

Current monitoring relay **SRN mecotron®**

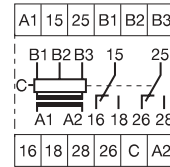


- Monitors AC or DC currents in 6 ranges covering 3 mA ... 15 A
- 3 measuring ranges covered by unit
- Switching hysteresis adjustable from 5...30 %
- Without or with delay on operate from 0.05...30 s
- 2 SPDT contacts
- 2 LEDs to indicate operational status
- 4 supply voltage versions, from 24...240 V AC/DC up to 415 V AC
- Version 24...240 V AC/DC with convertible undercurrent/ overcurrent monitoring, frequency range from 16 Hz to 400 Hz

Operation

The current being monitored is applied to the terminals B1 or B2 or B3 and C. The output relay energizes when the monitored current exceeds the set response value. It de-energizes when the current is below the set response value within the hysteresis range. The AC/DC version has a built-in selection switch on the front face where the energizing mode of the output relays can be preselected. In the OC position, the output relay will energize when the monitored current exceeds the set response value. In the UC position, the output relay energizes when the current is below the set response value. Hysteresis is adjustable from 5...30 % related to the response value. Measuring, output and supply circuits are electrically isolated to prevent mutual interference. As one measuring cycle takes only 80 ms, changes in current can quickly be detected. Delay on "ON" is continuously adjustable from 0.05 to 1 second or 1.5 to 30 seconds, thus ensuring optimal adaptation to application requirements.

■ Approvals:



Supply voltage 50...60 Hz

	With delay on operate Current measuring ranges P/N:		Without delay on operate Current measuring ranges P/N:	
	3...30 mA 10...100 mA 0.1...1 A	0.3...1.5 A 1...5 A 3...15 A	3...30 mA 10...100 mA 0.1...1 A	0.3...1.5 A 1...5 A 3...15 A
24...240 V AC/DC	2 450 125 00	2 450 125 01	2 450 115 00	2 450 115 01
110...130 V AC	2 450 120 00	2 450 120 01	2 450 110 00	2 450 110 01
220...240 V AC	2 450 121 00	2 450 121 01	2 450 111 00	2 450 111 01
380...415 V AC	2 450 122 00	2 450 122 01	2 450 112 00	2 450 112 01

Accessories	P/N:
Sealable transparent cover	3 440 005 01
Adapter for screw mounting	3 430 029 01
Current monitoring, see following page	

Technical data

Input circuit

Supply voltage - power consumption	A1-A2	24...240 V AC/DC - 2 VA
	A1-A2	110...130 V AC - 2 VA
	A1-A2	220...240 V AC - 2 VA
	A1-A2	380...415 V AC - 2 VA

Tolerance of supply voltage	-15 % ... +10 %
Supply voltage frequency	50...60 Hz
Duty time	100 %

Measuring circuit

Delay on operate time adjustable	0.05...1 s and 1.5...30 s
Timing error within tolerance of supply voltage	≤ 0.5 %
Timing error within temperature range	≤ 0.06 % / °C

Measuring circuit

Measuring current input	B1/C	3...30 mA	0.3...1.5 A
	B2/C	10...100 mA	1...5 A
	B3/C	0.1...1 A	3...15 A

Hysteresis (ref. to the response value) adjustable	5...30 %
Measuring cycle max.	80 ms
Temperature error	≤ 0.06 % / °C
Error within tolerance of supply voltage	≤ 0.5 %

Display of operational status

Supply voltage	LED, green
Output relay energized	LED, yellow

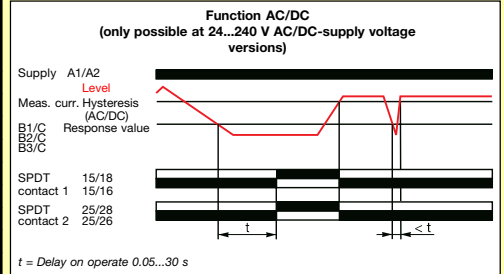
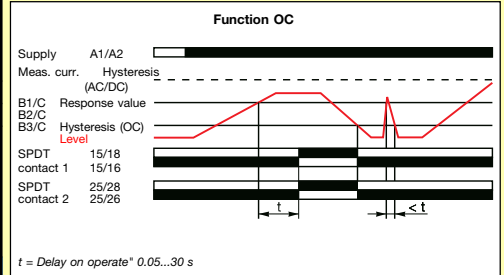
Output circuit

Output circuit	15-16/18, 25-26/28	Relay, 2 SPDT contacts, open-circuit principle
Rated voltage	VDE0100, IEC 947-1	400 V
Rated switching voltage max.		400 V AC
Rated switching current	AC 12 (resistive)	5 A (at 230 V)
Rated switching current	AC 15 (inductive)	3 A (at 230 V)
Rated switching current	DC 12 (resistive)	5 A (at 24 V)
Rated switching current	DC 13 (inductive)	2.5 A (at 24 V)
Maximum mechanical life		30 x 10 ⁶ operations
Maximum electrical life (acc. to AC 12 / 230 V / 5 A)		3 x 10 ⁵ operations
Short-circuit proof, max. fuse rating		5 A / fast, operating class gL

General data

Rated impulse withstand voltage V _{imp}	4 kV
Operating temperature	-25°C ... +60°C
Storage temperature	-40°C ... +85°C
Mounting position	any
Mounting to DIN rail (EN 50022)	Snap-on mounting/Screw mounting by adapter
Cable size stranded with wire end ferrule	2 x 14 AWG (2 x 2.5 mm ²)
Weight	approx. 0.66 lb (300 g)

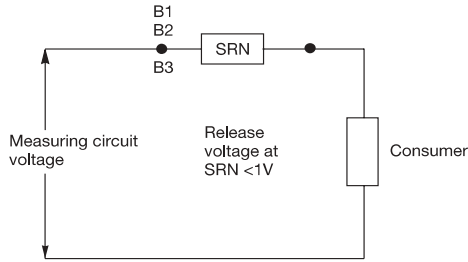
2 Functions



Note:
Dimensions (W x H x D), 45 x 78 x 101 mm

Current monitoring relays SRS and SRN mecotron®

Application



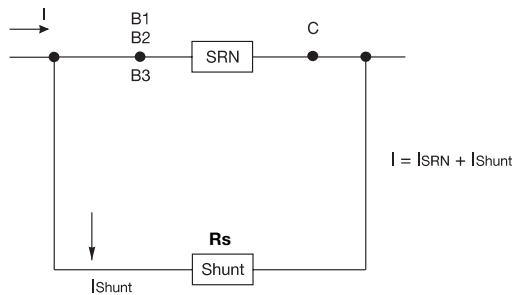
Voltage drop caused by internal resistance R_i of the SRN is negligible (less than 1 V). Thus the SRN can also be used at high measuring circuit voltages.

Setting up

Set delay time to minimum before setting the "desired" response value.

Measuring range extension

Measuring ranges can be extended by the use of current transformers or shunts which must be connected in parallel to the measuring input.



Example:

Current to be monitored: 110 A
 selected range of SRN: 1...5 A

Multiple of range "n": $n = \frac{110}{3} \approx 37$

(3 was chosen being the average of measuring range of 1 A to 5 A).

$$\text{Shunt resistor "Rs"} = \frac{\text{Input resistance "Ri"}}{\text{Multiple of range "n"} - 1}$$

$$R_s = \frac{R_i}{n-1} = \frac{18 \text{ m}\Omega}{37-1} \approx 0.58 \text{ m}\Omega$$

18 mΩ = input resistance SRN 1...5 A according to technical data.

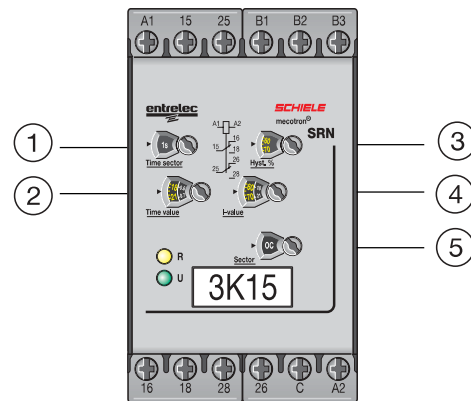
R_s selected 1.3 mΩ (nearest standard value)

Calculation of shunt load

Power consumption $P_v = (\text{extended value} - \text{basic value})^2 \times \text{shunt resistance}$

$$P_v = (110 \text{ A} - 3 \text{ A})^2 \times 0.0005 \approx 5.8 \text{ Watt}$$

With respect to temperature rise, the shunt must be rated **at least** twice the rating calculated.



- ① Time sector: Time selection switch, 0.05...1 s or 1.5...30 s
- ② Time value: Setting the desired time value
- ③ Hyst. %: Setting the response threshold/ hysteresis
- ④ I-value: Setting the desired current value
- ⑤ Sector: Only for AC/DC-versions:
 Selection switch overcurrent (OC)
 Selection switch undercurrent (AC/DC)

Current measuring ranges / current transformer

Current measuring range	Input resistance R_i	Terminal arrangement/ Measuring input	Continuous overload	Overload for $t < 1 \text{ s}$
3...30 mA	33 Ω	B1/C	50 mA	300 mA
10...100 mA	10 Ω	B2/C	150 mA	1 A
0.1...1 A	1 Ω	B3/C	1.5 A	10 A
The table below is only valid for the current monitor SRN mecotron®				
0.3...1.5 A	0.06 Ω	B1/C	2 A	15 A
1...5 A	0.018 Ω	B2/C	7 A	50 A
3...15 A	0.006 Ω	B3/C	20 A	100 A

Current transformer	Rated current	Power/class	sec. 5 A	sec. 1 A
IT 50-200	50 A	2 VA/1	4 450 116 50	4 450 116 10
	75 A	2.5 VA/1	4 450 116 51	4 450 116 11
	100 A	2.5 VA/1	4 450 116 52	4 450 116 12
	150 A	5 VA/1	4 450 116 53	4 450 116 13
	200 A	5 VA/1	4 450 116 54	4 450 116 14
IT 200-600	200 A	5 VA/1	4 450 117 50	4 450 117 10
	300 A	5 VA/1	4 450 117 51	4 450 117 11
	400 A	5 VA/1	4 450 117 52	4 450 117 12
	500 A	5 VA/1	4 450 117 53	4 450 117 13
	600 A	5 VA/1	4 450 117 54	4 450 117 14

Current monitoring relay SRS mecotron®



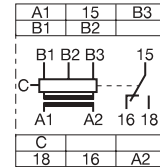
- Monitors AC or DC currents in three ranges from 3 mA ... 1 A
- 3 measuring ranges covered by one unit
- Switching hysteresis adjustable from 5...30 %
- No time delay
- 1 SPDT contacts
- 2 LEDs to indicate operational status
- 4 supply voltage versions, from 24...240 V AC

Operation




The current being monitored is applied to terminals B1, B2 or B3 and C. The output relay energizes when the current being monitored exceeds the set response value. It de-energizes when the current is below the set response value within the hysteresis range.

Hysteresis is adjustable from 5...30 % related to the response value. Measuring, output, and supply circuits are electrically isolated to prevent mutual interference.

One measuring cycle takes only 80 milliseconds; changes in current are quickly detected.



To extend the measuring range, use current monitoring relay type SRN shown on page 1484.

■ Approvals:   

Current measur. range: 3...30 mA, 10...100 mA, 0.1...1 A	P/N:
Supply voltage 50...60 Hz	
24 V AC	2 430 841 91
42...48 V AC	2 430 841 81
110...130 V AC	2 430 841 01
220...240 V AC	2 430 841 11

Accessories	P/N:
Sealable transparent cover	3 430 005 01
Adapter for screw mounting	3 430 029 01
Current transformer see "SRN"	

Technical data

Input circuit

Supply voltage - power consumption	A1-A2	24 V AC	- 1 VA
	A1-A2	42...48 V AC	- 1 VA
	A1-A2	110...130 V AC	- 1 VA
	A1-A2	220...240 V AC	- 1 VA
Tolerance of supply voltage			-15 % ... +10 %
Supply voltage frequency			50...60 Hz
Duty time			100 %
Measuring circuit			
Measuring current input	B1/C, B2/C, B3/C	3...30 mA	10...100 mA
Hysteresis (ref. to the response value) adjustable			0.1...1 A
			5...30 %
Measuring cycle max.			80 ms
Temperature error			≤ 0.06 % / °C
Error within tolerance of supply voltage			≤ 0.5 %
Input resistance		33 Ohm	10 Ohm
Possible permanent overload		50 mA	150 mA
Pulse overload for t < 1 s		300 mA	1 A
			10 A

Display of operational status

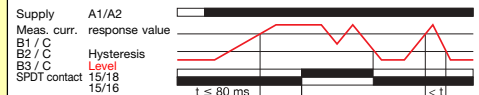
Supply voltage		LED, green
Output relay energized		LED, yellow
Output circuit	15-16/18	Relay, 1 SPDT contact, open-circuit principle

Rated voltage	VDE0100, IEC 947-1	250 V
Rated switching voltage max.		250 V AC
Rated switching current	AC 12 (resistive)	4 A (at 230 V)
Rated switching current	AC 15 (inductive)	3 A (at 230 V)
Rated switching current	DC 12 (resistive)	4 A (at 24 V)
Rated switching current	DC 13 (inductive)	2 A (at 24 V)
Maximum mechanical life		30 x 10 ⁶ operations
Maximum electrical life (acc. to AC 12 / 230 V / 4 A)		3 x 10 ⁶ operations
Short-circuit proof, max. fuse rating		10 A / fast, operating class gL

General data

Rated impulse withstand voltage V _{imp}		4 kV
Operating temperature		-20°C ... +60°C
Storage temperature		-40°C ... +85°C
Mounting position		any
Mounting to DIN rail (EN 50022)		Snap-on mounting/Screw mounting by adapter
Cable size stranded with wire end ferrule		2 x 14 AWG (2 x 2.5 mm ²)
Weight		approx. 0.33 lb (150 g)
Dimensions (W x H x D)		22.5 x 78 x 101 mm

1 Function



Over/Under Current Sensing ECS Series Current Sensor



TEN YEAR
WARRANTY

- Toroidal Through Hole Wiring
- 0.5...50 A Trip Point
- Adjustable or Factory Fixed Trip Delays
- 10 A SPDT Isolated Output Contacts
- 5% Trip Point Hysteresis (Dead Band)

Description

The ECS Series of Single Phase AC Current Sensors is a universal, overcurrent or undercurrent sensing control. Its built-in toroidal sensor eliminates the inconvenience of installing a stand-alone current transformer. Includes onboard adjustments for current sensing mode, trip point, and trip delay. Detects over or undercurrent events like locked rotor, loss of load, an open heater or lamp load, or proves an operation is taking place or has ended.

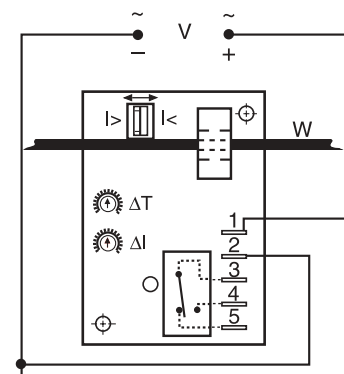
Adjustment

Select the desired function, over or under current sensing. Set the trip point and trip delay to approximate settings. Apply power to the ECS and the monitored load. Turn adjustment and watch the LED. LED will light; turn slightly in opposite direction until LED is off. Adjustment can be done while connected to the control circuitry if the trip delay is set at maximum.

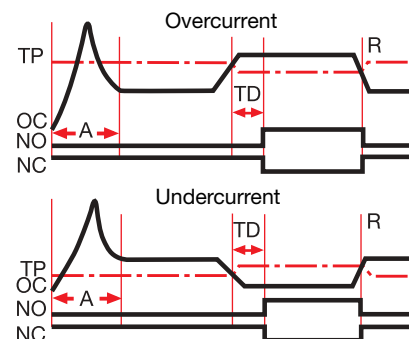
Operation

When a fault is sensed throughout the trip delay, the output relay is energized. When the current returns to the normal run condition, the output and the delay are reset. If a fault is sensed and then corrected before the trip delay is completed, the relay will not energize and the trip delay is reset to zero.

■ Approvals:



Relay contacts are isolated.
Dashed lines are internal connections.



V = Voltage W = Insulated Wire Carrying Monitored Current > = Overcurrent
 < = Undercurrent TP = Trip Point R = Reset
 OC = Monitored Current NO = Normally Open Contact NC = Normally Closed Contact
 A = Sensing Delay On Start Up TD = Trip Delay

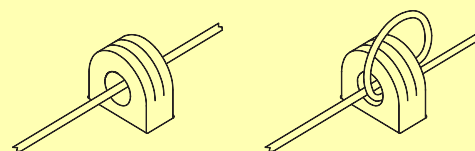
Ordering Table

X Series	X Input	X Trip Point	X Trip Delay	X Sensing Delay on Start up
Y ECS - (selectable over or undercurrent sensing)	-1 - 12 V DC	Fixed -	-F - Factory	Blank - 0
Y ECSH - (overcurrent sensing)	-2 - 24 V AC	Specify 2 ... 50 A	Fixed: Specify	-C - 1 s
Y ECSL - (undercurrent sensing)	-3 - 24 V DC	in 1 A increments	.08 ... 50 s	-D - 2 s
	-4 - 120 V AC	Adjustable Ranges	Adjustable Ranges	-E - 3 s
	-6 - 230 V AC	-0 - 0.5 ... 5 A	-A - 0.150 ... 7 s	-F - 4 s
		-1 - 2 ... 20 A	-B - 0.5 ... 50 s	-G - 5 s
		-H - 5 ... 50 A		-H - 6 s

Example P/N: **Y ECS41AC**
Fixed - **Y ECSH610AD**

Technical Data

Sensor	
Type	Toroidal, through hole wiring
Mode	Over or undercurrent, switch selectable on the unit or factory fixed
Trip Point Range	0.5 ... 50 A in 3 adjustable ranges or fixed
Tolerance: Adjustable	Guaranteed range
Fixed	0.5 ... 25 A: 0.5 A or +/-5% whichever is less; 26 ... 50 A: +/-2.5%
Maximum Allowable Current	Steady - 50 A turns; Inrush - 300 A turns for 10 s
Trip Point Hysteresis	≅ +/-5%
Trip Point vs. Temperature	+/-5%
Response Time	≤ 75 ms
Frequency	45 ... 500 Hz
Type of Detection	Peak detection
Trip Delay	
Type	Analog
Range: Adjustable	0.150 ... 7 s; 0.5 ... 50 s (Guaranteed ranges)
Factory Fixed	0.08 ... 50 s (+/-10%)
Delay vs. Temperature	+/-15%
Sensing Delay on Startup	Factory fixed 0 ... 6 s +40% ... 0%
Input	
Voltage	24 , 120, or 230 V AC; 12 or 24 V DC
Tolerance	12 V DC & 24 V DC/AC: -15% ... +20% 120 & 230 V AC: -20% ... +10%
Line Frequency	50 ... 60 Hz
Output	
Type	Electromechanical relay
Form	Isolated single pole double throw (SPDT)
Rating	10 A resistive at 240 V AC; 1/4 hp at 125 V AC; 1/2 hp at 250 V AC
Life	Mechanical - 1 x 10 ⁶ ; Electrical - 1 x 10 ⁵
Protection	
Circuitry	Encapsulated
Isolation Voltage	≥ 2500 V RMS input to output
Insulation Resistance	≥ 100 MΩ
Mechanical	
Mounting	Surface mount with two #6 (M3.5 x 0.6) screws
Termination	0.25 in. (6.35 mm) male quick connect terminals (5)
Humidity	95% relative, non-condensing
Operating/Storage Temperature	-40°C ... +60°C / -40°C ... +85°C
Weight	≅ 6.4 oz (181 g)

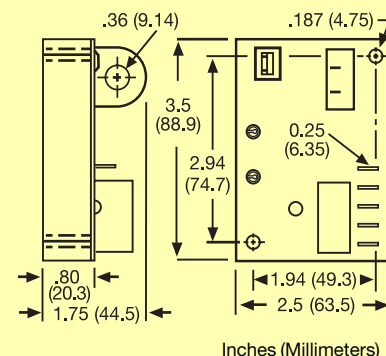


Multiple Turns To Increase Sensitivity

To increase sensitivity, multiple turns may be made through the ECS's toroidal sensor. The trip point range is divided by the number of turns through the toroidal sensor to create a new range.

Using an External Current Transformer (CT)

Select a 2 VA, 0 to 5 A output CT, rated for the current to be monitored. Select ECS adjustment range 0. Pass the CT's secondary wire lead through the ECS's toroid.



Accessories

- Female quick connect P/Ns:
- Y P1015 13** (AWG 10/12)
- Y P1015 64** (AWG 14/16)
- Y P1015 14** (AWG 18/22)



See accessory page at the end of this section.

Window Current Sensor ECSW Series Current Sensor

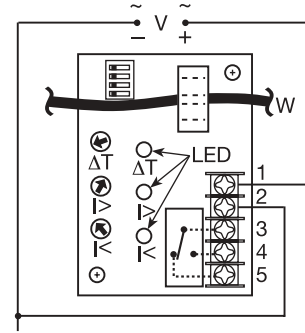


- Overcurrent & Undercurrent (Window Current) Sensing
- Adjustable Overcurrent & Undercurrent Trip Points
- Current Sensor is Included
- 10 A SPDT Isolated Output Contacts
- LED Indicators

Description

The ECSW Series of single phase, AC window current sensors includes adjustable overcurrent and undercurrent trip points. Detects locked rotor, loss of load, an open heater or lamp load, a broken belt, a jam or loss of suction. LEDs aid in trip point adjustment and provide fault indication. The built-in toroidal sensor eliminates the need for an external current transformer. The output can be electrically latched after a fault, or automatically reset. Remote resetting of a latched output by removing input voltage. The unit includes switch selectable zero current detection and normally de-energized or energized output operation. Time delays are included to improve operation and eliminate nuisance tripping.

Approvals:



V = Voltage W = Monitored Wire
 ΔT = Adjustable Trip Delay
 > = Adjustable Overcurrent
 < = Adjustable Undercurrent

Ordering Table

Y ECSW Series	X Input -1 - 12 V DC -2 - 24 V AC -3 - 24 V DC -4 - 120 V AC -6 - 230 V AC	X Trip Point Range Adjustable Ranges -L - 0.5 ... 5 A -M - 2 ... 20 A -H - 5 ... 50 A	X Trip Delay -A - Adjustable 0.15 ... 7 s -B - Adjustable 0.5 ... 50 s -F - Fixed	X Sensing Delay on Start Up -B - 0.1 s -C - 1 s -D - 2 s -E - 3 s -F - 4 s -G - 5 s -H - 6 s	X Connection -T - Terminal Blocks
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If Fixed Delay is selected, insert delay [0.08 ... 50] in seconds.
 0.1 ... 2 s in 0.1 s increments
 2 ... 50 s in 1 s increments

Example P/N: **Y ECSW4LBCT**

Technical Data

Sensor	
Type	Toroid, through hole wiring for up to #4 AWG (21.1 mm ²) THHN wire
Mode	Over and undercurrent trip points (window current sensing)
Trip Point Range	0.5 ... 50 A in 3 adjustable ranges or fixed
Tolerance	Adjustable – guaranteed range Fixed – 0.5 ... 25 A - 0.5 A or +/-5% whichever is less; 26 ... 50 A - +/-2.5%
Maximum Allowable Current	Steady - 50 A turns; Inrush - 300 A turns for 10 s
Trip Point vs. Temperature & Voltage	+/-5%
Response Time	≤ 75 ms
Frequency	45 ... 500 Hz
Type of Detection	Peak detection
Zero Current Detection	< 250 mA turns typical
Time Delay	
Range	0.15 ... 50 s in 2 adjustable ranges or 0.08 ... 50 s fixed
Tolerance	Adjustable: guaranteed range; Fixed; +/-10%
Sensing Delay On Start Up	Fixed ≅ 0.1 ... 6 s in 1 s increments
Tolerance	+40% -0%
Delay vs. Temperature & Voltage	+/-15%
Input	
Voltage	24, 120, or 230 V AC; 12 or 24 V DC
Tolerance	+/-20%
AC Line Frequency	50 ... 60 Hz
Output	
Type	Electromechanical relay
Mode: Switch selectable	ON - Energized during normal operation, de-energized after a fault OFF - De-energized during normal operation, energizes during a fault
Form	Isolated, SPDT
Rating	10 A resistive at 240 V AC; 1/4 hp at 125 V AC; 1/2 hp at 250 V AC
Life	Mechanical: 1 x 10 ⁶ ; Electrical: 1 x 10 ⁵
Latch	Electrical Remove input voltage Switch selectable latching function

Selector Switch

ON ↔ OFF

SW1	Not Used
SW2	Latched
SW3	Zero I Output Normally Energized

Mode Selection Switches

SW1 = Latched or Auto reset selector
 OFF - automatic relay reset after a fault
 ON - output relay latches after a fault trips the unit

SW2 = Zero current detection - (below 250mA)
 OFF - zero current detection disabled
 ON - zero current detection enabled

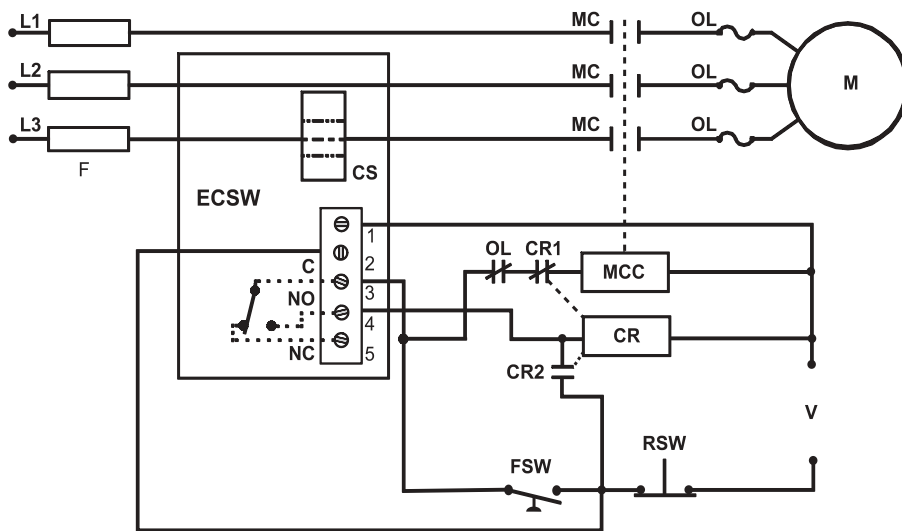
SW3 = Output during normal operation
 OFF - output relay de-energized
 ON - output relay energized

Operation

When the input voltage is applied, sensing delay on startup begins and the output transfers (if normally energized is selected). Upon completion of the startup delay, sensing of the monitored current begins. As long as current is above undercurrent trip point and below the overcurrent trip point (inside the window), the output relay remains in its normal operating condition and both red LEDs are OFF. The green LED glows when the output is energized. If current varies outside the window, the associated red LED glows, and the trip delay begins. If the current remains

(Continued on following page.)

Typical Pump or Fan Protection Circuit



Note: The output is normally de-energized. The zero current detection circuitry is enabled and a manual reset external latch has been added.

F = Fuses MC = Motor Contactor OL = Overload M = Motor
 CS = Current Sensor MCC = Motor Contactor Coil CR = Control Relay
 FSW = Fan or Float Switch RSW = Reset Switch

Window Current Sensor ECSW Series Current Sensor

Typical Pump or Fan Protection Circuit Operation

Window Current Sensing: With the ECSW connected as shown in the diagram, a load may be monitored and controlled for over and undercurrent. The ECSW Series' on board CT (CS) may be placed on the line or load side of the contactor. The ECSW selection switches are set for zero current sensing (see Selector Switch SW2) and the output selection is normally de-energized (see Selector Switch SW3). The input voltage (V) is applied to the ECSW continually. As the control switch (FSW) is closed, the input voltage (V) is applied to the motor contactor coil (MCC), and the motor (M) energizes. As long as the current remains below the overcurrent and above the undercurrent trip points, the ECSW's output contacts remain de-energized. If the load current should rise above or fall below a trip point, for the full trip delay, the normally open (NO) contact will close, energizing the control relay (CR) coil. The CR normally closed contact (CR1) opens and the MCC de-energizes and CR latches-on through its normally open contacts (CR2). Reset is accomplished by momentarily opening the normally closed reset switch (RSW).

Note: If the current falls to zero within the trip delay, the ECSW remains de-energized. The sensing delay on startup occurs when input voltage is applied therefore trip delay must be longer than the duration of the motor's inrush current. The external latching relay CR2 is required in this system to prevent rapid cycling. A timer can be added to provide an automatic reset.

Operation (cont.)

outside the window for the full trip delay, the relay transfers to fault condition state. If the current returns to normal levels (inside the window) during the trip delay, the red LED goes OFF, the trip delay is reset, and the output remains in the normal condition.

Reset: Remove input voltage or open latch switch. If zero current detection is selected, the unit will reset as soon as zero current is detected.

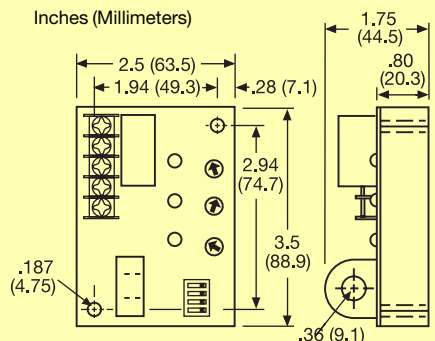
Operation With Zero Current Detection Enabled: If the current decreases to zero within the trip delay period, then zero current is viewed as an acceptable current level. The unit's output remains in its normal operating state. This allows the monitored load to cycle ON and OFF without nuisance tripping the ECSW. Zero current is defined as current flow of less than 250 milliamp-turns. Note: When zero current detect is selected, the latching operation of switch SW2 is canceled; the output will not latch after a fault trip.

Notes on Operation:

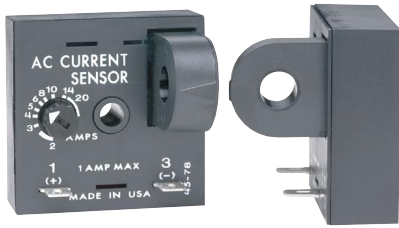
- 1) There is no hysteresis on the trip points. The overcurrent and undercurrent trip points should be adjusted to provide adequate protection against short cycling.
- 2) If the upper set point is set below the lower set point, both red LEDs will glow indicating a setting error.
- 3) If zero current detection is selected (SW2 ON), and the system is wired to disconnect the monitored load, the system may short cycle. After the unit trips, the load de-energizes, and zero current is detected. The ECSW resets, and the load energizes again immediately and may be short cycled.
- 4) The sensing delay on start up only occurs when input voltage is applied. When zero current detection is selected, the trip delay must be longer than the duration of the inrush current or the unit will trip on the inrush current.

Technical Data (cont.)

Protection	Surge	IEEE 587 Level A
Circuitry		Encapsulated
Isolation Voltage		≥ 2500 V RMS input to output
Insulation Resistance		≥ 100 MΩ
Mechanical		
Mounting		Surface mount with two #6 (M3.5 x 0.6) screws
Termination		0.197 in. (5 mm) terminal blocks for up to #12 (3.2 mm ²) AWG wire
Environmental		
Operating Temperature		-40° C ... +60° C
Storage Temperature		-40° C ... +85° C
Humidity		95% relative, non-condensing
Weight		≅ 6.4 oz (181 g)



AC Current Sensor PLC Interface TCS Series Current Sensor



- Direct Connection to PLC Input
- 3 ... 50 V DC, 24 ... 240 V AC in 2 Ranges
- 1 A Steady - 10 A Inrush
- Actuation Points - 2 ... 45 A (Fixed Units)
2 ... 20 A (Adjustable Units)
- Normally Open or Closed Solid State Output
- Complete Isolation Between Sensed Current & Control Circuit

Description

The TCS Series is a low cost method of GO/NO GO current detection. It includes a solid state output to sink or source current when connected directly to a standard PLC digital input module. Its normally open or normally closed output can also be used to control relays, lamps, valves, and small heaters rated up to 1 A steady, 10 A inrush. The TCS is self-powered (no external power required to operate the unit) available with an adjustable actuation range of 2 to 20 A or factory fixed actuation points from 2 to 45 A.

Operation

Normally Open: When a current equal to or greater than the actuate current is passed through the toroidal sensor, the output closes. When the current is reduced to 95% of the actuate current or less, the output opens.

Normally Closed: When the current through the toroid is equal to or greater than the actuate current, the output opens. When the current is reduced below 95% of the actuate current, the output closes.

■ Approvals:   

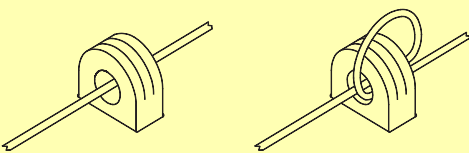
Ordering Table

Y TCS Series	X Input	X Actuate Current	X Output Form
	-G - 3 ... 50 V DC -H - 24 ... 240 V AC	-A - Adjustable 2 ... 20 A -Specify Fixed - Actuate Point 2 ... 45 A in 1 A increments	-A - Normally Open -B - Normally Closed

Example P/N: **Y TCSGAA** Fixed - **Y TCSH20A**

Technical Data

Sensor	
Type	Toroid, through hole wiring, alternating current
Current to Actuate	Adjustable Units -- 2 ... 20 A, Guaranteed Range Fixed Units -- 2 ... 45 A, +0/-20%
Reset Current	≅ 95% of the actuate current
Maximum Allowable Current	Steady -- 50 A-turns Inrush -- 300 A-turns for 10 s
Actuate Current vs. Temperature & Voltage	≤ +/-5%
Response Times	Overcurrent -- ≤ 200 ms Undercurrent -- ≤ 1 s
Burden	< 0.5 VA
Output	
Type	Solid State
Form	Normally Open or Normally Closed
Rating	1 A steady, 10 A inrush
On State Resistance or Voltage Drop	DC N.O. & N.C. -- ≅ 1.2 V AC N.O. & N.C. -- ≅ 2.5 V
Voltage	AC -- 24 ... 240 V AC +10/-20% DC -- 3 ... 50 V DC
Protection	
Circuitry	Encapsulated
Dielectric Breakdown	≥ 2000 V RMS terminals to mounting surface
Insulation Resistance	≥ 100 MΩ
Mechanical	
Mounting	Surface mount with one #10 (M5 x 0.8) screw
Package	2 x 2 x 1.75 in. (50.8 x 50.8 x 44.5 mm)
Termination	0.25 in. (6.35 mm) male quick connect terminals (2)
Environmental	
Operating/Storage Temperature	-20°C ... +60°C / -40°C ... +85°C
Humidity	95% relative, non-condensing
Weight	≅ 2.6 oz (74 g)

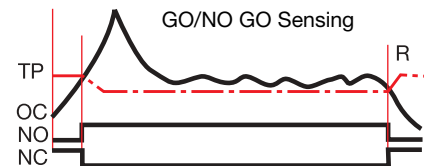
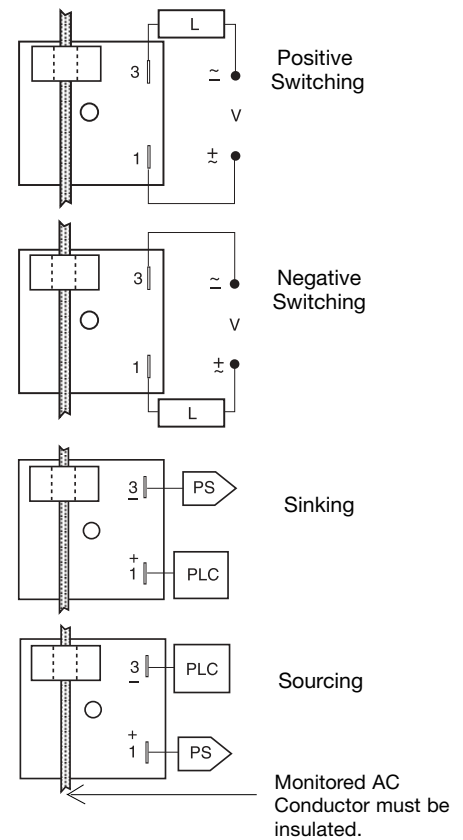


Multiple Turns To Increase Sensitivity

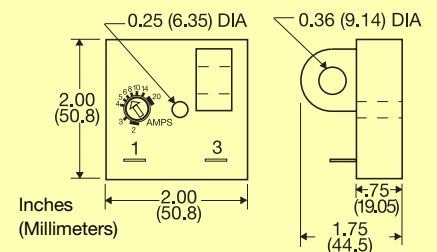
To increase sensitivity, multiple turns may be made through the TCS's toroidal sensor. The trip point range is divided by the number of turns through the toroidal sensor to create a new range.

Using an External Current Transformer (CT)

Select a 2 VA, 0 to 5 A output CT, rated for the current to be monitored. Select TCS adjustment range 0. Pass the CT's secondary wire lead through the TCS's toroid.



L = Load V = Voltage PS = Power Supply
PLC = PLC Digital Input Module R = Reset
TP = Trip Point OC = Monitored Current
NO = Normally Open Output NC = Normally Closed Output



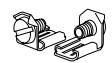
Accessories

Female quick connect



P/N:
Y P1015 64 (AWG 14/16)

Quick connect to screw adaptor
P/N: **Y P1015 18**

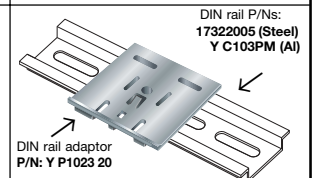


Mounting bracket
P/N: **Y P1023 6**



DIN rail P/Ns:
17322005 (Steel)
Y C103PM (Al)

DIN rail adaptor
P/N: **Y P1023 20**

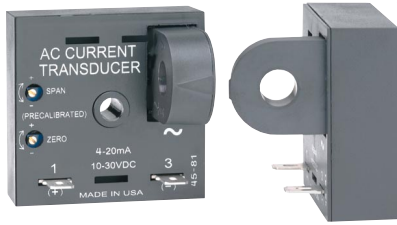


See accessory page at the end of this section.

AC Current Transducer

TCSA Series

Loop Powered



- Monitors 0 ... 50 A in 4 Ranges
- Loop Powered from 10 ... 30 V DC
- Linear Output from 4 ... 20 mA
- Zero and Span Adjustments
- Complete Isolation Between Sensed Current and Control Circuit

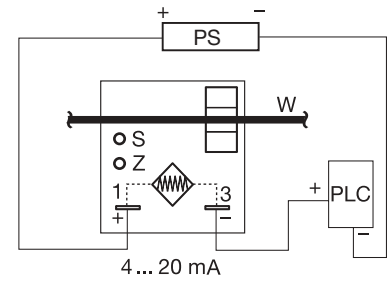
Description

The TCSA Series is a loop powered, linear output current transducer that provides an output that is directly proportional to the RMS AC current passing through the onboard toroid. The TCSA provides a 4 to 20 mA output over a power supply range of 10 to 30 V DC. Each unit is factory calibrated for monitoring from 0 to 5, 0 to 10, 0 to 20, or 0 to 50 A in four ranges. The 0 to 5 A range allows the use of external current transformers so loads up to 1200 AC amps can be monitored.

Operation

The TCSA varies the effective resistance of its output in direct proportion to the current flowing in the monitored conductor. The unit is factory calibrated so that 0 amps provide a 4 mA output and full span provide a 20 mA output. Zero and span adjustments are provided for minor calibration adjustments in the field (if required).

■ Approvals:



PS = Power Supply

W = Insulated Wire Carrying Monitored Current

PLC = PLC Analog Input or Meter Input

S = Span Adjust Z = Zero Adjust

Current Range

Part Number

0 ... 5 A	Y TCSA5
0 ... 10 A	Y TCSA10
0 ... 20 A	Y TCSA20
0 ... 50 A	Y TCSA50

Technical Data

Sensor

Type	Toroid, through hole wiring, alternating current Monitored conductor must be properly insulated
Monitored AC Current Ranges	0 ... 50 A
4 factory calibrated ranges	0 ... 5A, 0 ... 10A, 0 ... 20A, or 0 ... 50A
Factory Calibration	+/-0.5% of full scale
Maximum Allowable Current	Steady - 50 A turns Inrush - 300 A turns for 10 s
Repeat Accuracy	+/-0.25% of full scale under fixed conditions
Response Time	≅ 300 ms
Burden	≤ 0.5 VA
Frequency	0 ... 20A / 21 ... 50A 20 ... 100 Hz / 30 ... 100 Hz
Temperature Coefficient	+/-0.05%/°C

Output

Type: Series Connection	Current directly proportional to monitored current
Range	4 ... 20 mA
Sensor Supply Voltage*	10 ... 30 V DC
Momentary Voltage	40 V DC for 1 m
Zero Adjust	≅ 3.75 ... 4.25 mA
Span Adjust	18 mA ... 22 mA
Adjustment	Mini-screw, 25 turn potentiometer

Protection

Dielectric Breakdown	≥ 2000 V RMS terminals to mounting surface
Insulation Resistance	≥ 100 MΩ
Polarity	Units are reverse polarity protected

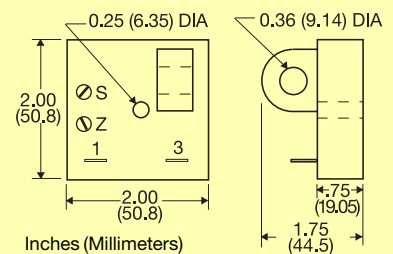
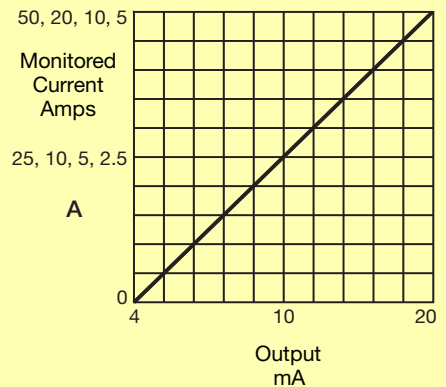
Mechanical

Mounting Package	Surface mount with one #10 (M5 x 0.8) screw 2 x 2 x 1.75 in. (50.8 x 50.8 x 44.5 mm)
Termination	0.25 in. (6.35 mm) male quick connect terminals
Sensor Hole	0.36 in. (9.14 mm) for up to #4 AWG (21.1 mm ²) THHN wire

Environmental

Operating Temperature	-30°C ... +60°C
Storage Temperature	-40°C ... +85°C
Humidity	95% relative, non-condensing
Weight	≅ 2.4 oz (68 g)

*Minimum loop power supply voltage equals the minimum sensor voltage 10 V DC plus the voltage drop developed across all the other loop devices at 20 mA.



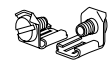
Accessories

Female quick connect



P/N:
Y P1015 64 (AWG 14/16)

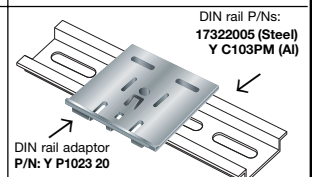
Quick connect to screw adaptor



P/N: Y P1015 18

Mounting bracket

P/N: Y P1023 6



See accessory page at the end of this section.

AC Current Transducer DCSA Series Loop Powered



TEN YEAR
10
WARRANTY

- Mounts on DIN 1 or DIN 3 Rail
- 0 ... 50 A in 4 Ranges using LCSC10T12 Sensor
- Loop Powered from 10 ... 30 V DC
- Linear Output from 4 ... 20 mA, 1 ... 10 V DC
- Zero and Span Adjustments
- Separate Sensor & Control Unit

Description

The DCSA Series is a loop powered, linear output current transducer that provides an output that is directly proportional to the RMS AC current passing through the LCSC10T12 sensor. The DCSA provides either an analog current or voltage: 4 to 20 mA, 1 to 5 V DC, or 2 to 10 V DC. Each unit is factory calibrated for monitoring (with the LCSC10T12 connected) from 0 to 5, 0 to 10, 0 to 20, or 0 to 50 A in four ranges. Zero and span adjustments allow field calibration if needed. The DCSA mounts on both DIN 1 and DIN 3 rails.

Operation

The DCSA varies the effective resistance of its output in direct proportion to the current flowing in the conductor monitored by the LCSC10T12. Connecting terminals C & D provides a 4 to 20 mA DC current. Connect the power supply to terminals C & A to get 1 to 5 V DC at terminal D. Connect the power supply to terminals C & B to get 2 to 10 V DC at terminal D.

■ Approvals:



Current Range with LCSC10T12	DCSA Input Range (F to E)	Part Number
0 ... 5 A	0 ... 5 mA AC	Y DCSA5
0 ... 10 A	0 ... 10 mA AC	Y DCSA10
0 ... 20 A	0 ... 20 mA AC	Y DCSA20
0 ... 50 A	0 ... 50 mA AC	Y DCSA50
	Toroidal Sensor	Y LCSC10T12

Technical Data

DCSA Current Transducer

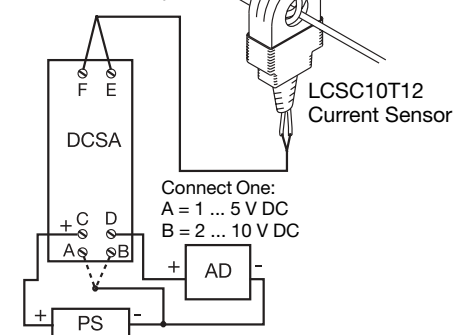
Input	
Ranges (without LCSC10T12 connected) 4 factory calibrated ranges in mA AC Factory Calibration	0...5 mA, 0...10 mA, 0...20 mA, or 0...50 mA AC +/-0.5% of full scale
Repeat Accuracy	+/-0.25% of full scale under fixed conditions
Response Time	≅ 300 ms
Temperature Coefficient	+/-0.05%/°C
Input To Output	Not isolated
Output	
Type: Analog	Current directly proportional to input current
Range	4 ... 20 mA; or 1 ... 5 V DC or 2 ... 10 VDC
Supply Voltage*	10 ... 30 V DC
Momentary Voltage	40 V DC for 1 m
Zero Adjust	≅ 3.75 ... 4.25 mA
Span Adjust	18 mA ... 22 mA
Adjustment	Mini-screw, multi-turn potentiometer
Protection	
Dielectric Breakdown	≥ 2500 V RMS terminals to mounting surface
Insulation Resistance	≥ 100 MΩ
Polarity	Units are reverse polarity protected
Mechanical	
Mounting	DIN 1 & DIN 3 rail mounting
Termination	Wire clamp
	For 22 ... 14 AWG (.336 mm ² ... 2.5 mm ²)
Environmental	
Operating Temperature	-30°C ... +60°C
Storage Temperature	-40°C ... +85°C
Humidity	95% relative, non-condensing
Weight	DCSA ≅ 1.6 oz (45.4 g)

LCSC10T12 Toroidal Sensor

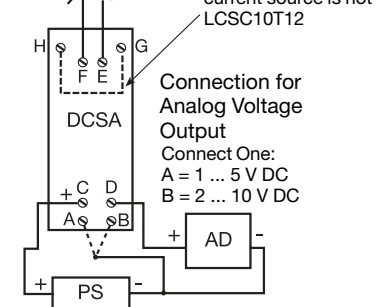
Number of Turns	1000
Nominal Output Current Full Range	0 ... 50 mA
Maximum Allowable Current	Steady – 50 A turns Inrush – 300 A turns for 10 s
Burden	≤ 0.5 VA
Frequency	0 ... 20A / 21 ... 50A 20 ... 100 Hz / 30 ... 100 Hz
Sensor Hole	0.36 in. (9.14 mm) for up to #4 AWG (21.1 mm ²) THHN wire
Weight	LCS ≅ 1 oz (28.3 g)

*Minimum loop power supply voltage equals the minimum sensor voltage 10 V DC plus the voltage drop developed across all the other loop devices at 20 mA.

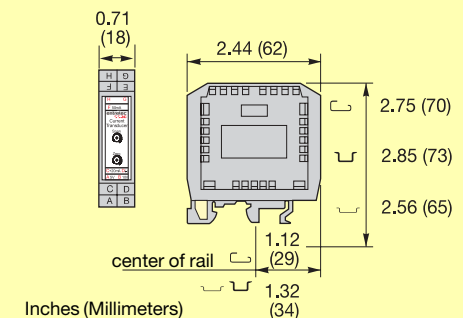
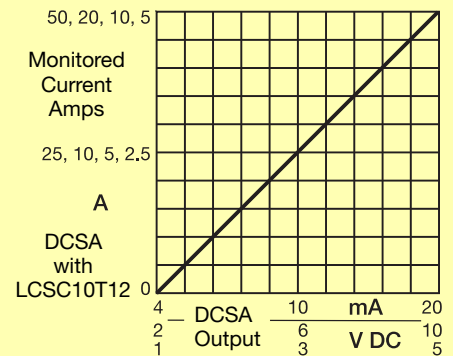
Connection for
4 ... 20 mA Loop



To LCSC10T12
Current Sensor



AD = Instrument, Meter, or PLC Input
PS = Power Supply



Current Sensor LCSC10T12



AC Current Indicator LCS10T12 & LPM Go-Glow Indicator



- Low Cost Go/No Go Indication
- May Be Connected To Wires Up To 500 Feet (152.4 m) Long
- Remote Current Monitoring of Currents Up To 50 A
- Green or Red LED Indicator Available

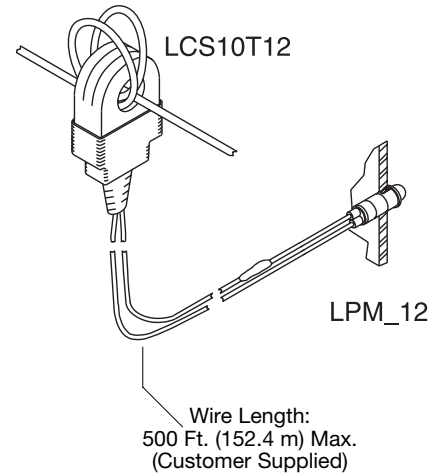
Description

The LCS10T12 connected to the LPM12 or LPMG12 indicator is a low cost, easy to use, go/no go indication system for the remote monitoring of current flow. The LCS10T12 is installed on an adequately insulated wire of the monitored load. Its 12 in. (30.4 cm) leads are connected to the LPM12 or LPMG12 panel mount indicator directly or via customer supplied wires up to 500 feet (152.4 m) long.

Operation

When the monitored current is 5 ampere-turns, the panel mount LPM indicator will glow. The LCS10T12 is designed to maximize the light output of the panel mount indicator. It can be used to monitor current flow of less than 5 A by passing the monitored conductor 2 or more times through the sensor.

■ Approvals:

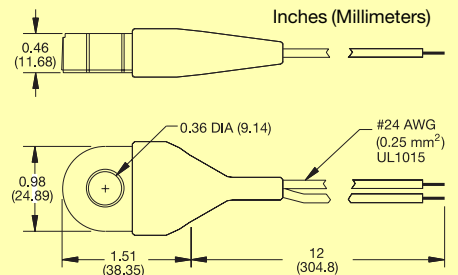


CAUTION: The LCS10T12 must be connected to the LPM12 or LPMG12 before current flows to prevent damage or a shock hazard. Monitored wires must be properly insulated.

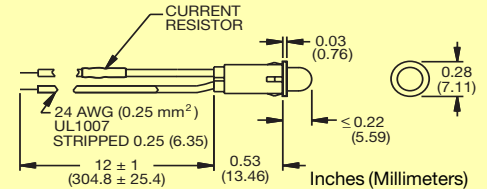
Description	Part Number
AC Current Sensor	Y LCS10T12
Red LED Indicator	Y LPM12
Green LED Indicator	Y LPMG12

Technical Data

Specifications		2 ... 50 A AC			
Current Range	Wire Passes	Min. Current	Max. Current	Max. Inrush	Max. Wire Dia.
	1	5 A	50 A	120 A	0.355 in. (9.0 mm)
	2	2.5 A	25 A	60 A	0.187 in. (4.7 mm)
	3	1.7 A	16.6 A	40 A	0.15 in. (3.8 mm)
	4	1.3 A	12.5 A	30 A	0.125 in. (3.2 mm)
	5	5/X	50/X	120/X	
Maximum Current	50 ampere-turns continuous				
Frequency	50 ... 60 Hz				
DC Resistance	65 Ω				
Sensor Hole	0.36 in. (9.14 mm) for up to #4 AWG (21.1 mm ²) THHN wire				
Termination	12 in. (30.4 cm) wire leads				
Operating Temperature	-40°C ... +60°C				
Weight	LCS: ≅ 0.8 oz (23 g) LPM: ≅ 0.2 oz (6 g)				



The LCS10T12 AC current sensor is installed on a wire of the monitored load. Its wire leads connect to the LPM12 or LPMG12 panel mount indicator.



Panel mount indicator designed to match the output of SSAC's LCS10T12. The LPM12 and LPMG12 come with 12 in. (30.4 cm) wires and a one piece mounting clip. Both devices install quickly in a 0.25 in. (6.35 mm) hole in panels from 0.031 ... 0.062 in. (0.79 ... 1.6 mm) thick.

Insulation Monitor IWN mecotron® AC



- Monitors insulation resistance between ungrounded AC supply voltages and earthed conductors
- 2 measuring ranges from 1...110 kΩ
- Manual reset capability
- Suitable for insulation monitoring of single phase or three phase power supplies
- Performance check with front mounted test button or remote test button
- 1 SPDT contact
- Faults are displayed by the yellow LED
- LED indicates supply voltage ON
- Acc. to VDE 0413 part 2

Operation

The IWN is designed for an insulation resistance range of 1...110 kΩ in 2 ranges. The desired range - 1...11 kΩ and 10...110 kΩ - is set with a front mounted switch. Setting range changeover helps to adapt the IWN to most application requirements. The output relay energizes and the yellow LED lights up as soon as insulation resistance is below the set response value and resets as soon as insulation resistance exceeds 1.6 times the response value.

Test

Insulation resistance breakdown can be simulated with the front mounted "Test" button. The output relay will energize after the test button has been pressed. A remote test button can be connected via terminals S1- $\frac{1}{2}$. Tripping will be caused by a normally-open contact.

■ Approvals:

Function

The IWN is used to monitor insulation of single phase or three phase AC supply voltages. It is mainly used to monitor auxiliary circuits that are electrically isolated from supply voltage circuits. The IWN monitors insulation resistance between ungrounded AC supply voltages and grounded conductors. A superposed DC measuring voltage is used for measurement. The unit complies with VDE 0413/part 2/1.73.

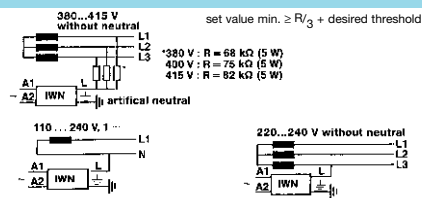
Fault storage/Remote Reset

The tripped state can be stored by connecting terminal S1 to S2; or a normally closed reset switch can be connected to S1 and S2: pressing the button resets the unit.

Attention

The IWN is designed for AC supply voltage. Rectifiers that are connected in series should be electrically isolated from the IWN. The unit may be powered by the supply voltage being monitored.

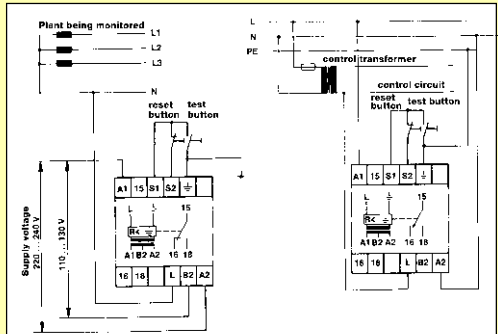
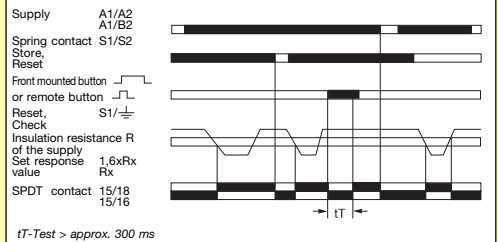
Application examples for different supply voltages



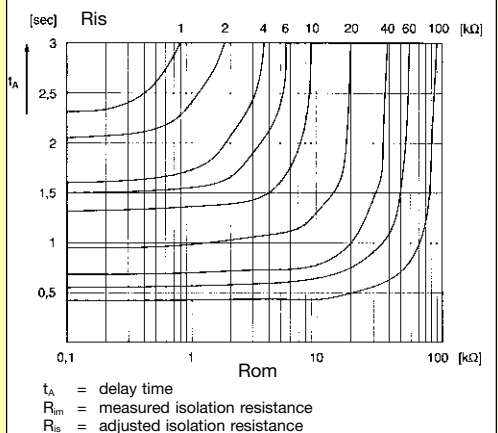
Technical data

Input circuit		Insulation resistance range 1...110 kΩ	
Supply voltage - power consumption		Supply voltage	P/N:
A1-A2	24...240 V AC/DC	24...240 V AC/DC	2 450 075 00
A1-B2	110...130 V AC	110...130 V, 220...240 V AC	2 450 071 00
A1-A2	220...240 V AC		
Accessories		P/N:	
Sealable transparent cover		3 440 005 01	
Adapter for screw mounting		3 430 029 01	
Output circuit		15-16/18	
Rated voltage		VDE 0110, IEC 947-1	
Rated switching voltage max.		400 V	
Rated switching current AC 12 (resistive)		5 A (at 230 V)	
Rated switching current AC 15 (inductive)		3 A (at 230 V)	
Rated switching current DC 12 (resistive)		5 A (at 24 V)	
Rated switching current DC 13 (inductive)		2.5 A (at 24 V)	
Maximum mechanical life/ operations		30 x 10 ⁶ operations	
Maximum electrical life (to AC 12 / 230 V / 5 A)		1 x 10 ⁶ operations	
Short-circuit proof, max. fuse rating		5 A / fast, operating class gL	
General data			
Rated impulse withstand voltage V _{imp}		4 kV	
Operating temperature		-25°C ... +65°C	
Storage temperature		-40°C ... +85°C	
Mounting position		any	
Mounting to DIN rail (EN 50022)		Snap-on mounting/ Screw mounting by adapter	
Cable size stranded with wire end ferrule		2 x 14 AWG (2 x 2.5 mm ²)	
Weight		approx. 0.66 lb (300 g)	
Dimensions (W x H x D)		45 x 78 x 101 mm	

1 Function



The response time varies with the severity of the fault and the selected trip point. (See graph below)



Insulation Monitor IWN mecotron® DC



- Monitors insulation resistance in ungrounded pure DC supply voltage from 24...220 V DC
- Adjustable response range from 10...110 kΩ
- Display of insulation breakdown by 2 LEDs, L+, L-
- Front face selection switch for operating or non-operating principle
- Front face as well as external test/ reset capability
- 1 SPDT contact

Operation

The IWN is designed for insulation resistance monitoring in ungrounded, pure DC supply voltage with or without filtering. Because of its electrical isolation between supply and measuring circuit, it can be used with an external auxiliary voltage, or where the supply voltage to be monitored is also the primary supply. An insulation resistance breakdown is evaluated separately for L+ or L- and is displayed by an LED. A balanced earth fault cannot be detected. The response value is infinitely adjustable in a range from 10...110 kΩ and can be adapted to prevailing local conditions. If the insulation resistance decreases below the set response value, the relay will transfer and the fault LED will light.

Test

An insulation resistance breakdown can be simulated with the front mounted "Test" button. The output relay will transfer after the test button has been pressed. A remote test button for L+ can be connected via terminals S1- S3 (S4-S3 for L-).

■ Approvals:

Application

The IWN is used to monitor DC auxiliary circuits that are electrically isolated from primary supply voltage circuits, as well as plants powered by batteries.

Fault storage/Remote Reset

The tripped state can be stored by connecting terminals S2-S3; or a normally closed reset switch can be connected to S1 and S2: pressing the button resets the unit.

Operate current/non-operate current selection switch

Selected by a front-mounted switch; when an insulation breakdown occurs, the output relay transfers to the rest position or to the energized position.

Transparent cover

To prevent unauthorized adjustment, a sealable transparent cover is available.

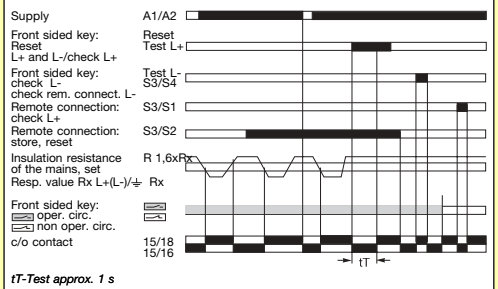
Insulation resistance range 1...110 kΩ	P/N:
Supply voltage 24...240 V AC/DC	2 450 065 00

Accessories	P/N:
Sealable transparent cover	3 440 005 01
Adapter for screw mounting	3 430 029 01

Technical data

Input circuit		A1-A2
Supply voltage - power consumption		24...240 V AC/DC - approx. 5.5 VA / W
Tolerance of supply voltage	24...240 V AC	-15 % ... +10 % (50...60 Hz)
	24...240 V DC	-15 % ... +10 %
Duty time		100 %
Measuring circuit		
Measuring input	L+, L-, $\frac{\text{---}}{\text{---}}$	
Response value		10...110 kΩ
Internal resistance min.		57 kΩ
Measuring voltage		24...240 V DC
Isolation voltage max.		300 V DC
Cable length for delete and check button		max. 10 m
Time delay		
		< 1 s at R isolation
		< 0.9 x response value
Display of operational status		
Supply voltage		LED, green
Fault at L+		LED, red
Fault at L-		LED, red
Output circuit		Relay, 1 SPDT, operating/non-operating principle select.
Rated voltage	VDE0100, IEC 947-1	400 V
Rated switching voltage max.		400 V AC
Rated switching current	AC 12 (resistive)	5 A (at 230 V)
Rated switching current	AC 15 (inductive)	3 A (at 230 V)
Rated switching current	DC 12 (resistive)	5 A (at 24 V)
Rated switching current	DC 13 (inductive)	2.5 A (at 24 V)
Maximum mechanical life		30 x 10 ⁶ operations
Maximum electrical life (acc. to AC 12 / 230 V / 5 A)		1 x 10 ⁶ operations
Short-circuit proof, max. fuse rating		5 A / fast, operating class gL
General data		
Rated impulse withstand voltage V _{imp}		4 kV
Operating temperature range		-25°C ... +65°C
Storage temperature range		-40°C ... +85°C
Mounting position		any
Mounting on DIN rail (EN 50022)		Snap-on mounting/screw mounting with adapter
Cable size stranded with wire end ferrule		2 x 14 AWG (2 x 2.5 mm ²)
Weight		approx. 0.66 lb (300 g)
Dimensions (W x H x D)		45 x 78 x 101 mm

1 Function



Application examples

