



IST ULTRASTAB

USER GUIDE





TABLE OF CONTENTS

TABLE OF CONTENTS	2
LIST OF FIGURES	2
LIST OF TABLES	2
1. INTRODUCTION	3
2. WARRANTY STATEMENT	4
3. RECEIVING AND UNPACKING	5
4. TECHNICAL SPECIFICATIONS	6
5. SYSTEM DESCRIPTION	7
5.1 FRONT PANEL	8
5.2 INDICATOR PANEL	8
5.3 BACK PANEL	9
5.4 TRANSDUCER PORT	9
5.5 CONNECTING THE TRANSDUCERS	10
5.6 OUTPUT PORT	11
6. INSTALLATION	14
7. OPERATING INSTRUCTIONS	15
8. MAINTENANCE	15

LIST OF FIGURES

FIGURE 1: An overview of the front panel, with a close-up of the indicator panel	8
FIGURE 2: Overview of the IST ULTRASTAB back panel	9
FIGURE 3: Pin out for 9-pin transducer connector	9
FIGURE 4: Connecting a transducer to IST ULTRASTAB	10
FIGURE 5: Transducer to IST ULTRASTAB connection cable wiring	10
FIGURE 6: Output terminals	11
FIGURE 7: Status/Interlock port Wiring	12
FIGURE 8: Pin out for 15-pin status connector	13
FIGURE 9: IST ULTRASTAB in a typical 3-channel current output application	14

LIST OF TABLES

TABLE 1: Technical specifications	6
TABLE 2: IT/ITN ULTRASTAB compatibility chart	7
TABLE 3: Two shielded connection cables available for connecting the transducers	10
TABLE 4: Recommended standard values of <i>R</i>	13



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 IT/ITN ULTRASTAB current transducer units. 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 either LEM Switzerland S.A. or our local distributor directly.

IMPORTANT: LEM Switzerland S.A. 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. 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 transducers 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 LEM 5-year warranty applies to all LEM transducers and is valid in addition to the legal warranty.

The warranty granted on LEM transducers is for a period of 5 years (60 months) from the date of their delivery.
(not applicable to EM4T & EM4TII & TEMA4T & LEMABOX & LZQJ products and automotive transducers where the warranty period is of 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.

LEM, warranty application date: April 1. 2008

François Gabella
President & CEO LEM



3. 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 Switzerland S.A. will not be responsible for any shortages unless notified immediately.

The LEM 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 Switzerland S.A. or our local representative immediately upon arrival.

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

Please include the Type No., Serial No., and Order No. for the IST ULTRASTAB on any communication with LEM Switzerland S.A. or our local representative.



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 secondary output current
Electrical data – TRANSDUCER PORT		
Supply Output	±15 V DC	6 channels, 1.1 A per channel
Ripple	<15 mV rms	50/60Hz
Noise	<15 mV rms	DC to 10kHz
Load regulation	<5 %	
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 between rack electronics and status port connections	3 kV rms	
Physical data		
Dimensions	483 x 88 x 290 mm	WxHxD, 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: 2001	
EMC	IEC 61000-6-2: 2005 IEC 61000-6-4: 2007	

TABLE 1: Technical specifications



5. SYSTEM DESCRIPTION

The IST ULTRASTAB voltage output differs from the current output by having up to six Voltage-Output-Modules (VOM) installed in the chassis. 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 ± 10 V Voltage output version differs from the current output one only in having up to six Current-to-Voltage conversion modules, which are mounted in the chassis.

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

In basic terms, the IST ULTRASTAB can drive up to six channels at a total (summed) current consumption of 6.6 A.

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
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

TABLE 2: IT/ITN ULTRASTAB compatibility chart.

5.1 FRONT PANEL

The front panel includes indicators for each transducer channel.

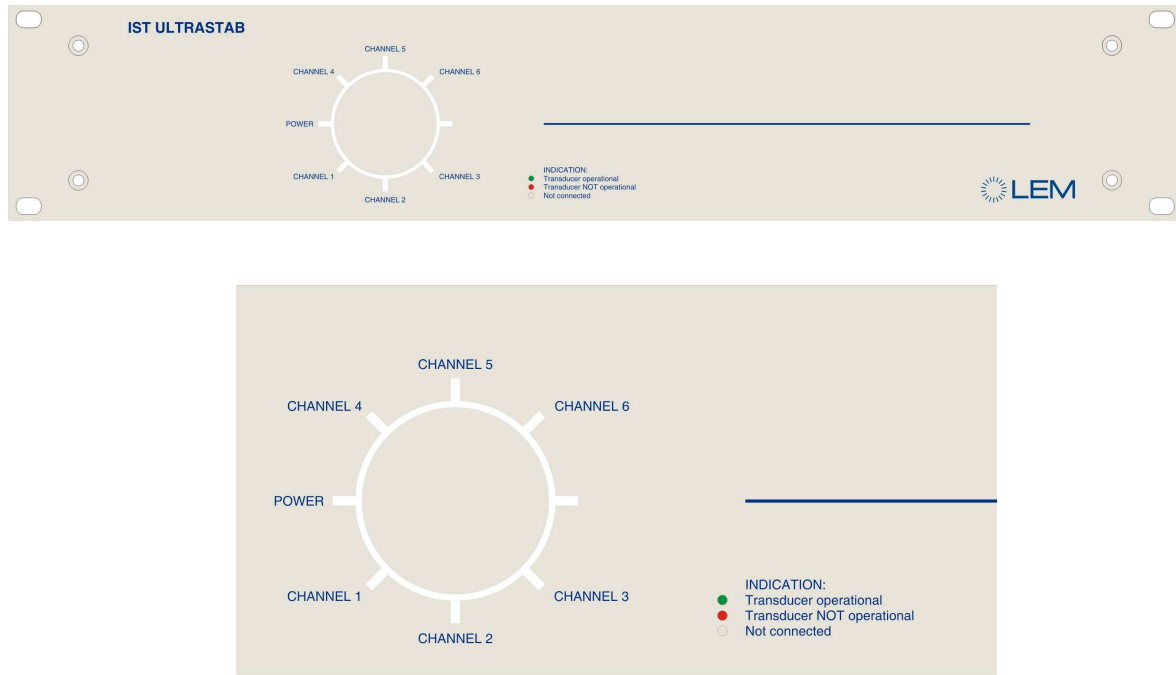


FIGURE 1: An overview of the front panel, with a close-up of the indicator panel

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 IT/ITN ULTRASTAB 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.

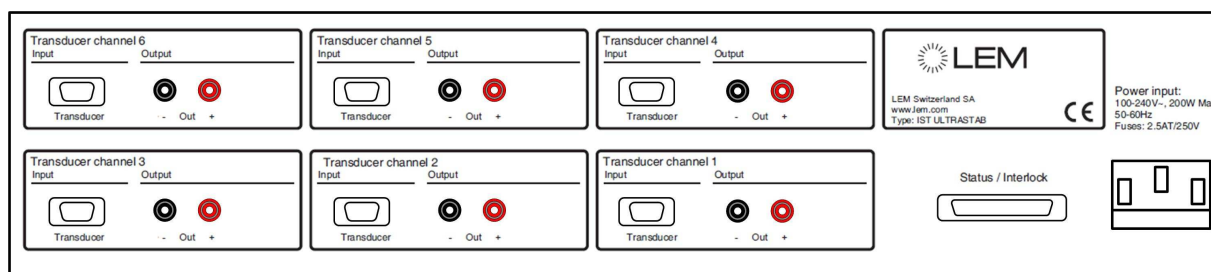


FIGURE 2: Overview of the IST ULTRASTAB back panel

5.4 TRANSDUCER PORT

Each channel is equipped with a 9-pin D-Sub connector that interfaces to LEM IT/ITN ULTRASTAB units. The pinout is shown below:

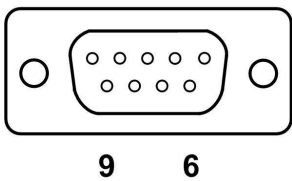
Pin 1: Output Current Return	 <p>9-pin D-Sub female UNC 4-40 screw lock</p>
Pin 2: N/C	
Pin 3: Ground	
Pin 4: Ground	
Pin 5: Negative supply -15V	
Pin 6: Output Current	
Pin 7: N/C	
Pin 8: Normal Operation	
Pin 9: Positive supply +15V	

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 up to 6 IT/ITN 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 have to be ordered separately.

The shielded connection cable for operating a transducer is shown below:

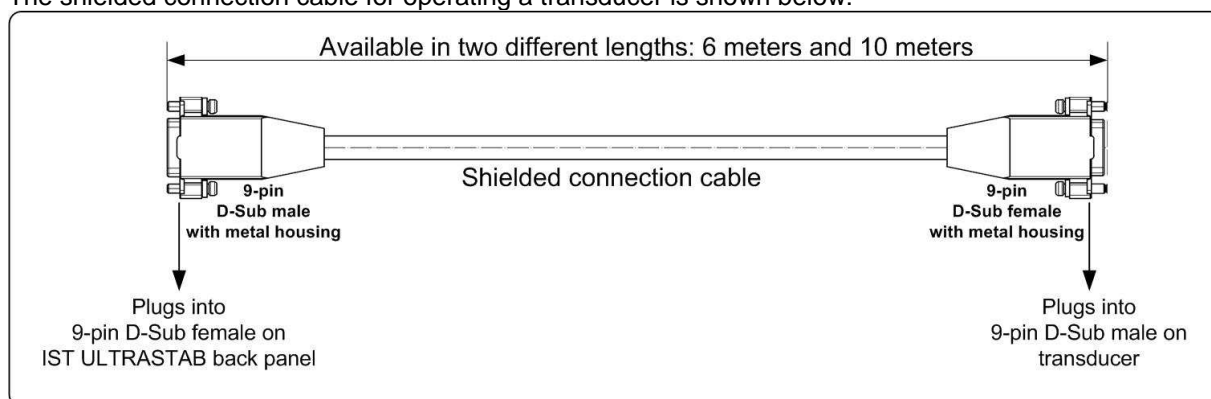


FIGURE 4: Connecting a transducer to IST ULTRASTAB

The following 2 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	71.12.08.000.0

TABLE 3: Two shielded connection cables available for connecting the transducers.

It is recommended to use the connection cables indicated in the table 3 above. It is also possible to configure your own cable, bearing the following description in mind.

The connection cable wiring is shown below:

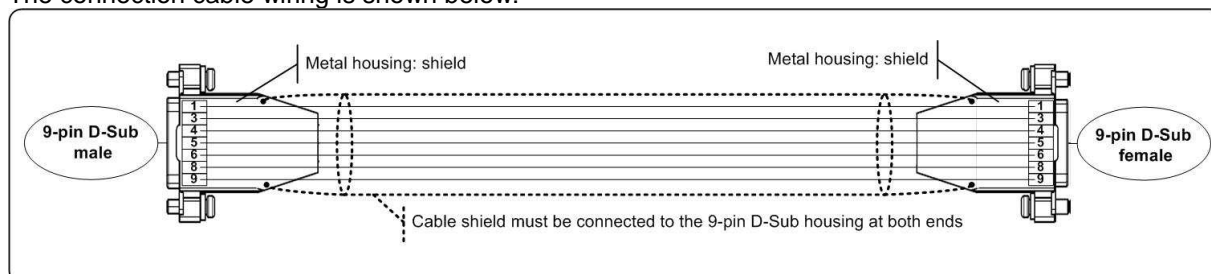


FIGURE 5: Transducer to IST ULTRASTAB connection cable wiring



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.

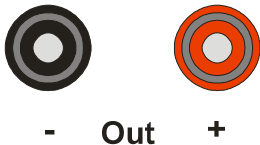
Red: Current output or $\pm 10 \text{ V}$ Voltage output depending on IST version. In current output case, this terminal is connected directly to pin 6 of the corresponding transducer port	
Black: Current output return or $\pm 10 \text{ V}$ signal ground. In current output case, this terminal is connected directly to pin 1 of the corresponding transducer port	

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.



All LEM IT/ITN ULTRASTAB 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 containing status signals for all 6 channels. 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, photocouplers type, floating Collector and Emitter. Depending on how each signal is wired, it can be “Active Low” or “Active High” as shown below:

Status/Interlock port Wiring

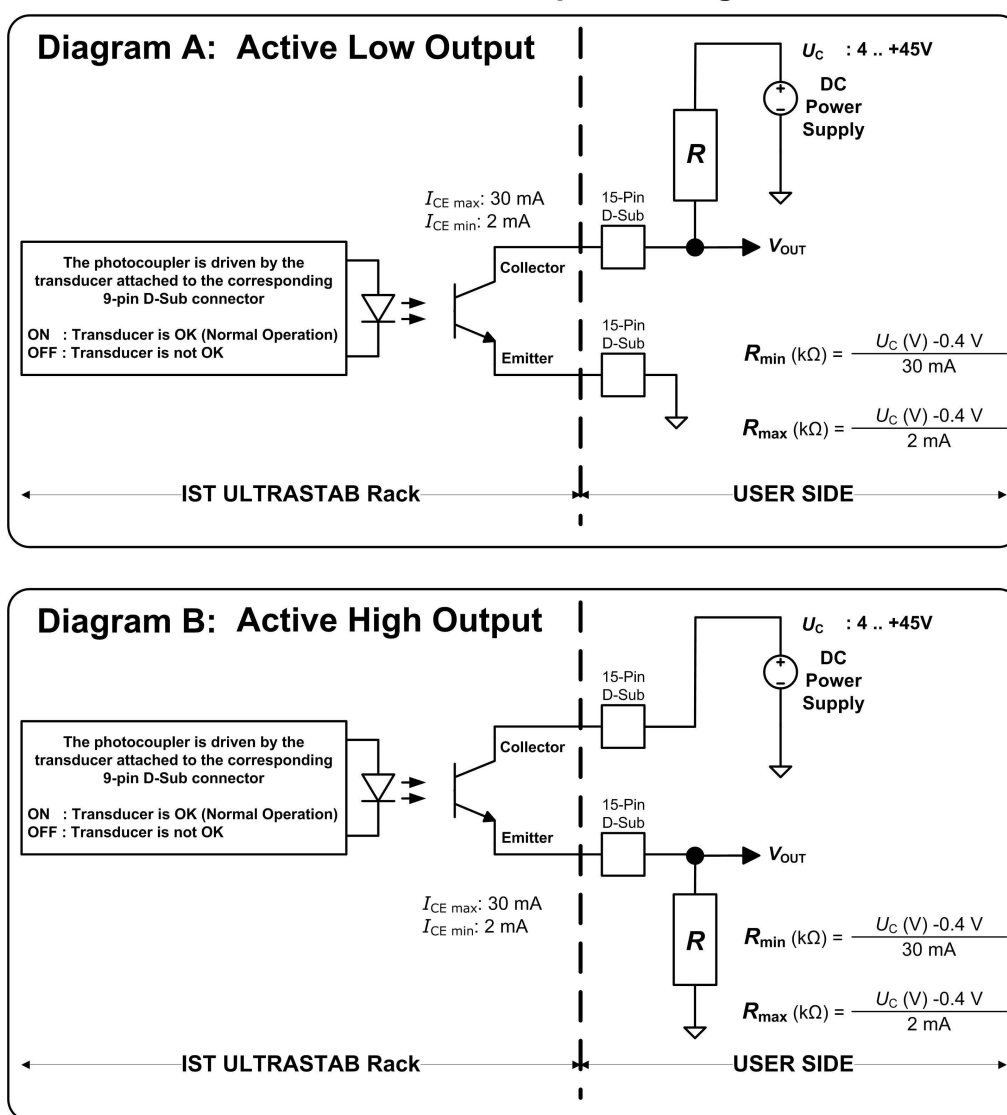


FIGURE 7: Status/Interlock port Wiring



In the diagram A, the active low output signal V_{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, V_{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 V_{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, V_{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:

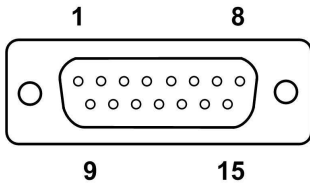
Power Status: Pin 1 Collector & Pin 5 Emitter	
Channel 1: Pin 9 Collector & Pin 13 Emitter	
Channel 2: Pin 2 Collector & Pin 6 Emitter	
Channel 3: Pin 10 Collector & Pin 14 Emitter	
Channel 4: Pin 3 Collector & Pin 7 Emitter	
Channel 5: Pin 11 Collector & Pin 15 Emitter	
Channel 6: Pin 4 Collector &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

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 IT/ITN ULTRASTAB 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.

Finally, make sure that a suitable burden resistor is installed on each active channel (only for current output version).

A typical 3-channel setup is shown below:

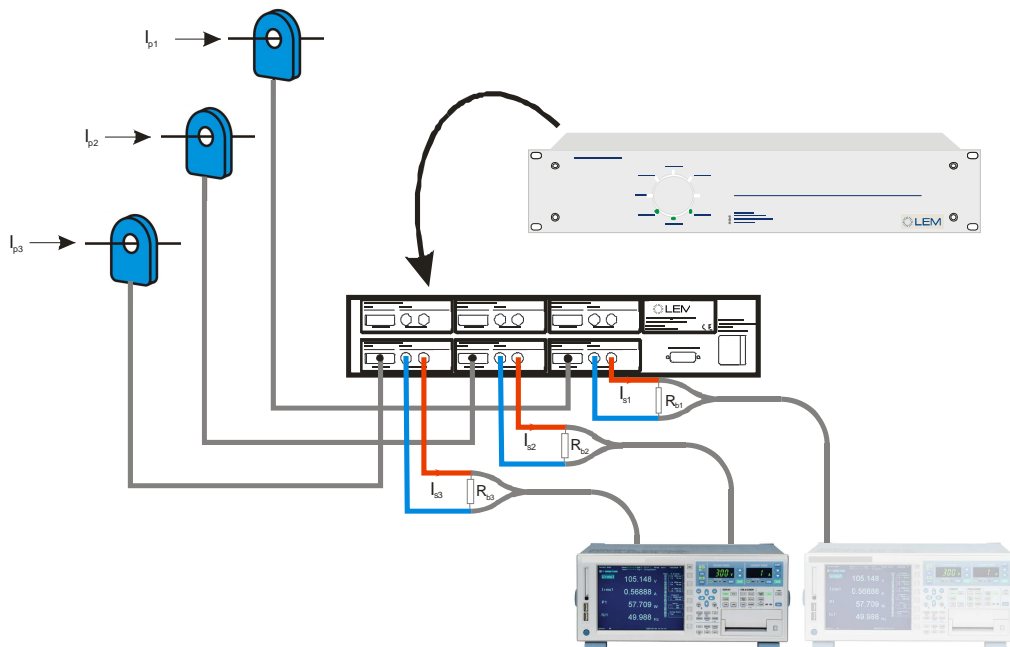


FIGURE 9: IST ULTRASTAB in a typical 3-channel current output application



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 switching on mains at the outlet. The green indicator LED "Power" will be lit.

Observe that the channel indicators turn on GREEN where transducers are connected and remain 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 the transducer that is faulty.

If any problem persists during this operation, please contact our local representative or LEM Switzerland S.A. directly.

Further application information for IT/ITN ULTRASTAB 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.