

# High-Performance Current Transducer ITZ-SB & SBPR ULTRASTAB

For ultra-high precision measurement of current (DC, AC, pulsed...) with galvanic isolation between primary and secondary. Separate magnetic head and measuring electronics provides high flexibility and a selectable measuring range from 600 to 24000 A.

$$I_{PM} = 0 \dots 24 \text{ kA}$$



Electrical data										
Parameter		ITZ 600-PR	ITZ 2000-PR	ITZ 2000	ITZ 5000	ITZ 10000	ITZ 16000	ITZ 24000	Unit	
$I_{PN}$	Primary nominal current - DC	±	600	2000	2000	5000	10000	16000	24000	A
$I_{PN}$	Primary nominal current - AC		424	1414	1414	3535	7070	11314	16970	A (rms)
$I_{PM}$	Primary current - meas. range	±	600	2000	2000	5000	10000	16000	24000	A
$\hat{I}_P$	Max overload capability 100 ms <sup>1)</sup>		3 k	10 k	10 k	25 k	> 30k	> 30k	> 30k	A
$R_M$	Measuring resistance (option)	min	0							Ohm
		max	0.5							Ohm
$I_S$	Secondary current		1	1	2	2	2	2	3	A
$V_S$	Secondary voltage	±	10	10	10	10	10	10	10	V
$K_N$	Conversion Ratio	V/A	1/60	1/200	1/200	1/500	1/1000	1/1600	1/2400	
	Monitor Output, 5% accuracy	±	1	1	1	1	1	1	1	V
$R_S$	Sec. coil resistance @ $T_A = 25^\circ\text{C}$		3.5	5.8	2.7	4.3	11.0	20.3	13.7	Ohm
$V_C$	Mains supply voltage		100-240/50-60Hz							V AC
	Programming range		40-600	125-2000	N/A					A
	- in steps of		20	125						A

Accuracy - Dynamic performance data											
Parameter		ITZ 600	ITZ 2000	ITZ 5000	ITZ 10000	ITZ 16000	ITZ 24000	Unit			
$\epsilon_L$	Linearity error <sup>2)</sup>	max	10	11	11	12	12	12	ppm		
$\epsilon_G$	Sensitivity error	max	50					ppm			
$V_{OE}$	Electrical offset voltage <sup>2)</sup>	max	3					ppm			
$\Delta V_{OE}$	Offset stability - no load <sup>2)</sup>	max	1.5					ppm/Month			
$\Delta G$	Sensitivity stability	max	2					ppm/Month			
$TCG$	Temperature coefficient of G	max	2					ppm/K			
$TCV_{OE}$	Temperature coefficient of $V_{OE}$ <sup>2)</sup>	max	0.3					ppm/K			

General data											
Parameter		ITZ 600	ITZ 2000-PR	ITZ 2000	ITZ 5000	ITZ 10000	ITZ 16000	ITZ 24000	Unit		
$T_A$	Ambient operating temperature - head	0 ... +55									deg. C
$T_A$	Ambient operating temperature - electronics	+10 ... +40									deg. C
$T_S$	Ambient storage temperature - head and electronics	-20 ... +85									deg. C
	Humidity - storage and operation	20 ... 80%									RH
	Dimensions - electronics	480x88x430									mm
$m$	Weight - electronics	8.4			9.2			10.0			kg
	Dimensions - head	See drawings towards the end of this datasheet									
$m$	Weight - head	1.0	4.6	3.3	17	20	80	90	kg		

Notes: <sup>1)</sup> Single pulse only, not AC. The transducer may require a few seconds to return to normal operation when autoreset system is running.

<sup>2)</sup> All PPM figures refer to secondary measuring range ( $I_S$ )

## Features

- ± 10V voltage output
- Closed loop fluxgate
- Split design - separate head and rack electronics.

## Special features

- D-sub 15-pole female output connector
- 4 mm banana sockets especially for secondary current output
- Full-featured indicator panel
- Also available with current-only output
- 600 A and 2000 A measuring head available with programming option.

## Advantages

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

## Applications

- Feedback element in high-precision, high-stability power supplies
- Calibration unit
- Absolute current standard reference
- Test and calibration of current sources
- Current extender for power systems
- Differential current measurement on power line
- Metrology applications.

## Application domain

- Industrial, laboratory and medical.

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### Isolation characteristics

Between primary and secondary

	Parameter	ITZ 600	ITZ 2000	ITZ 5000	ITZ 10000	ITZ 16000	ITZ 24000	Unit
$V_b$	Rated isolation voltage rms, reinforced isolation IEC 61010-1 conditions: - over voltage cat III - pollution degree 2	300	1250	2000	2000	2250	2250	V
$V_b$	Rated isolation voltage rms, single isolation IEC 61010-1 conditions: - over voltage cat III - pollution degree 2	2000	2500	4000	4000	4500	4500	V
$V_d$	RMS voltage for AC isolation test, 50/60 Hz, 1 min	4.9	10.8	16.2	16.2	17.9	17.9	kV
$\hat{V}_w$	Impulse withstand voltage 1.2/50 $\mu$ s	9.1	19.9	29.8	29.8	32.9	32.9	kV
$V_b$	Rated isolation voltage rms, reinforced isolation EN 50178 conditions: - over voltage cat III - pollution degree 2	600	1250	2000	2000	2250	2250	V
$V_b$	Rated isolation voltage rms, single isolation EN 50178 conditions: - over voltage cat III - pollution degree 2	1000	2500	4000	4000	4500	4500	V
dCp	Creepage distance	10	25	40	40	45	45	mm
dCI	Clearance	10	25	40	40	45	45	mm
CTI	Comparative Tracking Index (group I)	600	100	100	100	100	100	V

### 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

Parameter	Measure bandwidth	ITZ 600-PR	ITZ 2000-PR	ITZ 2000	ITZ 5000	ITZ 10000	ITZ 16000	ITZ 24000	Unit
Random noise @ 25 deg. C	0 .. 10 Hz	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	ppm (rms)
	0 .. 10 kHz	< 8	< 2	< 3.0	< 2.5	< 8	< 8	< 8	
	0 .. 100 kHz	< 60	< 60	< 60	< 60	< 60	< 60	< 60	
Re-injected noise on primary busbar/cable	0 .. 100 kHz	< 2	< 10	< 10	< 10	< 2	< 2	< 2	$\mu$ V (rms)

### Dynamic performance data

Parameter	Detail	ITZ 600	ITZ 2000-PR	ITZ 2000	ITZ 5000	ITZ 10000	ITZ 16000	ITZ 24000	Unit
Frequency Bandwidth <b>BW</b>	Small-signal bandwidth, 1% of $I_{PN-DC}$	0 .. 300	0 .. 80	0 .. 300	0 .. 80	0 .. 20	0 .. 3	0 .. 2	kHz ( $\pm$ 3 dB)
<b>di/dt</b> Slew-rate	di/dt accurately followed	> 50	> 20	> 50	> 20	> 100	> 160	> 250	A/ $\mu$ s
<b>t<sub>rise</sub></b> Rise time	Response time <sup>1)</sup> to 90 % of $I_{PN}$ step	< 1	< 1	< 1	< 1	< 2	< 2	< 2	$\mu$ s

**Note:** <sup>1)</sup> With di/dt as specified under "Slew-rate".

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### Status / Interlock Port - electrical specification

All signals on the Status/Interlock port are optically isolated, Open Collector ports.

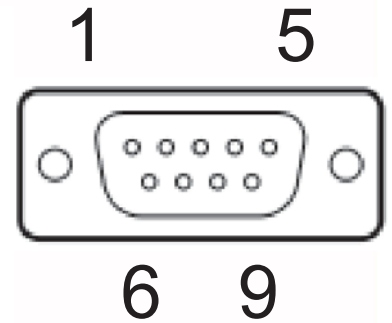
Four signals are present on the port, each having two dedicated pins in the connector:

- Collector (C)
- Emitter (E)

The ports are “Active Low”, meaning that an active signal will draw current from collector to emitter.

Pins list:

Signal	Description - pins
OVERLOAD	Active low when the transducer head is saturated due to excessive primary current. Pin 1: C Pin 6: E
High $I_p$	Active low when the transducer output is active with an $I_p$ higher than 105% of nominal full-scale output ( $I_{PN}$ DC). Pin 2: C Pin 7: E
ACTIVE	Active low when the transducer output is active, with an $I_p$ higher than approximately 1% of nominal full-scale output ( $I_{PN}$ DC). Pin 3: C Pin 8: E
STATUS	Active low when the status of the unit is OK. Pin 4: C Pin 9: E

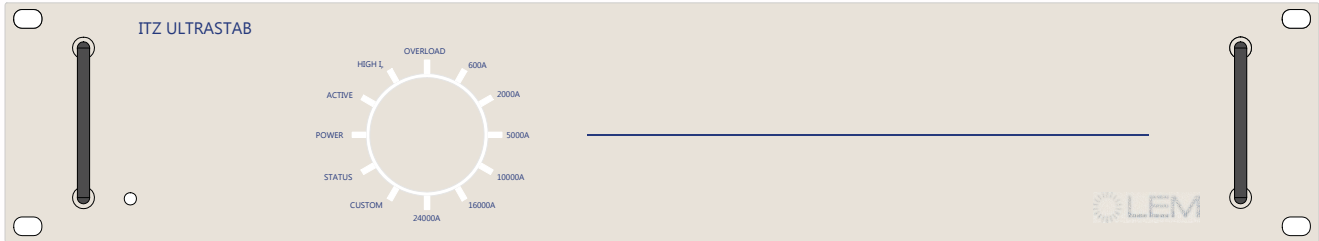


Electrical specification, each port

Symbol	Detail	Specification	Unit
$V_{CEO}$	Maximum off-state voltage	60	V
$V_{ECO}$	Maximum <b>reverse</b> off-state voltage	5	V
$I_C$	Maximum on-state CE current	10	mA
$V_{CE(sat)}$	Saturation CE voltage	< 1	V

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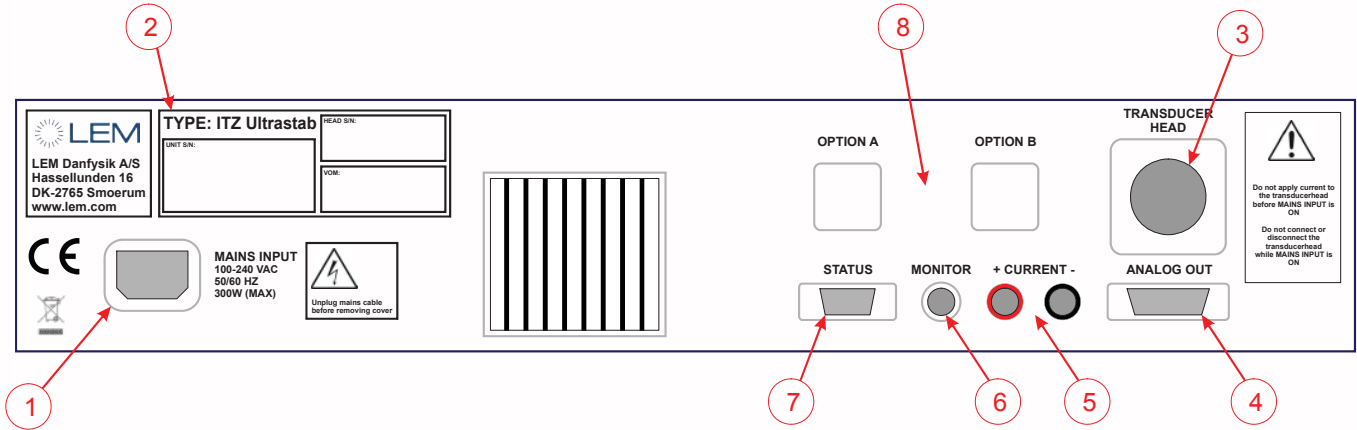
### Electronics - Description - Front panel



Indicator	Description
POWER	This LED is lit (Blue) when the unit is on.
ACTIVE	This LED is lit (Yellow) when the transducer output is active, with $I_p$ higher than approximately 1% of nominal full-scale output ( $I_{PN}$ DC).
High $I_p$	This LED is lit (Yellow) when the transducer output is active with an $I_p$ higher than 105% of nominal full-scale output ( $I_{PN}$ DC).
OVERLOAD	This LED is lit (red) when the transducer head saturates due to excessive primary current.
600 A	These LEDs are lit (Yellow) when a transducer head with the corresponding full-scale range is connected to the ITZ LTRASTAB.
2000 A	
5000 A	
10000 A	
16000 A	
24000 A	
CUSTOM	This LED is lit (Yellow) when the system setup has detected a custom head configuration.
STATUS	This LED is lit (Green) when the status of the unit is OK.

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### Electronics - Description - Back panel



Reference	Description
1	IEC power inlet: This connector accepts a standard IEC power cord (supplied).
2	Type / Serial number plate. Three individual S/Ns may be listed here: One for the ITZ electronics, one for the matching head and one (optional) for the installed VOM.
3	Transducer head: Connection to the transducer head.
4	Analog out: Output connection to a DMM or other equipment.
5	Current $\pm$ : Secondary current output.
6	Monitor: Voltage output with a buffered replica of the secondary current.
7	Status/Interlock signal outputs.
8	Option A+B: These positions are for future expansion or customization (not used).

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### Transducer-head Description

All heads carry a bayonet type interface connector to connect head with rack electronics.

Programmable heads (600 A and 2 kA) has an additional 25-pin D-sub connector for use with a programming plug:

- The 600 A head can be programmed from 40 A to 620 A in steps of 20 A.
- The programmable 2000 A head can be programmed from 125 A to 2000 A in steps of 125 A.

Contact your local LEM Sales representative for availability of programming plugs.

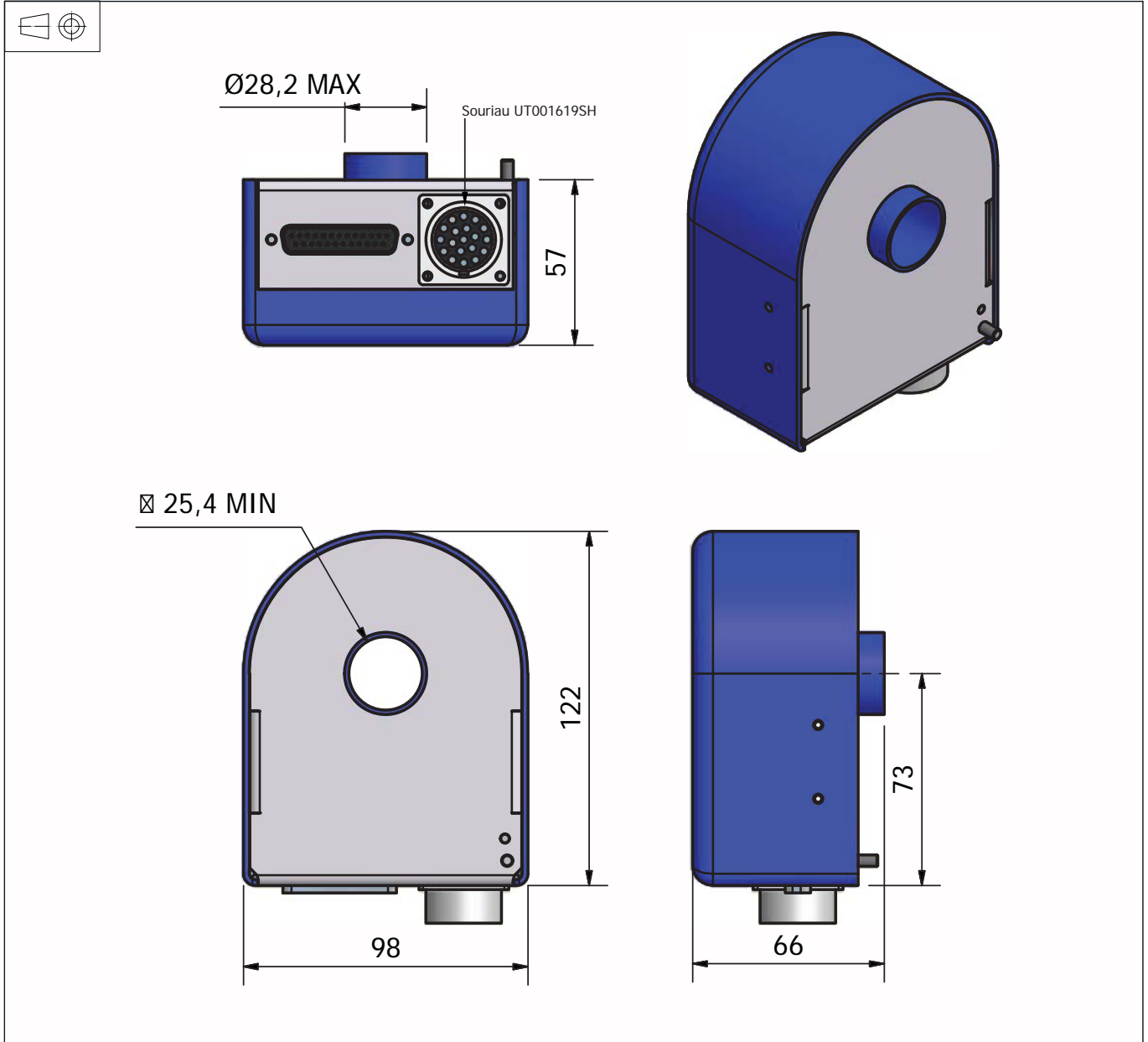
### Standard delivery package

The LEM ITZ Ultrastab package should contain:

- 19-inch rack-mount ITZ Ultrastab electronics
- Transducer head - depending on nominal current range
- European (Schuko) and US mains cable with three-pole IEC female connector
- Cable for connecting head and electronics crate
- Analog output cable
- Manual
- Calibration certificate.

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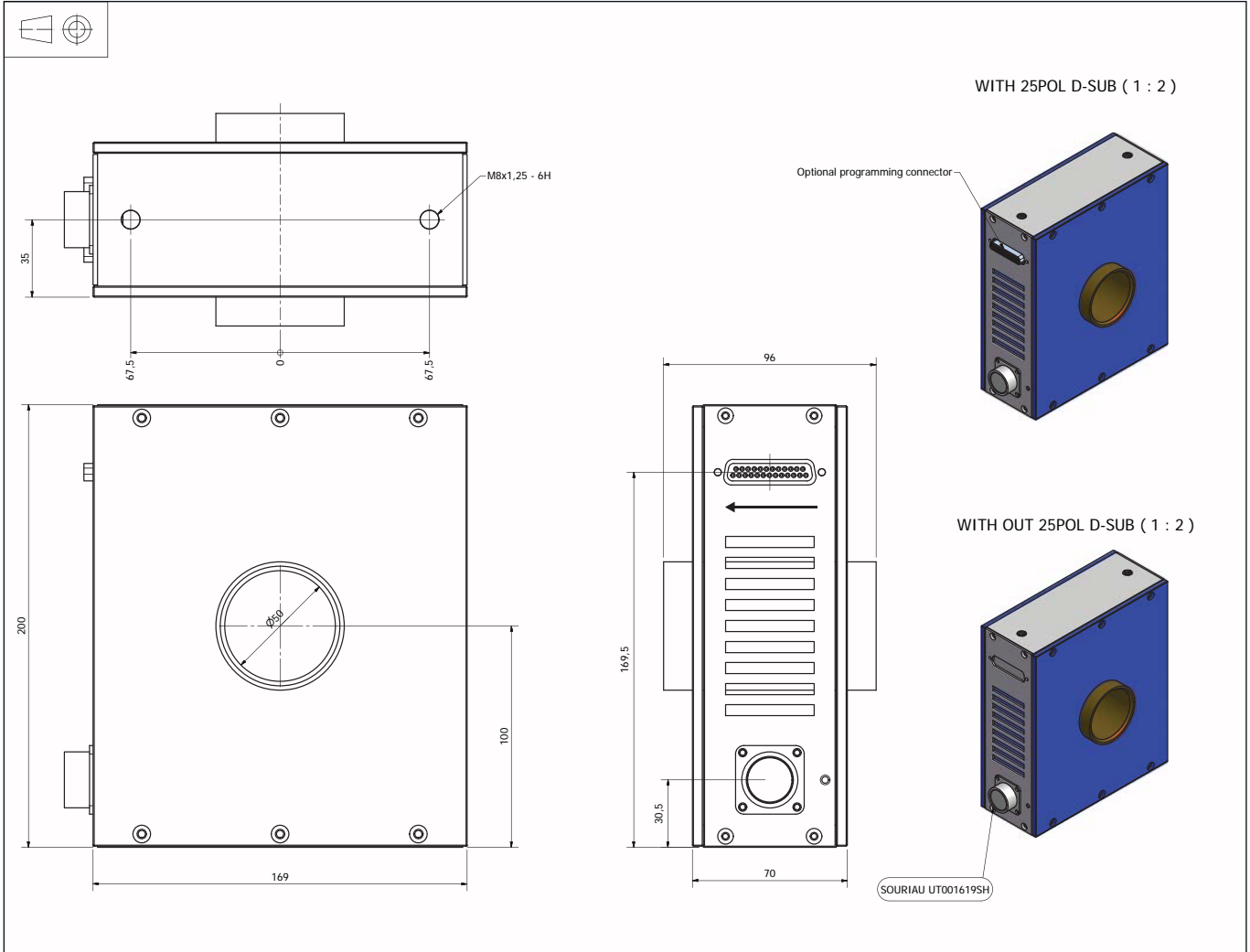
Mechanical dimensions - ITZ 600 - 25 measuring head





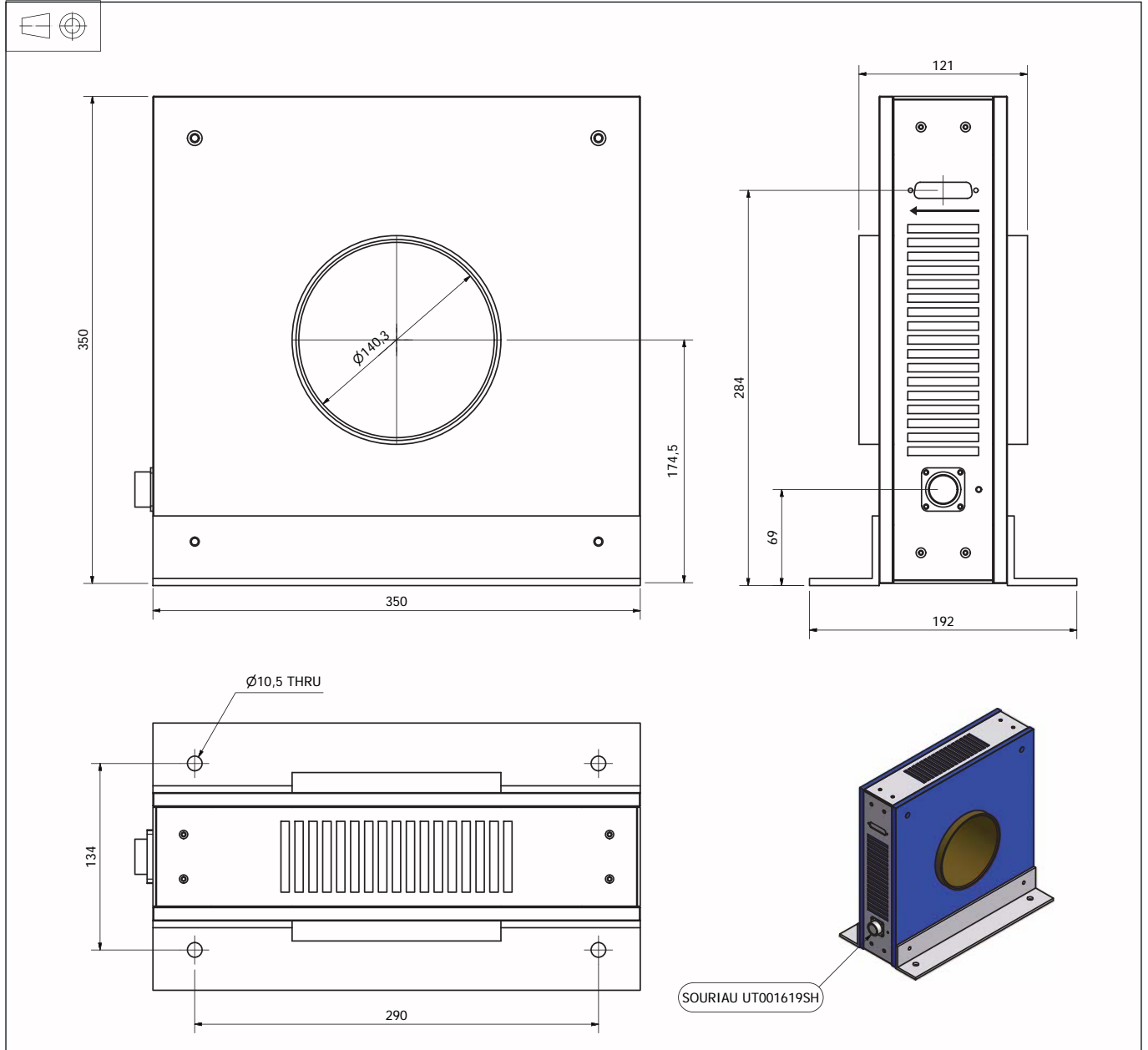
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Mechanical dimensions - ITZ 2000 - 50 measuring head



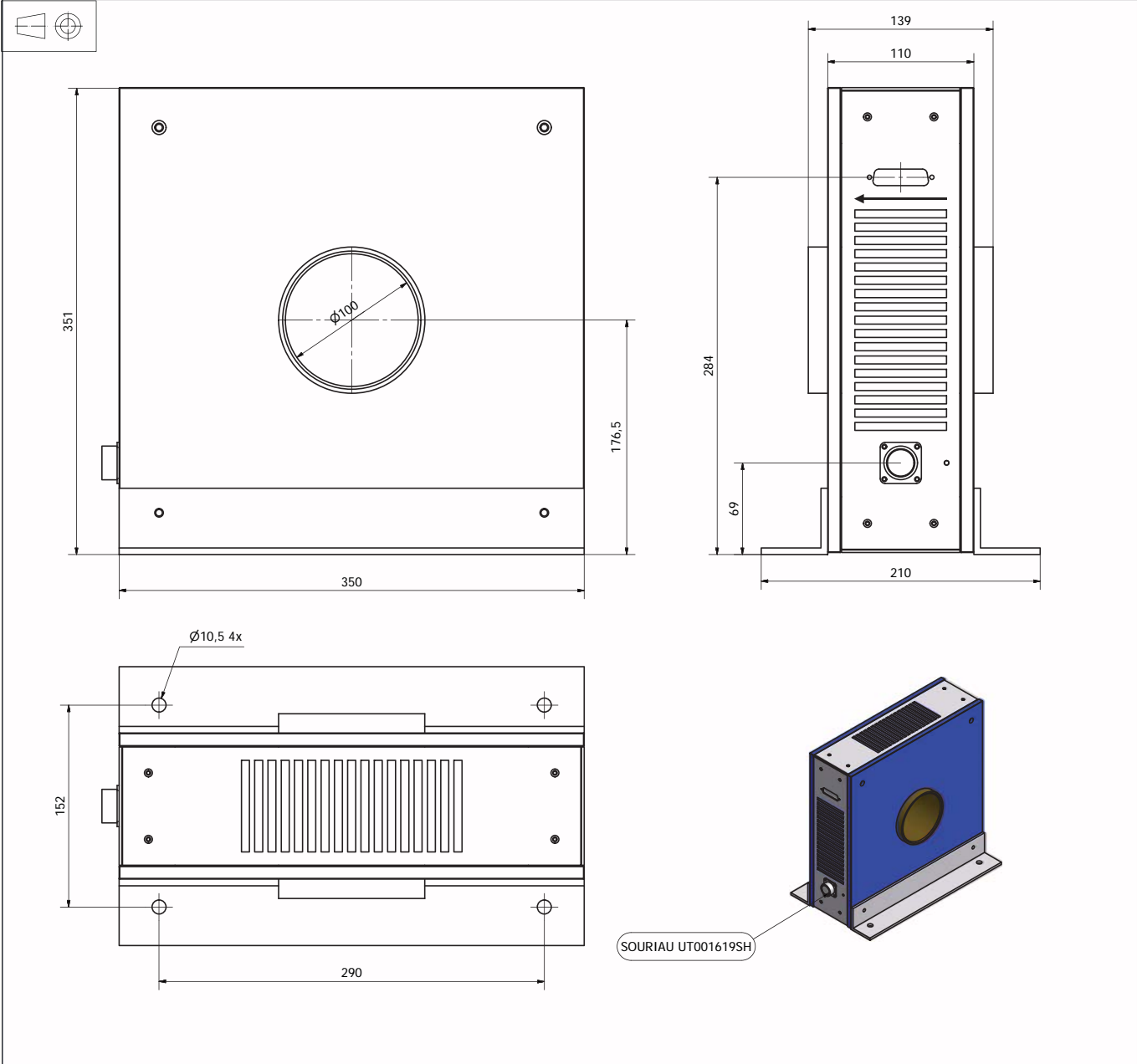
Current Transducer family ITZ-SB & SBPR ULTRASTAB

Mechanical dimensions - ITZ 5000 - 140 measuring head



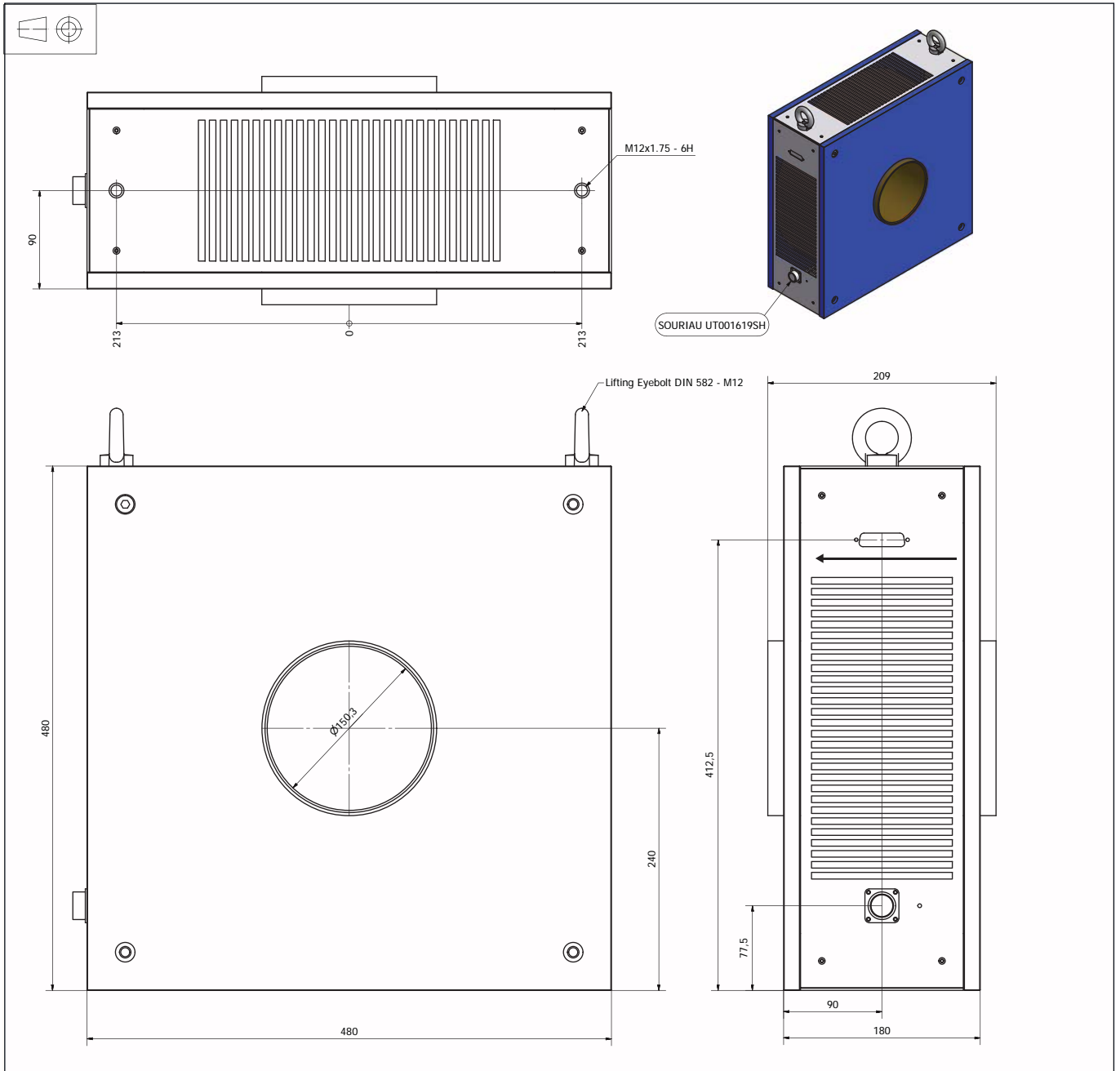
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Mechanical dimensions - ITZ 10000 - 100 measuring head



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Mechanical dimensions - ITZ 16000 - 150 and ITZ 24000 - 150 measuring head



- General Tolerance:  $\pm 0.5$  mm for all outline drawings