

# Current Transducer LTSR 15-NP

For the electronic measurement of currents: DC, AC, pulsed, mixed, with galvanic isolation between the primary circuit (high power) and the secondary circuit (electronic circuit).



$$I_{PN} = 15 \text{ At}$$

## Electrical data

$I_{PN}$	Primary nominal current rms	15	At
$I_{PM}$	Primary current, measuring range	0 .. $\pm 48$ <sup>1)</sup>	At
$\hat{I}_P$	Overload capability	250	At
$V_{OUT}$	Output voltage (Analog) @ $I_P$	$2.5 \pm (0.625 \cdot I_P / I_{PN})$	V
	$I_P = 0$	2.5 <sup>2)</sup>	V
$V_{REF}$	Reference voltage (internal reference), Ref <sub>OUT</sub> mode	2.5 <sup>3)</sup>	V
	Reference voltage (external reference), Ref <sub>IN</sub> mode	1.9 .. 2.7 <sup>4)</sup>	V
<b>G</b>	Sensitivity	41.6	mV/A
$N_S$	Number of secondary turns ( $\pm 0.1$ %)	2000	
$R_L$	Load resistance	$\geq 2$	k $\Omega$
$C_{Lmax}$	Maximum capacitive loading	500	pF
$R_{IM}$	Internal measuring resistance ( $\pm 0.5$ %)	83.33	$\Omega$
$TCR_{IM}$	Temperature coefficient of $R_{IM}$	< 50	ppm/K
$V_C$	Supply voltage ( $\pm 5$ %)	5	V
$I_C$	Current consumption @ $V_C = 5$ V	Typ 28 + $I_S$ <sup>5)</sup> + ( $V_{OUT} / R_L$ )	mA

## Accuracy - Dynamic performance data

<b>X</b>	Accuracy @ $I_{PN}$ , $T_A = 25^\circ\text{C}$	$\pm 0.2$	%
	Accuracy with $R_{IM}$ @ $I_{PN}$ , $T_A = 25^\circ\text{C}$	$\pm 0.7$	%
$\epsilon_L$	Linearity error	< 0.1	%
		Max	
$TCV_{OUT}$	Temperature coefficient of $V_{OUT} / V_{REF}$ @ $I_P = 0$		
	- $40^\circ\text{C} \dots + 85^\circ\text{C}$	64	ppm/K
<b>TCG</b>	Temperature coefficient of <b>G</b>	- $40^\circ\text{C} \dots + 85^\circ\text{C}$	50 <sup>6)</sup>
$V_{OM}$	Magnetic offset voltage @ $I_P = 0$ ,		
	after an overload of $3 \times I_{PN}$	$\pm 0.5$	mV
	$5 \times I_{PN}$	$\pm 2.0$	mV
	$10 \times I_{PN}$	$\pm 2.0$	mV
$TCV_{REF}$	Temperature coefficient of internal $V_{REF}$		
	@ $I_P = 0$ - $10^\circ\text{C} \dots + 85^\circ\text{C}$	50	ppm/K
	- $40^\circ\text{C} \dots - 10^\circ\text{C}$	100	ppm/K
$t_{ra}$	Reaction time @ 10 % of $I_{PN}$	< 100	ns
$t_r$	Response time to 90 % of $I_{PN}$ step	< 400	ns
<b>di/dt</b>	di/dt accurately followed	> 35	A/ $\mu$ s
<b>BW</b>	Frequency bandwidth (0 .. - 0.5 dB)	DC .. 100	kHz
	(- 0.5 .. 1 dB)	DC .. 200	kHz

**Notes:** <sup>1)</sup> Only in Ref<sub>OUT</sub> mode or with external REF less than 2.525 V and greater than 2.475 V. For external REF out of these limits see leaflet. <sup>2)</sup>  $V_{OUT}$  is linked to  $V_{REF}$ , by conception the difference between these two nodes for  $I_P = 0$  is maximum  $\pm 25$  mV,  $2.475 \text{ V} < V_{OUT} < 2.525 \text{ V}$ . <sup>3)</sup> In Ref<sub>OUT</sub> mode at  $T_A = 25^\circ\text{C}$ ,  $2.475 \text{ V} < V_{REF} < 2.525 \text{ V}$ . The minimal impedance loading the ref pin should be  $> 220 \text{ k}\Omega$ . Internal impedance =  $600 \Omega$ . For most applications you need to buffer this output to feed it into an ADC for example. <sup>4)</sup> To overdrive the REF (1.9 V .. 2.7 V) max  $\pm 1$  mA is needed. <sup>5)</sup>  $I_S = I_P / N_S$ . <sup>6)</sup> Only due to  $TCR_{IM}$ .

## Features

- Closed loop (compensated) multirange current transducer using the Hall effect
- Unipolar voltage supply
- Isolated plastic case recognized according to UL 94-V0
- Compact design for PCB mounting
- Incorporated measuring resistance
- Extended measuring range
- Access to the internal voltage reference
- Possibility to feed the transducer reference from external supply.

## Advantages

- Excellent accuracy
- Very good linearity
- Very low temperature drift
- Optimized response time
- Wide frequency bandwidth
- No insertion losses
- High immunity to external interference
- Current overload capability.

## Applications

- AC variable speed drives and servo motor drives
- Static converters for DC motor drives
- Battery supplied applications
- Uninterruptible Power Supplies (UPS)
- Switched Mode Power Supplies (SMPS)
- Power supplies for welding applications.

## Application Domain

- Industrial.

## Current Transducer LTSR 15-NP

### General data

$T_A$	Ambient operating temperature	- 40 .. + 85	°C
$T_S$	Ambient storage temperature	- 40 .. + 100	°C
$m$	Mass	10	g
	Standards <sup>1)</sup>	EN 50178: 1997	
		IEC 60950-1: 2001	

### Isolation characteristic

$V_d$	Rms voltage for AC isolation test, 50 Hz, 1 min	3	kV
$\hat{V}_w$	Impulse withstand voltage 1.2/50 $\mu$ s	> 8	kV
		Min	
$V_e$	Rms voltage for partial discharge extinction 10 pC	> 1.5	kV
		Min	
dCp	Creepage distance <sup>2)</sup>	15.35	mm
dCI	Clearance distance <sup>3)</sup>	6.2	mm
CTI	Comparative Tracking Index (group IIIa)	175	

### Applications examples

According to EN 50178 and CEI 61010-1 standards and following conditions:

- Over voltage category OV 3
- Pollution degree PD2
- Non-uniform field

	EN 50178	EIC 61010-1
dCp, dCI, $\hat{V}_w$	Rated insulation voltage	Nominal voltage
Single insulation	600 V	600 V
Reinforced insulation	300 V	300 V

Notes: <sup>1)</sup> On housing

<sup>2)</sup> On PCB with soldering pattern UTEC93-703.

### 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).

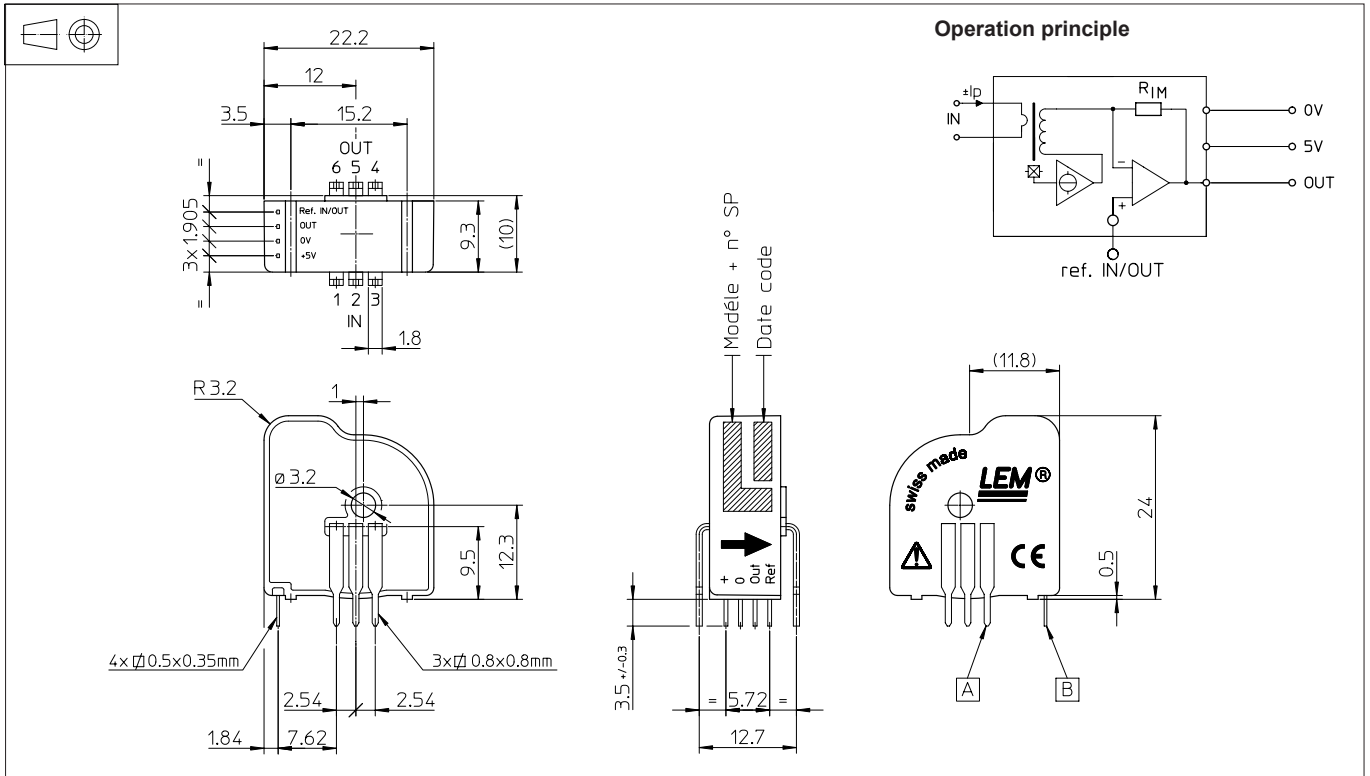
Ignoring this warning can lead to injury and/or cause serious damage.

This transducer is a built-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.

## Dimensions LTR 15-NP (in mm.)



Number of primary turns	Primary nominal current rms $I_{PN}$ [A]	Nominal <sup>1)</sup> output voltage $V_{OUT}$ [V]	Primary resistance $R_p$ [mΩ]	Primary insertion inductance $L_p$ [μH]	Recommended connections
1	± 15	2.5 ± 0.625	0.18	0.013	
2	± 7.5	2.5 ± 0.625	0.81	0.05	
3	± 5	2.5 ± 0.625	1.62	0.12	

### Mechanical characteristics

- General tolerance ± 0.2 mm
- Fastening & connection of primary 6 pins 0.8 x 0.8 mm  
Recommended PCB hole 1.3 mm
- Fastening & connection of secondary 4 pins 0.5 x 0.35 mm  
Recommended PCB hole 0.8 mm
- Additional primary through-hole ∅ 3.2 mm

### Remarks

- $V_{OUT}$  swings above the 2.5 V offset when  $I_p$  flows from terminals 1, 2, 3 to terminals 4, 5, 6 (with the arrow)
- For the EMC, the acceptance criteria are available on request
- Temperature of the primary conductor should not exceed 100°C.

**Note:** <sup>1)</sup> Output voltage when LTR 15-NP is used with internal reference.

### Output Voltage - Primary Current

