

High Performance Rack mounted programmable Current Transducer ITP 600-SBPR 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).



Electrical data

I_{PN}	Primary nominal current DC	± 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 ¹⁾	± 3000	A
	Programmable from	40	A
	Programming steps	20	A
V_S	Secondary voltage output	± 10	V
V_{SN}	Secondary nominal voltage output rms	7.07	V
I_{SL}	Maximum output drive current limitation	5	mA
C_L	Maximum output capacitive loading	≤ 3	nF
G_{th}	Theoretical sensitivity	0.0166	V/A
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

ϵ_L	Linearity error ²⁾	≤ 3	ppm
ϵ_G	Sensitivity error ²⁾	50	ppm
V_{OE}	Electrical offset voltage + self magnetization + effect of earth magnetic field @ $T_A = 25^\circ\text{C}$ ²⁾	< 2	ppm
ΔV_{OE}	Offset stability ²⁾	< 1	ppm/month
ΔG	Sensitivity stability ²⁾	2	ppm/month
TCG	Temperature coefficient of G ²⁾	2	ppm/K
TCV_{OE}	Temperature coefficient of V_{OE} ($10^\circ\text{C} \dots 40^\circ\text{C}$) ²⁾	< 0.6	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
m	Mass-Electronics	5	kg
m	Mass-Head	1	kg

Notes: ¹⁾Single pulse only, not AC.

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

²⁾All ppm figures refer to secondary measuring range 10 V.

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

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
- Includes one measuring head and one 19" rack-mountable electronics module.

Special features

- D-Sub 15 pin female output interface connector
- D-Sub 9 pin male status output interface connector
- LED indicators for normal operation and 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.

Current Transducer ITP 600-SBPR ULTRASTAB

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 ¹⁾	kV
\hat{V}_w	Impulse withstand voltage 1.2/50 μ 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		
dCp	Creepage distance	10	mm
dCl	Clearance distance	10	mm
CTI	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: ¹⁾ 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.

Current Transducer ITP 600-SBPR ULTRASTAB

Output noise figures: @ 25°C

Random Noise ppm (rms):

0 – 10 Hz	0 – 10 kHz	0 – 100 kHz
< 0.15	< 6.5	< 16

Re-injected noise measured on primary cable
(DC - 100 kHz) < 2 μV_{RMS}

Dynamic performance data

BW	Frequency bandwidth for small signal 5 %, of I_{PN} (DC) (- 3 dB)	DC .. 300	kHz
di/dt	di/dt accurately followed	> 50	A/ μs
t_r	Response time ¹⁾ to 90 % of I_{PN} step	< 1	μs

Note: ¹⁾ With a di/dt of 50 A/ μs .

Current Transducer ITP 600-SBPR ULTRASTAB

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**.

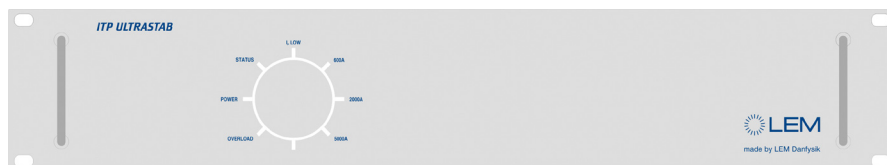
The Status/Interlock connector (Sub-D, 9 pole, male) contains the following signals:

Pin N°	Description
1	Normal operation Fault When the unit status is faulty (error, overload, warning etc.), this pin is connected to the Normal operation common.
2	Normal operation OK When the unit status is OK (Normal operation), this pin is connected to the Normal operation common pin.
3	I_p Low common This pin is connected to either I _p Low True or I _p Low False depending on the unit's status.
4	Overload warning True This pin is connected to the Overload common pin when the current through the transducer head exceeds 30 % of the maximum programmed current.
5	Overload warning False 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	Normal operation common This pin is connected to either Normal operation on or the Normal operation off depending on the unit's status.
7	I_p Low True This pin is connected to I _p Low common when the current through the transducer head is below 5 % of the programmed current.
8	I_p Low False This pin is connected to I _p Low common when the current through the transducer head is above 5 % of the programmed current.
9	Overload warning common This pin is connected to either Overload warning on or Overload warning off pin depending on the unit's status.

Current Transducer ITP 600-SBPR 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_p 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:

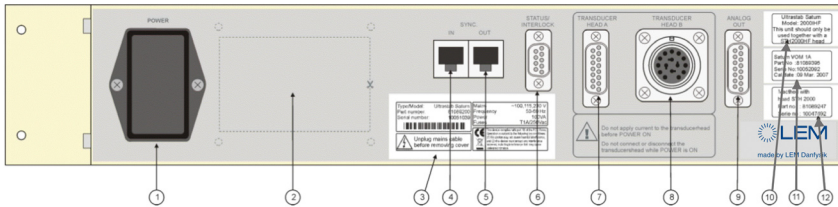
This LED is lit (Yellow) when 5000 A transducer head is connected to the ITP Electronics unit.

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-SBPR ULTRASTAB

Electronics - Description - Back panel connectors

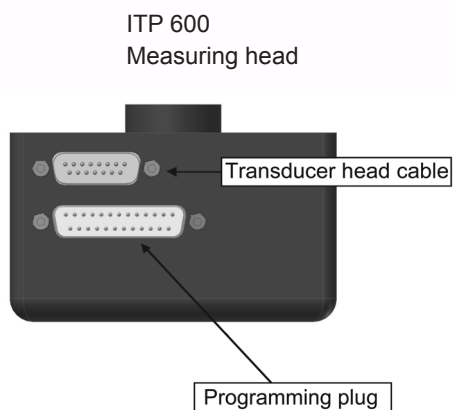


Refer to the drawing above for description of back panel layout and connectors:

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-SBPR ULTRASTAB

Transducer head - Description - Connectors



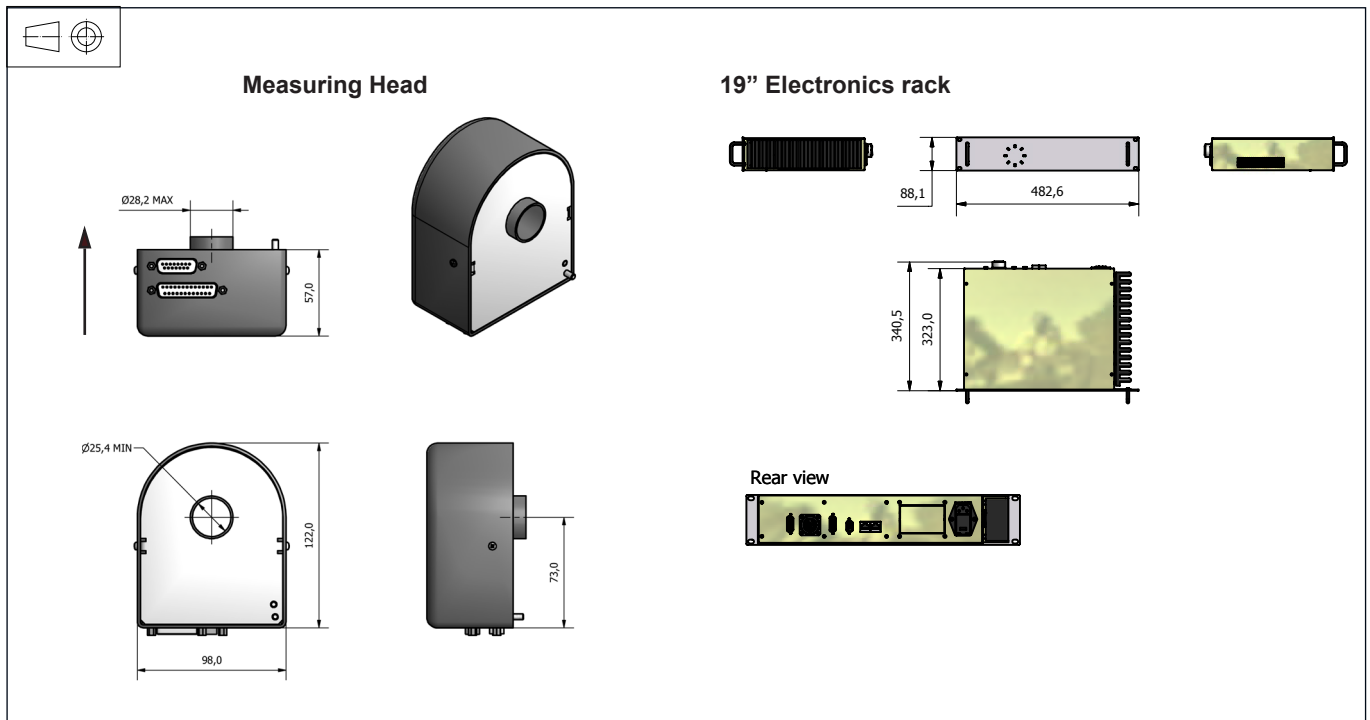
Miscellaneous

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

ITP 600-SBPR 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-SBPR ULTRASTAB (in mm. 1 mm = 0.0394 inch)

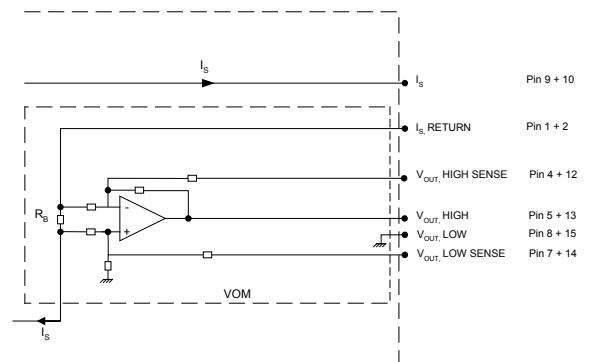


Analogue output connection - D Sub 15 female connector

Pin N°	Description
1	Current return
2	Current return
3	Not used
4	Voltage output - high sense
5	Voltage output - high out
6	Ground
7	Voltage out - low sense
8	Voltage out - low out
9	Current output
10	Current output
11	Not used
12	Voltage output - high sense
13	Voltage output - high out
14	Voltage output - low sense
15	Voltage output - low out

Important:

- Pin 1 - 9 as well as pin 2 - 10 must be shorted. This will loop the current output through the VOM (Voltage output Module inside).
- The voltage output is then present at pin 4 - 8 and 12 - 15. Please refer to the simplified schematic of voltage output through the VOM (Voltage Output Module) just hereafter:



Mechanical characteristics

- General tolerance: ± 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

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