4kV acc. to DIN VDE 0110-1:1997-04 |
| Protection | IP20 |
| Temperature range | DC 24V: -15°C to +60°C AC 230V/115V: -15°C to +40°C |
| Weight | approx. 230g |
| Mounting | DIN-rail acc. to EN 50022-35 |



| Order No. | Type |
|-----------|-----------------|
| 472150 | SR2C, AC 230V |
| 472151 | SR2C, AC 115V |
| 472152 | SR2C, AC/DC 24V |

SR3C is an all-purpose emergency stop device which ensures the quick and safe deactivation of the moving parts of a machine in case of danger. Preferred applications include single and dual-channel emergency stop circuits and dual-channel safety gate or safety guard monitoring.

- ∅ STOP category: 0
- ∅ Up to safety category: 4
- ∅ Control: single or dual-channel
- ∅ Force guided safety contacts: 3
- ∅ Auxiliary contacts: 1
- ∅ Redundancy and cyclical monitoring
- ∅ Short-circuit monitoring and earth fault monitoring
- ∅ According to EN 60204-1, IEC 60204-1, EN 954-1



4

Application / Installation

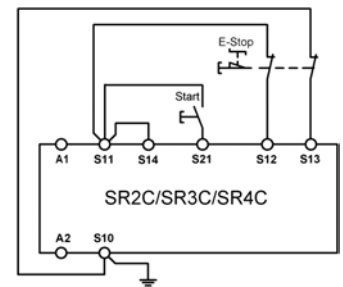
The device is designed according to EN 60204-1 (IEC 60204-1) for safety circuits and it may be applied up to safety category 4 according to EN954-1, provided that the start button is not replaced by a link. The force guided safety contacts will be opened by pressing the emergency stop button and so the machine is switched off safely. It is ensured that the occurrence of a single fault does not result in a loss of the safety function and that every fault will be recognized by the cyclical self monitoring at the latest when the device is switched off and shall be switched on again.

According to EN 60204-1 the unit is designed to be used in switch cabinets with a minimum environmental protection of IP54. The mounting is made on a 35 mm DIN-rail.

Provided that the system has been installed properly, no maintenance is necessary.

Dual-Channel Emergency Stop with Short-Circuit Monitoring and Earth Fault Monitoring (up to Category 4)

To activate the cross short-circuit monitoring, S11 and S14 must be connected. The emergency stop button has to be looped into the lines S11-S12 and S10-S13. The start button connects S11 with S21. To activate the detection of earth faults, S10 needs to be connected to earth ground. After connecting the power supply to A1 and A2, the safety contacts can be actuated with the start button.



Dual-channel emergency stop application with short-circuit and earth fault monitoring

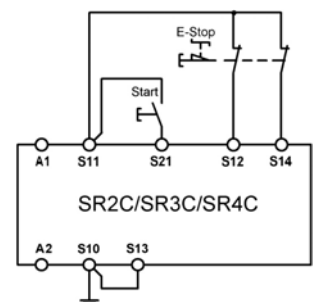
Safety Warnings



- Installation and operation must be carried out by qualified personnel only.
- The electrical installation must be performed after disconnecting the device and the machine from the mains supply.
- The wiring must be carried out according to the instructions of this operating manual, or the safety function may be lost.
- Opening the device, any manipulation of the device and the avoidance of the safety facilities are not permitted.
- All relevant safety regulations and standards must be attended to.
- Non-observance of the safety regulations may cause death, severe injuries or substantial damage to property.

Dual-Channel Emergency Stop, only with Earth Fault Monitoring, no Short-Circuit Monitoring (up to Category 3)

This application allows to reduce the wiring to the emergency stop button by one line, but the cross short-circuit monitoring is disabled. The terminals S10 and S13 are connected, the emergency stop button is looped into the lines S11-S12 and S11-S14. The start button connects S11 and S21. The earth fault monitoring is enabled by connecting S10 to earth ground.



Dual-channel emergency stop application with earth fault monitoring

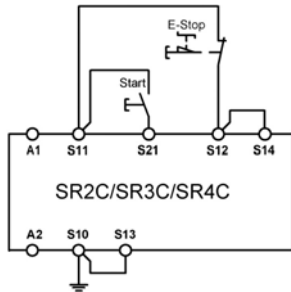


Safety Emergency Stop Relay SR3C (AC/DC 24V)



Single-Channel Emergency Stop (up to Category 1)

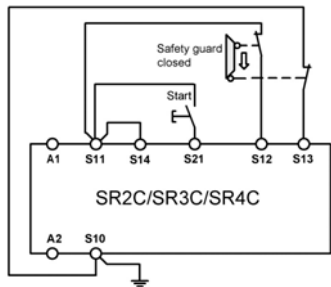
If the risk assessment acc. to EN 954-1 permits, the SR3C may be operated as an emergency stop relay with a single-channel push button. For this purpose, S10 and S13 as well as S12 and S14 must be connected. The single-channel emergency stop button is looped into the line S11-S12/S14. The earth fault monitoring is operative if S10 is connected to earth ground.



Single-channel emergency stop application with earth fault monitoring

Dual-Channel Safety Guard Monitoring with Short-Circuit Monitoring and Earth Fault Monitoring (up to Category 4)

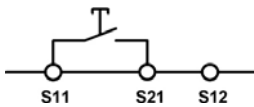
This application conforms to the dual-channel emergency stop, however, the emergency stop button is replaced by two limit switches which monitor the guard door. The limit switches must have positive opening NC contacts, i.e. in case of need they must cut off the electric connection by forcibly opening the switching contacts.



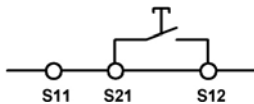
Dual-channel safety guard application with short-circuit monitoring and earth fault monitoring

Start Performance

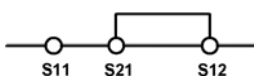
SR3C provides an input for a start push-button. When the start button is pressed the safety contacts are closed. Depending on the application and the demanded safety category it can be wired as follows:



Monitored manual start, up to category 4; it is monitored that the start button has been opened before the emergency button is closed.



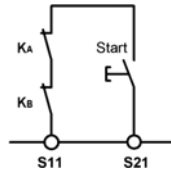
Manual start without monitoring, up to category 3



Automatic start (e.g. for safety gate application), up to category 3. Maximum allowable time difference when closing the safety switches at S12 and S13: S12 prior to S13: 50ms; S13 prior to S12: any time (infinite)

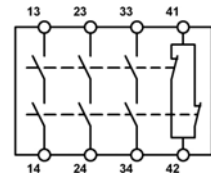
Feedback Circuit

The feedback circuit monitors contactors or the extension modules SREC or SRTC which are connected to the emergency stop relay. K_A, K_B are force guided contacts of the connected contactor or extension module, up to category 3.

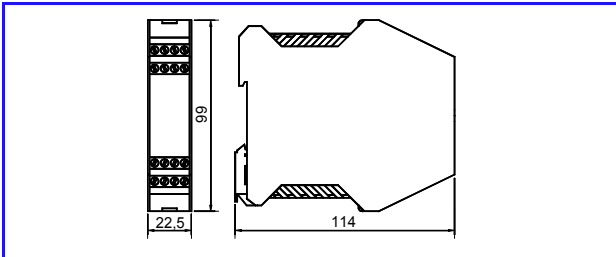


Safety Contacts

SR3C provides three force guided, redundant safety contacts (13-14, 23-24, 33-34, NO), and one auxiliary contact (41-42, NC).



| Technical Data | |
|---|--|
| Conforms to standards | VDE 0113 part 1: 1998-11, EN 60204-1:1997, IEC 60204-1:1997, EN 954-1:1996 |
| Operating voltage | AC/DC 24V An insulating transformer acc. to EN 60742 must be used. |
| Allowable tolerance | +/-10% |
| Power consumption | approx. 1,5VA |
| Control voltage at S11 | DC 24V |
| Control current | approx. 60mA |
| Safety contacts | 3 NO |
| Auxiliary contact | 1 NC |
| Switching voltage max. | AC 250V |
| Contact rating of safety contacts (13-14, 23-24, 33-34) Cumulative current | AC: 250V, 2000VA, 8A for AC-12 250V, 3A for AC-15 DC: 24V, 48W, 2A for DC-12 and DC-13 (con. 13-14 + 23-24 + 33-34): max. 15A |
| Contact rating of auxiliary contact (41-42) | AC: 250V, 500VA, 2A for AC-12 DC: 24V, 30W, 1,25A for DC-12 |
| Minimum current | 24V/20mA |
| External fuses for safety cont. | 6A slow-blow or 8A quick-blow |
| Wire width | max. 2,5mm ² |
| Length of control lines | max. 1000m at 0,75mm ² |
| Contact material | AgNi |
| Service life | mech. approx. 1x10 ⁷ , elec. 1x10 ⁵ switching cycles |
| Rated impulse withstand voltage | 2,5kV (control voltage/contacts) |
| Dielectric strength | 4kV acc. to DIN VDE 0110-1:1997-04 |
| Protection | IP20 |
| Temperature range | -15°C to +40°C |
| Weight | approx. 230g |
| Mounting | DIN-rail acc. to EN 50022-35 |



| Order No. | Type |
|-----------|-----------------|
| 472172 | SR3C, AC/DC 24V |

SR3C is an all-purpose emergency stop device which ensures the quick and safe deactivation of the moving parts of a machine in case of danger. Preferred applications include single and dual-channel emergency stop circuits and dual-channel safety gate or safety guard monitoring.

- ∅ STOP category: 0
- ∅ Up to safety category: 4
- ∅ Control: single or dual-channel
- ∅ Force guided safety contacts: 3
- ∅ Auxiliary contacts: 1
- ∅ Redundancy and cyclical monitoring
- ∅ Short-circuit monitoring and earth fault monitoring
- ∅ According to EN 60204-1, IEC 60204-1, EN 954-1



4

Application / Installation

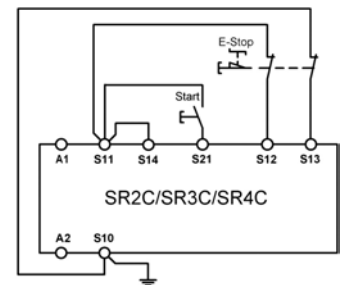
The device is designed according to EN 60204-1 (IEC 60204-1) for safety circuits and it may be applied up to safety category 4 according to EN954-1, provided that the start button is not replaced by a link. The force guided safety contacts will be opened by pressing the emergency stop button and so the machine is switched off safely. It is ensured that the occurrence of a single fault does not result in a loss of the safety function and that every fault will be recognized by the cyclical self monitoring at the latest when the device is switched off and shall be switched on again.

According to EN 60204-1 the unit is designed to be used in switch cabinets with a minimum environmental protection of IP54. The mounting is made on a 35 mm DIN-rail.

Provided that the system has been installed properly, no maintenance is necessary.

Dual-Channel Emergency Stop with Short-Circuit Monitoring and Earth Fault Monitoring (up to Category 4)

To activate the cross short-circuit monitoring, S11 and S14 must be connected. The emergency stop button has to be looped into the lines S11-S12 and S10-S13. The start button connects S11 with S21. To activate the detection of earth faults, S10 needs to be connected to earth ground. After connecting the power supply to A1 and A2, the safety contacts can be actuated with the start button.



Dual-channel emergency stop application with short-circuit and earth fault monitoring

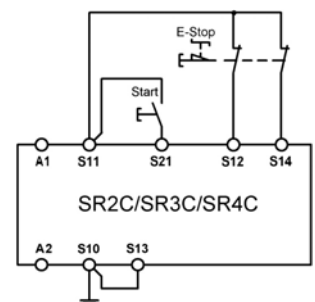
Safety Warnings



- Installation and operation must be carried out by qualified personnel only.
- The electrical installation must be performed after disconnecting the device and the machine from the mains supply.
- The wiring must be carried out according to the instructions of this operating manual, or the safety function may be lost.
- Opening the device, any manipulation of the device and the avoidance of the safety facilities are not permitted.
- All relevant safety regulations and standards must be attended to.
- Non-observance of the safety regulations may cause death, severe injuries or substantial damage to property.

Dual-Channel Emergency Stop, only with Earth Fault Monitoring, no Short-Circuit Monitoring (up to Category 3)

This application allows to reduce the wiring to the emergency stop button by one line, but the cross short-circuit monitoring is disabled. The terminals S10 and S13 are connected, the emergency stop button is looped into the lines S11-S12 and S11-S14. The start button connects S11 and S21. The earth fault monitoring is enabled by connecting S10 to earth ground.



Dual-channel emergency stop application with earth fault monitoring

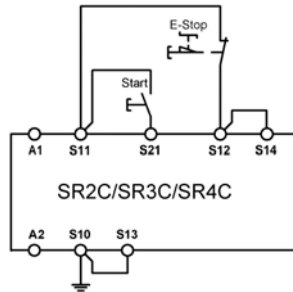


Safety Emergency Stop Relay SR3C (AC230/115V)



Single-Channel Emergency Stop (up to Category 1)

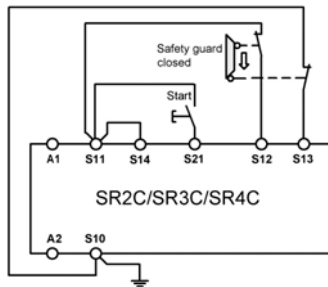
If the risk assessment acc. to EN 954-1 permits, the SR3C may be operated as an emergency stop relay with a single-channel push button. For this purpose, S10 and S13 as well as S12 and S14 must be connected. The single-channel emergency stop button is looped into the line S11-S12/S14. The earth fault monitoring is operative if S10 is connected to earth ground.



Single-channel emergency stop application with earth fault monitoring

Dual-Channel Safety Guard Monitoring with Short-Circuit Monitoring and Earth Fault Monitoring (up to Category 4)

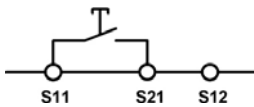
This application conforms to the dual-channel emergency stop, however, the emergency stop button is replaced by two limit switches which monitor the guard door. The limit switches must have positive opening NC contacts, i.e. in case of need they must cut off the electric connection by forcibly opening the switching contacts.



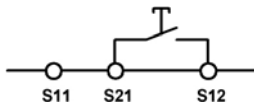
Dual-channel safety guard application with short-circuit monitoring and earth fault monitoring

Start Performance

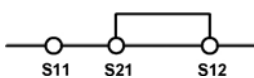
SR3C provides an input for a start push-button. When the start button is pressed the safety contacts are closed. Depending on the application and the demanded safety category it can be wired as follows:



Monitored manual start, up to category 4; it is monitored that the start button has been opened before the emergency button is closed.



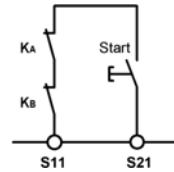
Manual start without monitoring, up to category 3



Automatic start (e.g. for safety gate application), up to category 3. Maximum allowable time difference when closing the safety switches at S12 and S13: S12 prior to S13: 50ms; S13 prior to S12: any time (infinite)

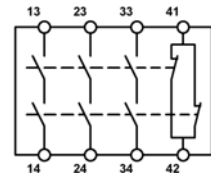
Feedback Circuit

The feedback circuit monitors contactors or the extension modules SREC or SRTC which are connected to the emergency stop relay. K_A , K_B are force guided contacts of the connected contactor or extension module, up to category 3.



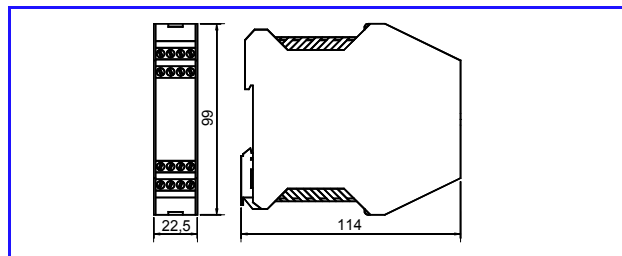
Safety Contacts

SR3C provides three force guided, redundant safety contacts (13-14, 23-24, 33-34, NO), and one auxiliary contact (41-42, NC).



Technical Data

| | |
|---|--|
| Conforms to standards | VDE 0113 part 1: 1998-11, EN 60204-1:1997, IEC 60204-1:1997, EN 954-1:1996 |
| Operating voltage | AC 230V, AC 115V, 50-60Hz |
| Allowable tolerance | +/-10% |
| Power consumption | approx. 7VA |
| Control voltage at S11 | DC 24V |
| Control current | approx. 60mA |
| Safety contacts | 3 NO |
| Auxiliary contact | 1 NC |
| Switching voltage max. | AC 250V |
| Contact rating of safety contacts (13-14, 23-24, 33-34) | AC: 250V, 2000VA, 8A for AC-12 250V, 3A for AC-15 DC: 50V, 400W, 8A for DC-12 24V, 3A for DC-13 |
| Cumulative current | (con. 13-14 + 23-24 + 33-34): max. 15A |
| Contact rating of auxiliary contact (41-42) | AC: 250V, 500VA, 2A for AC-12 DC: 50V, 100W, 2A for DC-12 |
| Minimum current | 24V/20mA |
| External fuses for safety cont. | 6A slow-blow or 8A quick-blow |
| Wire width | max. 2.5mm ² |
| Length of control lines | max. 1000m at 0,75mm ² |
| Contact material | AgNi |
| Service life | mech. approx. 1x10 ⁷ , elec. 1x10 ⁵ switching cycles |
| Rated impulse withstand voltage | 2,5kV (control voltage/contacts) |
| Dielectric strength | 4kV acc. to DIN VDE 0110-1:1997-04 |
| Protection | IP20 |
| Temperature range | -15°C to +40°C |
| Weight | approx. 230g |
| Mounting | DIN-rail acc. to EN 50022-35 |



| Order No. | Type |
|-----------|---------------|
| 472170 | SR3C, AC 230V |
| 472171 | SR3C, AC 115V |

Up to 3 additional safety contacts can be added with the safety expansion unit SREC. Thus an existing system can be expanded modularly by any number of additional contacts. The actuation is done by a safety contact of the basic emergency stop relay. The SREC provides auxiliary contacts for fault monitoring. The safety expansion units can be used in applications up to category 3 according to EN 954-1:1996.

- ∅ Stop category: 0
- ∅ Up to safety category: 3
- ∅ Control: basic device of the SR series
- ∅ Force guided safety contacts: 3
- ∅ Modular expandable emergency stop system
- ∅ Fault monitoring by basic device
- ∅ Redundancy and earth fault monitoring
- ∅ According to EN60204-1, VDE0113-1, EN954-1



Application / Installation

As many as desired SREC can be connected to a basic emergency stop relay, so the number of safety contacts can be customized to the individual needs.

The SREC in combination with a basic device was designed to comply with the requirements of EN 60204-1 for emergency stop devices, stop category 0, and the demands of EN 954-1, up to safety category 3.

A stand alone operating without a basic device is not possible. According to EN 60204-1 the unit is designed to be used in switch cabinets with a minimum environment protection of IP54. The mounting is made on a 35 mm DIN-rail.

Provided that the system has been installed properly, no maintenance is necessary.

Technical Design

The SREC has got force guided safety contacts so that faults can be recognized by the basic emergency stop relay via the auxiliary contacts S23-S24. The relays are actuated via the terminals S15 and S16. A further component of the unit produces a control voltage of DC 24V at terminal S11 which is connected to the actuating safety contact of the basic device. The supply voltage is applied to terminals A1 and A2. The SREC is available for the supply voltages AC 230V, AC 115V and AC/DC 24V.

Connection of a SREC to a Basic Device

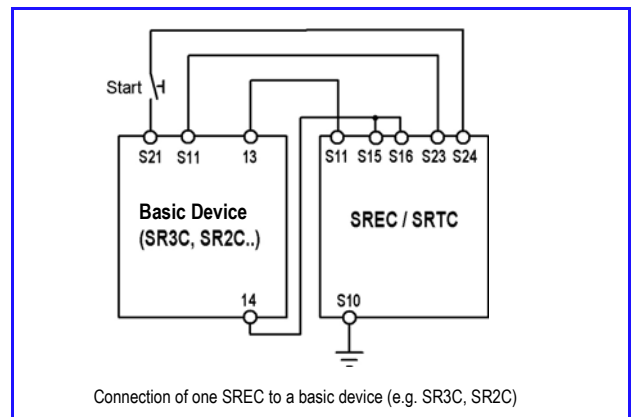
The connection of the expansion unit SREC to the basic device is made by only 4 lines: One safety contact of the basic device (e.g. 13-14) controls the relays of the SREC (S11 and S15/S16).

Two lines at S23 and S24 are needed for the feedback / fault monitoring. Through this a restart of the complete safety chain is inhibited if a fault in the SREC occurs. Besides of internal faults earth faults of the control lines are recognized, too.

Safety Warnings



- Installation and operation must be carried out by qualified personnel only.
- The electrical installation must be performed after disconnecting the device and the machine from the mains supply.
- The wiring must be carried out according to the instructions of this operating manual, or the safety function may be lost.
- Opening the device, any manipulation of the device and the avoidance of the safety facilities are not permitted.
- All relevant safety regulations and standards must be attended to.
- Non-observance of the safety regulations may cause death, severe injuries or substantial damage to property.



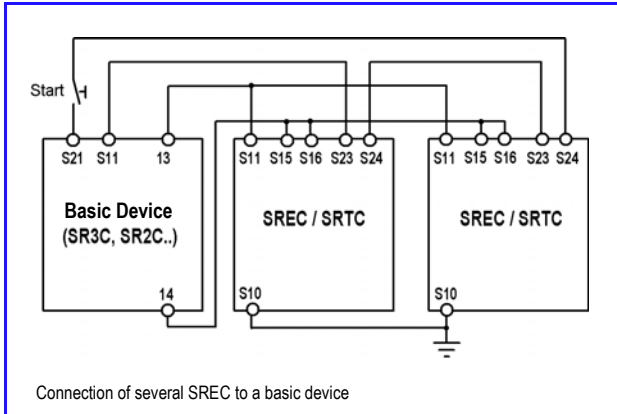


Safety Expansion Unit SREC



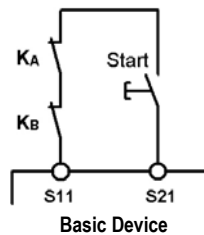
Connection of several SREC to a Basic Device

If more than one SREC shall be connected to a basic device, the terminals S11 of all expansion units must be connected in parallel as well as the terminals S15/S16.



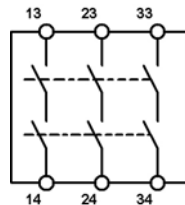
Feedback Circuit

Contactors connected to the SREC or the basic device are monitored via the feedback circuit. K_A , K_B are force guided contacts of the connected contactor or expansion module, up to category 3.

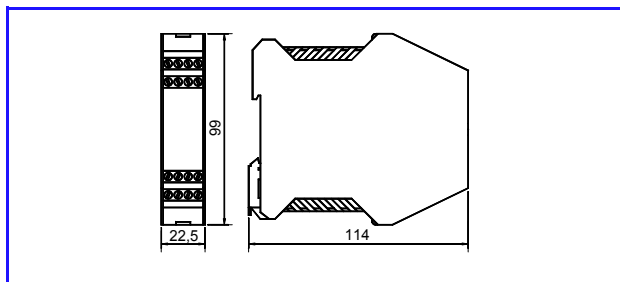


Safety Contacts

The SREC provides three force guided redundant safety contacts (13-14, 23-24, 33-34, NO).



| Technical Data | |
|--|---|
| Conforms to standards | VDE 0113 part 1: 1998-11, EN 60204-1:1997, IEC 60204-1:1997, EN 954-1:1996 |
| Operating voltage | AC 230V, AC 115V, AC/DC 24V At AC/DC 24V an insulating transformer acc. to EN 60742 must be used. |
| Allowable tolerance | +/-10% |
| Power consumption | approx. 4VA / 2W |
| Control voltage at S11 | DC 24V |
| Control current | approx. 40mA |
| Safety contacts | 3 NO |
| Auxiliary contacts | 1 NC, only usable as a monitoring contact for the basic device |
| Switching voltage max. | AC 250V |
| Contact rating of safety contacts (13-14, 23-24) | AC: 250V, 1500VA, 6A for AC-12 230V, 4A for AC-15 DC: 24V, 30W, 1.25A for DC-12 24V, 30W, 2A for DC-13 |
| Minimum current | 24V/20mA |
| External fuses for safety cont. | 4A slow-blow or 6A quick-blow |
| Wire width | max. 2,5mm ² |
| Length of control lines | max. 1000m at 0,75mm ² |
| Contact material | AgNi |
| Service life | mech. approx. 1x10 ⁷ , elec. 1x10 ⁵ switching cycles |
| Rated impulse withstand voltage | 2,5kV (control voltage/contacts) |
| Dielectric strength | 4kV acc. to DIN VDE 0110-1:1997-04 |
| Protection | IP20 |
| Temperature range | DC 24V: -15°C to +60°C AC 230V/115V: -15°C to +40°C |
| Weight | approx. 230g |
| Mounting | DIN-rail acc. to EN 50022-35 |



| Best-Nr | Artikel |
|---------|-----------------|
| 472180 | SREC, AC 230V |
| 472181 | SREC, AC 115V |
| 472182 | SREC, AC/DC 24V |

SRTC is an expansion unit which can be used with any basic unit of the SR series to enable a delayed shutdown of machine components. This function is required e.g. to move a machine tool back to its start position, if this is safer than directly stopping the drive unit. SRTC was designed as a component of a modular system: any combination of one or more SRTC and non-delayed expansion units SREC may be connected to each other by a few wires, making it possible to realize a total system with several different delay-times and the individually needed number of safety contacts.

- ∄ Stop category: 1
- ∄ Up to safety category: 3
- ∄ Control: basic device of the SR series
- ∄ Force guided safety contacts with time-delay: 3
- ∄ Modular expandable and combinable emergency stop system
- ∄ Fault monitoring by basic device
- ∄ According to EN60204-1, VDE0113-1, EN954-1



Application / Installation

As many as desired SRTC can be connected to a basic emergency stop relay, so the number of safety contacts can be customized to the individual needs.

If the basic device is activated the output relays of the SRTC are directly switched on. If the emergency button is pressed the basis device are switched off immediately, however, the output relays of the SRTC will be switched off after the delay time adjusted at the potentiometer has elapsed. The supply voltage must remain applied during the timing period.

The SREC in combination with a basic device was designed to comply with the requirements of EN 60204-1 for emergency stop devices, stop category 1, and the demands of EN 954-1, up to safety category 3.

A stand alone operating without a basic device is not possible. According to EN 60204-1 the unit is designed to be used in switch cabinets with a minimum environment protection of IP54. The mounting is made on a 35 mm DIN-rail.

Provided that the system has been installed properly, no maintenance is necessary.

Technical Design

The SRTC has got force guided safety contacts so that faults can be recognized by the basic emergency stop relay via the auxiliary contacts S23-S24. The relays are actuated via the terminals S15 and S16.

Using electronic components, a very high repeat accuracy of the adjusted time is achieved. In order to obtain the required degree of safety, all functional units are designed redundant and with diversity. At the terminal S11 a control voltage of DC 24V is provided which is connected to the actuating safety contact of the basic device. The supply voltage is applied to terminals A1 and A2. The SRTC is available for the supply voltages AC 230V, AC 115V and AC/DC 24V.

Connection of a SREC to a Basic Device

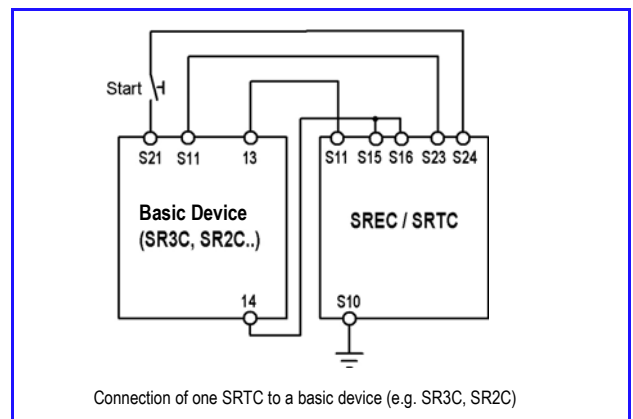
The connection of the expansion unit SRTC to the basic device is made by only 4 lines: One safety contact of the basic device (e.g. 13-14) controls the relays of the SRTC (S11 and S15/S16).

Two lines at S23 and S24 are needed for the feedback / fault monitoring. Through this a restart of the complete safety chain is inhibited if a fault in the SRTC occurs. Besides of internal faults earth faults of the control lines are recognized, too.

Safety Warnings



- Installation and operation must be carried out by qualified personnel only.
- The electrical installation must be performed after disconnecting the device and the machine from the mains supply.
- The wiring must be carried out according to the instructions of this operating manual, or the safety function may be lost.
- Opening the device, any manipulation of the device and the avoidance of the safety facilities are not permitted.
- All relevant safety regulations and standards must be attended to.
- Non-observance of the safety regulations may cause death, severe injuries or substantial damage to property.



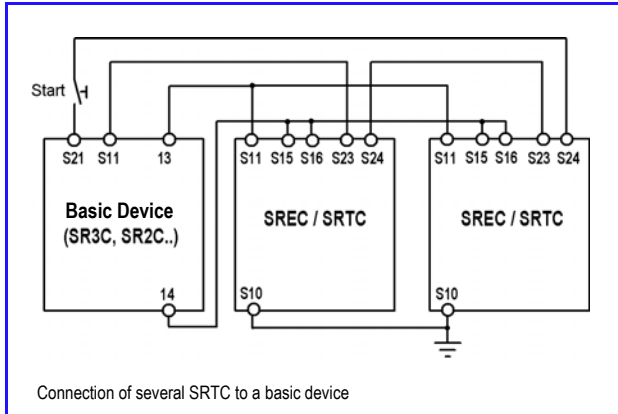


Time-Delayed Safety Expansion Unit SRTC



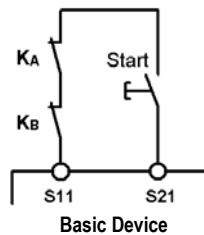
Connection of several SRTC to a Basic Device

If more than one SRTC shall be connected to a basic device, the terminals S11 of all expansion units must be connected in parallel, as well as the terminals S15/S16.



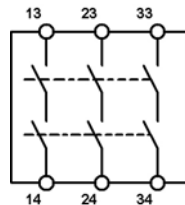
Feedback Circuit

Contactors connected to the SRTC or the basic device are monitored via the feedback circuit. K_A , K_B are force guided contacts of the connected contactor or expansion module, up to category 3.

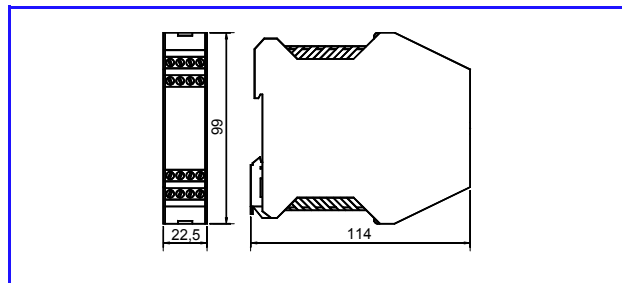


Safety Contacts

The SRTC provides three force guided redundant safety contacts (13-14, 23-24, 33-34, NO).



| Technical Data | |
|---|--|
| Conforms to standards | VDE 0113 part 1: 1998-11, EN 60204-1:1997, IEC 60204-1:1997, EN 954-1:1996 |
| Operating voltage | AC 230V, AC 115V, AC/DC 24V At AC/DC 24V an insulating transformer acc. to EN 60742 must be used. |
| Allowable tolerance | +/-10% |
| Power consumption | approx. 4VA / 2W |
| Delay time | 1 to 30s, continuously adjustable |
| Control voltage at S11 | DC 24V |
| Control current | approx. 40mA |
| Safety contacts | 3 NO |
| Auxiliary contacts | 1 NC, only usable as a monitoring contact for the basic device |
| Switching voltage max. | AC 250V |
| Contact rating of safety contacts (13-14, 23-24, 33-34) | AC: 250V, 1500VA, 6A for AC-12 230V, 4A for AC-15 Cumulating current through all 3 contacts: 10.5A/120V; 6A/250V DC: 24V, 30W, 1.25A for DC-12 24V, 30W, 2A for DC-13 |
| Minimum current | 24V/20mA |
| External fuses for safety cont. | 4A slow-blow or 6A quick-blow |
| Wire width | max. 2,5mm ² |
| Length of control lines | max. 1000m at 0,75mm ² |
| Contact material | AgNi |
| Service life | mech. approx. 1x10 ⁷ , elec. 1x10 ⁵ switching cycles |
| Rated impulse withstand voltage | 2,5kV (control voltage/contacts) |
| Dielectric strength | 4kV acc. to DIN VDE 0110-1:1997-04 |
| Protection | IP20 |
| Temperature range | DC 24V: -15°C to +60°C AC 230V/115V: -15°C to +40°C |
| Weight | approx. 230g |
| Mounting | DIN-rail acc. to EN 50022-35 |



| Best-Nr | Artikel |
|---------|-----------------|
| 472190 | SRTC, AC 230V |
| 472191 | SRTC, AC 115V |
| 472192 | SRTC, AC/DC 24V |

SR4C is a safety emergency stop relay which combines non-time-delayed and time-delayed contacts in just one compact housing. So the dangerous parts of a machinery can be switched off quickly and safely in case of an emergency situation. At the same time other circuits still can be supplied with power for up to 30 seconds, for example to move a tool into the initial position or to slow down running parts by a brake.

- ∅ STOP category: 0 (non-time-delayed), 1 (time-delayed)
- ∅ Up to safety category: 4
- ∅ Control: single or dual-channel
- ∅ Force guided safety contacts: 4
- ∅ 3 non-time-delayed and 1 time-delayed contact or 2 non-delayed and 2 delayed contacts or 1 non-delayed and 3 delayed contacts
- ∅ Continuously adjustable delay-time, 1 to 30s
- ∅ Extremely compact housing, width just 22,5 mm
- ∅ Redundancy and cyclical monitoring
- ∅ Short-circuit monitoring and earth fault monitoring
- ∅ According to EN 60204-1, IEC 60204-1, EN 954-1



Application / Installation

In case of danger the **SR4C** can disconnect quickly and safely the moving parts of a machine by switching off the entire main circuits with the non-time-delayed relay contacts. The SR4C provides additional time-delayed contacts. These come into operation if it is safer to supply some parts of a machine with power after pressing the emergency stop button.

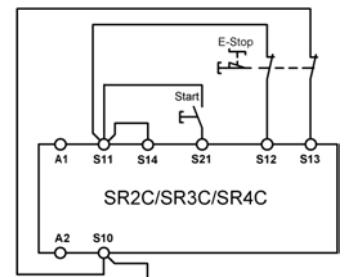
The device is designed according to EN 60204-1 (IEC 60204-1) for safety circuits and it may be applied up to safety category 4 according to EN954-1, provided that the start button is not replaced by a link. It is ensured that the occurrence of a single fault does not result in a loss of the safety function and that every fault will be recognized by the cyclical self monitoring at the latest when the device is switched off and shall be switched on again.

The time-delayed contacts are switched on simultaneously with the non-time-delayed contacts, however, when pressing the emergency stop button they will be switched off after the delay-time adjusted at the potentiometer (1 to 30s) has elapsed.

Acc. to EN 60204-1 the unit is designed to be used in switch cabinets with a minimum environment protection of IP54. The mounting is made on a 35 mm DIN-rail. Provided that the system has been installed properly, no maintenance is necessary.

Dual-Channel Emergency Stop with Short-Circuit Monitoring and Earth Fault Monitoring (up to Category 4)

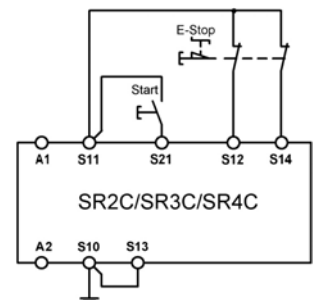
To activate the cross short-circuit monitoring, S11 and S14 must be connected. The emergency stop button has to be looped into the lines S11-S12 and S10-S13. The start button connects S11 with S21. To activate the detection of earth faults, S10 needs to be connected to earth ground. After connecting the power supply to A1 and A2, the safety contacts can be actuated with the start button.



Dual-channel emergency stop application with short-circuit and earth fault monitoring

Dual-Channel Emergency Stop, only with Earth Fault Monitoring, no Short-Circuit Monitoring (up to Category 3)

This application allows to reduce the wiring to the emergency stop button by one line, but the cross short-circuit monitoring is disabled. The terminals S10 and S13 are connected, the emergency stop button is looped into the lines S11-S12 and S11-S14. The start button connects S11 and S21. The earth fault monitoring is enabled by connecting S10 to earth ground.



Dual-channel emergency stop application with earth fault monitoring



Safety Warnings

- Installation and operation must be carried out by qualified personnel only.
- The electrical installation must be performed after disconnecting the device and the machine from the mains supply.
- The wiring must be carried out according to the instructions of this operating manual, or the safety function may be lost.
- Opening the device, any manipulation of the device and the avoidance of the safety facilities are not permitted.
- All relevant safety regulations and standards must be attended to.
- Non-observance of the safety regulations may cause death, severe injuries or substantial damage to property.

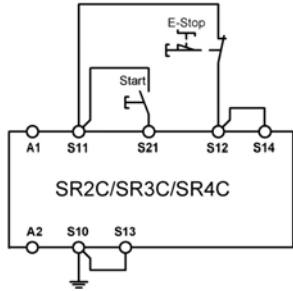


Time-Delayed Emergency Stop Relay SR4C



Single-Channel Emergency Stop (up to Category 1)

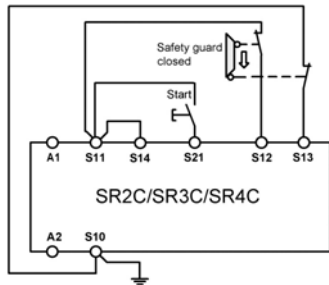
If the risk assessment acc. to EN 954-1 permits, the SR4C may be operated as an emergency stop relay with a single-channel push button. For this purpose S10 and S13 as well as S12 and S14 must be connected. The single-channel emergency stop button is looped into the line S11-S12/S14. The earth fault monitoring is operative if S10 is connected to earth ground.



Single-channel emergency stop application with earth fault monitoring

Dual-Channel Safety Guard Monitoring with Short-Circuit Monitoring and Earth Fault Monitoring (up to Category 4)

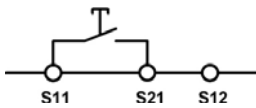
This application conforms to the dual-channel emergency stop, however, the emergency stop button is replaced by two limit switches which monitor the guard door. The limit switches must have positive opening NC contacts, i.e. in case of need they must cut off the electric connection by forcibly opening the switching contacts.



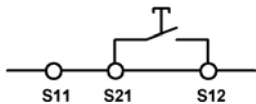
Dual-channel safety guard application with short-circuit monitoring and earth fault monitoring

Start Performance

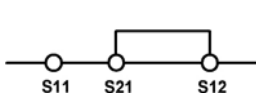
SR4C provides an input for a start push-button. When the start button is pressed the safety contacts are closed. Depending on the application and the demanded safety category it can be wired as follows:



Monitored manual start, up to category 4; it is monitored that the start button has been opened before the emergency button is closed.



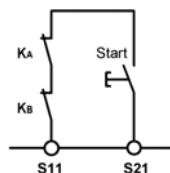
Manual start without monitoring, up to category 3



Automatic start (e.g. for safety gate application), up to category 3.
Maximum allowable time difference when closing the safety switches at S12 and S13:
S12 prior to S13: 50ms;
S13 prior to S12: any time (infinite)

Feedback Circuit

The feedback circuit monitors contactors or the extension modules SREC or SRTC which are connected to the emergency stop relay. K_A, K_B are force guided contacts of the connected contactor or extension module, up to category 3.



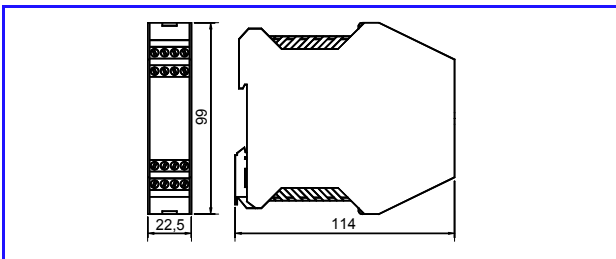
Safety Contacts

SR4C is available in three variants:

- 3 non-time-delayed and 1 time-delayed safety contact
 - 2 non-time-delayed and 2 time-delayed safety contacts
 - 1 non-time-delayed and 3 time-delayed safety contacts
- The terminal diagram can be seen in the following picture.

| | | |
|---|--|--|
| | | |
| <p>SR4C with 3 non-time-delayed and 1 time-delayed contact (Order No. 472212)</p> | <p>SR4C with 2 non-time-delayed and 2 time-delayed contacts (Order No. 472222)</p> | <p>SR4C with 1 non-time-delayed and 3 time-delayed contacts (Order No. 472232)</p> |

| Technical Data | |
|--|--|
| Conforms to standards | VDE0113 part 1: 1998-11, EN60204-1:1997, IEC 60204-1, EN954-1:1996 |
| Operating voltage | AC/DC24V An insulating transformer acc. to EN 60742 must be used. |
| Allowable tolerance | +/-10% |
| Power consumption | approx. 4.6W |
| Control voltage at S11 | DC24V |
| Control current | approx. 190mA |
| Safety contacts | 4 NO (2n/d, 1d; 2n/d, 2d; 1n/d, 3d) |
| Switching voltage max. | AC250V |
| Contact rating of safety contacts (13-14, 23-24, 33-34, 43-44) Cumulative current | AC: 250V, 2000VA, 8A for AC-12 250V, 3A for AC-15 DC: 24V, 48W, 2A for DC-12 and DC-13 (con. 13-14 + 23-24 + 33-34 + 33-44): max. 15A |
| Delay-time | 1 to 30s, continuously adjustable |
| Minimum current | 24V/20mA |
| External fuses for safety cont. | 6A slow-blow or 8A quick-blow |
| Wire width | max. 2,5mm ² |
| Length of control lines | max. 1000m at 0,75mm ² |
| Contact material | AgNi |
| Service life | mech. approx. 1x10 ⁷ , elec. 1x10 ⁵ switching cycles |
| Rated impulse withstand voltage | 2,5kV (control voltage/contacts) |
| Dielectric strength | 4kV acc. to DIN VDE 0110-1:1997-04 |
| Protection | IP20 |
| Temperature range | -15°C to +40°C |
| Weight | approx. 230g |
| Mounting | DIN-rail acc. to EN 50022-35 |



| Order No. | Type |
|-----------|--|
| 472212 | SR4C, AC/DC 24V, 3 non-delayed / 1 delayed 1-30s |
| 472222 | SR4C, AC/DC 24V, 2 non-delayed / 2 delayed 1-30s |
| 472232 | SR4C, AC/DC 24V, 1 non-delayed / 3 delayed 1-30s |

Emergency stop circuits control and shuts down the machines dangerous parts fast, safely and reliably, which is indispensable to the protection of both man and machine. The safety relay SR1 completes these main functions, as the main power circuits are switched by a control circuit equipped with force guided and redundant relay contacts i.e. dual safety. During each ON/OFF cycle, an automatic function monitoring takes place to ensure the relevant equipment cannot be switched on in the event of failure of a safety circuit (selfmonitoring).



- ⊄ Safety category 3
- ⊄ Stop category 0
- ⊄ Forced guided contacts, redundancy and cyclical monitoring
- ⊄ One or two channel emergency stop circuit
- ⊄ Shorting to ground monitoring
- ⊄ Conforms to EN60204-1, VDE0113-1, EN954-1
- ⊄ **Max. switching voltage: AC 400V**
- ⊄ Cross short-circuit monitoring



Application

The safety relay **SR1** is designed to be used in safety power circuits in compliance with EN 60204-1: 1992. Section 9.2 of this standard defines the conditions governing the design of power circuits with safety functions. For the **SR1** in particular the demands of EN60204-1 for switching-OFF, stop and emergency-stop were taken into consideration. By the utilized technic the stop-category 0 is reached.

A single-fault occurrence does NOT lead to the loss of the safety-function. It will be recognized at or before the next requirement of the safety function.

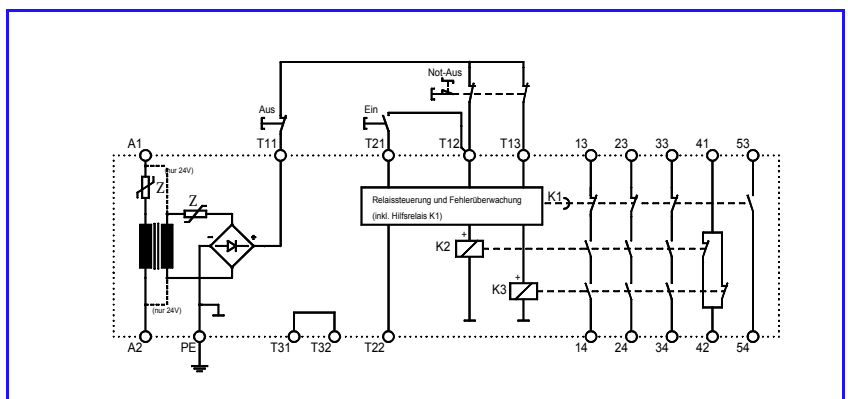
Preferred applications include one and two channel emergency stop circuits and two channel safety gate monitoring. The secondary 0V potential is made available at the PE connection, for instance, for insulation monitoring or as a reference potential for external connection of the control current circuit. Additional auxiliary contacts, which can also be connected to the control signals to increase redundancy, are routed to the terminals 41, 42, 53, 54.

Two channel emergency stop

After applying the rated voltage to A1 and A2, control voltage is supplied from T11 to K1 by means of the ON button. K1 picks up and switches on the relays K1 and K2 with K1.1 and K2.2. Both relays assume self-holding and by the way of the n/c contacts K2.1 and K3.1, they disconnect the voltage from K1. K1 drops out after a delay of approx 150ms. This drop-out delay ensures that K2 and K3 reliably assume soft holding condition.

In this switching status, the output contacts 13-14, 23-24, 33-34 are closed, 41-42 and 53-54 open, the LED's K2 and K3 light. By operating the emergency stop switch or the OFF switch, K2 and K3 are disconnected from the control voltage, the contacts 13-14, 23-24, 33-34 open and the contact 41-42 closes.

The safety power circuit also remains effective when a contact (e.g. T12) of the emergency stop switch does not open. In this case only K3 assumes the normal position. As a result, 13-14, 23-24, 33-34 open and contact 41-42 closes. The safety relay can only be switched on again when both auxiliary relays K2 and K3 are in the normal position.



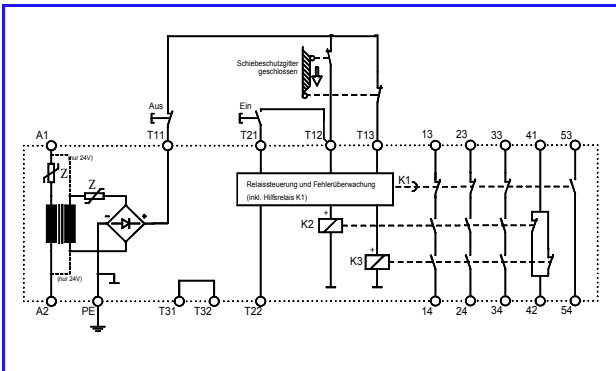


Safety Emergency Stop Relay SR1



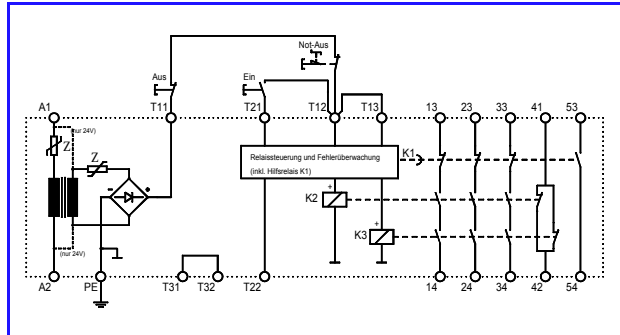
Two channel safety guard monitoring with cross short circuit and ground monitoring.

The position of the safety gate is monitored by two limit switches, which are connected to channel 1 and 2 or T12 and T13. When the safety gate is closed, voltage is applied to K1 via the ON switch. K2 and K3 are switched on by K1.1 and K1.2. Both relays K2 and K3 switch off K1. K1 drops out with a delay of approx. 150ms. The contacts 13-14, 23-24, 33-34 are closed, 41-42 and 53-54 are open, the LED K2 and K3 light. When the safety gate is opened K2 and K3 drop out. Contacts 13-14, 23-24, 33-34 open and the contact 11-12 closes. After closing the safety gate, the safety relay can be switched on via the ON switch. At least one of the limit switches should be positive force opening.

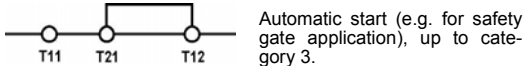
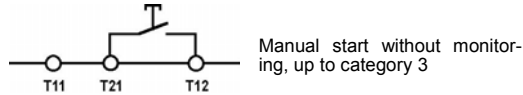


One channel emergency stop

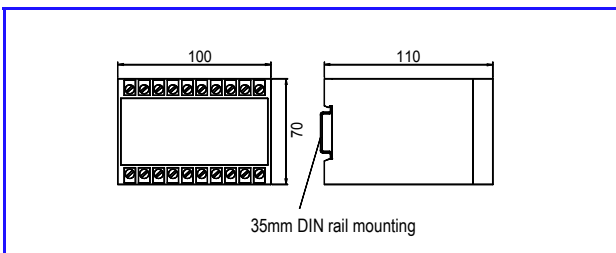
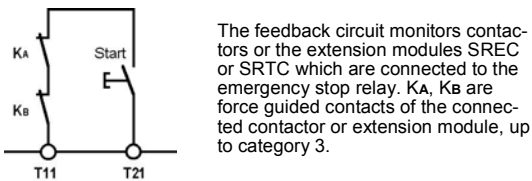
A jumper must be connected between T12 and T13 when using a single channel emergency stop switch. The redundancy requirement with regards to the emergency stop switch is not fulfilled by single-channel push button.



Start Performance



Feedback Circuit



| Specifications | |
|--|--|
| Conforms to | VDE0113 Teil 1: 1998-11, EN60204-1:1997 EN954-1:1996 |
| Operating voltage | AC230V, AC115V, DC24V Attention to DC 24V-Type: It is recommended to connect the DC 24V-type to a (control) transformer in accordance with VDE 0551 / EN 60742 |
| Voltage tolerance | +/-10% |
| Power consumption | approx. 6VA |
| Control voltage on T11 | DC24V |
| Control current | approx. 100mA |
| Safety Contacts | 3 N/O safety-contacts |
| Auxiliary contacts | 1 N/C and N/O contact |
| Max. switching voltage | AC400V / DC 230V |
| Switching capacity of contacts | Safety contacts: AC: 250V, 2000VA, 8A at AC-12 230V, 4A at AC-15 DC: 24V, 120W, 5A at DC-12 24V, 2A at DC-13 Auxiliary contact 41-42: AC: 250V, 500VA, 2A at AC12 DC: 24V, 30W, 1,25A at DC13 |
| Min. current (contacts): | 24V, 20mA |
| Fuse external (contacts) | 6A |
| Time delay at K1 | approx. 150ms |
| Max. length of cables T11 <-> T12, T13, T21 | 1000m at 0,75mm ² |
| Mechanical life | 1 x 10 ⁷ switching operations |
| Electrical service life | 1 x 10 ⁵ switching operations |
| Dielectric strength | 4kV DIN VDE 0110-1:1997-04 |
| Protection | IP20 |
| Temperature range | -15°C to +55°C |
| Weight | approx. 700g |
| Mounting | DIN rail DIN EN 50022-35 or Screen Mounting |

| Order-No | Type |
|----------|-------------|
| 472000 | SR1, AC230V |
| 472001 | SR1, AC115V |
| 472002 | SR1, DC24 |

The **S2HC** is a very compact all-purpose two-hand control unit conforming to the requirements of EN574, type III C. It is designed for the use in safety circuits in accordance to EN60204-1, e.g. in presses, stamping machines or bending tools. Despite its compact dimensions the S2HC is suitable for any application up to the highest safety category 4 according to EN954-1 and type III C according to EN574 due to the internal error monitoring.

- ∓ STOP category: 0
- ∓ Up to safety category: 4 / III C
- ∓ Two-channel control system
- ∓ Very compact housing 22.5 mm
- ∓ 2 force-guided contacts
- ∓ Redundancy and cyclical monitoring
- ∓ Cross short-circuit monitoring
- ∓ Conforms to EN574, EN954-1, EN60204-1, VDE0113-1



Application

The safety two - hand control unit **S2HC** is suitable for the construction and monitoring of two-hand controls providing the safety of the operating personnel. Operations jeopardizing the operator's safety are only actuated if both two-hand switch buttons are connected and pressed at the same time, i.e. within 0.5 s.

A single failure will **not** result in a loss of the safety function. Due to the cyclical monitoring, the failure will be detected at last before the next actuation. In addition to the requirements of EN60204-1 and EN574, the **S2HC** also meets the requirements for the safety category 4 of EN954-1. In accordance to EN60204-1 the device is designed for the installation into service cabinets with a minimum protection of IP54.

To avoid inadvertent activation of the switch buttons and easy bypassing of the protective function, the switches of the two-hand control have to be arranged and designed accordingly. **The relevant safety regulations and standards must be attended, especially EN 574 and EN 999.**

The **S2HC** is designed for the connection to two-hand switch buttons with a break (N/C) and a make contact (N/O) each.

Function

After applying operating voltage to A1-A2 and closing the feedback circuit, the **S2HC** is ready for operation. The output relays must be in the de-energized condition in order to be able to initialise a switching operation. The output relays switch over to their working position when the two-hand switch buttons T1 and T2 are activated simultaneously, i.e. within 0.5 s. The output relays will not switch on,

- if the two-hand switch buttons are not activated simultaneously within 0.5s
- if the feedback circuit is open (failure at the external contactors)
- if any other failure has occurred (short-circuit, cable break, internal failure of the two-hand control unit).

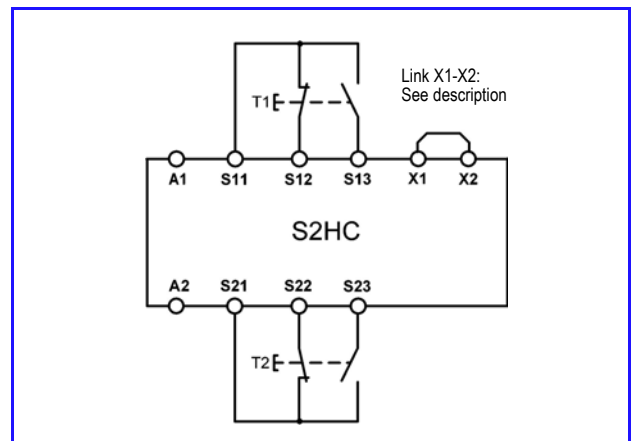
As soon as T1 and/or T2 are released, the output relays return to their de-energized condition. To actuate a new operation, both two-hand switch buttons must be released and the feedback circuit must be closed again.

Due to the feedback circuit, the monitoring of external contactors or relays is possible to increase the number of contacts or enhance the switching capacity. If no external contactors or extension units are used the terminals X1 and X2 must be connected to each other. Provided that the system has been installed properly, no maintenance is necessary.

Safety Warnings



- Installation and operation must be carried out by qualified personnel only.
- The electrical installation must be performed after disconnecting the device and the machine from the mains supply.
- The wiring must be carried out according to the instructions of this operating manual, or the safety function may be lost.
- Opening the device, any manipulation of the device and the avoidance of the safety facilities are not permitted.
- All relevant safety regulations and standards must be attended to.
- Non-observance of the safety regulations may cause death, severe injuries or substantial damage to property.



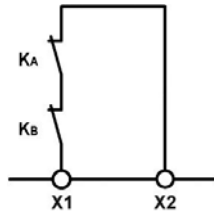


Safety Two-Hand-Control Unit S2HC



Feedback circuit X1-X2

If external contactors or extension modules (e.g. SREC) shall be connected to the two hand control unit in order to increase the number of contacts or enhance the switching capacity, their force-guided monitoring contacts K_A and K_B must be wired in series and connected to X1 and X2.



Avoiding inadvertent actuation or bypassing the safety function

According to the standard EN 574, the arrangement of the two-hand switch buttons must be carried out in a way that an inadvertent actuation or an easy bypassing of the safety function is impossible. The actuation of both buttons with only one hand must be inhibited by a sufficient distance between them (min. 260 mm) or by a partition wall. The operation with the forearm, elbow, knee, hip or other parts of the body can be inhibited effectively by further increasing of the distance, sufficient distance to the floor and/or covers and/or partition walls.

Distance between the two-hand switch button and the danger zone

It is required to keep a minimum distance between the two-hand switch buttons and the danger zone of the machine. After releasing of one or both buttons the dangerous movement of the machine must have stopped before the danger zone can be reached.

According to the standard EN999 the minimum distance can be calculated with the following equation:

$$S = (K \Delta T) + C$$

The identifiers mean:

- S:** Minimum distance measured between the nearest actuator component (two-hand switch button) and the danger zone
 - K:** Constant (mm/s), derived from data about the approach speeds of the body or parts of the body, 1600 mm/s for two-hand controls.
 - T:** Running-down time of the complete system (seconds), i.e. the time between the release of the two-hand switch button and the termination of the dangerous movement.
 - C:** Additional distance (mm) based on the penetration into the danger zone before activation of the safety unit. This is 250 mm for two-hand controls. If a suitable cover is used, it may be set to 0, however, S must be 100 mm at minimum.
- Example:* The running-down time of the system is 90 s. The result of the equation provides the minimum distance:

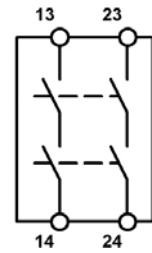
$$S = (1600 \text{ mm/s} \Delta 0,09 \text{ s}) + 250 \text{ mm}$$

$$S = 144 \text{ mm} + 250 \text{ mm} = \mathbf{394 \text{ mm}}$$

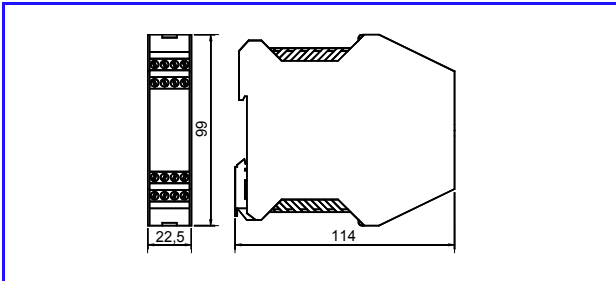
If a suitable cover is used, S can be reduced to 144 mm (see above).

Safety Contacts

S2HC provides two force-guided, redundant safety contacts (13-14, 23-24, NO).



| Specifications | |
|--|--|
| Conforms to | EN574:1996, VDE0113 part 1 / 07.98, EN60204-1:1998, EN954-1:1996 |
| Operating voltage | AC 230V, AC 115V, AC/DC 24V, frequency AC: 50-60 Hz At AC/DC 24V an insulating transformer acc. to EN 60742 must be used. |
| Allowable tolerance | +/-10% |
| Power consumption | approx. 4VA / 2W |
| Control voltage at S12/S13 and S22/S23 | DC 24V |
| Control current | Approx. 2x20 mA |
| Break time of the safety relays | < 20 ms |
| Safety contacts | 2 N/O |
| Max. switching voltage | AC250V |
| Switching capacity | AC: 250V, 1500VA, 6A (AC-12) 230V, 4A (AC-15) DC: 24V, 30W, 1.25A (DC-12) 24V, 30W, 2A (DC-13) |
| Min. load | 24V, 20mA |
| Contact protection | 4A slow fuse or 6A fast fuse |
| Wire width | 2,5mm ² |
| Length of control lines | Max. 1000m at 0,75mm ² |
| Contact material | AgNi |
| Service life | mech. 1x10 ⁷ , electr. 1x10 ⁵ switching cycles |
| Rated impulse withstand voltage | 2,5kV (control voltage/contacts) |
| Dielectric strength | 4kV acc. to DIN VDE 0110-1:1997-04 degree of pollution 2 |
| Protection | IP20 |
| Temperature range | AC/DC 24V: -15°C to +60°C AC 230V/115V: -15°C to +40°C |
| Weight | approx. 230g |
| Mounting | 35mm rail DIN EN 50022-35 |



| Order No. | Type |
|-----------|----------------|
| 472400 | S2HC, AC230V |
| 472401 | S2HC, AC115V |
| 472403 | S2HC, AC/DC24V |

The compact power supply unit NTSR is excellently qualified to be used as a power supply unit for small components of the safety technology, e.g. of the safety emergency stop relay SR3C or the safety two-hand operation relay S2HC. The NTSR is also just right as a supply unit in control applications, e.g. proximity switches, light barriers or sensors.



- ⊘ DC 24V / 70mA smoothed output voltage
- ⊘ Ultra compact size, 22.5mm DIN-housing
- ⊘ LED-display for secondary voltage
- ⊘ Mains filter included
- ⊘ Permanent short-circuit proof

The output terminals are existing twice, so on the secondary side several NTSR can be connected easily parallel or in series. Because of the integrated mains filter and the short-circuit proof transformer, processor controls can operate at the NTSR with noise immunity. The DC 24V-connection should be as short as possible and may not be placed near a high voltage transmission line or a high frequency line.

The supply unit is loadable up to 100mA. This is sufficient, in order to supply

- two emergency-stop-relays SR2C, SRLC, SRTC, SREC
- one emergency-stop-relay SR3C or S2HC.

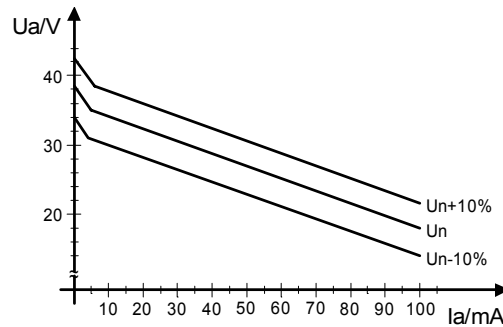


Fig 1: Output voltage in reliance on the output current

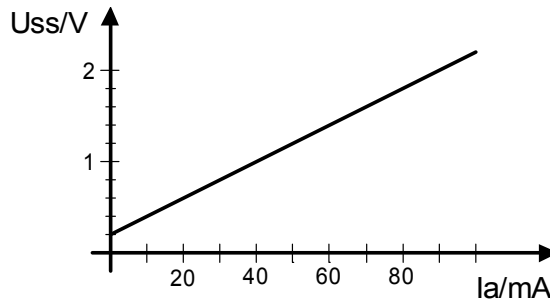
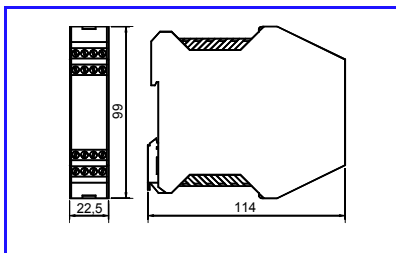


Fig 2: Residual ripple at Un



| Order-No | Type |
|----------|--------------|
| 471310 | NTSR, AC230V |
| 471311 | NTSR, AC115V |

| Specifications | |
|---------------------|---|
| Operating Voltage | AC230V, AC115V +/- 10% |
| Mains frequency | 50-60Hz |
| Power consumption | ca. 7VA |
| LED | green for operational (secondary voltage) |
| Output voltage | DC 24V unstabilized, smoothed, (see Fig.1) |
| Output current | $I_n=70\text{mA}$, max. 100mA |
| Residual ripple | see Fig. 2 |
| Dielectric strength | 4kV DIN VDE 0110-1:1997-04 |
| Protection | IP20 |
| Temperature range | -15°C bis +40°C at 100mA -15°C bis +60°C at 70mA |
| Weight | approx. 220g |
| Mounting | DIN rail (DIN EN 50022-35) |



TALOS®

4



The Plug & Play Safety System

TALOS - safety in any situation

For medium and larger machines you often have to consider various requirements and tasks regarding the security. Singular emergency stop switching devices usually do not suffice if several emergency stop buttons, protection gates or protection doors simultaneously have to be supervised. If a dangerous situation arises some parts of the machine have to stop immediately while others have to stop with delay, if for instance a deceleration process or a move backwards in the home position of a tool is necessary. Perhaps in a few cases of danger you have to stop only one part of the installation while the other stations can continue.

The solution for all these applications is **TALOS**, the **modular Plug & Play** Safety System.



„Real Plug & Play“

4

TALOS®

- Inputs/outputs can be extended as desired
- Self-configuration
- Safety category 4 according to EN954-1, SIL3 according to EN61508
- Monitoring of emergency stop, guard doors, safety light grids
- Non delayed and delayed safety contacts
- Monitored manual start or automatic start
- Combination/grouping without programming
- All modules pluggable vertically
- Perfect diagnostic by integrated serial interface

„Extendable as desired without programming + configuration“



Easy Plug & Play: TALOS Safety Module

TALOS is ideal for prevention of dangerous states at small, middle and large installations. Already the basic module is a complete security system with 2 dual-channel force guided input contacts and 3 force guided safety output contacts. Later on, an individual expansion is possible at anytime.

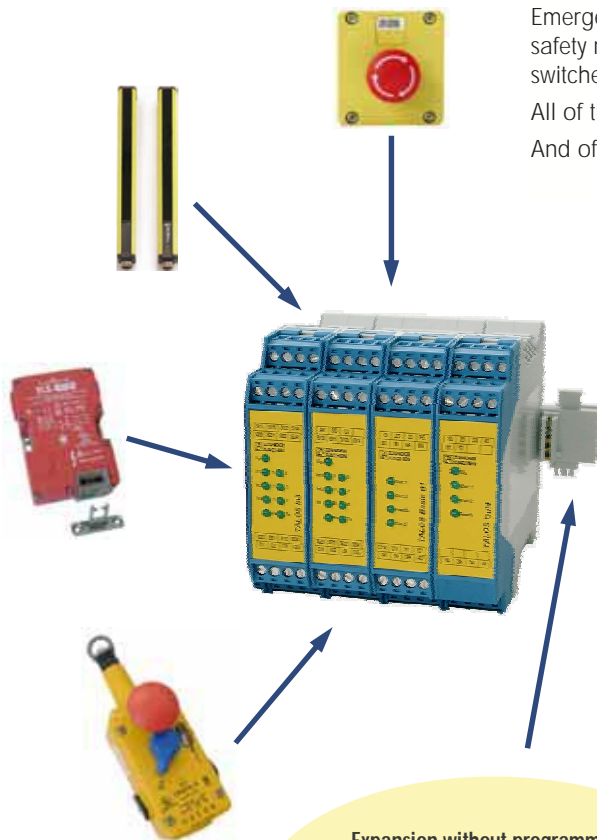
TALOS grows according to your installation: Just insert a new input or output module and the installation runs! **The system is self-configuring**, and the highest safety category 4 / SIL3 is maintained all the time. The modules communicate with each other via a bus connection in the 35mm DIN-rail. Simply by adjusting the modules - without programming - there are different functions and combinations realizable. For instance undelayed or delayed interruption or allocation of input and output modules to a group. Because the modules are pluggable vertically a perhaps necessary exchange is done in a few seconds.

In the TALOS bus integrated is a serial communication interface which offers a perfect diagnostic and fault detection. Downtime as the result of troubleshooting belongs to the past.



Each module is pluggable vertically and insertable without removing its neighbour modules. By removing one module the rest of the system is still functioning.

All safety switches are connectable to TALOS



Emergency stop bottom, safety switches, interlock switches, safety rope switches, safety light curtains, non contact safety switches...

All of them can be connected easily and directly to TALOS. And of course up to the highest safety category 4 / SIL3!



TALOS Know How

Expansion without programming:
If desired just plug-in additional input or output modules - that's all!
TALOS is self configuring.

Plugging instead of programming

All you have to learn:

1. Plug in input modules to the left of the TALOS basic module .

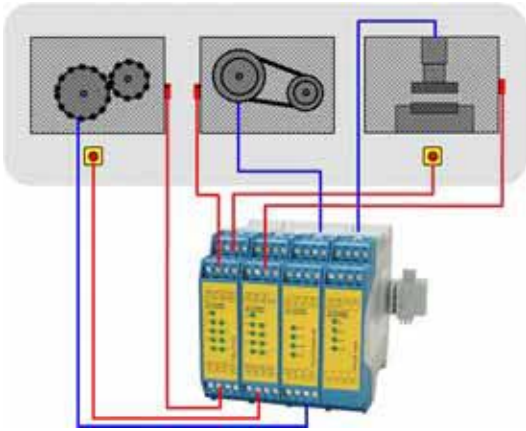


2. Plug in output modules to the right of the TALOS basic module.

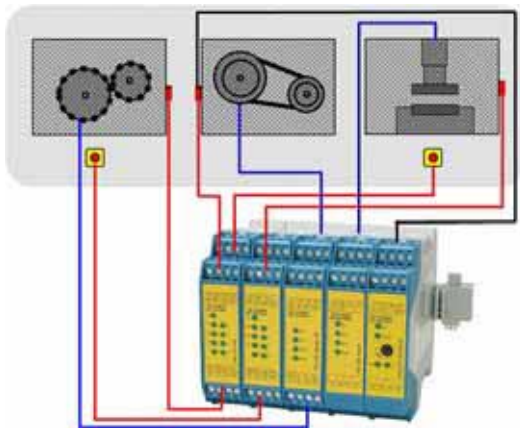
3. If desired: Specify end of the group with connection cable.

... Done !!

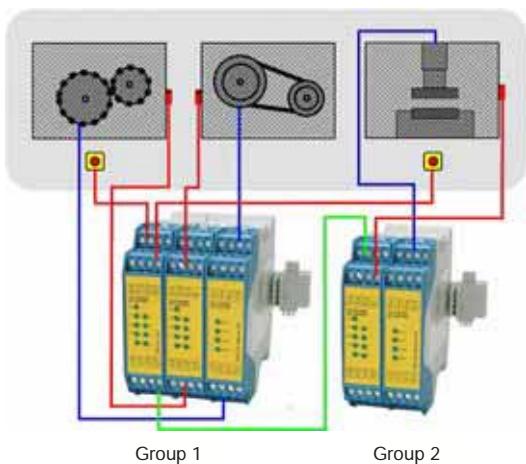
Application examples



Monitoring of 3 guard doors and 2 emergency stop switches, interruption of 3 drives.



Monitoring of 3 guard doors and 2 emergency stop switches, interruption of 3 drives, time-delayed opening of the middle guard door.



Group 1

Group 2

Monitoring of 3 guard doors and 2 emergency stop bottoms, interruption of 3 drives, grouping in 2 groups with higher-level stop switch

With TALOS an installation consisting of several guard doors, emergency stop bottoms and drives can be protected individually. The specified example shows that severe injuries caused by the moving machine parts are possible if the guard doors would be opened and the drives not reliably switched-off. And if furthermore a more frequent access to the dangerous area is necessary and a dangerous situation is not be signalled, then the complete safety installation needs to comply with the safety category 4 according to EN 954-1. With the TALOS system you fulfil these requirements without restrictions.

Without programming various functions are realizable with TALOS, e.g. if a time delayed output signal is needed then just the plugging of such a module is sufficient to realize for example the delayed opening of the guard door in connection with an interlock switch. The adjustment of the time-delay at the potentiometer is the only needed configuration.



Sometimes it makes sense to shut down just one special drive instead of the whole system, when a security door is opened. The figure shows that the left and the middle guard door belongs to group 1 and the right door to group 2. Each group has its own basic module, to which the necessary input and output modules are adjoined. Opening the left or the middle guard door causes the stop of the drives of group 1, while the punch behind the right guard door will still be running. Opening the right guard door causes the stop of the punch, but accordingly both drives of the group 1 will still be running. On the other hand both emergency stop switches will stop **all** drives. That shows the green connection cable in the figure – all input modules which are to the left of the green connection also have effect on group 2.

Save with TALOS

- No programming necessary, TALOS is self-configuring
- Already the basic module is a complete security system with inputs and outputs
- Fast and inexpensive installation by consistent plug-in technology
- Low cost modules
- Simple und fast extendable
- High speed exchange of the modules
- Complete pre-wiring is possible
- Just the necessary hardware will be installed
- Perfect diagnostic by signalling contact and communication via RS485, RS232, Profibus...



Benefit from combination discount

Reduce your costs. emergency stop - switching devices and safety switches fit together optimally

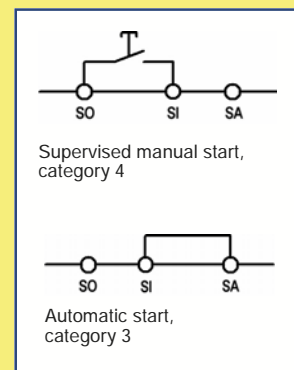
Order them together and get a combination discount.



Supervised start / automatic start

The basic module monitors the switching-on of the output modules. If the input modules give signal that all connected safety switches are closed, the output modules can be activated by pushing the start button which is connected to the basic module. This results in an error check procedure of the start button.

Alternatively the basic module can be used in the auto start mode, if for example safety doors are supervised or a two-hand input module is applied. Then the output modules will be automatically activated, as soon as all input modules are activated.



Perfect communication and diagnostic

For monitoring an installation by PC, PLC or a monitoring system, TALOS provides diagnostic information via the RS485 interface which is always integrated in the TALOS bus.

This way the switching status and also possible fault detection can be transferred to a PC or PLC and be visualized there. TALOS configures and addresses each module automatically.

Besides the always integrated RS485 interface a connection to Profibus or RS232 via TALOS-Gateway-Module is possible (in preparation).

A PC software package, which contains a complete description of the protocol and programming tools for every actual common programming language under Windows, can be downloaded for free

A communication module with web server function will be available, which enables any internet browser to control and diagnose the TALOS modules.

TALOS - perfect diagnostic - no downtime during troubleshooting.



BASIC B1

Basic module

Basic unit with 2 safety inputs, 3 safety outputs, several signal and communication functions. Extendable with all TALOS modules.



- Safety category 4
- Monitoring/Controlling of TALOS input / output modules
- 2 inputs, dual-channel
- 3 outputs
- Short circuit monitoring and earth fault monitoring
- 6 monitoring outputs
- Activation: manual or automatic
- RS485 interface

| Order-No | Type |
|---|----------------------------|
| 472500 | TALOS B1 Inputs 2 NC |
| 472501 | TALOS B1-A Inputs NC/NO |
| Operating voltage | |
| DC 24V, ± 10% | |
| Inputs / outputs | |
| 2 inputs, dual channel 3 safety outputs 6 semiconductor monitoring outputs Input for manual start Input for automatic start Input for group connection TALOS bus connection | |
| Switching capacity outputs | |
| AC: 250V, 2000VA, 8A*, AC-12 DC: 24V, 8A DC-12; 3A DC-13 | |
| According to | |
| EN60204-1, EN954-1, EN61508 | |

In2-G

Standard input module

with 2 dual channel inputs, 2 monitoring outputs, Diagnostic-LED and TALOS bus connection. Outputs for establishing safety groups.



- 2 inputs, dual-channel NC/NC
- Safety category 4
- Short circuit monitoring and earth fault monitoring
- 2 monitoring outputs
- Diagnostic LED's
- Only in combination with basic module B1
- Output group connection

| Order-No | Type |
|---|-------------|
| 472522 | TALOS In2-G |
| Operating voltage | |
| DC 24V via TALOS bus | |
| Inputs / outputs | |
| 2 inputs, dual-channel 2 semiconductor monitoring outputs Output group connection TALOS bus connection | |
| According to | |
| EN60204-1, EN954-1, EN61508 | |

In3

Standard input module

with 3 dual channel inputs, 3 monitoring outputs and diagnostic LED.



- 3 inputs, dual-channel NC/NC or NC/NO
- Safety category 4
- Short circuit monitoring and earth fault monitoring
- 3 monitoring outputs
- Diagnostic LED's
- Only in combination with basic module B1

| Order-No | Type |
|--|-----------------------------|
| 472511 | TALOS In3 Inputs NC/NC |
| 472523 | TALOS In3-A Inputs NC/NO |
| Operating voltage | |
| DC 24V via TALOS bus | |
| Inputs / outputs | |
| 3 inputs, dual-channel 3 semiconductor monitoring outputs TALOS bus connection | |
| According to | |
| EN60204-1, EN954-1, EN61508 | |

In3-6

Standard input modules

with 6 single-channel NC inputs, 3 monitoring outputs and diagnostic-LED.



- 6 Inputs, single-channel, NC
- Safety category 4
- earth fault monitoring
- 3 monitoring outputs
- Diagnostic LED's
- Only in combination with basic module B1

| Order-No | Type |
|--|-------------|
| 472510 | TALOS In3-6 |
| Operating voltage | |
| DC 24V via TALOS bus | |
| Inputs / outputs | |
| 6 inputs, single-channel 3 semiconductor monitoring outputs TALOS bus connection | |
| According to | |
| EN60204-1, EN954-1, EN61508 | |



Any questions?



.. Together we will find a solution

Hotline +49 / 5481 / 9385-21

In3-L

Light curtain input module

With 3 dual-channel inputs for the connection of safety light grids, 3 auxiliary outputs, diagnostic LED and TALOS bus connection.



- 3 inputs, dual-channel safety light grid connection
- Safety category 4
- Earth fault monitoring
- 3 monitoring outputs
- Diagnostic LED's
- Only in combination with basic module B1

| Order-No | Type |
|--|-------------|
| 472521 | TALOS In3-L |
| Operating voltage | |
| DC 24V via TALOS bus | |
| Inputs / outputs | |
| 3 inputs, dual-channel 3 semiconductor monitoring outputs TALOS bus connection | |
| According to | |
| EN60204-1, EN954-1, EN61508 | |

Out4

Standard output module

With 4 non delayed safety contacts, safety by redundant and force-guided contacts. TALOS bus connection.



- Stop category 0
- Safety category 4
- 4 safety contacts
- 3 safety / 1 fault monitoring contact
- Only in combination with basic module B1
- Diagnostic LED

| Order-No | Type |
|---|---|
| 472512 | TALOS Out4; 4 NO |
| 472514 | TALOS Out4-A; 3 NO/1NC auxiliary contact |
| Switching capacity | |
| AC: 250V, 2000VA, 8A*, AC-12 DC: 24V, 8A DC-12; 3A DC-13 | |
| Inputs / outputs | |
| 4 non delayed NO or 3 NO/1 NC TALOS bus connection | |
| According to | |
| EN60204-1, EN954-1, EN61508 | |

DelOut4

Timer output module

With 4 signal off-delayed safety contacts, safety by redundant and force-guided contacts. TALOS bus connection.



- Stop category 1
- Safety category 4
- 4 delayed safety contacts
- 1..30s variabel or 0,5s fixed
- 1 monitoring output
- Only in combination with basic module B1
- Diagnostic LED

| Order-No | Type |
|--|----------------------------------|
| 472513 | TALOS DelOut4 1..30s variabel |
| 472515 | TALOS DelOut4-A 0.5s fixed |
| Switching capacity | |
| AC: 250V, 2000VA, 8A*, AC-12 DC: 24V, 8A DC-12; 3A DC-13 | |
| Inputs / outputs | |
| 4 time delayed NO 1 semiconductor monitoring output TALOS bus connection | |
| According to | |
| EN60204-1, EN954-1, EN61508 | |

* maximal summary current 15A

TC

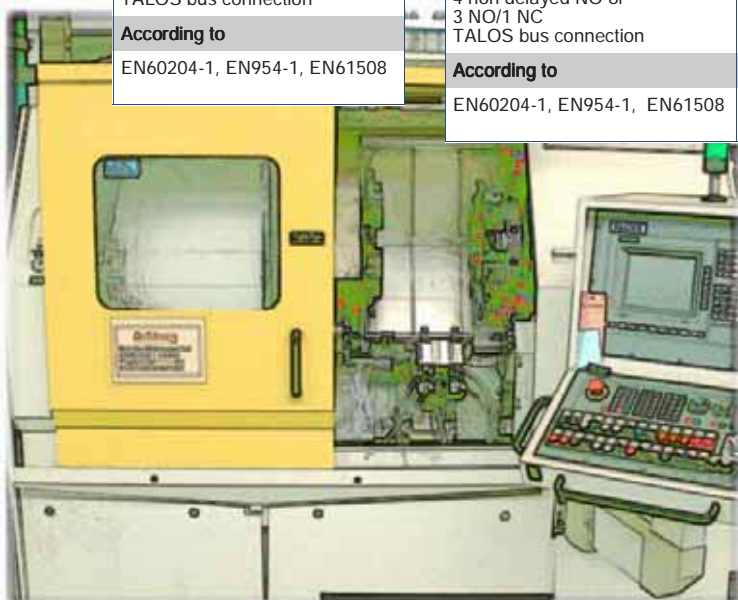
Communication module

Gateway module for the connection of TALOS to RS232, RS485 or Profibus. Transferring the current operating status, e.g. status of the safety inputs.



- Perfect diagnostic
- No downtimes
- Automatic communication with TALOS basic module, inputs, TALOS bus
- Free PC configuration and diagnostic software
- Easy connection to PC and PLC
- All common protocols

| Order-No | Type |
|----------------------|-------------------|
| 472520 | TALOS TC RS232 |
| 472529 | TALOS TC Profibus |
| Operating voltage | |
| DC 24V via TALOS bus | |
| Serial interface | |
| each max. 9600 baud | |



TALOS is still growing:

In preparation:

2-Hand input module
Webserver communication module

4-23

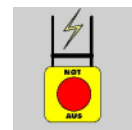
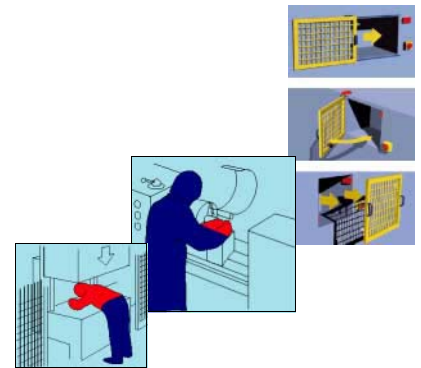
R05

Meyer Industrie-Electronic GmbH MEYLE

Carl-Bosch-Str. e 8 Tel.: +49 (0) 5481-9385-0 Internet: www.meyle.de
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For machinery safety we offer growing selection of safety switches and safety emergency stop relays, designed, manufactured and certified according to the latest national and international safety regulations.

See also Meyle safety switches for conveyor belts catalogue



Miniature safety switches ELF & CADET

Safety switches with a separate actuator
 Miniature size, 75 x 25 x 29mm
 8 possible actuator entry points
 Contacts: 1 N/C or 1N/C, 1N/O or 2N/C
 Protection category up to IP67



Safety rope operated emergency stop switch LIFELINE

Combined rope and push button actuated emergency stop unit
 Switch lockout on rope pulled and rope slack
 Rope-status indicator on switch lid
 Switches up to 75m span
 2 N/C and 1 N/O contacts
 Protection category IP66



Safety interlock switch TITAN with guard locking

Compact safety interlock switch, high locking force up to 2000N
 Locks guard mechanically shut until the machine power is isolated
 Stainless-steel actuator guide aids alignment
 Rotatable head: 4 possible key entry slots
 3 N/C and 2 N/O contacts



Magnetically coded safety interlock switch SIPHA

Coded sensor - highly resistant to defeat
 Tolerant to misaligned guards
 Full self monitoring
 2 safety contacts, 1 auxiliary contact
 Protection category up to IP67

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Send information about:

Meyer Industrie-Electronic GmbH
Carl-Bosch-Straße 8
D-49525 Lengerich
Telefon +49 (0) 54 81 - 93 85-0
Telefax +49 (0) 54 81 - 93 85-12
sales@meyle.de
www.meyle.de