

IST ULTRASTAB

USER GUIDE

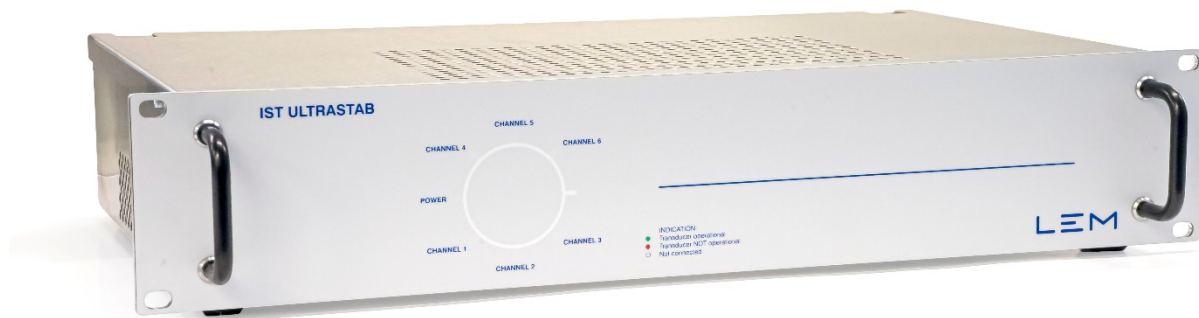


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1 INTRODUCTION

Congratulations with your purchase of LEM IST ULTRASTAB.

The IST ULTRASTAB unit serves as power supply and signal processing unit for up to 6 individual LEM high precision current transducers. It ensures that the extremely high precision and low noise offered by the transducers is preserved and made available in a convenient and user-friendly unit.

Please read this manual carefully before use. It contains information on how to set up and use the IST ULTRASTAB and how to build a system utilizing the multichannel capabilities of the unit. In case of unanswered questions do not hesitate to contact your LEM representative.

IMPORTANT: LEM will not be held responsible for use of the IST ULTRASTAB unit under conditions and/or in application setups not supported by the information in this user guide.

2 RECEIVING AND UNPACKING

The shipping material and the IST ULTRASTAB should be thoroughly inspected for signs of obvious physical damage immediately upon receipt.

All materials in the package should be checked against the enclosed packing list and the list of standard delivery below. LEM will not be responsible for any shortages unless notified immediately.

The IST ULTRASTAB package should contain:

- Electronics 19 inch crate model IST ULTRASTAB
- European (Schuko) and USA mains cable with three-pole IEC female connector.

IN CASE OF DAMAGE

If the equipment is damaged in any way, a claim should be filed with the shipping agent, and a full report of the damage should be forwarded to LEM immediately upon arrival. Please see more on <http://www.lem.com> , After Sales customer service – Return Merchandise Authorization RMA procedure.

Upon receipt of the report, LEM will forward instructions concerning the repair, replacement or return shipment.

Please include the Product description, Serial number and Order reference on any communication with LEM.



3 WARRANTY STATEMENT



5 Year Warranty on LEM Transducers

We design and manufacture high quality and highly reliable products for our customers all over the world.

We have delivered several million current and voltage sensors since 1972 and most of them are still being used today for traction vehicles, Industrial motor drives, UPS systems and many other applications requiring high quality standards.

The warranty granted on LEM sensors is for a period of 5 years (60 months) from the date of their delivery (not applicable to Energy-meter product family for traction where the warranty period is 2 years).

During this period LEM shall replace or repair all defective parts at its' cost (provided the defect is due to defective material or workmanship).

Additional claims as well as claims for the compensation of damages, which do not occur on the delivered material itself, are not covered by this warranty.

All defects must be notified to LEM immediately and faulty material must be returned to the factory along with a description of the defect.

Warranty repairs and or replacements are carried out at LEM's discretion.

The customer bears the transport costs. An extension of the warranty period following repairs undertaken under warranty cannot be granted.

The warranty becomes invalid if the buyer has modified or repaired, or has had repaired by a third party the material without LEM's written consent.

The warranty does not cover any damage caused by incorrect conditions of use and cases of force majeure.

No responsibility will apply except legal requirements regarding product liability. The warranty explicitly excludes all claims exceeding the above conditions.

Geneva, 5 December 2019

A handwritten signature in black ink, appearing to read "Frank Rehfeld".

Frank Rehfeld
CEO LEM



4 TECHNICAL SPECIFICATIONS

Electrical Data – MAINS INPUT		
Mains Input	100 ... 240 V RMS, 50/60 Hz	IEC-type dual-fused inlet socket
Fuses	2.5 At / 240 V RMS	
Power consumption	< 150 W	All channels driven at max. 1 A RMS secondary output current
Electrical data – TRANSDUCER PORT		
Supply output	±15 V DC	6 channels
Ripple	< 15 mV RMS	50/60Hz
Noise	< 15 mV RMS	DC to 10kHz
Load regulation	< 5 %	
Power budget	125 W max 20.8 W max	Total: for all 6 channels connected Per channel
Electrical data – STATUS PORT		
Max Collector-Emitter voltage, off-state	45 V	
Max Collector-Emitter current, on-state	30 mA	
Max reverse Collector-Emitter voltage, off-state	5 V	
Collector-Emitter voltage, on-state	≤1 V	
Insulation voltage	3 kV RMS	between rack electronics and status port connections
Physical data		
Dimensions	483 x 88 x 290 mm	W x H x D, incl. handles/connectors
Weight	4.2 kg	
Operating conditions		
Temperature	10 ... 40 °C	
Humidity	20 ... 80 % RH	
Cooling	Passive	
Storage conditions		
Temperature	-20 ... 85 °C	
Humidity	20 ... 80 % RH	
Regulatory conformance		
Safety	IEC 61010-1: 2010	
EMC	IEC 61000-6-2: 2016 IEC 61000-6-4: 2011	



5 SYSTEM DESCRIPTION

The system cabinet is compatible with standard 19 inch rack mount systems, but can also be used in a table-top setup.

LEM IST ULTRASTAB is available in two versions:

- Current output
- ± 10 V Voltage output.

The IST Voltage output version differs from the current output one only in having up to six current-to-voltage conversion modules (VOM), which are mounted in the chassis.

Typical applications include multichannel AC and DC measurements on three-phase systems like motors and motor drivers, power converters and similar types of equipment often in combination with a precision power analyser.

Depending on the transducer's type and applied primary current (DC or AC), the IST ULTRASTAB can drive up to 6 channels at a total consumption of maximum 125 W.

Current range	Products
60 A	IT 60-S, IT 65-S
200 A	IT 200-S, IT 205-S
400 A	IT 400-S, IT 405-S
500 A	IN 500-S
600 A	IT 605-S, ITN 600-S
700 A	IT 700-S
900 A	ITN 900-S
1000 A	IT 1000-S/SP1, ITN 1000-S, IN 1000-S
1200 A	IN 1200-S
2000 A	IN 2000-S ⁽¹⁾

TABLE 1: IT/ITN/IN ULTRASTAB compatibility chart.

Note ¹⁾ For IN 2000-S series and only in pure AC measurement, the IST ULSTRASTAB can provide the power for 6 channels. For DC measurement or for AC and DC combined, the IST ULSTRASTAB provides the power for 4 channels maximum.



5.1 FRONT PANEL

The front panel includes indicators for each transducer channel.

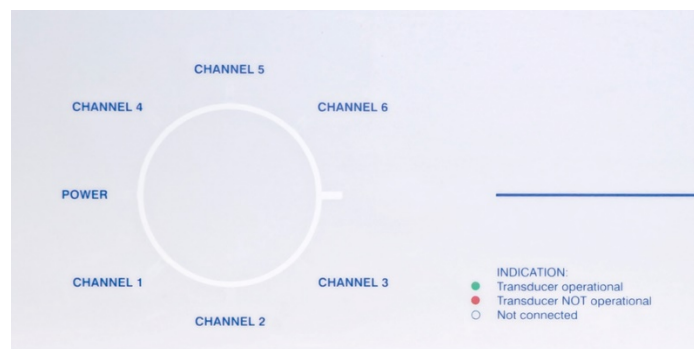


FIGURE 1: An overview of the front panel, with a close-up of the indicator panel

5.2 INDICATOR PANEL

The illuminated indicator panel has seven fields that are lit in the following modes:

POWER:

- **Green light** - Mains power is applied.
- **No light** – Unit is in off-state.

CHANNEL 1-6:

- **Green light** - Indicated transducer is attached and Normal Operation signal is ok. Transducer is operational.
- **Red light** - Indicated transducer is attached and Normal Operation signal is NOT ok.
- **No light** – No transducer is connected.



5.3 BACK PANEL

The IST ULTRASTAB unit provides 9-pin D-Sub female connector for up to six transducers and the measured secondary current from each transducer is looped to a set of output jacks (4 mm standard “banana” terminals) for the current output version.

For the voltage output, the secondary current from each transducer flows through the burden resistance in the corresponding Voltage-Output-Module (VOM).

The status of each individual transducer is presented on a 15-pin D-Sub male connector common for all six channels.

IMPORTANT: The IST ULTRASTAB unit has NO breaker for switching mains on and off. Power is supplied to the unit once the mains cable is inserted into the mains inlet and mains are switched on at the outlet. Indication of active mains is provided by the POWER indicator.

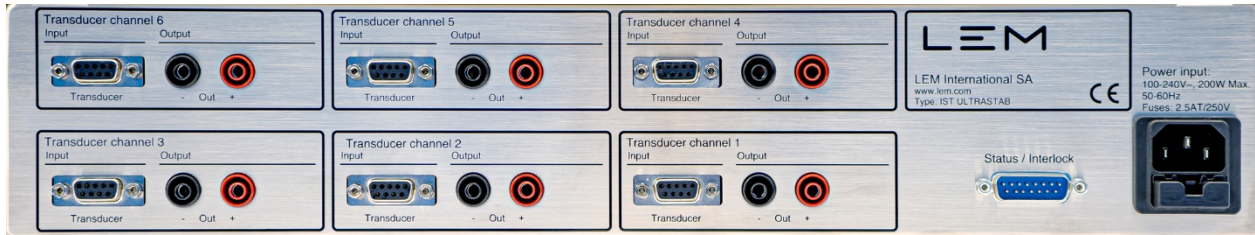


FIGURE 2: Overview of the IST ULTRASTAB back panel

5.4 TRANSDUCER PORT

Each channel is equipped with a 9-pin D-Sub connector that interfaces to LEM transducers. The pinout is shown below:

Pin 1: Output Current Return	<p>9-pin D-Sub female UNC 4-40 screw lock</p>
Pin 2: N/C	
Pin 3: Ground	
Pin 4: Ground	
Pin 5: Negative supply -15V	
Pin 6: Output Current	
Pin 7: N/C	
Pin 8: Normal Operation	
Pin 9: Positive supply +15V	

FIGURE 3: Pinout for 9-pin transducer connector



5.5 CONNECTING THE TRANSDUCERS

The IST ULTRASTAB rack provides 6 9-pin D-Sub connectors on the back panel for connecting to 6 individual transducers.

Each 9-pin D-Sub connector is used to connect the supply voltage to the DC power input of the transducer. It also routes the secondary current lines and the status signal from the transducer to the IST ULTRASTAB unit.

Connect the transducers at the 9-pin D-Sub connectors on the IST ULTRASTAB back panel via the shielded connection cables which must be ordered separately.

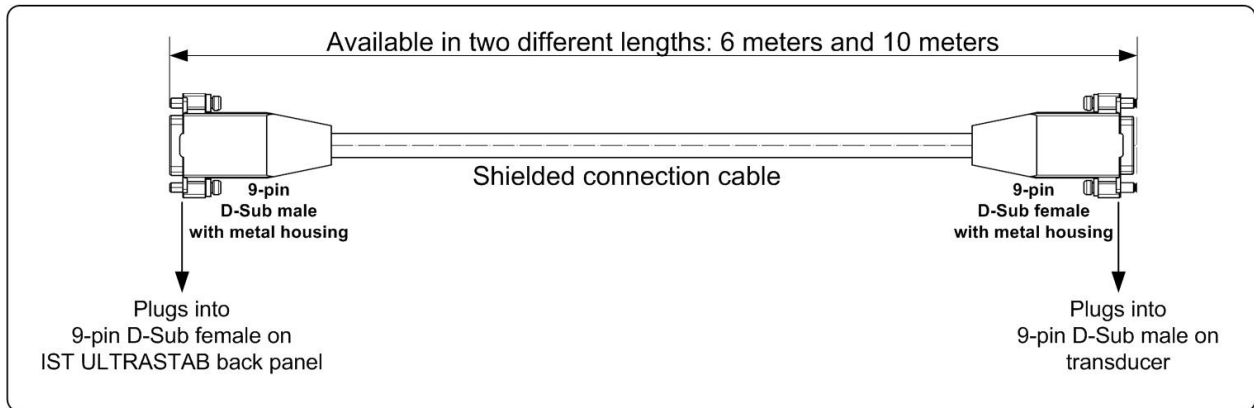


FIGURE 4: Connecting a transducer to IST ULTRASTAB

The following two shielded connection cables are available:

Description	Order number
Shielded connection cable length = 6 meters	71.12.08.000.0
Shielded connection cable length = 10 meters	71.12.13.000.0

TABLE 2: Shielded connection cables

It is recommended to use the connection cables indicated above. It is also possible to configure your own cable, bearing the following wiring description in mind.

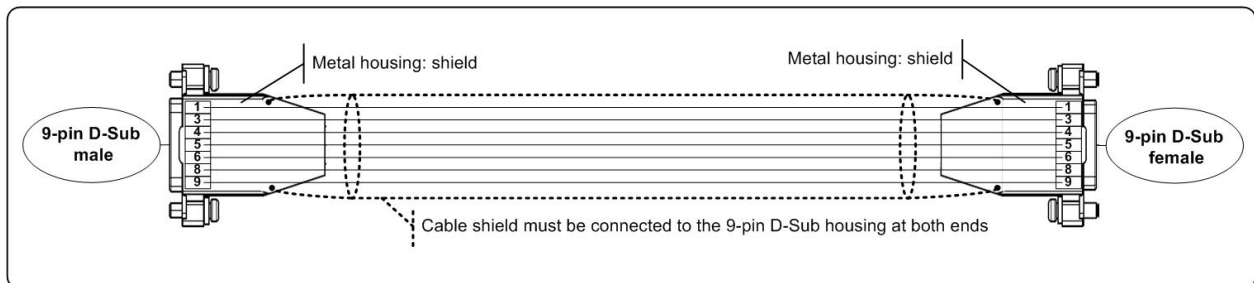


FIGURE 5: Transducer to IST ULTRASTAB connection cable wiring



To prevent any malfunction that may occur due to the cable/wire voltage drop (i.e., its length and the wire resistance inside the cable) between the IST ULTRASTAB rack and the transducer, a cable with at least 7 wires, each having a cross section AWG 22, AWG 23 or $\geq 0.25 \text{ mm}^2$, must be used.

In addition, it is recommended to use shielded cables in order to limit the effects of noise due to electromagnetic interference (EMI).

5.6 OUTPUT PORT

The measured secondary current or the $\pm 10 \text{ V}$ signal is output on a pair of 4 mm safety “banana” jacks.

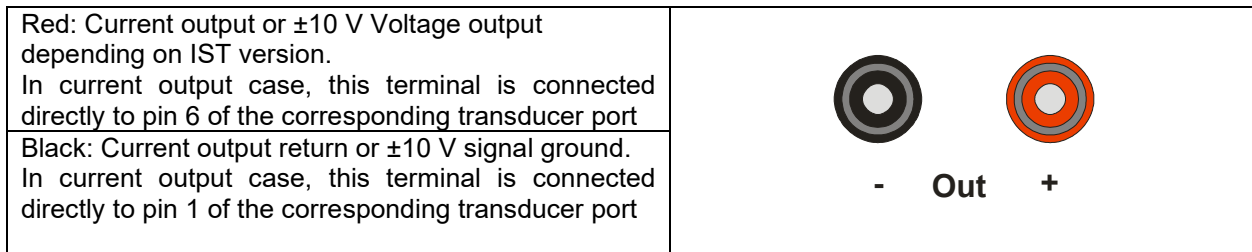


FIGURE 6: Output terminals

IMPORTANT: The secondary current path must ALWAYS be closed before applying primary current, i.e. a terminating burden resistor must be connected.

5.7 VOLTAGE OUTPUT VERSIONS

The following versions with $\pm 10 \text{ V}$ output signal are available:

Description	Order number	Secondary output current	Concerned transducers
IST 200-B ULTRASTAB	71.93.44.000.0	$\pm 200 \text{ mA}$	IT 200-S, IT 205-S, IT 400-S
IST 400-B ULTRASTAB	71.93.48.000.0	$\pm 400 \text{ mA}$	IT 400-S/SPxx, IT 605-S, IT 700-S, ITN 600-S

TABLE 3: Voltage output versions



5.8 STATUS / INTERLOCK

All LEM current transducers generate a status signal, which contains information about the operational status of the unit. This signal is routed through the IST ULTRASTAB and available in one 15-pin D-Sub male connector for each channel. The pinout is shown in figure 8.

The status port can optionally be used in any general safety interlock set up circuit. All signals on the status/interlock connector are optically isolated, photo-couplers type, floating Collector and Emitter. Depending on how each signal is wired, it can be “Active Low” or “Active High” as shown below:

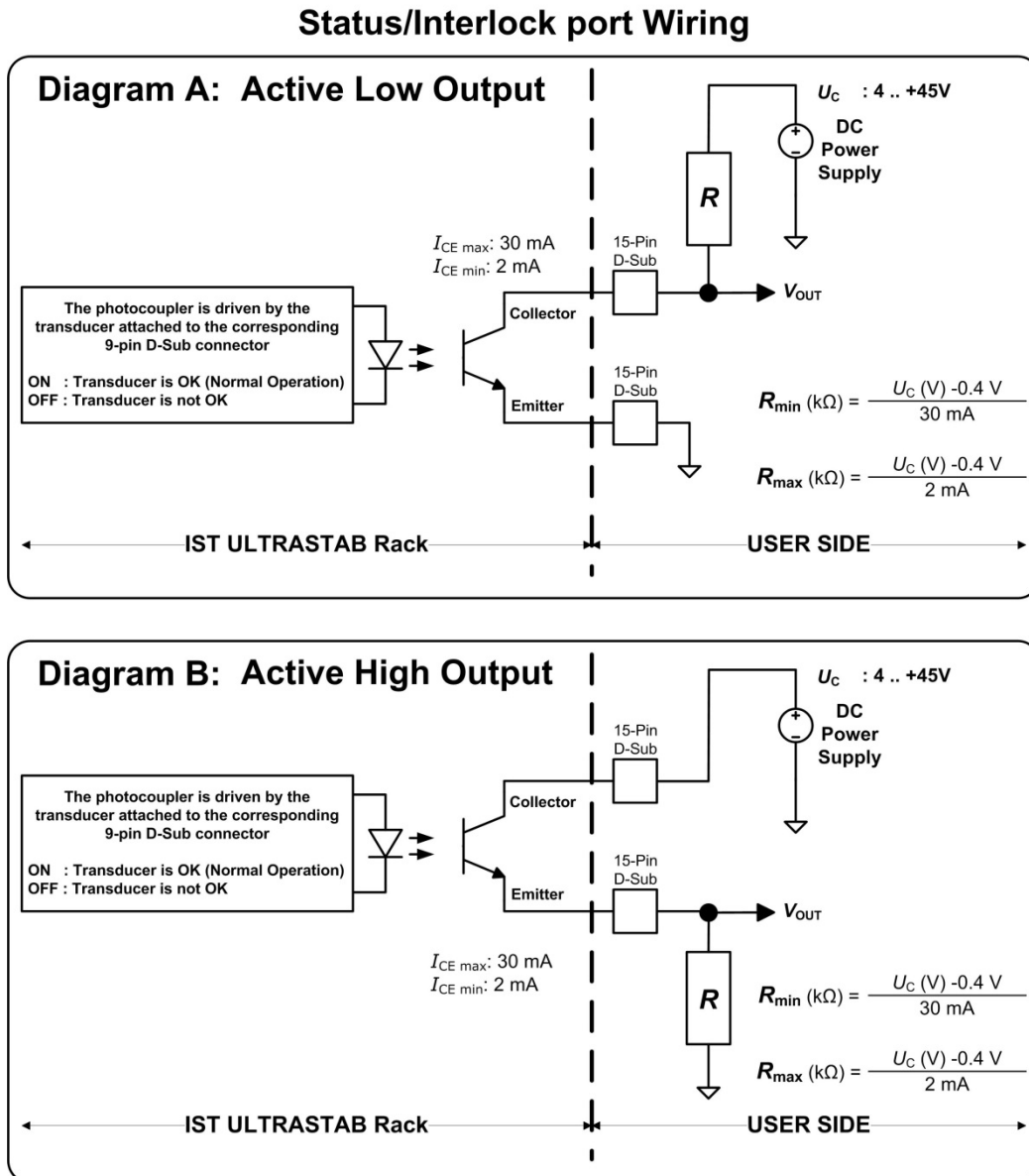


FIGURE 7: Status/Interlock port wiring



In the diagram A, the active low output signal U_{out} switches to GND when the corresponding transducer is OK (Normal operation and Green LED is lit). In the same manner, the transistor is switched off (No current from collector to emitter) to indicate that the corresponding transducer is not OK. Consequently, U_{out} switches to U_C and the corresponding Green LED is OFF, whereas the corresponding Red LED is lit.

In the diagram B, the active high output signal (U_{out} switches to U_C when the corresponding transducer is OK (Normal operation and Green LED is lit). In the same manner, the transistor is switched off (No current from collector to emitter) to indicate that the corresponding transducer is not OK. Consequently, U_{out} switches to GND and the corresponding Green LED is OFF, whereas the corresponding Red LED is lit.

The power supply voltage U_C must be between 4 V and 45 V DC and the resistor value R must be chosen between a minimum value R_{min} and a maximum value R_{max} .

Some recommended standard values of R are given in the following table:

Power supply Voltage U_C	R_{min} (k Ω)	R_{max} (k Ω)	R Standard Values $\pm 5\%$
5 V	0.153	2.3	180 Ω , 1k Ω , or 2.2 k Ω
12 V	0.386	5.8	470 Ω , 2.2 k Ω or 4.7 k Ω
24 V	0.786	11.8	1 k Ω , 2.2 k Ω or 10 k Ω

TABLE 4: Recommended standard values of R

Status Connector:

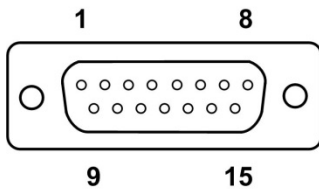
Power Status: Pin 1 Collector & Pin 5 Emitter	 <p>15-pin D-Sub male UNC 4-40 screw lock</p>
Channel 1: Pin 9 Collector & Pin 13 Emitter	
Channel 2: Pin 2 Collector & Pin 6 Emitter	
Channel 3: Pin 10 Collector & Pin 14 Emitter	
Channel 4: Pin 3 Collector & Pin 7 Emitter	
Channel 5: Pin 11 Collector & Pin 15 Emitter	
Channel 6: Pin 4 Collector & Pin 8 Emitter	

FIGURE 8: Pinout for 15-pin status connector



6 INSTALLATION

Before applying mains power to the unit, check that the specified AC voltage and current are available, and that the ambient temperature is within the range specified in this manual.

IMPORTANT: The IST ULTRASTAB is passively cooled by airflow entering the perforated areas in top, sides, and bottom of the cabinet. Make sure that these holes are not blocked as this will severely affect the performance of the unit.

Establish the Ground connection according to the local authority regulations and the requirements of the equipment via the AC power plug.

Mount the shielded connection cables between the electronics crate and the transducers. Use channel 1 to 3 as default. Check that all plugs are pushed fully in place.

The transducer itself may be installed in any orientation but be careful to consider potential influence of the physical layout of the setup with surrounding bus bars, transformers etc.

A typical 3-channel setup is shown below:

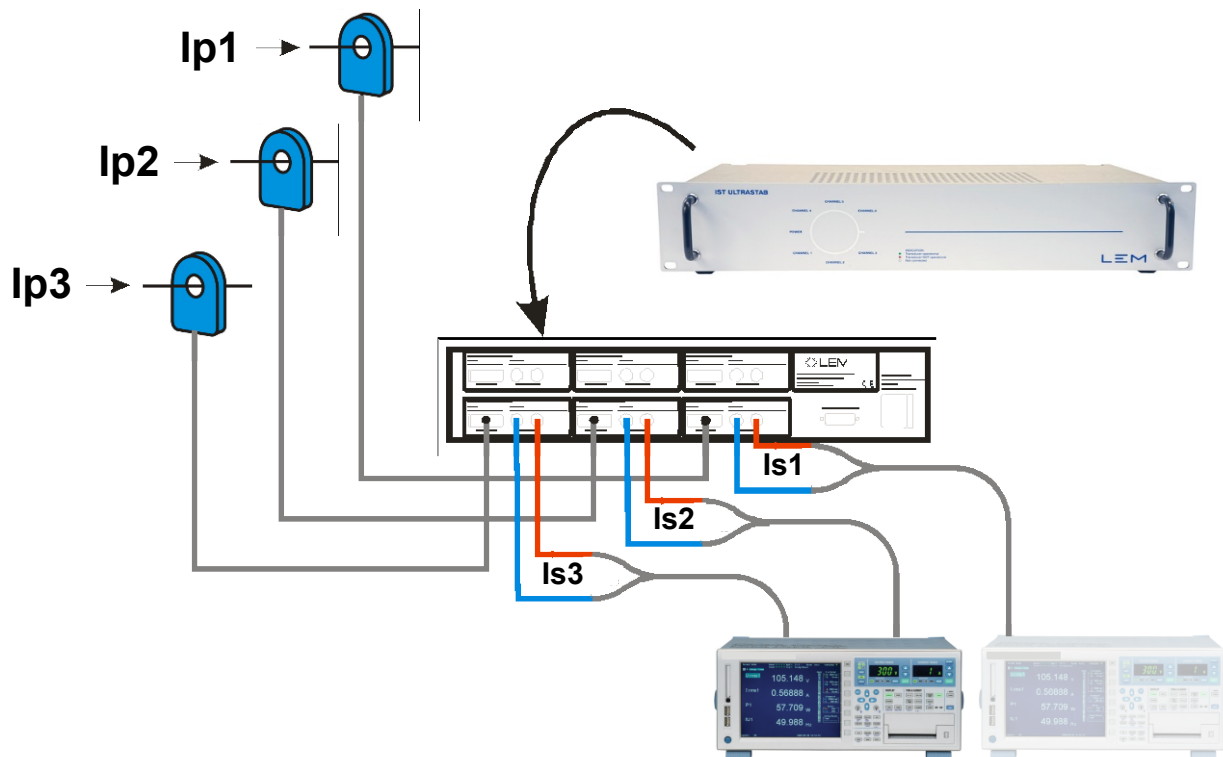


FIGURE 9: IST ULTRASTAB in a typical 3-channel current output application



7 OPERATING INSTRUCTIONS

When instructions for installation are complete, the IST ULTRASTAB can be switched ON.

Apply mains power by inserting the cable plug in the mains inlet and by switching on mains at the outlet. The green indicator LED “Power” will be lit.

Observe that the channel indicators turns on GREEN where transducers are connected and remains unlit where no transducer is connected. If a channel indicator turns RED please go through the setup, check that all cables are securely fastened etc. – it may also be that the transducer is faulty.

If any problem persists during this operation, please immediately take contact with LEM.

Further application information for high precision transducers can be found in their respective data sheets which can be easily obtained on www.lem.com or by contacting your local representative.

IMPORTANT: In order to avoid excessive saturation of the iron core in the transducer head, the IST ULTRASTAB unit should ALWAYS be switched on before the actual primary current source is applied to any of the attached transducers.

IMPORTANT: The secondary current path must NEVER be opened when primary current is applied. This means that cables to/from the current output port (banana jacks) should never be detached during operation.

8 MAINTENANCE

The IST ULTRASTAB assembly does not require any maintenance under normal operation.

