

# High Performance Rack mounted programmable Current Transducer ITP 600-SPR ULTRASTAB

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



$I_{PM} = 0 \dots 600 \text{ A}$

Programmable from 40 A to 600 A

## Features

- Closed loop (compensated) current transducer using an extremely accurate zero flux detector
- Electrostatic shield between primary and secondary circuit
- Made up of one measuring head + 19" electronics rack.

## Special features

- D-Sub 15 pole female output interface connector
- D-Sub 9 pole male status output interface connector
- LED shows normal operation
- LED shows overload condition.

## Advantages

- Very high accuracy
- Excellent linearity
- Extremely low temperature drift
- Wide frequency bandwidth
- High immunity to external electrostatic and magnetic fields interference
- No insertion losses
- High resolution
- Low noise on output signal
- Low noise feedback to main conductor.

## Applications

- Feed back element in high performance power supplies...
- Calibration unit
- Absolute current standard reference
- Test and calibration of current sources
- Current extender for power analysis
- Differential current measurement on power line
- Metrology applications.

## Application domain

- Industrial and Medical.

### Electrical data

$I_{PN}$	Primary nominal current DC	$\pm 600$	A
$I_{PN}$	Primary nominal current rms	424	A
$I_{PM}$	Primary current, measuring range	$0 \dots \pm 600$	A
$\hat{I}_P$	Max overload capability 100 ms <sup>1)</sup>	$\pm 3000$	A
	Programmable from	40	A
	Programming steps	20	A
$R_M$	Measuring resistance	$R_{M \min}$ $R_{M \max}$	
	Over operating current, temperature and supply voltage range	0 1.5	$\Omega$
$I_S$	Secondary current	$0 \dots \pm 1000$	mA
$I_{SN}$	Secondary nominal current rms	707	mA
$K_N$	Conversion ratio	1 : 600	
$V_C$	Supply voltage ( $\pm 10 \%$ ) 50-60 Hz	100/115/230	V AC
$P_C$	Power consumption	max 50	VA

### Accuracy - Dynamic performance data

$\epsilon_L$	Linearity error <sup>2)</sup>	$\leq 1$	ppm
$I_{OE}$	Electrical offset current + self magnetization + effect of earth magnetic field @ $T_A = 25^\circ\text{C}$ <sup>2)</sup>	$< 2$	ppm
$\Delta I_{OE}$	Offset stability (no load) <sup>2)</sup>	$< 1$	ppm/month
$TCI_{OE}$	Temperature coefficient of $I_{OE}$ ( $10^\circ\text{C} \dots 40^\circ\text{C}$ ) <sup>2)</sup>	$< 0.1$	ppm/K

### General data

$T_A$	Ambient operating temperature Head	$0 \dots + 55$	$^\circ\text{C}$
	Ambient operating temperature Electronics	$10 \dots + 40$	$^\circ\text{C}$
	Humidity (non condensing)	20 - 80 %	RH
$T_S$	Ambient storage temperature Electronics and Head	$- 20 \dots + 85$	$^\circ\text{C}$
	Humidity (non condensing)	20 - 80 %	RH
$R_S$	Secondary coil resistance @ $T_A = 25^\circ\text{C}$	$< 3.8$	$\Omega$
$m$	Mass-Electronics	5	kg
$m$	Mass-Head	1	kg

Notes: <sup>1)</sup> Single pulse only, not AC.

The transducer may requires a few seconds to return to normal operation when autoreset system is running.

<sup>2)</sup> All ppm figures refer to secondary measuring range 1000 mA.

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### Isolation characteristics

Between primary and secondary

$V_b$	Rated isolation voltage rms, reinforced isolation	300	V
	Rated isolation voltage rms, single isolation	2000	V
with IEC 61010-1 standards and following conditions			
- Over voltage category III			
- Pollution degree 2			
$V_d$	Rms voltage for AC isolation test, 50/60 Hz, 1 min	4.9 <sup>1)</sup>	kV
$\hat{V}_w$	Impulse withstand voltage 1.2/50 $\mu$ s	9.1	kV
$V_b$	Rated isolation voltage rms, reinforced isolation	600	V
	Rated isolation voltage rms, single isolation	1000	V
with EN 50178 standards and following conditions			
- Over voltage category III			
- Pollution degree 2			
<b>dCp</b>	Creepage distance	10	mm
<b>dCl</b>	Clearance distance	10	mm
<b>CTI</b>	Comparative Tracking Index (Group I)	600	V

If isolated cable is used for the primary circuit, the voltage category could be improved with the following table (for single isolation) (IEC 61010-1 standard):

cable isolated (primary)	Category
HAR03	2150 V CAT III
HAR05	2250 V CAT III
HAR07	2350 V CAT III

Note: <sup>1)</sup> Between primary and secondary + shield.

### 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

Random Noise ppm (rms):

0 – 10 Hz	0 – 10 kHz	0 – 100 kHz
< 0.01	< 3.5	< 6.5

Re-injected noise measured on primary cable (DC - 100 kHz) < 2  $\mu\text{V}_{\text{RMS}}$

### Dynamic performance data

<b>BW</b> Frequency bandwidth for small signal 5 %, of $I_{\text{PN}}$ (DC) ( $\pm 3$ dB)	DC .. 300	kHz
<b>di/dt</b> di/dt accurately followed	> 50	A/ $\mu\text{s}$
<b>t<sub>r</sub></b> Response time <sup>1)</sup> to 90 % of $I_{\text{PN}}$ step	< 1	$\mu\text{s}$

Note: <sup>1)</sup> With a di/dt of 50 A/ $\mu\text{s}$ .

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### Status/Interlock port - Electrical specification

All signals on the Status/Interlock port are floating relay type. All signals are therefore galvanically isolated from the electrical circuits of the unit.

Maximum allowed voltage on the relay switches is **33 V AC** or **70 V DC**.

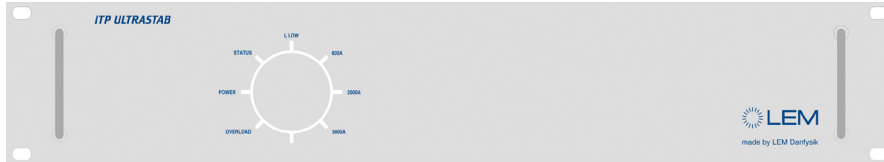
The Status/Interlock connector (Sub-D, 9 pole, male) contains the following signals:

Pin N°	Description
1	<b>Normal operation Fault</b> When the unit status is faulty (error, overload, warning etc.), this pin is connected to the Normal operation common.
2	<b>Normal operation OK</b> When the unit status is OK (Normal operation), this pin is connected to the Normal operation common pin.
3	<b>I<sub>p</sub> Low common</b> This pin is connected to either I <sub>p</sub> Low True or I <sub>p</sub> Low False depending on the unit's status.
4	<b>Overload warning True</b> This pin is connected to the Overload common pin when the current through the transducer head exceeds 30 % of the maximum programmed current.
5	<b>Overload warning False</b> This pin is connected to the Overload common pin when the unit is in normal mode and the current through the transducer head is within the measurement area.
6	<b>Normal operation common</b> This pin is connected to either Normal operation on or the Normal operation off depending on the unit's status.
7	<b>I<sub>p</sub> Low True</b> This pin is connected to I <sub>p</sub> Low common when the current through the transducer head is below 5 ‰ of the programmed current.
8	<b>I<sub>p</sub> Low False</b> This pin is connected to I <sub>p</sub> Low common when the current through the transducer head is above 5 ‰ of the programmed current.
9	<b>Overload warning common</b> This pin is connected to either Overload warning on or Overload warning off pin depending on the unit's status.

## Current Transducer ITP 600-SPR ULTRASTAB

### Electronics - Description - Front panel indicators

19" Electronics Rack



The indicators on the front panel are:

**POWER:**

This LED is lit (Blue) when the system is on.

**STATUS:**

This LED is lit (Green) when the status of the system is OK.

**I<sub>p</sub> LOW:**

This LED is lit (Yellow) when the current passing through the transducer head is below 5 % of the programmed maximum current.

**600A:**

This LED is lit (Yellow) when a 600 A transducer head is connected to the ITP Electronics unit.

**2000A:**

This LED is lit (Yellow) when a 2000 A transducer head is connected to the ITP Electronics unit.

**5000A:**

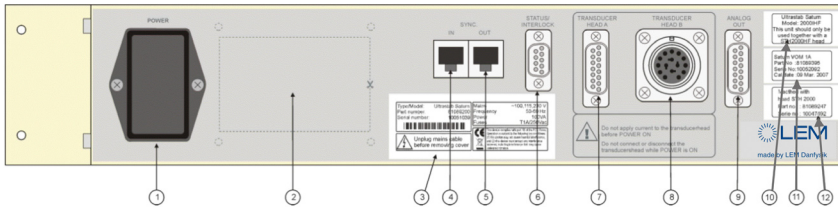
This LED is lit (Yellow) when 5000 A transducer head is connected to the ITP Electronics unit.

**OVERLOAD:**

This LED is lit (Red) when the current passing through the transducer head exceeds 130 % of the maximum current for the transducer head (including programming) or the transducer head saturates.

## Current Transducer ITP 600-SPR ULTRASTAB

### Electronics - Description - Back panel connectors

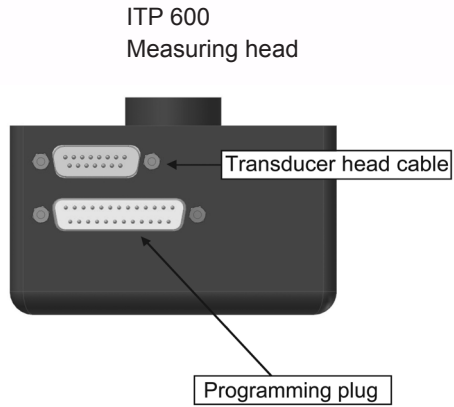


Refer to the drawing above for description of back panel layout and connectors:

1. IEC power inlet and voltage selector:  
This connector accepts a standard IEC power cord (supplied). The voltage can be changed using the voltage selector code wheel in order to match local voltages.  
Furthermore, the unit's two mains fuses are located in the IEC power inlet.
2. Punch out plate (optional):  
This plate is for future expansion or customization
3. Type / Serial number plate.
4. Sync in:  
Synchronization input when slaved to another ITP product in a multichannel system
5. Sync out:  
Synchronization out when the unit is master or part of a daisy-chain in a multichannel system
6. Status / Interlock signal outputs - Sub D, 9 pole male connector
7. Transducer head A:  
Connection to the ITP 600 measuring head.
8. Transducer head B:  
Connection to the ITP 2000 and ITP 5000 measuring head.
9. Analog out:  
Output connection to a DMM or other equipment - Sub D, 15 female connector.
10. Label indicating that the electronics unit is a special type only to be used with the stated transducer head.
11. Calibration date label (on ITP...-SBPR models only)
12. Serial N° label of matched transducer head. This label is only mounted if a transducer head is delivered with the electronics unit.

## Current Transducer ITP 600-SPR ULTRASTAB

### Transducer head - Description - Connectors



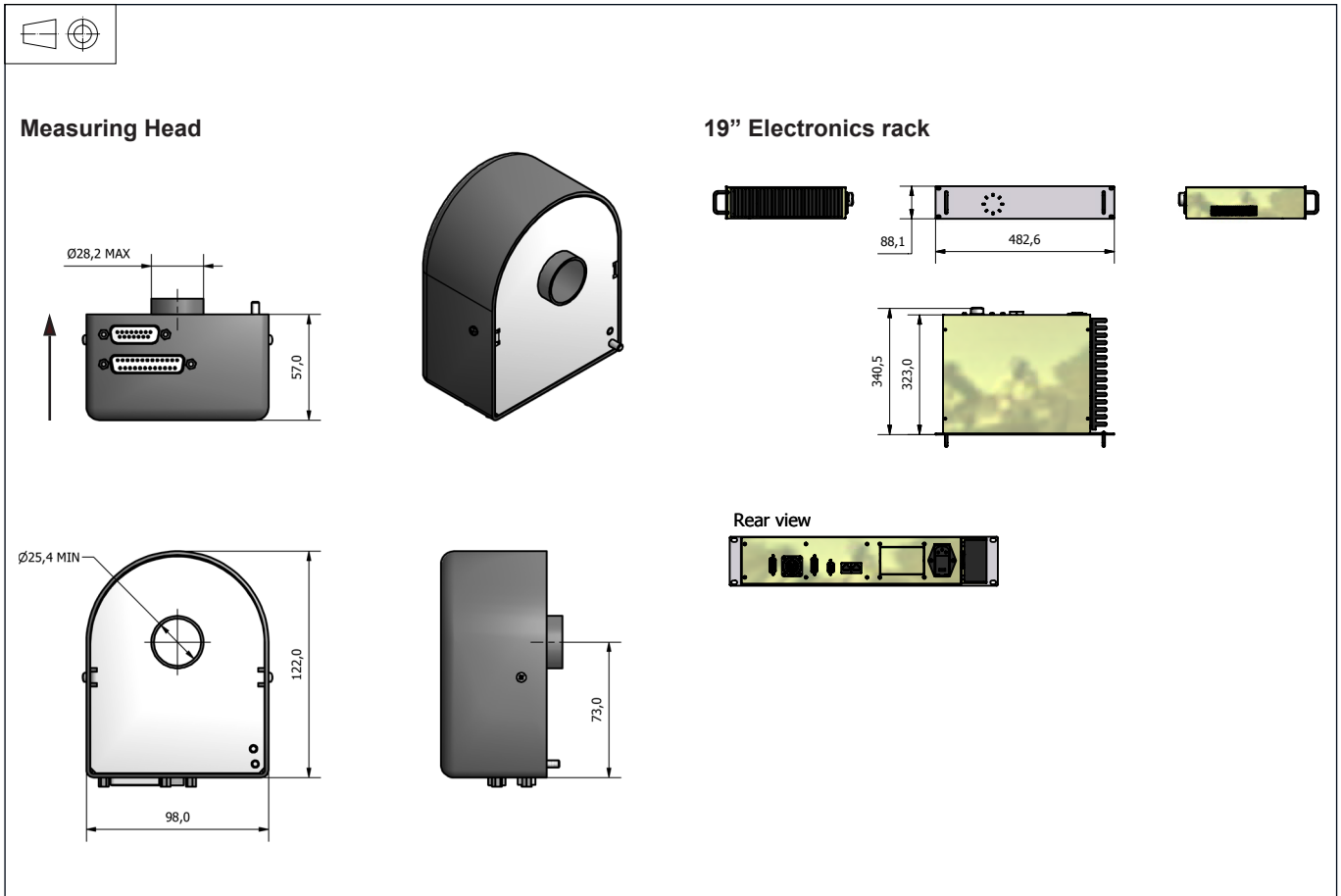
### Miscellaneous

Bus bar free zone (length: 75 mm) (from center)  $r \geq 75$  mm

### ITP 600-SPR standard delivery

- Transducer head 600 A
- Electronics for 19" rack installation
- Cable, transducer - electronics, length 10 m
- Cable, output, length 1.5 m
- Programming plug, standard 600 A.

**Dimensions ITP 600-SPR ULTRASTAB** (in mm. 1 mm = 0.0394 inch)



**Analogue output connection - D Sub 15 female connector**

Pin N°	Description
1	Current return
2	Current return
3	Not used
4	Not to be used
5	Not to be used
6	Ground
7	Not to be used
8	Not to be used
9	Current output
10	Current output
11	Not used
12	Not to be used
13	Not to be used
14	Not to be used
15	Not to be used

**Mechanical characteristics**

- General tolerance:  $\pm 0.1$  mm
- Electronics:  
Width: 482.6 mm  
Height: 88.1 mm  
Depth: 323 mm
- Transducer head  
Width: 98 mm  
Height: 122 mm  
Depth: 57 mm  
Inner hole diameter  $\varnothing$  minimum: 25.4 mm
- Transducer head fastening  
Flat mounting: 2 x M6 x 10  
Recommended fastening torque: 1.96 Nm or 1.44 Lb.-Ft

**Remarks**

- $I_s$  is positive when  $I_p$  flows in the direction of the arrow.
- Temperature of the primary conductor should not exceed 50°C.