Post Box 71 02 28
D-30542 Hannover
Kronsberger Straße 25
D-30559 Hannover

Fon +49(0)511 35 71 00 0
Fax +49(0)511 35 71 00 19
www.schaeper.com
info@schaeper.com

+ messen + steuern +
+ regeln ++ melden +

schaeper AUTOMATION GMBH

ES-IS30R

AC/DC (Rotor) Current Sensor

Application

The AC/DC (rotor) current sensor *ES-IS30R* monitors the rotor current circuits of collector ring induction motors, as e.g. are used in hoisting and chassis motors in cranes. Motors with direct current braking can also be monitored with these current sensors. But the unit is also highly suitable to be used for other tasks, which require the recognition of low-frequency currents or direct currents. For example, the stator currents of motors, which are operated in frequency converters, can be monitored with these units. The version *ES-IS30R* of the rotor current sensors is suitable for frequency converters with clock frequencies of more than 3kHz, while the version *ES-IS30RL* is suitable for clock frequencies of less than 1kHz.

Three current transformers integrated into this unit detect the rotor current. Based on this principle of operation, all of the components in the current paths, such as rotor resistors, terminals and contacts, are monitored.

Features

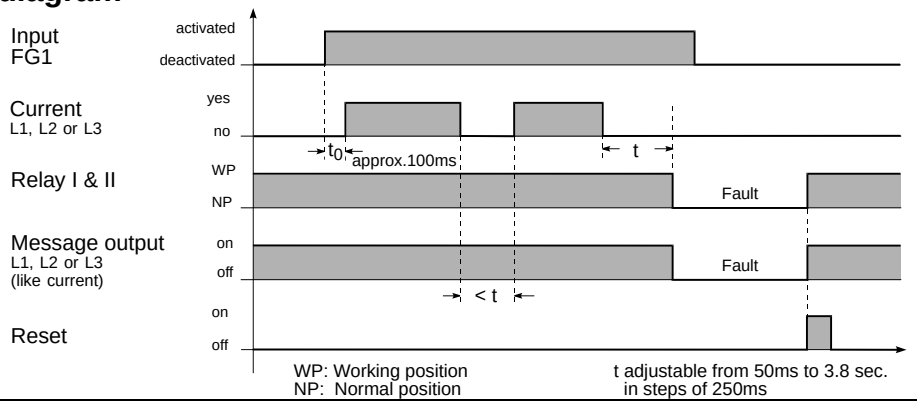
- ☺ Current range: I_N = 0.5 ... 600AW (ampere windings)
- ☺ Frequency range of the current: f = 0...110Hz
- ☺ Current measurement with bushing transformer
- ☺ **Fault memory** and indication for each phase
- ☺ Delayed activation of the fault signallings (adjustable from 0 ... 3.8 sec.)
- ☺ Activation via enable inputs
- ☺ Fault signallings via 2 relays (1 changer each) and 3 optocoupler outputs
- ☺ Double LED display (red, green) for relay setting
- ☺ Easy to service due to **detachable screw terminals** (interchange-proof)

Function

With an enabled unit (approx. 120ms (t_0) after application of a signal at FG1), it is possible to determine whether an alternating current of at least 0.5A is flowing in all three phases L1, L2 and L3. In this case, relay I and relay II remain in the operative position. If there is no current in one, two or three phases, then the relays switch into the normal position after a basic delay of max. 50ms and the corresponding current fault LED's light up on the front of the unit. A further delay of up to 3.8 sec. can be set with t.

Fault signallings remain stored until a reset signal is applied, even if the supply voltage has meanwhile been switched off.

Function diagram



Inputs

The various input groups are galvanically isolated from each other and from the outputs.

Measuring inputs (current transformer)
The bushing transformers have an inner diameter of 32mm. The maximum current through the transformer amounts to 600AW, while a short current peak of up to 7 times this value is permissible. The input sensitivity is at max. 0.5AW. With multiple lead-throughs of a lead, the unit can also be used for the supervision of lower currents. The frequency of the currents must be in the range of 0 to 110Hz.

Mains voltage
The mains voltage input is protected against switching overvoltages by means of a varistor and is equipped with a thermistor fuse. If the thermistor fuse is tripped (e.g. due to overvoltage, overtemperature or a unit defect), the mains voltage can be applied again after switching it off and then waiting a sufficient amount of time for the unit to cool down. If the cause for the fuse being tripped has meanwhile been eliminated, then the unit will work again perfectly afterwards.
After the **mains voltage has been applied**, an approx. 80ms long initialization phase starts that disables the monitoring function and keeps the outputs in the acceptance state. Afterwards, the delay times for the enable inputs are expired (if activated) and then the outputs switch accordingly to the currents in the three phases.

Enable input
The input *FG1* activates the AC current sensor when a signal is applied. The inverted function of the enable input *FG1* is also available as an option. The time of application of a signal to *FG1* until the actual activation of the current sensor amounts to approx. 120ms.

Reset input
A signal to *Reset* deletes the stored fault signallings, switches the relays back to the working position, switches the current fault LED's off and switches the fault outputs L1, L2 and L3 on again.

Ouputs

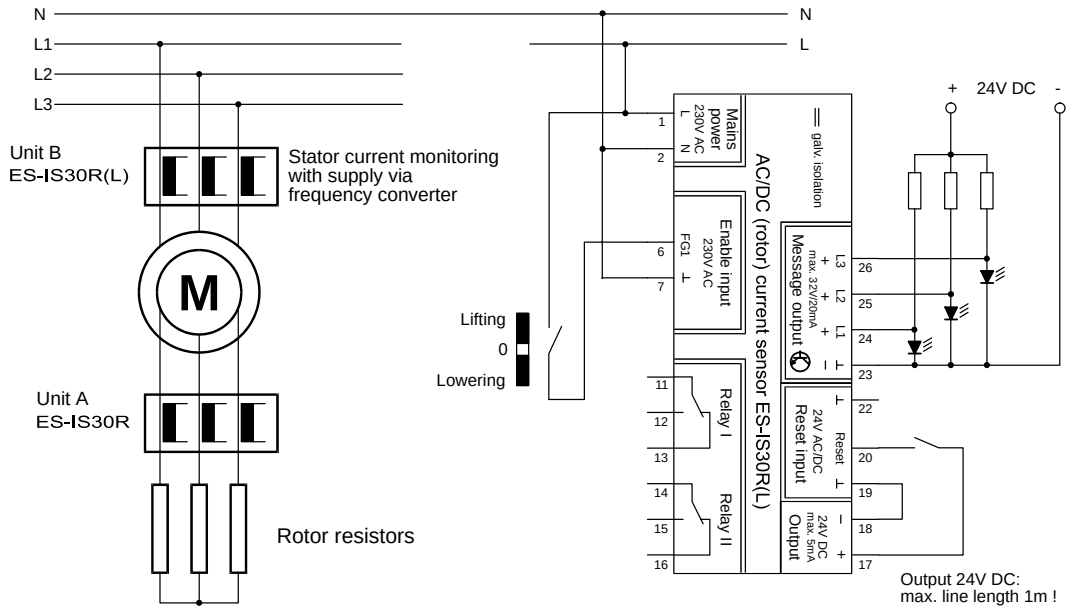
The relay contacts and the message outputs are galvanically isolated, while the 24V DC output is connected to the internal electronics.

Any fault that arises remains stored until a signal is applied to the reset input. A continuous reset signal suppresses all fault messages!

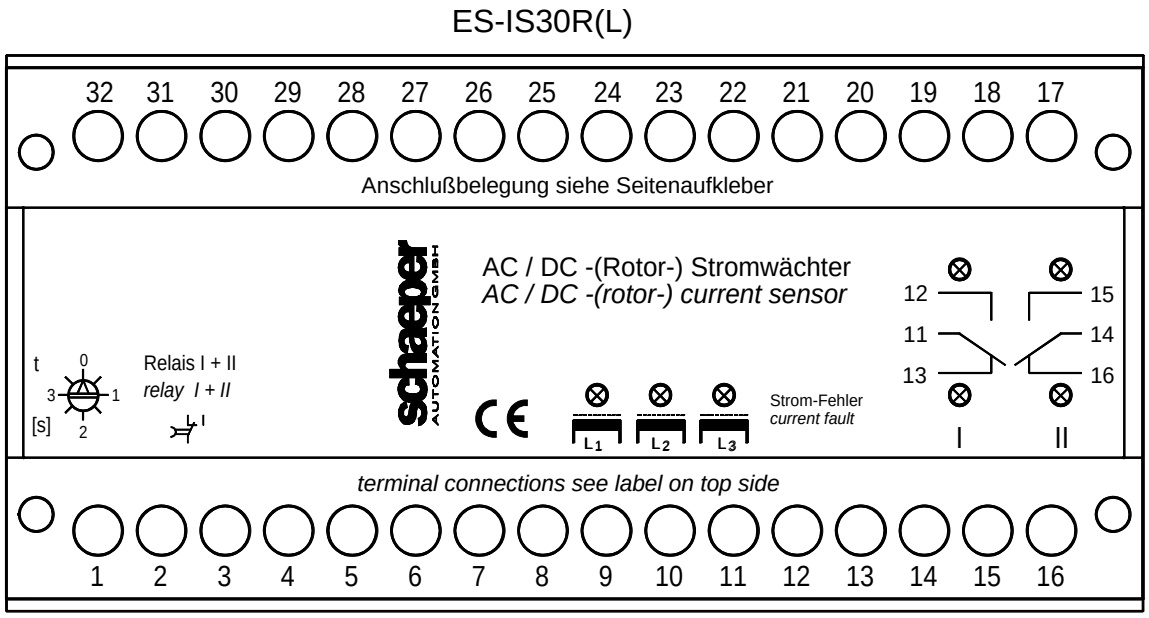
Relay outputs
The relay outputs are in the working position (green LED lit up) with proper currents flow in the transformers and switch to the normal position (red LED lit up) in the case of current faults and an enabled sensor after a basic delay of max. 50ms. A further delay of up to 3.8sec. can be set with t.

Signalling outputs
The signalling outputs have open-collector NPN transistors as contactless semiconductor switches with a mutual minus connection. They are disabled with polarity reversal and may be loaded with max. 20mA and 32V. The outputs L1, L2 and L3 are switched on in the case of correct current flow through the transformers. They are switched off if the current through the corresponding transformer is less than 0.5AW.

Connection principle



Frontal view *(approx. original size)*



Unit versions

Function	Type
Standard, 230V AC, 0...110Hz current frequency also suitable for frequency converter with **clock frequencies f > 3kHz**	ES-IS30R
Standard, 230V AC, 0...110Hz current frequency also suitable for frequency converter with **clock frequencies f < 1kHz**	ES-IS30RL
Supply voltage 115V AC (or 24V, 42V, 48V AC)	/115V (or /24V etc.)
inverted enable input FG1	/iFG

Technical data

Supply voltage: Terminals (1) and (2)	U_V = 205 … 253V AC; 50 - 60Hz; 25mA U_V = 103 … 127V AC; 50 - 60Hz; 50mA U_V = 38 … 46V AC; 50 - 60Hz; 140mA	 **for unit option /115V** **for unit option /42V**
Fuse:	Soldered PTC resistor fuse	
Current transformer:	I_N = 0.5 ... 600AW, f = 0 ... 110Hz (7x switch-on peak permissible) inner dia.: dia. 32mm	
Enable input ***FG1*:** Terminals (6) and (7)	on: U = 195 ... 260V AC/DC off: U < 100V AC/DC on: U = 98 ... 130V AC/DC off: U < 50V AC/DC on: U = 20 ... 80V AC/DC off: U < 8V AC/DC galv. isolated (U_{Isol} = 3.75kV AC) from other inputs/outputs	 **for unit option /115V** **for unit options /48V, /42V, /24V**
Reset input: Terminals (20) and (19, 22)	on: U = 20 ... 80V AC/DC off: U < 8V AC/DC galv. isolated (U_{Isol} = 3.75kV AC) from other inputs/outputs	
Relay outputs: Terminals (11) to (16)	1 changeover switch, 250V/5A AC, 30V/5A DC, electrical contact service life (resistive load): 1 x 10^5 switching plays	
Signalling outputs: Terminals (24, 25, 26) and (23)	U_{max} = 32V DC, I_{max} = 20mA DC (Transistor), switched off: fault, switched on: faultless galv. isolated (U_{Isol} = 3.75kV AC) from other inputs/outputs	
Fault memory:	Faults remain stored until a reset signal is applied, even if the supply voltage has meanwhile been switched off	
24V output: Terminals (+(17) and –(18)	I_{max} = 5mA DC, only for activation of the input *Reset* via short lines (< 1m long)	
Delay times: **t** (click-stop switch, no stopper)	Detection time t_0 for enabling current sensor: Signalling delay t for phase failure:	approx. 0.12 sec. 0.05 to 3.80 sec.
EMC-Directive: CE	*Emission:* According to EN 50081-1, 1993 (Residential, commercial) and EN 55022 *Immunity:* According to EN 50082-2, 1995 (Industrial environment) and EN 61000-4-2, -3, -4, -6	
Low Voltage Directive:	*Safety:* According to DIN VDE 0106, part 1, 1982 and VBG 4, 1979 Conditions of use: degree of contamination 1 or 2 according to DIN VDE 0110, part 1, 1989	
Ambient temperature:	-10 ... +50 °C, no condensation -20 ... +85 °C	(operation) (storage)
Housing:	L = 152mm, W = 75mm, H = 121mm, partially cast with snap-on fastening for DIN EN mounting rails ⊓⎽⊓	
Connection terminals:	Detachable screw terminals (interchange-proof) 2 x 2.5mm² solid or 2 x 1.5mm² stranded wire with sleeve according to DIN 46288	
Behaviour in fire:	Housing made of polycarbonat: according to UL94: V-0 according to VDE 0304: stage 1	
Mass:	approx. 1100g	

***Note:** For fault signalling, we recommend the fault signalling unit ES-STM8x2*