

# Current Transducer LTSR 15-NP

$I_{PN} = 15 A$

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



## Electrical data

$I_{PN}$	Primary nominal current rms	15	At
$I_{PM}$	Primary current, measuring range	$0 \dots \pm 48$ <sup>1)</sup>	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), refout mode	$2.5$ <sup>3)</sup>	V
	Reference voltage (external reference), refin mode	$1.9 \dots 2.7$ <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 $28 + I_S^{(5)} + (V_{OUT} / R_L)$	mA

## Accuracy - Dynamic performance data

<b>X</b>	Accuracy @ $I_{PN}, T_A = 25^\circ C$	$\pm 0.2$	%
	Accuracy with $R_{IM}$ @ $I_{PN}, T_A = 25^\circ C$	$\pm 0.7$	%
$\epsilon_L$	Linearity error	$< 0.1$	%
		Maxi	
$TCV_{OUT}$	Temperature coefficient of $V_{OUT} / V_{REF}$ @ $I_p = 0$		
	- $40^\circ C \dots + 85^\circ C$	64	ppm/K
<b>TCG</b>	Temperature coefficient of <b>G</b>	- $40^\circ C \dots + 85^\circ C$	$50$ <sup>6)</sup> ppm/K
$V_{OM}$	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 $V_{REF}$		
	@ $I_p = 0$		
	- $10^\circ C \dots + 85^\circ C$	50	ppm/K
	- $40^\circ C \dots - 10^\circ C$	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 refout 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,  $2.475 V < V_{OUT} < 2.525 V$ . <sup>3)</sup> In Refout mode at  $T_A = 25^\circ C$ ,  $2.475 V < V_{REF} < 2.525 V$ . The minimal impedance loading the ref pin should be  $> 220 k\Omega$ . 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) maxi  $\pm 1$  mA is needed.

<sup>5)</sup>  $I_S = I_p / N_S$ . <sup>6)</sup> Only due to  $TCR_{IM}$ .

## Features

- Closed loop (compensated) multi-range 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.

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## Current Transducer LTSR 15-NP

### General data

$T_A$	Ambient operating temperature	- 40 .. + 85	°C
$T_S$	Ambient storage temperature	- 40 .. + 100	°C
	Insulating material group	III a	
$m$	Mass	10	g
	Standards	EN 50178: 1997	
		IEC 60950-1: 2001	

### Isolation characteristics

$V_d$	Rms voltage for AC isolation test, 50/60 Hz, 1 min	3	kV
$\hat{V}_w$	Impulse withstand voltage 1.2/50 $\mu$ s	> 8	kV
		Mini	
$V_e$	Rms voltage for partial discharge extinction @ 10pC	> 1.5	kV
		Mini	
dCp	Creepage distance <sup>7)</sup>	15.35	mm
dCl	Clearance distance <sup>8)</sup>	6.2	mm
CTI	Comparative Tracking Index (Group III a)	175	

## Application examples

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

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

	EN 50178	IEC 61010-1
dCp, dCl, $\hat{V}_w$	Rated isolation voltage	Nominal voltage
Single isolation	600 V	600 V
Reinforced isolation	300 V	300 V

Notes: <sup>7)</sup> On housing

<sup>8)</sup> On PCB with soldering pattern UTEC93-703.

## Safety



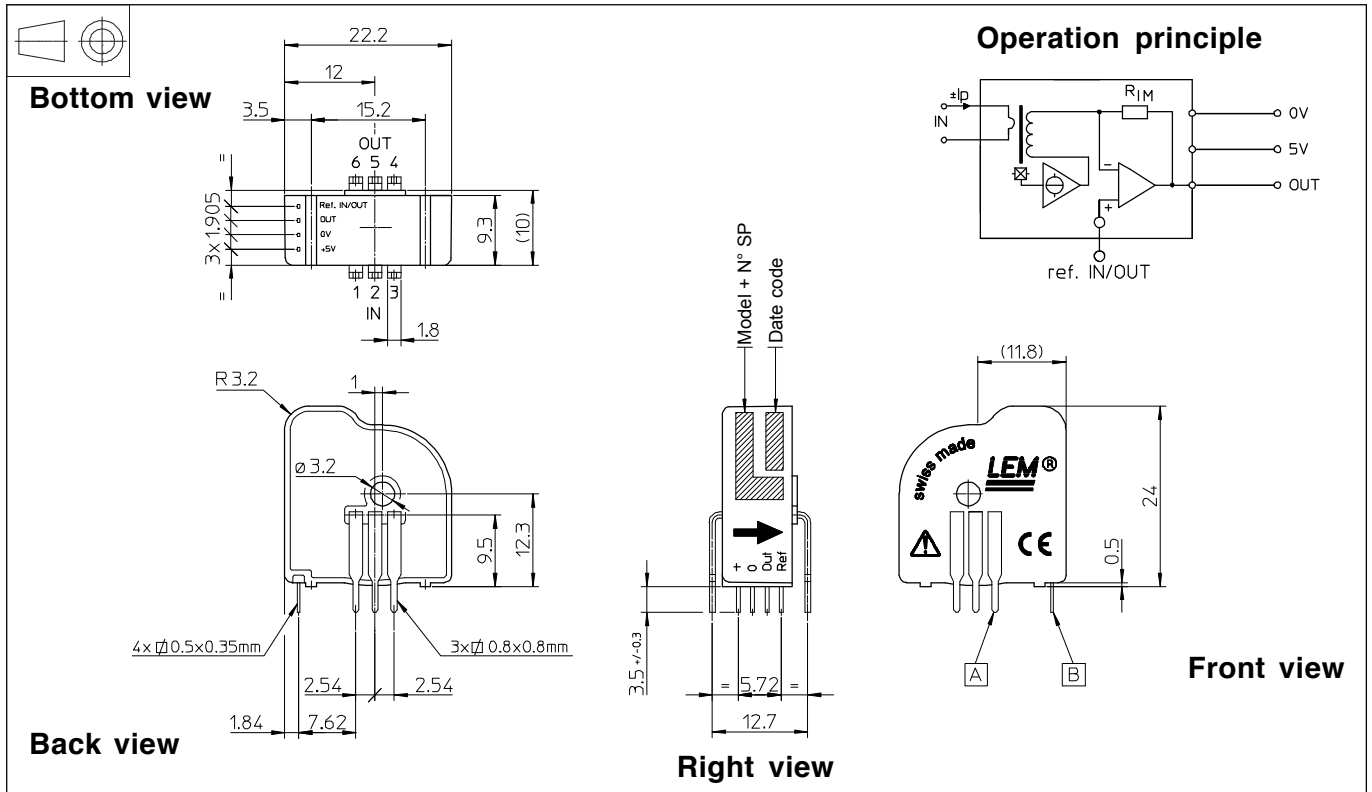
This transducer must be used in electric/electronic equipment with respect to applicable standards and safety requirements in accordance with the manufacturer's operating instructions.

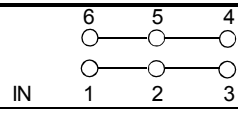
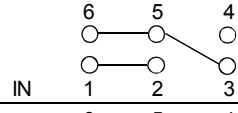
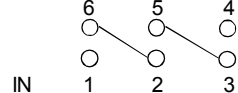
Caution, risk of electrical shock



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 LTSR 15-NP (in mm. 1 mm = 0.0394 inch)



Number of primary turns	Primary nominal current rms $I_{PN}$ [A]	Nominal <sup>9)</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  
Recommended PCB hole 1.3 mm
- Fastening & connection of secondary  
Recommended PCB hole 0.8 mm
- Additional primary through-hole ∅3.2 mm

### Remarks

- $V_{OUT}$  is positive when  $I_p$  flows from terminals 1, 2, 3 to terminals 6, 5, 4
- For the EMC, the acceptance criteria are available on request.
- Temperature of the primary jumper should not exceed 100 [°C].

**Note:** <sup>9)</sup> Output voltage when LTSR 15-NP is used with internal reference.

### Output Voltage - Primary Current

