

High Performance Current Transducer ITL 900-T

For the electronic measurement of currents: DC, AC, pulsed..., with galvanic separation between the primary and the secondary circuit.



RoHS

$$I_{PM} = 0 \dots 900 \text{ A}$$



Electrical data

I_{PN}	Primary nominal rms current	400	A
I_{PM}	Primary current, measuring range	0 ... ± 900	A
R_M	Measuring resistance with $\pm 15 \text{ V}$	$R_{M \min}$ $R_{M \max}$	Ω
	@ $\pm 900 \text{ A}_{\max}$	5 5	Ω
	@ $\pm 800 \text{ A}_{\max}$	5 7.4	Ω
	@ $\pm 700 \text{ A}_{\max}$	5 10.4	Ω
	@ $\pm 500 \text{ A}_{\max}$	5 20	Ω
	@ $\pm 265 \text{ A}_{\max}$	5 50	Ω
I_S	Secondary current	0 ... ± 600	mA
I_{SN}	Secondary nominal rms current	266.6666	mA
K_N	Conversion ratio	1 : 1500	
U_C	Supply voltage ($\pm 5 \%$)	± 15	V
I_C	Current consumption ¹⁾	$\leq 280 + I_S$	mA
		$\leq 45 + I_S$	mA

Accuracy - Dynamic performance data

		Typ	Max	
ϵ_L	Linearity error @ $T_A = 10 \text{ }^\circ\text{C}$ ^{50°F} ... $50 \text{ }^\circ\text{C}$ ^{122°F} ²⁾	1	3	ppm
I_{OE}	Electrical offset current + self magnetization + effect of earth magnetic field @ $T_A = 25 \text{ }^\circ\text{C}$ ^{77°F} ²⁾	10	20	ppm
I_{OM}	Magnetic offset current in case of overload 3000 A @ $T_A = 25 \text{ }^\circ\text{C}$ ^{77°F} ²⁾ and $R_M = 5 \text{ } \Omega$	-	20	ppm
ΔI_{OE}	Offset stability (4 hours) ²⁾	-	0.5	ppm
TCI_{OE}	Temperature coefficient of I_{OE} ($10 \text{ }^\circ\text{C}$ ^{50°F} ... $50 \text{ }^\circ\text{C}$ ^{122°F} ²⁾)	-	0.3	ppm/K
ϵ_G	Sensitivity error @ $T_A = 25 \text{ }^\circ\text{C}$ ^{77°F} ²⁾	4	15	ppm

General data

T_A	Ambient operating temperature	10 ... +50	$^\circ\text{C}$
		50 ... +122	$^\circ\text{F}$
T_S	Ambient storage temperature	-20 ... +85	$^\circ\text{C}$
		-4 ... +185	$^\circ\text{F}$
R_S	Resistance of secondary winding @ $T_A = 50 \text{ }^\circ\text{C}$	13.1	Ω
m	Mass	1.5	kg
	Standards	EN 50178: 1997	

Notes: ¹⁾ With external synchronization signal

²⁾ All ppm figures refer to secondary measuring range 600 mA.

Features

- Closed loop (compensated) current transducer using an extremely accurate zero flux detector
- Electrostatic shield between primary and secondary circuit
- Can be synchronized with an external clock signal.

Advantages

- Very high accuracy
- Excellent linearity
- Extremely low temperature drift
- Wide frequency bandwidth
- Negligible self-magnetization
- High immunity to external interference
- Current overload capability.

Applications

- Feed back element in high performance gradient amplifiers for MRI
- Feed back element in precision current regulated devices.

Application domain

- Industrial and Medical.

Current Transducer ITL 900-T

Insulation characteristics

Between primary and secondary

U_b	Rated insulation rms voltage, reinforced or basic insulation with IEC 61010-1 standards and following conditions - Over voltage category III - Pollution degree 2	650	V
U_d	Rms voltage for AC insulation test, 50 Hz, 1 min	5	kV
\hat{U}_w	Impulse withstand voltage 1.2/50 μ s	9.9	kV
U_b	Rated insulation rms voltage, reinforced or basic insulation with EN 50178 standards and following conditions - Over voltage category III - Pollution degree 2	800	V
U_d	Rms voltage for AC insulation test, 50 Hz, 1 min	5	kV
\hat{U}_w	Impulse withstand voltage 1.2/50 μ s	9.9	kV
d_{cp}	Creepage distance	11	mm
d_{ci}	Clearance	11	mm
CTI	Comparative tracking index (Group I)	600	V

Between secondary and external synchronization SMA connector

U_b	Rated insulation rms voltage, reinforced or basic insulation with IEC 61010-1 & EN 50178 standards and following conditions - Over voltage category III - Pollution degree 2	100	V
U_d	Rms voltage for AC insulation test, 50 Hz, 1 min	1.4	kV
\hat{U}_w	Impulse withstand voltage 1.2/50 μ s	2.5	kV
d_{cp}	Creepage distance	1.5	mm
d_{ci}	Clearance	1.5	mm

Safety



This transducer must be used in electric/electronic equipment with respect to applicable standards and safety requirements in accordance with the manufacturer's operating instructions.



Caution, risk of electrical shock

When operating the transducer, certain parts of the module can carry hazardous voltage (eg. primary busbar, power supply).

Ignoring this warning can lead to injury and/or cause serious damage.

This transducer is a build-in device, whose conducting parts must be inaccessible after installation.

A protective housing or additional shield could be used.

Main supply must be able to be disconnected.

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Output noise figures: @ 25 °C 77°F

Random noise rms:

0.125 Hz – 1 Hz	1 Hz – 10 Hz	12.5 Hz – 45 Hz	55 Hz – 100 Hz	95 Hz – 1 kHz	1 kHz – 10 kHz	10 kHz – 30 kHz
< 10 $\mu\text{At}_{\text{rms}}$	< 15 $\mu\text{At}_{\text{rms}}$	< 15 $\mu\text{At}_{\text{rms}}$	< 12 $\mu\text{At}_{\text{rms}}$	< 15 $\mu\text{At}_{\text{rms}}$	< 5 $\mu\text{At}_{\text{rms}}$	< 5 $\mu\text{At}_{\text{rms}}$

Coherent noise:

50 Hz / 60 Hz
< 50 $\mu\text{At}_{\text{rms}}$

Re-injected noise measured on 1 primary turn < 25 μV

Dynamic performance data

BW Frequency bandwidth for small signal 5 %, 32 A_{rms}, $R_M = 5 \Omega$
 (-1 dB) DC ... 100 kHz
 (-3 dB) DC ... > 200 kHz
di/dt di/dt accurately followed $R_M = 5 \Omega$ > 100 A/ μs
t_r Response time ¹⁾ to 90 % of I_{PN} step < 0.5 μs

PSRR Power supply rejection ratio $R_M = 5 \Omega$

Frequency	PSRR on + U_c	PSRR on - U_c
60 Hz	85 dB	95 dB
120 Hz	80 dB	90 dB
300 Hz	71 dB	84 dB
600 Hz	66 dB	78 dB
1000 Hz	64 dB	75 dB
2000 Hz	60 dB	70 dB
10 000 Hz	62 dB	72 dB

$$PSRR = 20 \text{ Log}_{10} \left(\frac{\text{V ripple on supply}}{\text{V measured on } R_M = 5 \Omega} \right)$$

Note: ¹⁾ With a di/dt of 100 A/ μs .

Current Transducer ITL 900-T

Over current protection

As soon as electrical saturation appears, the transducer switches from normal operation to over current mode.

This electrical saturation is defined as 1.05 times the current range (I_{PM})

Under these conditions:

- the output (pin 6 of D-SUB-9 connector) of the transducer is short circuited to the 0 V inside the transducer (with the help of a relay contact).
- the contact (operation status) between pin 8 to 3 (of D-SUB-9 connector) switches off, this contact becomes open.
- the green LED (located on the cover plate of the transducer and related to operation status) switches off.

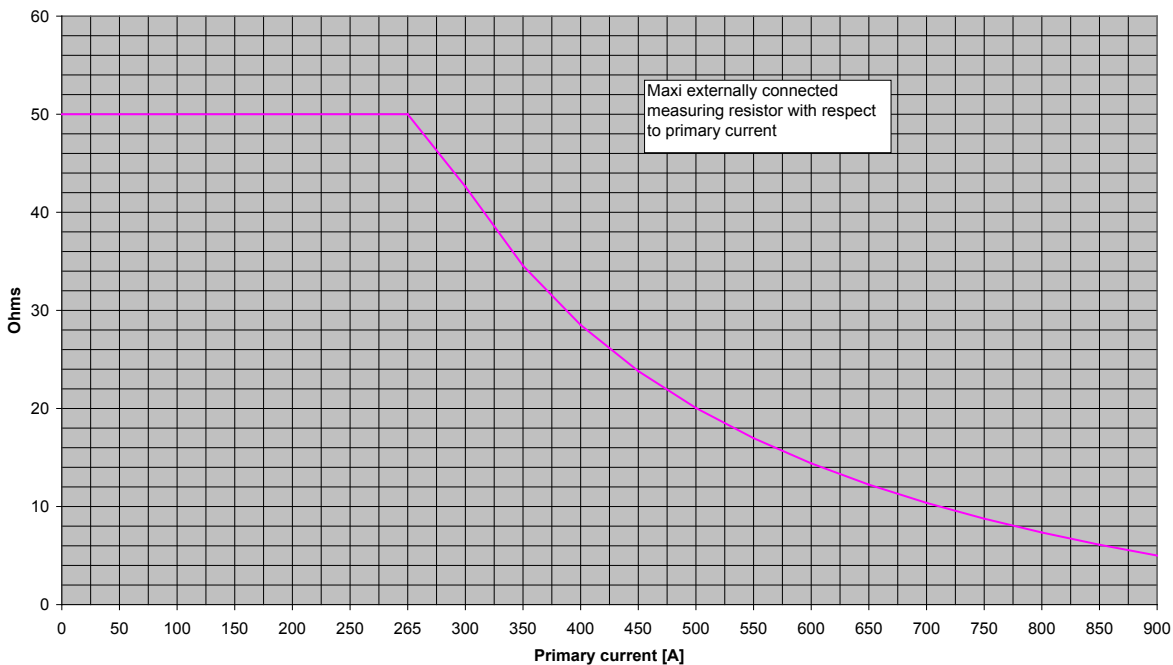
The over current mode remains until the primary current decreases below the recovery current.

The value of the recovery current is typically ± 165 A (max 260 A, min 70 A).

- TO ENSURE PROPER OPERATION, THE MAXIMUM BURDEN RESISTOR ALLOWED IS 50 OHMS. (5 OHMS MINIMUM).

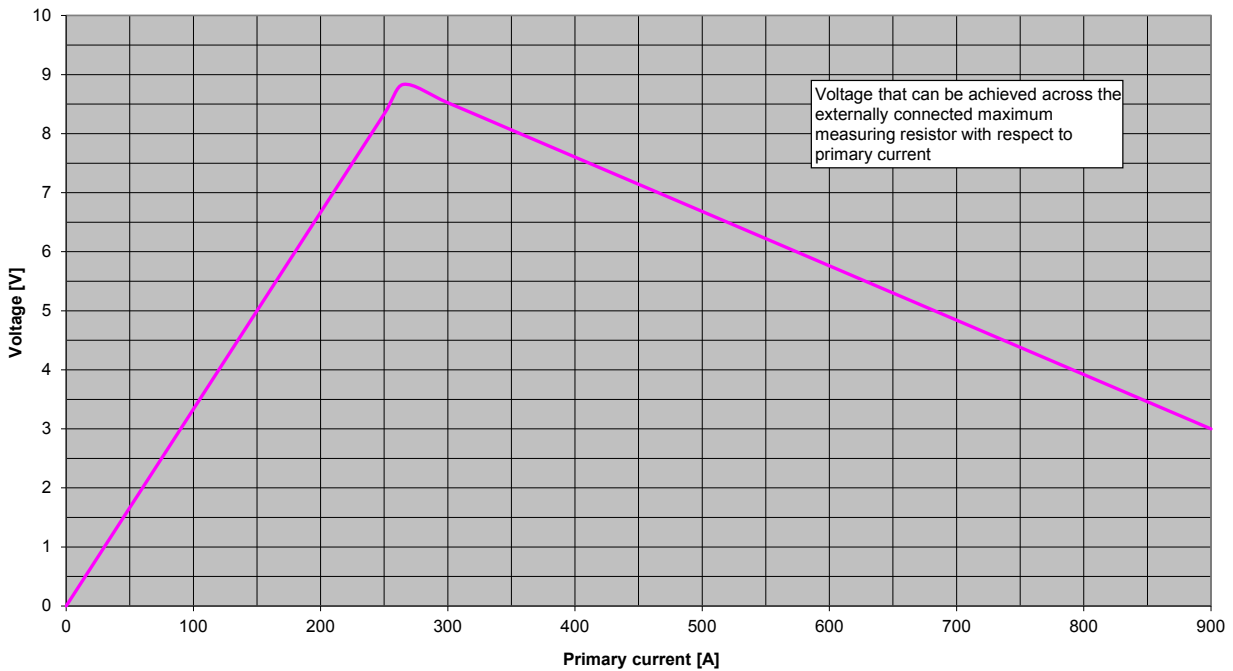
Maximum measuring resistor

Maxi measuring resistor



Voltage across the maximum measuring resistor

Voltage across the maximum measuring resistor

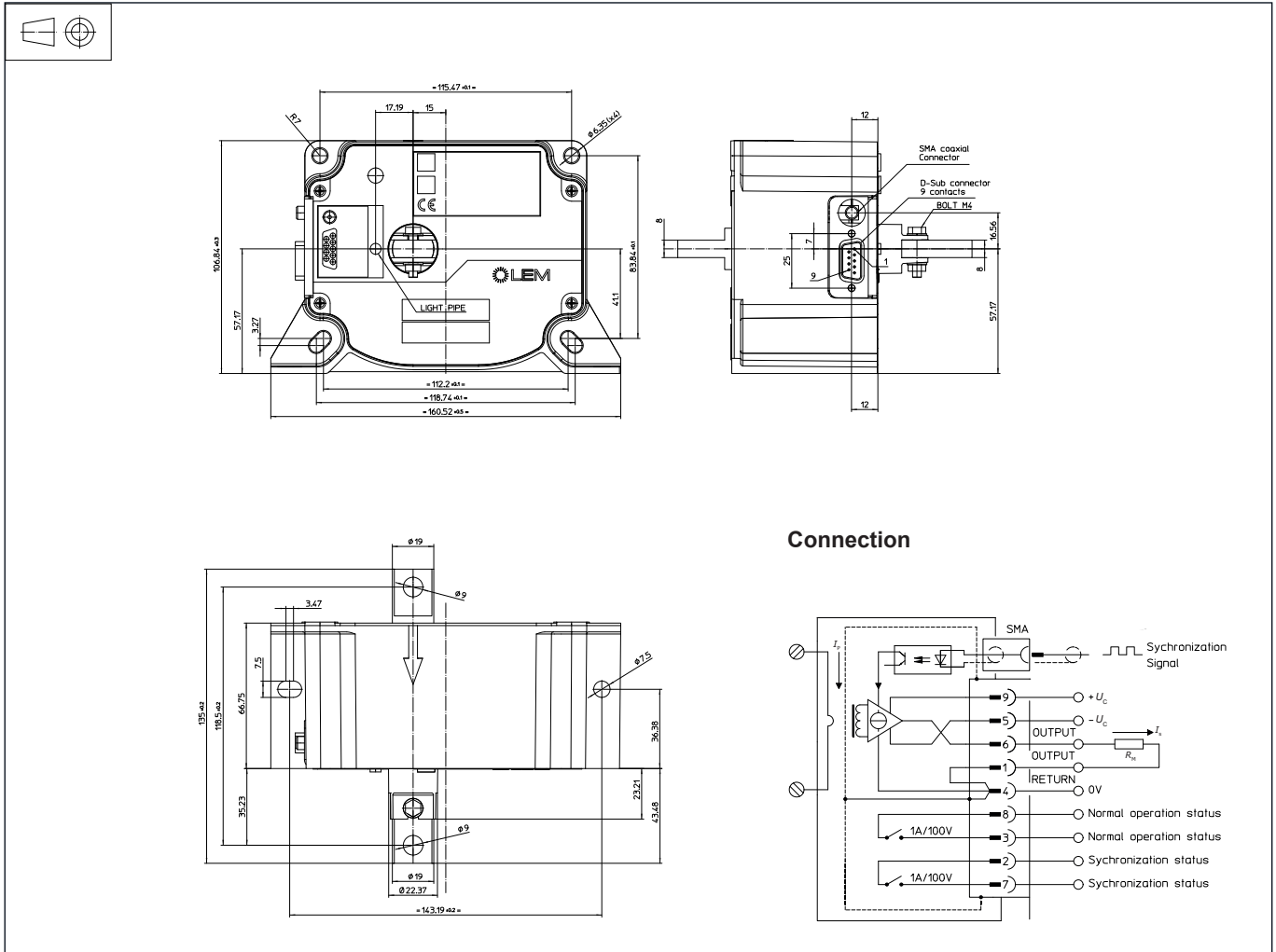


Miscellaneous

Bus bar free zone (from center)	$r \geq 100$	mm
Disturbance by a dv/dt of 5000 V, 6000 V/ μ s	< 100	ppm ¹⁾
Sensitivity to DC magnetic field 900 A @ 100 mm	< 10	ppm ¹⁾
External synchronization signal: if needed, an external signal can be applied on the SMA connector.		
This signal consists in a square wave 0 to 5 V, 10 mA, 31.25 kHz (± 1 kHz).		

Note: ¹⁾ All ppm figures refer to secondary measuring range 600 mA.

Dimensions ITL 900-T (in mm)



Connection

- Normal operation status (Pins 8 and 3):
Normal operation means: - ± 15 V present
- zero detector is working
- compensation current $\leq 105\%$ of I_{PM} / K_N
The contacts of the related relay are closed under normal operation.
- Synchronization status (Pins 7 and 2)
Synchronization means: working of ITL 900-T is synchronized with an external synchronization signal.
Under this condition, the contacts of the relay are closed.

Mechanical characteristics

- General tolerance ± 0.5 mm
- Transducer fastening by busbar
Primary connection 2 holes $\varnothing 9$ mm
2 M8 steel screws
Recommended fastening torque 4 N·m
- Transducer fastening
2 M6 steel screws
Recommended fastening torque 5 N·m
- Connection of secondary on D-SUB-9, UNC 4-40
- Connection of external synchronization signal on SMA connector

Remarks

- I_S is positive when I_p flows in the direction of the arrow.
- Temperature of the primary conductor should not exceed $100\text{ }^\circ\text{C}$ ($212\text{ }^\circ\text{F}$).