

ES-I30, ES-I304 und ES-I314 AC Current Sensor



Application

The AC current sensors *ES-I30* and *ES-I304* monitor the correct electrical supply of three-phase consumers, such as hoisting and chassis motors on cranes, fan motors, solenoid actuators, heating etc. With these units, the relays switch if there is no current in one, two or three phases.

Three current transformers integrated in the unit detect the load current. Based on this principle of operation, all components located in the current paths, such as supply units, fuses and contacts, are monitored.

The AC current sensor *ES-I314* detects unwanted current flow and/or also the switching on of single-phase consumers. This means that, with this unit, the relays switch if current is flowing in at least one phase. With this, for example, it is possible to achieve current-dependent locking of the reversing contactors of motors.

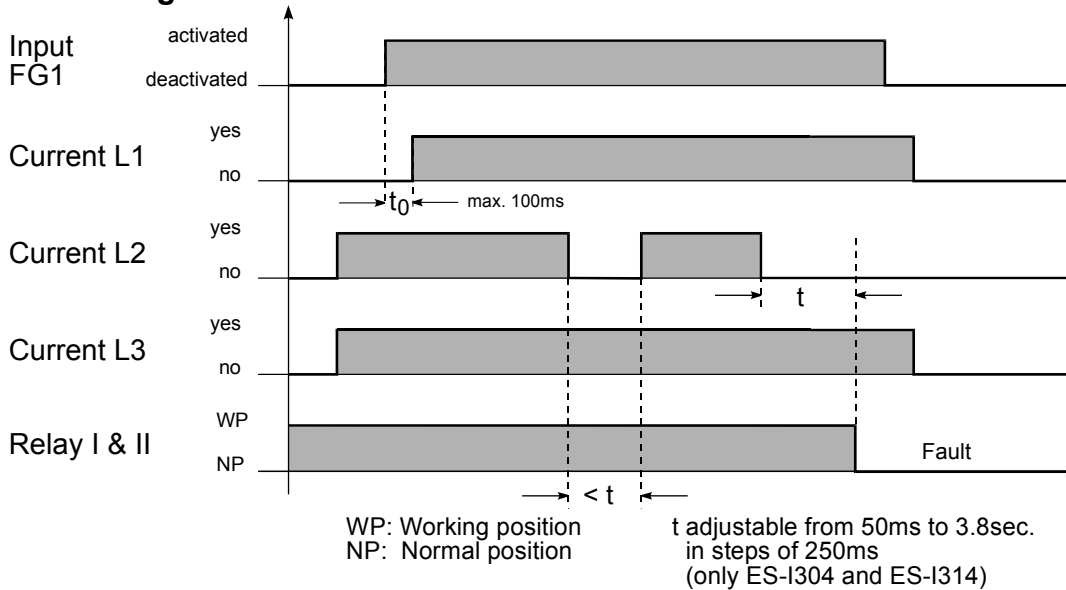
Features

- ☺ Current range: $I_N = 0.5 \dots 600\text{AW}$ (ampere windings)
- ☺ Frequency range of the current: $f = 35 \dots 500\text{Hz}$
- ☺ Current measurement with bushing transformer
- ☺ Delayed activation of the fault signalings (adjustable from 0 ... 3.8 sec.)
- ☺ Activation via enable inputs
- ☺ Fault signalings via 2 relays (1 changer each)
- ☺ 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 0.5 A is flowing in all three phases L1, L2 and L3. In this case, relay I and relay II remain in the working position. If the current fails in a least one phase (*ES-I30* and *ES-I304*) and/or current flows in at least one phase (*ES-I314*), then the relays switch into the normal position after a basic delay of max. 50ms. With the units *ES-I304* and *ES-I314*, a further delay of up to 3.8sec. can be set with it.

Function diagram



Inputs

The power input and the enable input *FG1* are galvanically isolated from each other.

Measuring inputs (current transformer)

The bushing transformers have an inner diameter of 32mm. The maximum current through the transformers 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 situated in the range of 35 to 500Hz.

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.

With the units *ES-I304* and *ES-I314*, after the mains voltage has been applied, an approx. 80ms long initialization phase starts that disables the monitoring function and keeps the relays in the working position. Afterwards, the delay times for the enable inputs are expired (if activated) and then the relays switch accordingly to the currents in the three phases. With the unit *ES-I30*, there is no initialization phase.

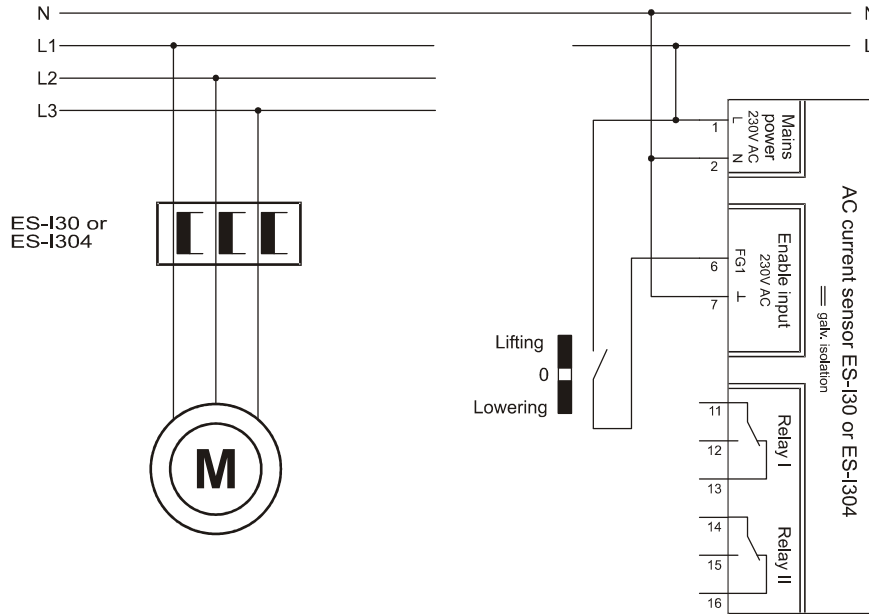
Enable input

The input *FG1* activates the AC current sensor when a signal is applied. Also available is the inverted function of the enable input *FG1* (unit option */iFG*). The time of application of a signal to *FG1* until the actual activation of the current sensor amounts to approx. 120ms.

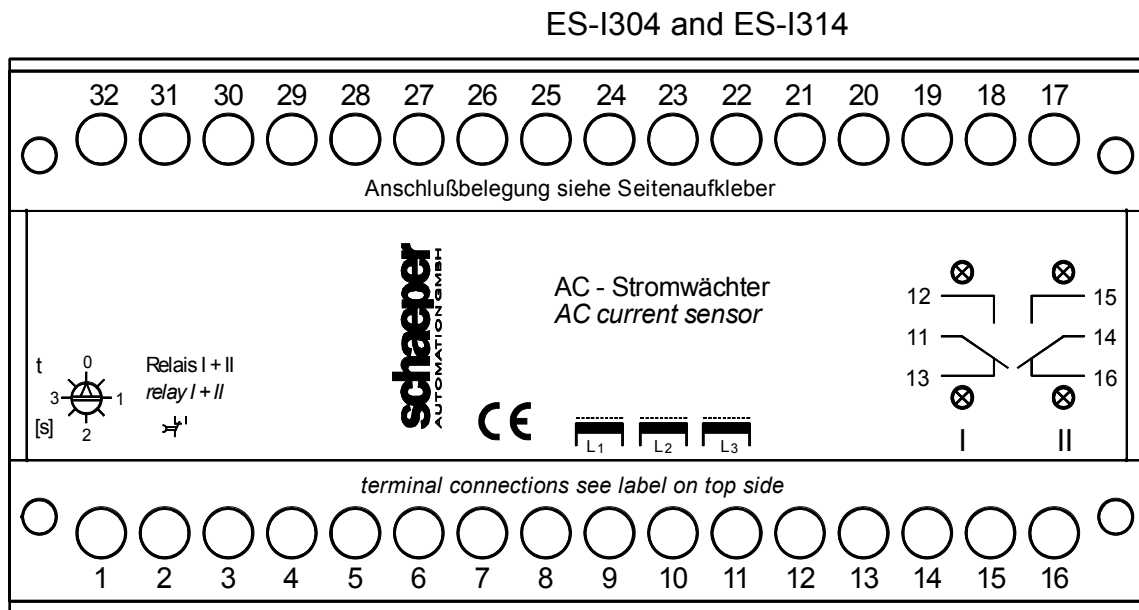
Relays

The relay outputs are in the working position (green LED lit up) with proper current flowing in the transformers and switch to the normal position (red LED lit up) in the case of a detected phase failure (detection time max. 50ms) and an enabled sensor. With the units *ES-I304* and *ES-I314*, a further delay of up to 3.8sec. can be set with it.

Connection principle




Frontal view (approx. original size)



Unit versions

Function	Type
Standard , 230V AC without adjustable switching delay for the relays Fault signalling with failure of at least one phase	ES-I30
Standard , 230V AC with adjustable switching delay (0.05 to 3.8sec.) for the relays Fault signalling with failure of at least one phase	ES-I304
Standard , 230V AC with adjustable switching delay (0.05 to 3.8 sec.) for the relays Fault signalling with current flow in at least one phase	ES-I314
Supply voltage 115V AC (or 24V, 42V, 48V AC)	/115V (or /24V etc.)
Inverted enable input FG1 (not for ES-I30)	/iFG
Switching delay 0.05 to 38sec. (not for ES-I30)	/LT

Technical Data

Supply voltage:	$U_V = 205 \dots 253V$ AC; 50 - 60Hz; 25mA	
Terminals (1) and (2)	$U_V = 103 \dots 127V$ AC; 50 - 60Hz; 50mA	for unit option /115V
	$U_V = 38 \dots 46V$ AC; 50 - 60Hz; 140mA	for unit option /42V
Fuse:	Soldered PTC resistor fuse	
Current transformer:	$I_N = 0.5 \dots 600A$ W, $f = 35 \dots 500$ Hz (7x switch-on peak permissible) inner dia.: dia. 32mm	
Enable input	on: $U = 195 \dots 260V$ AC/DC	for standard unit
FG1:	off: $U < 100V$ AC/DC	
Terminals (6) and (7)	on: $U = 98 \dots 130V$ AC/DC	for unit option /115V
	off: $U < 50V$ AC/DC	
	on: $U = 20 \dots 80V$ AC/DC	for unit options /48V, /42V, /24V
	off: $U < 8V$ AC/DC	
	galv. isolated ($U_{isol} = 3.75kV$ AC) from other inputs/outputs	
Relay outputs:	1 changeover switch, 250V/5A AC, 30V/5A DC, electric contact service life (resistive load): 1×10^5 switching plays	
Terminals (11) to (16)		
Delay times:	Detection time t_0 for enable current sensor:	approx. 0.12sec.
t (click-stop switch, no stopper)	Signalling delay t for phase failure:	0.05 to 3.80sec.
	(Signalling delay $t > 0.05$ sec. only for ES-1304 and ES-1314)	
EMC Directive:	<i>Emission:</i>	According to EN 50081-1, 1993 (Residential, commercial) and EN 55022
CE	<i>Immunity:</i>	According to EN 50082-2, 1995 (Industrial environment) and EN 61000-4-2, -3, -4, -6
Low Voltage Directive:	<i>Safety:</i>	According to DIN VDE0106, part 1, 1982 and VBG 4, 1979 Conditions of use: degree of pollution 1 or 2 according to DIN VDE 0110, part 1, 1989
Ambient temperature:	-10 ... +50 °C, no condensation	(operation)
	-20 ... +85 °C	(storage)
Housing:	L = 152mm, W = 75mm, H = 121mm, partially cast with snap lock for DIN EN mounting rails 	
Connection terminals:	Detachable screw terminals (interchange-proof) 2 x 2.5mm ² solid or 2 x 1.5mm ² 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