



# SSO-10

**CE** Approved:  
MD, EMC, LVD

## Category 3/4, EN 954-1

(By 2-channel operation of 23-24, 33-34, 41-42)

- Designed for 1- and 3-phase motors
- Can be used in applications with frequency converters
- Microprocessor controlled
- 2 NO safety outputs and 1 NC signal contact
- 10 A contact load
- Status indication with LEDs
- Detachable terminals

### Function:

Relay for standstill monitoring of 1- and 3-phase motors. SSO-10 is designed for applications as centrifugal, mixing and chopping machines, where the run-down time is not a constant value due to the varying load of the machine.

### Technical facilities regarding safety requirements:

- Forced contacts
- Doubling of output contacts
- Internal / external redundancy

### LED status table

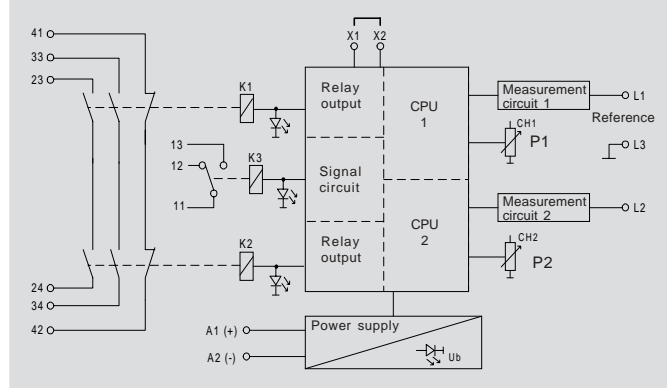
LED K1	LED K2	Status/Error
OFF	OFF	Relay detects that the motor is running
Green	Green	Relay detects that the motor has stopped
Red	Red	Constant, flashing or changing green/red light. Signal/control error. Relay may be defective
LED U <sub>b</sub>	Status/Error	
OFF	Power supply not present / bad connection	
ON	Power supply OK	

### User's advantages:

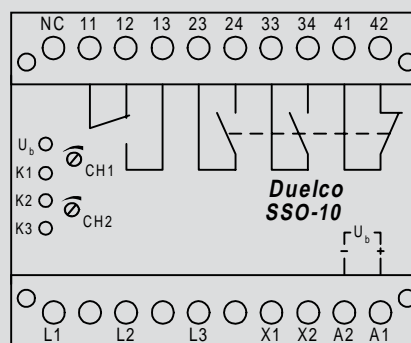
- 2 NO safety contacts 10 A AC, 5 A DC
- 1 NC signal contact 10 A AC, 5 A DC
- 1 CO signal contact 4 A AC, 3 A DC
- Monitoring of external relays through terminals X1-X2
- LED indication of supply + output status for K1, K2 and K3
- Power supply: 24 VDC, ± 10%
- DIN rail mounting
- Two separate and independent microprocessors working with two different and independent software codes acc. to the principles for diversity and monitoring
- Approved by Demko acc. to the Machinery- and the Low Voltage Directive
- Complies with MD, EMC, LVD (98/37/EC, 89/336/EEC and 93/68/EEC)
- Design is based on the European Standard, EN 60204-1

➔ **Technical specifications and physical dimensions, see page 44-45**

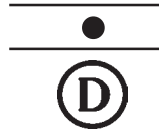
### Block diagram:



### Front layout:



### Approvals:



Approved by DEMKO acc. to:  
The Machinery Directive: MD-DK 97-02639  
The Low Voltage Directive: CCA Certificate no. DK97-02985

● Approved

### Terminal description:

- A1/A2:** Power supply (+) / Power supply (-)
  - L1/L2:** Measure input, channel 1 / Measure input, channel 2
  - L3:** Reference input
  - X1\*/X2\*:** Output / Input control of K1's driver step
  - NC:** Option: 24V supply for the shortest possible measurement setting (only build on request)
  - 11\*\*/12\*\*/13\*\*:** Common / NC / NO signal output
  - 23-24, 33-34:** NO safety outputs
  - 41-42:** NC signal output
  - CH1/CH2:** Potentiometers (P1, P2) for adjustment of the voltage level (standstill level)
- \* Maintain voltage for K1's driver step. Possibility for use of external monitoring of contacts.  
\*\* Signal contact for status of the output

### Order information

Article name: SSO-10, 24 V DC  
Article no.: 42501240

### Operation description and connection examples

The supply voltage is connected to A1(+) and A2(-) and the LED Ub illuminates green. The terminals X1-X2 are used to monitor any external relays and the motor is connected to L1, L2 and L3, the monitoring circuit. Upon connection of supply voltage, SSO-10 performs an internal self test which checks for:

- Detection of cable-break in channel 1 (L1-L3) and channel 2 (L2-L3).
- Detection of incorrect supply voltage.
- Control of the level (Motor versus Settings).
- Cyclic test of feedback from safety- / signalling contacts and relays.
- Cyclic test of the controlling device.

During the self-test, the LEDs for K1/K2 illuminate both green and red. If no errors are detected and the input voltages connected to L1, L2, and L3 are below the threshold voltage, then the output relays will be activated, i.e. the safety contacts 23-24, 33-34 close and the signalling contact 41-42 opens. The CO switch changes position from 11-12 to 11-13.

The LEDs K1, K2, and K3 illuminate, and the Power On LED illuminates. The relay functions internally with 2 measuring channels (L1-L3 / L2-L3 with L3 as the reference point) each monitoring its own relay. The relays for the measurement channels must be activated within a time interval less than 2 seconds or the output relay will lock out. If the time interval exceeds 2 seconds, then the LEDs for K1/K2 change colour from green to red and the LED for K3 will remain off. This condition remains until the supply voltage is removed.

The colour of LEDs K1 and K2 is green if the voltage of the input L1-L3 or L2-L3 is below the threshold voltage. If an error occurs, they change to red. LED K3 is illuminated only if both the output relays K1 and K2 are correctly activated within the interval time of 2 seconds.

If a breakage in the cables is detected or the voltage of L1-L3 / L2-L3 is greater than the level of the threshold voltage, then the LED of the channel in question will turn off and the output relay will lock itself into a safe position. The relay can only be reset by removing the supply voltage.

\*) The threshold voltage is regulated by CH1/CH2. When the monitored voltage is below the regulated threshold point, the relay is activated. The threshold voltage can be adjusted between 0,02 - 0,5 VDC or 0,04 - 1 VAC (see fig. 6).

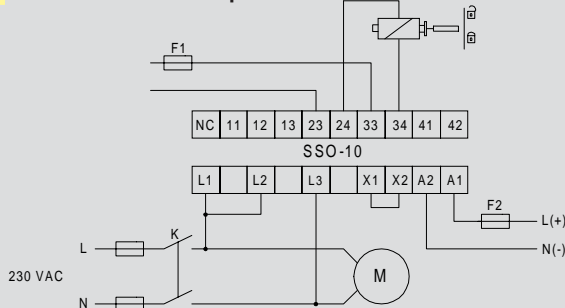
**Function test:** The SSO-10 can be function tested by the following procedure. Connect a short circuit between L1 - L2 - L3 and a short circuit between X1 - X2. Connect 24 VDC across A1 and A2 and if the relay is functioning correctly, then all of the outputs will be activated and all of the LEDs will illuminate green!

**Note:** SSO-10 is tested with the following frequency converters:

- Danfoss VLT 2030
- Danfoss VLT 5001
- Danfoss VLT 5003
- Danfoss VLT 5004
- Danfoss VLT 5005
- Telemecanique ATV-18U29N4

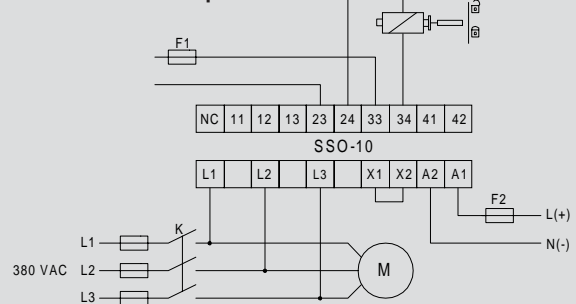
Contact Duelco or your local distributor for further information.

#### 1 Connection of a 1 phase motor



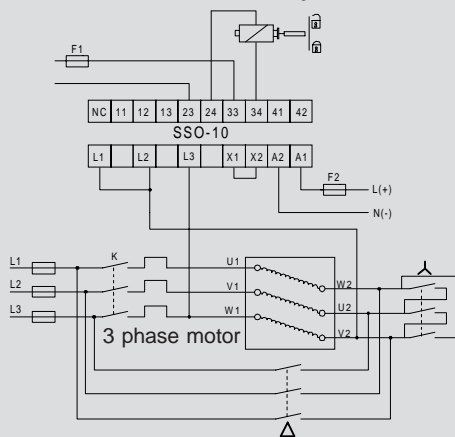
Motor running: Relay deactivated, magnetic catch is locked  
By standstill: Relay activates, magnetic catch can be opened

#### 2 Connection of a 3 phase motor

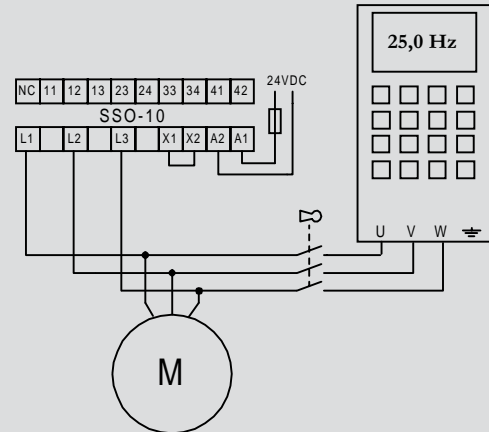


Motor running: Relay deactivated, magnetic catch is locked  
By standstill: Relay activates, magnetic catch can be opened

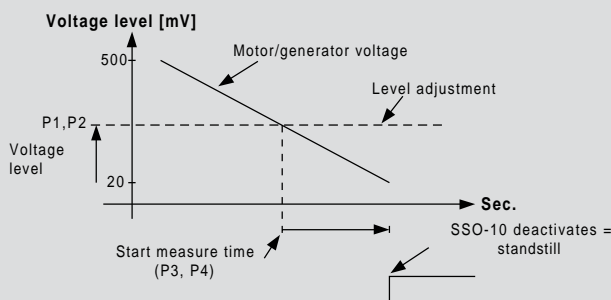
#### 3 Connection of a star/delta system



#### 4 Connection of a frequency converter



#### 5 Description of the potentiometers



The measure time is the time interval where SSO-10 must measure, if the generator voltage is less than the chosen level adjustment (voltage level), before the standstill of the motor will be accepted.

P1(CH1), P2(CH2) => potentiometers for adjustment of the level. P1 and P2 are placed on the front.  
P3(CH1), P4(CH2) => potentiometers for adjustment of the measure time. P3 and P4 is placed under the terminal block with the outputs contacts.