

# High Accuracy and Stability Current Transducers



**ITB 300-S**  
**IT 400-S**  
**IT 700-S**

**$I_{PN} = 300 \text{ A}$**   
 **$I_{PN} = 400 \text{ A}$**   
 **$I_{PN} = 700 \text{ A}$**

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

## Electrical data

Primary nominal r.m.s. current $I_{PN}$ (A)	Primary current measuring range $I_p$ (A) @ $\pm 15 \text{ V}$	Type			
300	$\pm 450$	<b>ITB 300-S</b> <b>IT 400-S</b> <b>IT 700-S</b>	<b>ITB 300-S</b>	<b>IT 400-S</b>	<b>IT 700-S</b>
400	$\pm 400$		$\pm 3000/10\text{ms}$	$\pm 2000/100\text{ms}$	$\pm 3500/100\text{ms}$
700	$\pm 700$		$0 \left( T_A = +85^\circ\text{C} \right)$	$0 \left( T_A = +10..+50^\circ\text{C} \right)$	$0 \left( T_A = +10..+50^\circ\text{C} \right)$
$\hat{I}_P$	Max overload capability <sup>1)</sup>	$R_{M \min}$	$5 \left( I_p = \pm 450\text{A} \right)$	$10 \left( I_p = \pm 400\text{A} \right)$	$2.5 \left( I_p = \pm 700\text{A} \right)$
$R_M$	Measuring resistance @ $V_C = \pm 15 \text{ V}$	$R_{M \max}$	150	200	400
$I_{SN}$	Secondary nominal r.m.s. current		1 : 2000	1 : 2000	1 : 1750
$K_N$	Conversion ratio		$\pm 15$	$\pm 15$	$\pm 15$
$V_C$	Supply voltage ( $\pm 5 \%$ )		$< \pm 90 + I_s$	$< \pm 50 + I_s$	$< \pm 70 + I_s$
$I_C$	Current consumption @ $\pm 15 \text{ V}$				

## Accuracy - Dynamic performance data

Parameter	ITB 300-S	IT 400-S	IT 700-S	Unit
$X_G$ Overall accuracy @ $I_{PN}, T_A = 25^\circ\text{C}$	$< \pm 0.05$	$< \pm 0.0033$	$< \pm 0.0053$	%
$\epsilon_L$ Linearity error <sup>2)</sup>	$< 0.001 \%$	$< 3$	$< 3$	ppm
$I_O$ Offset current @ $I_p = 0, T_A = 25^\circ\text{C}$	Max $\pm 0.1 \text{ mA}$	Max $< 30^{2)}$	Max $< 50^{2)}$	ppm
$TCI_O$ Offset current drift temperature coefficient	$< 1 \mu\text{A/K}$	$< 0.5^{2)}$	$< 0.5^{2)}$	ppm / K
$t_r$ Response time @ 90 % of $I_{PN}$ <sup>3)</sup>	$< 1 \mu\text{s}$	$< 250$	$< 250$	ns
$di/dt$ di/dt accurately followed	$> 100$	$> 100$	$> 100$	A / $\mu\text{s}$
$f$ Frequency bandwidth	DC .. 100 <sup>4)</sup>	DC .. 100 <sup>5)</sup>	DC .. 100 <sup>6)</sup>	kHz

## General data

Parameter	ITB 300-S	IT 400-S	IT 700-S	Unit
$T_A$ Ambient operating temperature	-40 .. +85	+10 .. +50	+10 .. +50	$^\circ\text{C}$
$T_S$ Ambient storage temperature	-45 .. +85	-20 .. +85	-20 .. +85	$^\circ\text{C}$
$R_S$ Secondary coil resistance	31 @ +85 $^\circ\text{C}$	51.2 @ +50 $^\circ\text{C}$	22.3 @ +50 $^\circ\text{C}$	$\Omega$
$m$ Mass	0.49	0.5	0.8	kg
Standards	EN 50178 : 1997 EN 50155 : 2001			
UL 94 Classification	VO	VO	VO	

Notes : <sup>1)</sup> Transducer may need a few seconds to come back to «Normal operation» state when autoreset system is running.

<sup>2)</sup> Refer to nominal.

<sup>3)</sup> With a  $di/dt \geq 100 \text{ A} / \mu\text{s}$ .

<sup>4)</sup> -3 dB with limited amplitude.

<sup>5)</sup> 10 A sinusoidal, -0.6 dB, 5  $\Omega$  as measuring resistor.

<sup>6)</sup> 10 A sinusoidal, -0.5 dB, 2.5  $\Omega$  as measuring resistor.

Isolation characteristics		ITB 300-S	IT 400-S	IT 700-S	
$V_d$	R.m.s. voltage for AC isolation test, 50 Hz, 1 mn	5.3 <sup>7)</sup> 1 <sup>8)</sup> kV	5 <sup>7)</sup> 0.2 <sup>8)</sup> kVDC	5 <sup>7)</sup> 0.2 <sup>8)</sup>	kV kVDC
$\hat{V}_w$	Impulse withstand voltage 1.2/50 $\mu$ s	10.8 Min	8 Min	8 Min	kV
$V_e$	R.m.s. voltage for partial discharge extinction @ 10 pC	2.2 <sup>9)</sup> Min	1.52 Min	1.51 Min	kV
dCp	Creepage distance	12.2 <sup>10)</sup>	11	9	mm
dCI	Clearance distance	12.2 <sup>10)</sup>	11	9	mm
CTI	Comparative Tracking Index (Group I)	600	600	600	V

## Application examples

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

- Overvoltage category OV3
- Pollution degree PD2
- Heterogeneous field.

dCp, dCI, $\hat{V}_w$	EN 50178			IEC 61010-1		
	Rated isolation voltage			Nominal voltage		
Model	ITB 300-S	IT 400-S	IT 700-S	ITB 300-S	IT 400-S	IT 700-S
Single Isolation	1600 V	1420 V	1140 V	2000 V	2000 V	1600 V
Reinforced isolation	880 V	800 V	660 V	770 V	650 V	500 V

- Notes :
- <sup>7)</sup> Between primary and secondary + shield.
  - <sup>8)</sup> Between secondary and shield.
  - <sup>9)</sup> Test carried out with a busbar  $\varnothing$  19 mm centered in the through-hole.  
With a busbar  $\varnothing$  21.5 mm (contact between busbar and housing) the min value is reduced to 1 kV.
  - <sup>10)</sup> See outline drawing.

## Features

- Closed loop (compensated) current transducer using fluxgate technology
- D-Sub 9 pole male output interface connector
- Output indicates the transducer state
- LED shows normal operation (IT 400-S & IT 700-S).

## Advantages

- Excellent linearity
- High accuracy over high bandwidth
- Very low output noise
- Very low offset drift
- Optimized response time
- No insertion losses
- High immunity to external interference
- Current overload capability
- Autoreset after overload <sup>1)</sup>.

## Applications


- High precision power supplies
- Calibration unit
- Precise and high stability inverters
- Energy measurement
- Medical equipment
- High performance gradient amplifiers for MRI.

## Application domain

- Industrial & Traction (ITB 300-S)

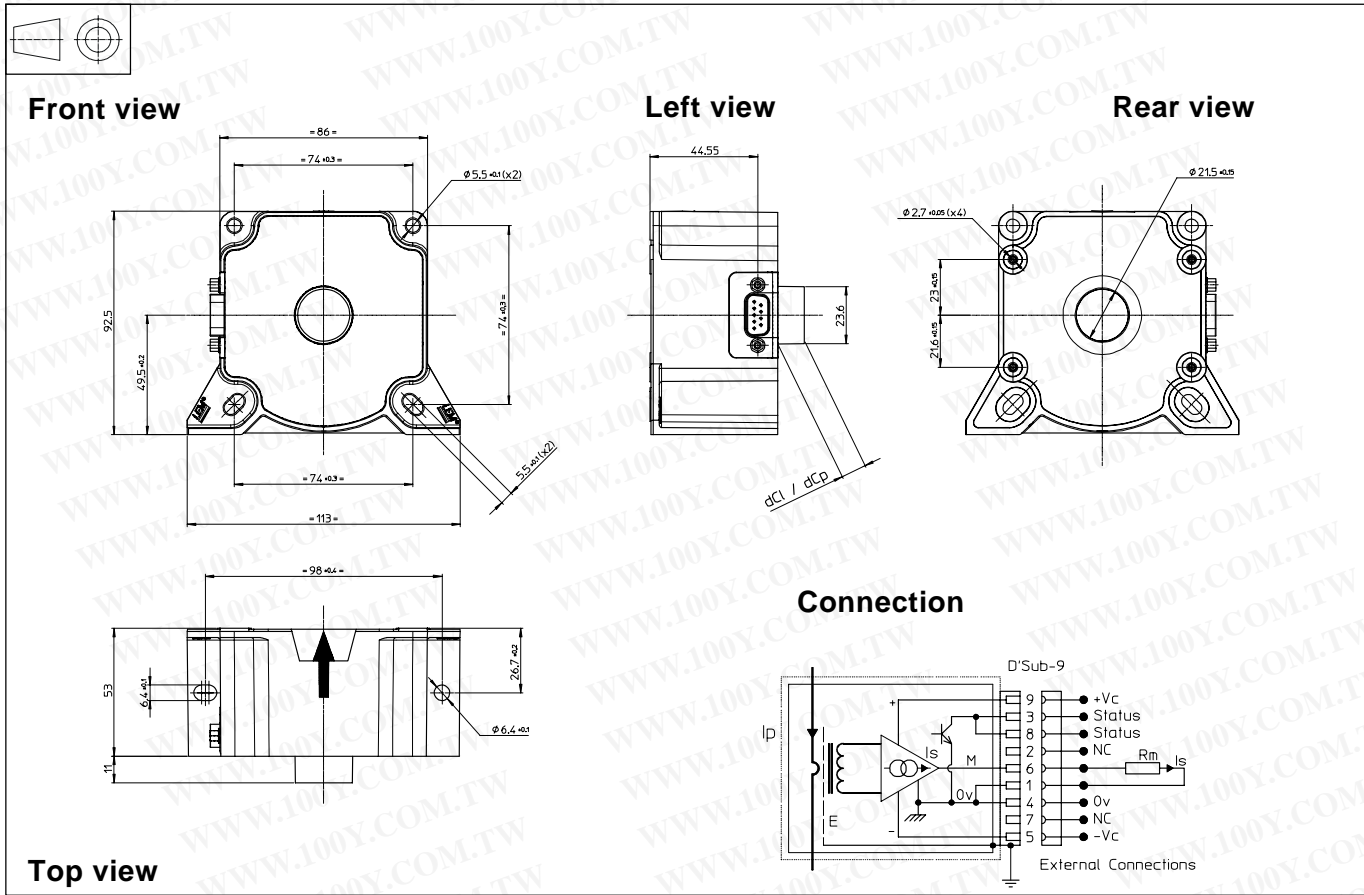
## Safety

This transducer must be used in electric/electronic equipment with respect to applicable standards and safety requirements in accordance with the following 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 ITB 300-S (in mm. 1 mm = 0.0394 inch)

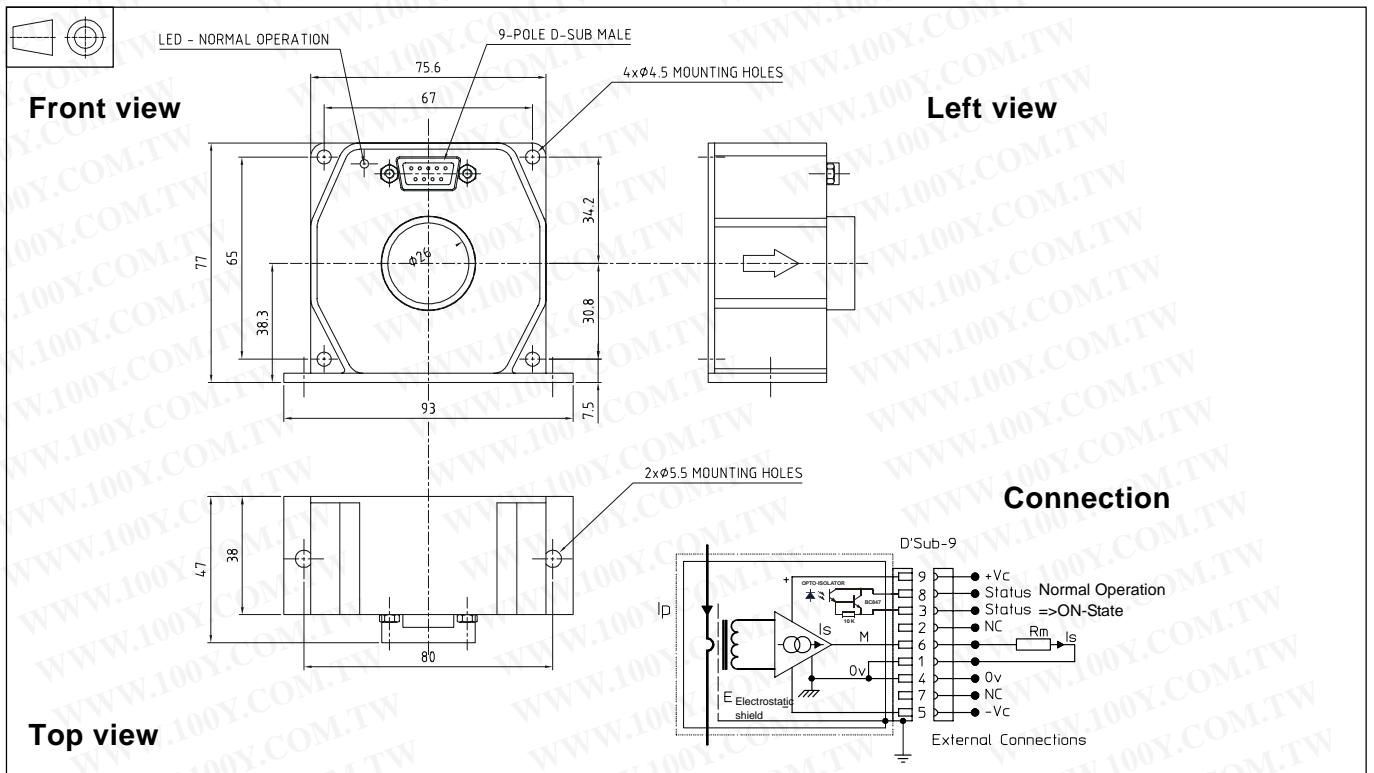


Status Output	ITB 300-S	IT 400-S	IT 700-S
	Normal operation indicator : open collector, active low (Normal operation)		
Max. input Collector current	40 mA	-	-
Max. Collector - Emitter voltage	50 V	-	-
Fault level (off-state)	-	$I_p > 110$	$I_p > 110$
Max. voltage pin 8 to pin 3, off-state	-	45	100
Max. current pin 8 to pin 3, on-state	-	0.03	1
Reverse voltage pin 8 to pin 3, off-state	-	5	-
On-voltage pin 8 to pin 3, I = 5 mA	-	max. 1	-
Contact resistance pin 8 to pin 3	-	-	typ. 50
Test voltage secondary (pin 4) to pin 8	-	300	500
			VDC

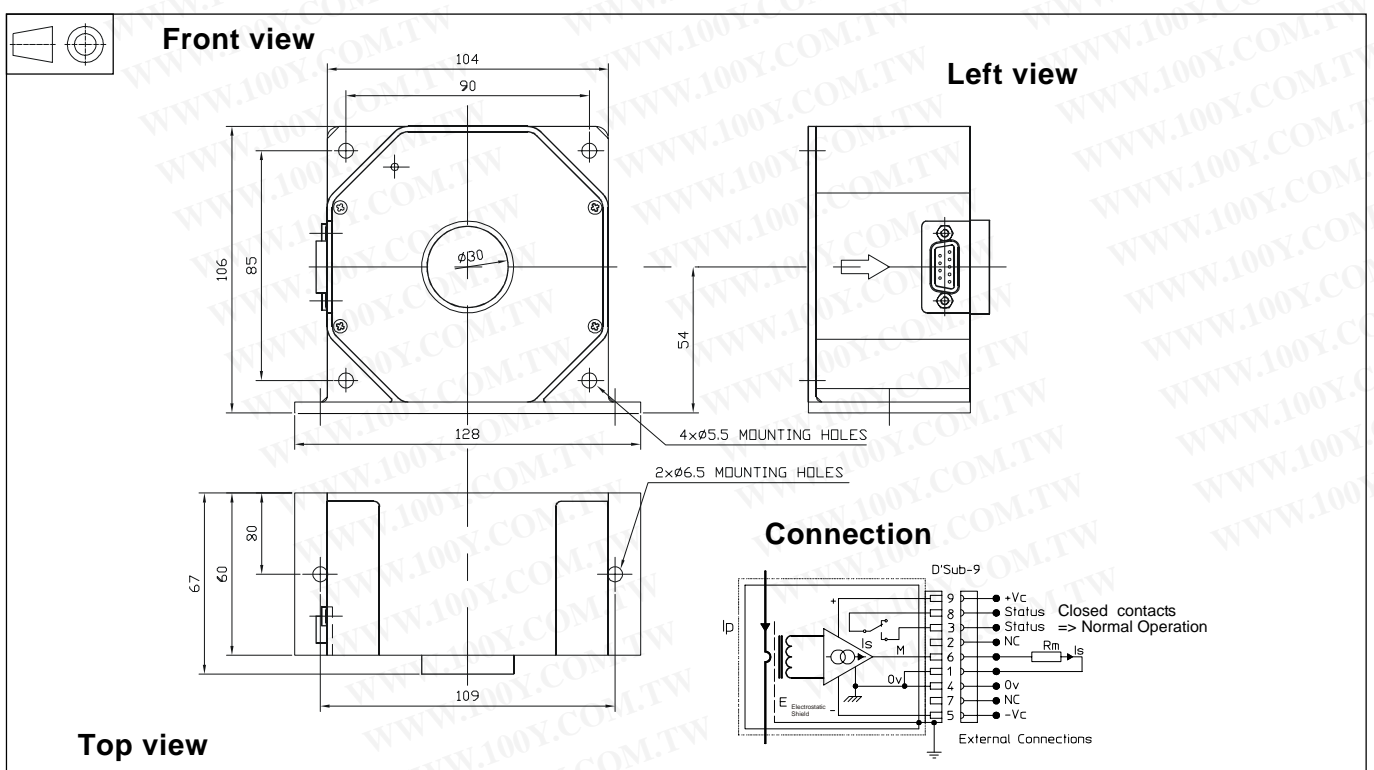
Mechanical Characteristics	ITB 300-S	IT 400-S	IT 700-S
• General tolerance	± 1	± 0.3	± 0.3
• Transducer fastening			mm
- Flat 1	4 x M5 steel screws	4 holes Ø 4.5 mm 4 x M4 steel screws	4 holes Ø 5.5 mm 4 x M5 steel screws
Recommended fastening torque	3.4 Nm or 2.5 Lb.-Ft.	2.8 Nm or 2.07 Lb.-Ft.	3.7 Nm or 2.73 Lb.-Ft.
- Flat 2	4 x PTKA30 steel screws	-	-
Recommended fastening torque	1 Nm or 0.74 Lb.-Ft. @10 mm penetration	-	-
- Upright	2 x M6 steel screws	2 holes Ø 5.5 mm 2 x M5 steel screws	2 holes Ø 6.5 mm 2 x M6 steel screws
Recommended fastening torque	4.5 Nm or 3.3 Lb.-Ft.	3.7 Nm or 2.73 Lb.-Ft.	4.4 Nm or 3.25 Lb.-Ft.
• Primary through hole	Ø < 21.5	Ø < 26	Ø < 30
• All mounting recommendations are given for a standard mounting : Screws with flat and spring washers			mm

LEM reserves the right to carry out modifications on its transducers, in order to improve them, without previous notice.

### Dimensions IT 400-S (in mm. 1 mm = 0.0394 inch)



### Dimensions IT 700-S (in mm. 1 mm = 0.0394 inch)



### Remarks

- $I_s$  is positive when  $I_p$  flows in the direction of the arrow.
- Temperature of the primary conductors should not exceed 100°C (ITB 300-S) / 65°C (IT 400-S & IT 700-S).
- Transducer needs to be connected with a shielded secondary cable to comply with EN 50155 standard (ITB 300-S).

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