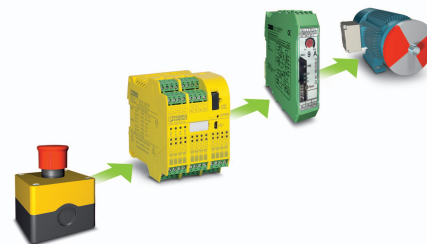


# PSR-TRISAFE and CONTACTRON ELR-H3-IES.../ELR-H5-IES...

**Safety-oriented and wear-free shutdown of the CONTACTRON hybrid motor starter with the PSR-TRISAFE safety module**



Application note  
108168\_en\_01

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## 1 Description

This application note is intended to assist you with the use of the PSR-TRISAFE safety modules, along with the hybrid motor starters in the CONTACTRON family.

When using PSR-TRISAFE safety modules, use hybrid motor starters of the type ELR-H3-IES...

or ELR-H5-IES... .



The approved ELR types can be found in the section "Ordering data".

### Application

The components used in your application have various functions.

The hybrid motor starter provides various control functions for the drive.

The safety module securely switches off the application after a safety function has been triggered or in the case of an error.

### Task

In order to implement secure shutdown, the supply voltage of the hybrid motor starter must be switched off by the PSR-TRISAFE safety module.

Immediate shutdown of the supply voltage is associated with wear to or destruction of the hybrid motor starter, however.

### Solution

To switch off the application using the PSR-TRISAFE safety module without causing any wear to the hybrid motor starter, be sure to follow a specified shutdown sequence. To this end, orient yourself on the application examples in this application note.



Make sure you always use the latest documentation. It can be downloaded at [phoenixcontact.net/products](https://www.phoenixcontact.net/products).



This document is valid for products listed in the Section "Ordering data" on page 3.

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## 2 Ordering data

### PSR-TRISAFE safety module

| Description                                                                                                         | Type                       | Order No. | Pcs./Pkt. |
|---------------------------------------------------------------------------------------------------------------------|----------------------------|-----------|-----------|
| Configurable safety module, <b>non-expandable</b> , DIN rail connector is included                                  |                            |           |           |
| Module with screw connections                                                                                       | PSR-SCP-24DC/TS/S          | 2986229   | 1         |
| Module with spring-cage connections                                                                                 | PSR-SPP-24DC/TS/S          | 2986232   | 1         |
| Configurable safety module, <b>expandable</b> , DIN rail connector is included                                      |                            |           |           |
| Module with screw connections                                                                                       | PSR-SCP-24DC/TS/M          | 2986012   | 1         |
| Module with spring-cage connections                                                                                 | PSR-SPP-24DC/TS/M          | 2986025   | 1         |
| Configurable safe extension module with <b>parameterizable inputs/outputs</b> , DIN rail connector is included with |                            |           |           |
| Module with screw connections                                                                                       | PSR-SCP-24DC/TS/SDI8/SDIO4 | 2986038   | 1         |
| Module with spring-cage connections                                                                                 | PSR-SPP-24DC/TS/SDI8/SDIO4 | 2986041   | 1         |

### CONTACTRON hybrid motor starter

| Description                                                                                                                                                                                                                   | Type                         | Order No. | Pcs./Pkt. |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|-----------|-----------|
| Hybrid motor starter for starting 3~AC motors up to 500 V AC and 0.6 A output current, with 24 V DC control voltage, adjustable overload shutdown and emergency switching off function to SIL 3 / PL e, and screw connection. | ELR H3-IES-SC-24DC/500AC-0.6 | 2900566   | 1         |
| Hybrid motor starter for starting 3~AC motors up to 500 V AC and 2.4 A output current, with 24 V DC control voltage, adjustable overload shutdown and emergency switching off function to SIL 3 / PL e and, screw connection. | ELR H3-IES-SC-24DC/500AC-2   | 2900567   | 1         |
| Hybrid motor starter for starting 3~AC motors up to 500 V AC and 9A output current, with 24 V DC control voltage, adjustable overload shutdown and emergency switching off function to SIL 3 / PL e, and screw connection.    | ELR H3-IES-SC-24DC/500AC-9   | 2900569   | 1         |
| Hybrid motor starter for reversing 3~AC motors up to 500 V AC and 0.6 A output current, with 24 V DC control voltage, adjustable overload shutdown, emergency switching off function to SIL 3 / PL e, and screw connection.   | ELR H5-IES-SC-24DC/500AC-0.6 | 2900582   | 1         |
| Hybrid motor starter for reversing 3~AC motors up to 500 V AC and 2.4 A output current, with 24 V DC control voltage, adjustable overload shutdown and emergency switching off function to SIL 3 / PL e and screw connection  | ELR H5-IES-SC-24DC/500AC-2   | 2900414   | 1         |
| Hybrid motor starter for reversing 3~AC motors up to 500 V AC and 9 A output current, with 24 V DC control voltage, adjustable overload shutdown, emergency switching off function to SIL 3 / PL e, and screw connection.     | ELR H5-IES-SC-24DC/500AC-9   | 2900421   | 1         |

### 3 Documentation



Observe the product documentation valid for the devices you are using.  
Make sure you always use the latest documentation.  
It can be downloaded at [phoenixcontact.net/products](https://phoenixcontact.net/products).

### 4 Application examples

#### 4.1 Application 1: PSR-TRISAFE with ELR-H3-IES...

##### 4.1.1 Safe shutdown

The safety-oriented shutdown in the depicted application is implemented exclusively by switching off the supply voltage for the hybrid motor starter.

##### 4.1.2 Wear-free shutdown

To switch off the CONTACTRON hybrid motor starter via the PSR-TRISAFE safety module, observe the following shutdown sequence:

1. Shutdown of the control signal at the **ON** input of the hybrid motor starter (not safety-oriented).
2. Delayed shutdown of the control supply voltage at the **U<sub>S</sub>** input of the hybrid motor starter (safety-oriented).



Advanced shutdown of the **ON** control input serves to extend the service life of the CONTACTRON hybrid motor starter.

When the **U<sub>S</sub>** is switched off, the cooling time stops. This can cause a quick triggering of the motor protection when starting the motor, shortly after voltage recovery.

##### 4.1.3 Wiring and parameterization notes

- Connect the PLC control signal to a secure input of the PSR-TRISAFE safety module (in example **I3**).
- To switch off the control signal at the **ON** input, use a secure output of the PSR-TRISAFE safety module (in the example **O2**).
- The control input of the hybrid motor starter is thus controlled by the PLC signal via the PSR-TRISAFE safety module.
- Use the secure inputs of the PSR-TRISAFE safety module for the demand of the safety function (e. g. emergency switching off).
- To switch off the control supply voltage at the **U<sub>S</sub>** input, use a secure output of the PSR-TRISAFE safety module (in the example **O0/O0-**).
- Parameterize a delay of **min** in the SAFECONF configuration software. **100 ms** for the output used (in the example **O0/O0-**).
- Establish the same reference ground for the hybrid motor starter and the PSR-TRISAFE safety module.
- Ensure an appropriate safeguard for motor leads **L1**, **L2** and **L3**.



##### Time delay

The delay for wear-free shutdown must be at least 100 ms. Take the delay into account when calculating the shutdown time of the PSR-TRISAFE system.

See user manual for UM DE PSR-TRISAFE system.

# PSR-TRISAFE and CONTACTRON ELR-H3-IES.../ELR-H5-IES...

## 4.1.4 Application drawing and classification

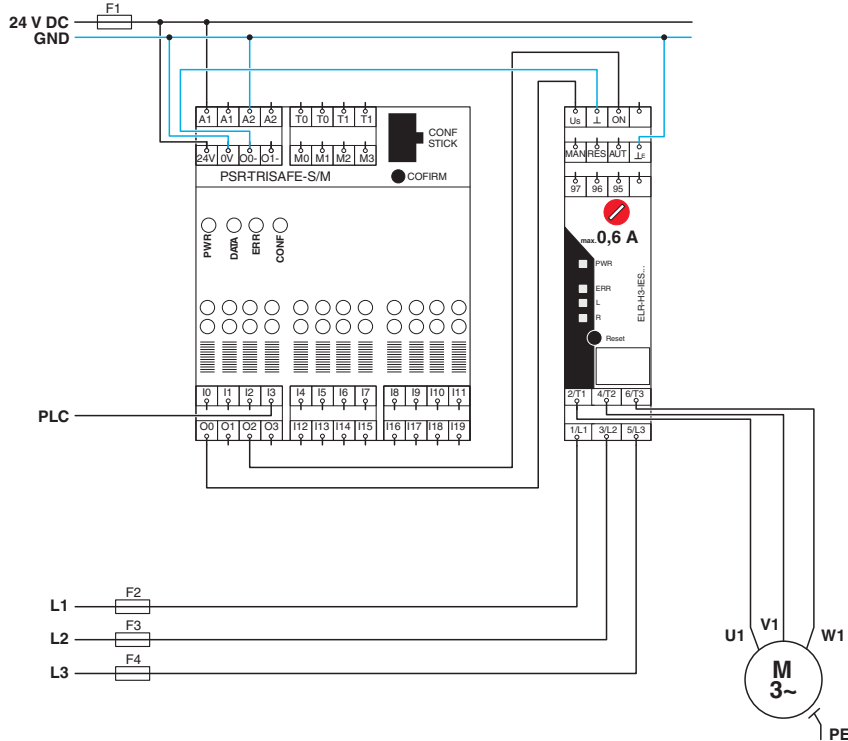


Figure 1 Circuit diagram PSR-TRISAFE with ELR-H3-IES...

### Key:

#### Connections of PSR-TRISAFE

|               |                                             |
|---------------|---------------------------------------------|
| <b>A1/A2</b>  | Power supply connections                    |
| <b>24V/0V</b> | Power supply connections for secure outputs |
| <b>00-</b>    | Ground switching output                     |
| <b>00, 02</b> | Safe digital outputs                        |
| <b>I3</b>     | Safe digital input                          |

#### Connections ELR-H3-IES...

|                         |                               |
|-------------------------|-------------------------------|
| <b>Us</b>               | Control supply voltage input  |
| <b>⊥</b>                | Ground reference point        |
| <b>ON</b>               | Control Input                 |
| <b>⊥E</b>               | Control input reference point |
| <b>2/T1, 4/T2, 6/T3</b> | 3-phase output voltage        |
| <b>1/L1, 3/L2, 5/L3</b> | 3-phase input voltage         |

#### Miscellaneous

|                   |                    |
|-------------------|--------------------|
| <b>L1 ... L3</b>  | Motor leads        |
| <b>U1, V1, W1</b> | Motor phases       |
| <b>F1 ... F4</b>  | External fuses     |
| <b>PLC</b>        | PLC control signal |

### Safety level:

- Suitable up to category 3, PL e (EN ISO 13849-1), SIL 3 (EN 62061)

[illegible]

**Key:**

- |             |                                                                                                                          |
|-------------|--------------------------------------------------------------------------------------------------------------------------|
| <b>0_I0</b> | Input I0 for emergency switching off signal channel 1                                                                    |
| <b>0_I1</b> | Input I1 for emergency switching off signal channel 2                                                                    |
| <b>0_I2</b> | Input I2 for acknowledgement of the safety function                                                                      |
| <b>C_1</b>  | Enable emergency switching off                                                                                           |
| <b>0_O0</b> | Bipolar output O0/O0- for shutdown of the control supply voltage of the hybrid motor starter ( $U_S$ ) with 100 ms delay |
| <b>0_I3</b> | Input I3 for PLC control signal                                                                                          |
| <b>0_O2</b> | Output O2 for control signal of hybrid motor starter (ON)                                                                |

## 4.2 Application 1: PSR-TRISAFE with ELR-H5-IES...

### 4.2.1 Safe shutdown

The safety-oriented shutdown in the depicted application is implemented exclusively by switching off the supply voltage for the hybrid motor starter.

### 4.2.2 Wear-free shutdown

To switch off the CONTACTRON hybrid motor starter via the PSR-TRISAFE safety module, observe the following shutdown sequence:

3. Shutdown of the control signal at the **R** and **L** inputs of the hybrid motor starter (not safety-oriented).
4. Delayed shutdown of the control supply voltage at the **U<sub>S</sub>** input of the hybrid motor starter (safety-oriented).



Advanced switching off of the **R** and **L** control inputs serves to extend the service life of the CONTACTRON hybrid motor starter.

When the **U<sub>S</sub>** is switched off, the cooling time stops. This can cause a quick triggering of the motor protection when starting the motor, shortly after voltage recovery.

### 4.2.3 Wiring and parameterization notes

- Connect the PLC control signals to secure inputs of the PSR-TRISAFE safety module (in example **I3** and **I4**).
- To shut down the control signals at the **R** and **L** inputs, use secure outputs of the PSR-TRISAFE safety module (in the example **O2** and **O3**).
- The control inputs of the hybrid motor starter are thus controlled by the PLC signals via the PSR-TRISAFE safety module.
- Use the secure inputs of the PSR-TRISAFE safety module for the demand of the safety function (e. g. emergency switching off).
- To switch off the control supply voltage at the **U<sub>S</sub>** input, use a secure output of the PSR-TRISAFE safety module (in the example **O0/O0-**).
- Parameterize a delay of **min** in the SAFECONF configuration software. **100 ms** for the output used (in the example **O0/O0-**).
- Establish the same reference ground for the hybrid motor starter and the PSR-TRISAFE safety module.
- Ensure an appropriate safeguard for motor leads **L1**, **L2** and **L3**.



The ground switching output **O1-** of the PSR-TRISAFE safety module is not required in practice. Leave **O1-** unwired.

# PSR-TRISAFE and CONTACTRON ELR-H3-IES.../ELR-H5-IES...

## 4.2.4 Application drawing and classification

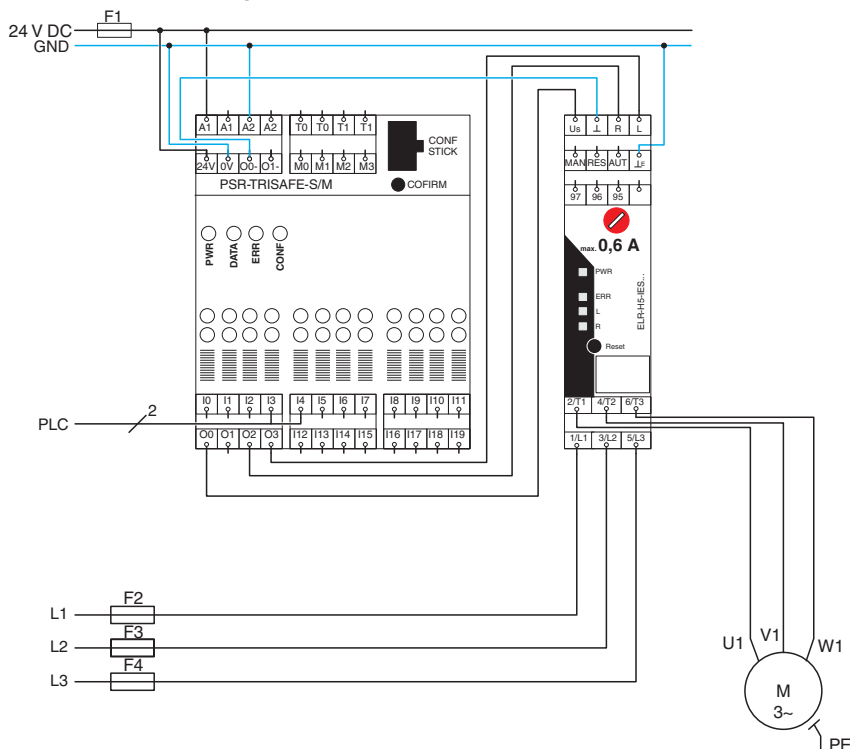


Figure 3 Circuit diagram PSR-TRISAFE with ELR-H5-IES...

### Key:

#### Connections of PSR-TRISAFE

|                   |                                             |
|-------------------|---------------------------------------------|
| <b>A1/A2</b>      | Power supply connections                    |
| <b>24V/0V</b>     | Power supply connections for secure outputs |
| <b>O0-</b>        | Ground switching output                     |
| <b>O0, O2, O3</b> | Safe digital outputs                        |
| <b>I3, I4</b>     | Secure digital inputs                       |

#### Connections ELR-H3-IES...

|                         |                                |
|-------------------------|--------------------------------|
| <b>Us</b>               | Control supply voltage input   |
| <b>⊥</b>                | Ground reference point         |
| <b>R</b>                | Forward running control input  |
| <b>L</b>                | Control input: Reverse running |
| <b>⊥E</b>               | Control input reference point  |
| <b>2/T1, 4/T2, 6/T3</b> | 3-phase output voltage         |
| <b>1/L1, 3/L2, 5/L3</b> | 3-phase input voltage          |

#### Miscellaneous

|                   |                    |
|-------------------|--------------------|
| <b>L1 ... L3</b>  | Motor leads        |
| <b>U1, V1, W1</b> | Motor phases       |
| <b>F1 ... F4</b>  | External fuses     |
| <b>PLC</b>        | PLC control signal |

### Safety level:

- Suitable up to category 3, PL e (EN ISO 13849-1), SIL 3 (EN 62061)



#### 4.2.5 Wiring and parameterization in SAFECONF



For additional information and detailed step-by-step instructions for the SAFECONF configuration software, please refer to the online help of the software.

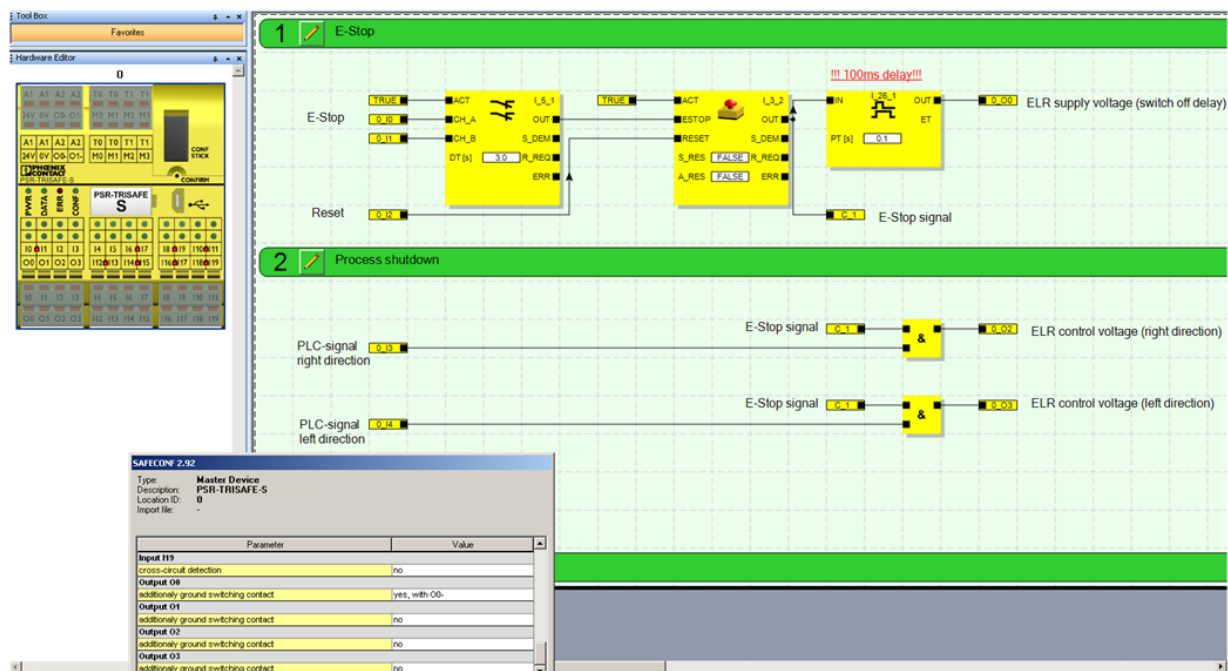


Figure 4 SAFECONF PSR-TRISAFE with ELR-H5-IES...

#### Key:

- 0\_10** Input I0 for emergency switching off signal channel 1
- 0\_11** Input I1 for emergency switching off signal channel 2
- 0\_12** Input I2 for acknowledgement of the safety function
- C\_1** Enable emergency switching off
- 0\_O0** Bipolar output O0/O0- for shutdown of the control supply voltage of the hybrid motor starter ( $U_S$ ) with 100 ms delay
- 0\_13** Input I3 for PLC control signal forward running
- 0\_14** Input I4 for PLC control signal reverse running
- 0\_O2** Output O2 for forward running control signal of hybrid motor starter (R)
- 0\_O3** Output O3 for reverse running control signal of hybrid motor starter (L)

## 5 Revision history

| Revision | Date       | Contents                      |
|----------|------------|-------------------------------|
| 00       | 2017-10-06 | First publication             |
| 01       | 2018-06-08 | Figure 1 and figure 2 revised |



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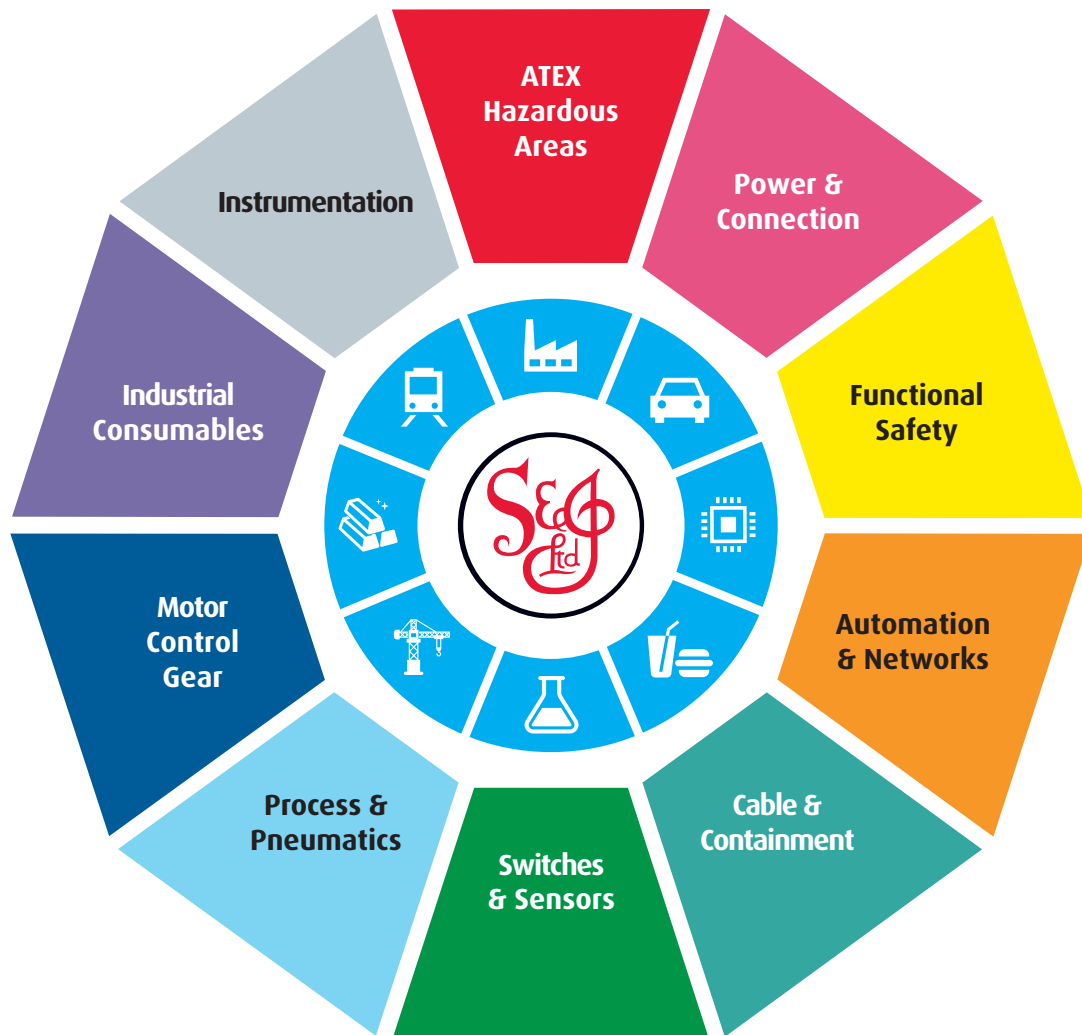
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