DEWETRON

PU[REC]

TECHNICAL REFERENCE MANUAL

WELCOME TO THE WORLD OF DEWETRON!

Congratulations on your new device! It will supply you with accurate, complete and reproducible measurement results for your decision making.
Look forward to the easy handling and the flexible and modular use of your DEWETRON product and draw upon more than 30 years of DEWETRON expertise in measurement engineering.

ISO9001

EN ISO 14001

THE MEASURABLE DIFFERENCE.

Thank you!

Thank you very much for your investment in DEWETRON's unique data acquisition systems. These are top-quality instruments which are designed to provide you years of reliable service. This guide has been prepared to help you get the most from your investment, starting from the day you take it out of the box, and extending for years into the future.

This guide includes important startup notes, as well as safety notes and information about keeping your DEWETRON system in good working condition over time.

We strongly suggest that you read this entire manual, especially the safety and care sections, as well as to avoid damaging your DEWETRON system.

What is PU[REC]?

PU[REC] stands for PURE RECORDING and is your portable and reliable data acquisition system for field tests, troubleshooting and maintenance in various application areas. The 16 available analog input channels support +/- 10 V directly and with the use of one (or more) of the nine available types of Modular Smart Interfaces (MSI) in front of the analog input, you can acquire almost any signal. The option of adding quasi-static channel expansion modules to the PU[REC] provides additional measurement inputs for voltage, current, temperature or resistance.

PREFACE

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Training

DEWETRON offers training at various offices around the world several times each year. DEWETRON headquaters in Austria have a very large and professional conference and seminar center, where training classes are conducted on a regular basis starting with sensors and signal conditioning, A/D technology and software operation. For more information about training services, please visit:
http://www.dewetron.com/services/dewetron-academy/

Dewetron Inc. in the USA also has a dedicated training facility connected to its headquarters, located in Rhode Island. For more information about training services in the US, please visit:
http://www.dewetron.us/service-support/system-training-usa/

Calibration

Every instrument needs to be calibrated at regular intervals. The standard norm across nearly every industry is annual calibration. Before your DEWETRON data acquisition system is delivered, it is calibrated at our DEWETRON headquater. Each of this system is delivered with a certificate of compliance with our published specifications. Detailed calibration reports from our calibration system are available for purchase with each order. We retain them for at least one year, so calibration reports can be purchased for up to one year after your system was delivered.

Support

DEWETRON has a team of people ready to assist you if you have any questions or any technical difficulties regarding the system. For any support please contact your local distributor first or DEWETRON directly.

For Asia and Europe, please contact:

DEWETRON GmbH
Parkring 4
8074 Grambach
AUSTRIA
Tel.: +43 316 3070
Fax: +43 316 307090
Email: support@dewetron.com
Web: http://www.dewetron.com

The telephone hotline is available
Monday to Friday between
08:00 and 17:00 CET (GMT +1:00)

For the Americas, please contact:

DEWETRON, Inc. (HQ USA)
2850 South County Trail, Unit 1
East Greenwich, RI 02818
U.S.A.
Tel.: +1 401 284 3750
Toll-free: +1 866 598 3393
Fax: +1 401 284 3755
Email: us.support@dewetron.com
Web: http://www.dewetron.us

The telephone hotline is available
Monday to Friday between
08:00 and 4:30 EST

Service/Repair Policy

We are very sorry that your DEWETRON system is not operating properly. Our team is here to ensure that your DEWETRON product is returned to peak performance as quickly as possible.
Please help us to help you by following the RMA policy.

Some problems can be solved remotely by our support team. To facilitate a quicker resolution to the problem and save unnecessary shipping costs, we ask you to first have your problem investigated by our technical support before sending your product. Contact details for our support can be found on our website. Please describe the error accurately and with as much detail as possible. This helps expedite the repair process.

If a repair is necessary, please complete our online RMA form. You will then receive an RMA (Return Material Authorization) number and detailed instructions that identify where to ship the damaged product.

Please note: Products arriving at our repair department without RMA require follow-up calls and investigation, which lead to longer turnaround. Only the team of DEWETRON is allowed to perform any kinds of repairs to your system to assure a safe and proper operation in future.

Any spare parts (screws, backplanes, cables,...) must be obtained from DEWETRON only.

NOTICE

The information contained in this document is subject to change without notice.

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Warranty Information

A copy of the specific warranty terms applicable to your DEWETRON product and replacement parts can be obtained from your local sales and service office.

Restricted Rights Legend

Use austrian law for duplication or disclosure.

DEWETRON GmbH
Parkring 4
A-8074 Grambach / Austria

Printing History

Please refer to the page bottom for printing version.

Safety conventions

Observe precautions for handling electrostatic sensitive devices!

This icon denotes a caution, which advises you of precautions to take to avoid injury, data loss, or a system crash. When this symbol is marked on the product, refer to the technical reference manual.

Indicates hazardous voltages.

Indicates the chassis terminal

WARNING	*Calls attention to a procedure, practice, or condition that could cause bodily injury or death.*
CAUTION	*Calls attention to a procedure, practice, or condition that could possibly cause damage to equipment or permanent loss of data.*

WARNINGS

The following general safety precautions must be observed during all phases of operation, service, and repair of this product. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the product. DEWETRON GmbH assumes no liability for the customer's failure to comply with these requirements.

SAFETY INSTRUCTIONS

Your safety is our primary concern! Please be safe!

General safety and hazard warnings for all DEWETRON systems

> Use this system under the terms of the specifications only to avoid any possible danger. If the unit is used in a manner not specified by the manufacturer the protection can be impaired!

> Ths product is intended for use in industrial locations. As a result, this product may cause interference if used in residential areas. Such use must be avoided unless the user takes special measures to reduce electromagnetic emissions to prevent interferences to the reception of radio and television broadcasts.

> Maintenance will be executed by qualified staff only.

> During the use of the system, it might be possible to access another parts of a more comprehensive system. Please read and follow the safety instructions provided in the manuals of all other components regarding warning and security advices for using the system.

> With this product, only use the power cable delivered or defined for the host country.

> DO NOT connect or disconnect sensors, probes or test leads, as these parts are connected to a voltage supply unit.

> The system is grounded via a protective conductor in the power supply cord. To avoid electric shocks, the protective conductor has to be connected with the ground of the power network. Before connecting the input or output connectors of the system, make sure that there is a proper grounding to guarantee potential free usage. For countries, in which there is no proper grounding, please refere to your local legally safety regulations for safety use.

  DC systems: Every DC system has a grounding connected to the chassis (yellow/green safety banana plug).

> Please note the characteristics and indicators on the system to avoid fire or electric shocks. Before connecting the system, please carefully read the corresponding specifications in the product manual.

> The inputs are not, unless otherwise noted (CATx identification), for connecting to the main circuits of category II, III and IV. The measurement category can be adjusted depending on module configuration.

> The power cord separates the system from the power supply. Do not block the power cord, since it has to be accessible for the users.

> Supply overvoltage category is II.

> DO NOT use the system if equipment covers or shields are removed.

> If you assume the system is damaged, get it examined by authorised personnel only.

> Any use in wet rooms, outdoors or in adverse environmental condition is not allowed!
  Adverse environmental conditions are:

  > Moisture or high humidity
  > Dust, flammable gases, fumes or dissolver
  > Thunderstorm or thunderstorm conditions (except assembly PNA)
  > Electrostatic fields, et cetera.

> Any direct voltage output is protected with a fuse against short cut and reverse-polarity, but is NOT galvanically isolated (except it is explicit marked on the system).

> The system must be connected and operated to an earthed wall socket at the AC mains power supply only (except for DC systems).

> Any other use than described above may damage your system and is attended with dangers like shortcut, fire or electric shocks.

- The whole system must not be changed, rebuilt or opened (except for changing TRION™ modules).
- If you assume a more riskless use is not provided anymore, the system has to be rendered inoperative and should be protected against inadvertent operation. It is assumed that a more riskless operation is not possible anymore, if
  - the system is damaged obviously or causes strange noises.
  - the system does not work anymore.
  - the system has been exposed to long storage in adverse environmental.
  - the system has been exposed to heavy shipment strain.
- DO NOT touch any exposed connectors or components if they are live wired. The use of metal bare wires is not allowed. There is a risk of short cut and fire hazard!
- Warranty void if damages caused by disregarding this manual. For consequential damages NO liability will be assumed!
- Warranty void if damages to property or persons caused by improper use or disregarding the safety instructions.
- Unauthorized changing or rebuilding the system is prohibited due to safety and permission reasons (CE). Exception: changing DAQP/PAD/HSI/TRION™/TRION3™ modules.
- The assembly of the system is equivalent to protection class I. For power supply, only the correct power socket of the public power supply must be used, except the system is DC powered.
- Be careful with voltages >25 V_{AC} or >35 V_{DC}! These voltages are already high enough in order to get a perilous electric shock by touching the wiring.
- Unless otherwise stated, maximum input voltage for measuring cards are 70 V_{DC} and 46.7 V_{PEAK}.
- The product heats during operation. Make sure there is adequate ventilation. Ventilation slots must not covered!
- Only fuses of the specified type and nominal current may be used. The use of patched fuses is prohibited.
- Prevent using metal bare wires! Risk of short cut and fire hazard!
- DO NOT use the system before, during or shortly after a thunderstorm (risk of lightning and high energy overvoltage). An advanced range of application under certain conditions is allowed with therefore designed products only. For details please refer to the specifications.
- Make sure that your hands, shoes, clothes, the floor, the system or measuring leads, integrated curcuits and so on, are dry.
- DO NOT use the system in rooms with flammable gases, fumes or dust or in adverse environmental conditions.
- Avoid operation in the immediate vicinity of:
  - high magnetic or electromagnetic fields
  - transmitting antennas or high-frequency generators

  For exact values please refere to enclosed specifications.
- Use measurement leads or measurement accessories aligned to the specification of the system only. Fire hazard in case of overload!
- Do not switch on the system after transporting it from a cold into a warm room and vice versa. The thereby created condensation may damage your system. Acclimatise the system unpowered to room temperature.
- Do not disassemble the system! There is a high risk of getting a perilous electric shock. Capacitors still might charged, even the system has been removed from the power supply.

SAFETY INSTRUCTIONS

> Direct exposure of any DEWETRON product to strong sunlight or other heat radiation shall be prevented, as this could excessively heat up the product and lead to permanent damage of the product.

> The electrical installations and equipments in industrial facilities must be observed by the security regulations and insurance institutions.

> The use of the measuring system in schools and other training facilities must be observerd by skilled personnel.

> The measuring systems are not designed for use at humans and animals.

> Please contact a professional if you have doubts about the method of operation, safety or the connection of the system.

> Please be careful with the product. Shocks, hits and dropping it from already lower level may damage your system. For exact values please refere to enclosed specifications.

> Please also consider the detailed technical reference manual as well as the security advices of the connected systems.

This product has left the factory in safety-related flawless and proper condition.
In order to maintain this condition and guarantee safety use, the user has to consider the security advices and warnings in this manual.

EN 61326-3-1:2008

IEC 61326-1 applies to this part of IEC 61326 but is limited to systems and equipment for industrial applications intended to perform safety functions as defined in IEC 61508 with SIL 1-3.

The electromagnetic environments encompassed by this product family standard are industrial, both indoor and outdoor, as described for industrial locations in IEC 61000-6-2 or defined in 3.7 of IEC 61326-1. Equipment and systems intended for use in other electromagnetic environments, for example, in the process industry or in environments with potentially explosive atmospheres, are excluded from the scope of this product family standard, IEC 61326-3-1.

Devices and systems according to IEC 61508 or IEC 61511 which are considered as “operationally well-tried”, are excluded from the scope of IEC 61326-3-1.

Fire-alarm and safety-alarm systems, intended for protection of buildings, are excluded from the scope of IEC 61326-3-1.

Maintenance

The information in this section is designed for use by qualified service personal.

Service interval:

Clean dust from the chassis exterior/interior and exchange filter foam based on the operating environment.

Cleaning:

Clean surface of the chassis with dry lintfree cloth.
Use a dry velocity stream of air to clean the chassis interior.

> Disconnect all cables before servicing the unit!
> Many components within the chassis are sensitive to static discharge damage. Always wear a ground wrist strap and service the unit only in static-free environment.
> Do not use harsh chemical cleaning agents!

GENERAL INFORMATION

CAUTION

> The system BIOS is protected by password. Any change in the BIOS may cause a system crash. When the system is booting, do not press ESC-button on keyboard. This may clear the BIOS settings and cause system faults.

> Any change in the file structure as deleting or adding files or directories might cause a system crash.

> Before installing software updates contact DEWETRON or your local distributor. Use only software packages which are released by DEWETRON. Further informations are also available in the internet (http://www.dewetron.com).

> After power off the system wait at least 10 seconds before switching the system on again. Otherwise the system may not boot correct. This prolongs also the life of all system components.

Windows updates and antivirus/security software

Before installing Windows software updates consult with DEWETRON for compatibility guidance. Please also keep in mind that the use of any antivirus or other security software may slow down your system and may cause data loss.

Problematic network stacks

Often intrusive IT software or network processes can interfere with the primary function of the DEWETRON system: to record data. Therefore we recommend strongly against the installation of IT/MIS software and running their processes on any DEWETRON data acquisition system, and cannot guarantee the performance of our systems if they are so configured.

Environmental Considerations

Information about the environmental impact of the product.

Product End-of-Life Handling

Observe the following guidelines when recycling a DEWETRON system:

System and Components Recycling

Production of these components required the extraction and use of natural resources. The substances contained in the system could be harmful to your health and to the environment if the system is improperly handled at it's end of life! Please recycle this product in an appropriate way to avoid an unnecessary pollution of the environment and to keep natural resources.

This symbol indicates that this system complies with the European Union’s requirements according to Directive 2012/19/EU on waste electrical and electronic equipment (WEEE). Please find further information about recycling on the DEWETRON website
www.dewetron.com

Restriction of Hazardous Substances

This product has been classified as Monitoring and Control equipment, and is outside the scope of the 2011/65/EU RoHS Directive. This product is known to contain lead.

PU[REC] - portable data recorder

> 16 analog input channels
(expandable to any signal input via Modular Smart Interfaces)
> Quasi-static channel expansion via EPAD2
> Available with 50 kS/s or 200 kS/s (optional) sampling rate
> 15.6” multi-touch display
> Rugged and portable housing for easy transportation

System specifications

	PU[REC]		
Configuration			
Sampling rate / resolution	PUREC-50:	50 kS/s per channel	16-bit
	PUREC-200:	50 kS/s to 200 kS/s	18-bit
		100 S/s to 50 kS/s	24-bit
Digital input	2x counter shared with 8x digital inputs; 4x digital outputs		
CAN bus	1x highspeed CAN 2.0 (ordering option PUREC-OPT-CAN)		
Quasi-static channel expansion	EPAD2 interface connector		
Expansion	SYNC-BUS (requires ordering option OXY-OPT-NET)		
Main system			
Display	15.6“ multi-touch TFT (full HD 1920 x 1080)		
Additional Connectors	2x Display Port; 1x HDMI; Audio interface (3x 3.5mm connectors) 4x USB 3.0; 2x Gbit LAN;		
Operating system	Microsoft Windows 10 64-bit; (optional Linux OS)		
Data Storage	1 TB SSD in a removeable drive bay (870 GB useable for data storing) up to 7 days of recording all channels at 50 kS/s or 300 days at 1 kS/s		
MTBF	27800 hours		
Noise emission	system idle	38 dBA	
	CPU max. heat; max. fan:	45 dBA	
Dimensions (W x D x H)	463 x 129 x 318 mm (18.2 x 5.1 x 12.5 in.)		
Weight	7.3 kg (16.1 lb.)		
Power supply			
Rated input voltage	100 to 240 V_{AC} (max 90 to 264 V_{AC}), active PFC		
Input frequency	47 to 63 Hz		
Maximal input current	2 A (230 V_{AC}) / 4 A (115 V_{AC})		
Inrush current	80 A (264 V_{AC})		
Power consumption	max. 300 W; typical 65W (fully equipped with MSI, recording data)		
Environmental specifications			
Operating temperature	0 to +50 °C, down to -20 °C with prewarmed unit		
Storage temperature	-20 to +70 °C		
Humidity	10 to 80 % non cond., 5 to 95 % rel. humidity		
Max. altitude	2000 m (6561 ft)		
Sine vibration (EN 60068-2-6:2008)	Acceleration: 20 m/s² Frequency range: 10 Hz - 150 Hz Sweep: 1 oct/min 20 cycles		
Shock (EN 60028-2-27:2009)	Acceleration: 15 g Duration: 11 ms Pulse form half sine 3 pumps/direction 6 directions		
Random vibration (EN IEC 60721-3-2:2018)	Class 2M4 Spectral acceleration density: 1 m²/s³ Frequency range: 10 Hz-200 Hz Duration: 30 min/direction		

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MAIN SYSTEM

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Input types	Input	Sensor excitation	Bandwidth (max.) consider limit of PU[REC]	Accuracy (typ.)	Sensor connection
Direct voltage input	±10 V; ±5 V	±5 V; 12 V	DC to 70 kHz	0.02 %	D-SUB-9
MSI2-250R-20mA[1] 	4 to 20 mA sensors	n/a	DC to 70 kHz	±0.1 %	Miniature spring terminals
MSI2-STG[1] 	Bridge-type sensors full-bridge, half-bridge, quarter-bridge 120 Ω and 350 Ω	5 V and 10 V	60 kHz	±0.1 %	Miniature spring terminals
MSI2-LVDT[1] 	LVDT and RVDT sensors, 5- or 6-wire connection	3 V at 2.5, 5 or 18 kHz	1 kHz	±0.1 %	Soldering pads
MSI-BR-ACC[1] 	IEPE® sensors, typ. accelerometer, microphone	4 mA	1.4 Hz to 70 kHz	±0.2 %	BNC
MSI2-CH-x[1] 	Charge type sensors up to 100 000 pC	n/a	0.08 Hz to 70 kHz	±0.5 %	BNC
MSI2-TH-x[1] 	Thermocouple sensors standard models for type K, J, T, others on request	n/a	DC to 70 kHz	±1 °C	Mini TC socket
MSI-BR-V-200[1] 	Voltage up to 200 V	n/a	DC to 60 kHz	±0.1 %	BNC
MSI2-V-600[1] 	Voltage up to 600 V	n/a	DC to 60 kHz	±0.1 %	Banana sockets
MSI-BR-RTD[1] 	RTD sensors Pt100, Pt200, Pt500, Pt1000, Pt2000; 2-, 3- and 4-wire connection	1.25 mA	DC to 10 kHz	±0.1 %	Binder 712 series 5-pin socket

1) MSIs are automatically detected

Direct voltage input specification					
Input connector		16x 9-pin female D-SUB			
Input ranges		±10 V; ±5V			
Sensor excitation	**±5 V**	Accuracy:	±0.2 %; balanced around GND; remote sense support max. 40 mA per channel		
		Protection:	Continuous short to GND; short circuit limit is 70 mA		
	12V	Accuracy:	±5 %; max. 1 A in total for all channels, including EPAD2 supply		
		Protection:	Self resetting fuse."		
Input noise		0 to 10 Hz:	10 μV_{pp}		
		full bandwidth:	1.35 mV_{pp}		
Input impedance		1 MΩ single ended, 2 MΩ differential			
Input bias current		<25 pA			
Input coupling		DC			
Accuracy[1]	**Voltage**	DC to 1 kHz	±0.02 % of reading ± 0.01 % of range ±20 µV		
		>1 kHz to 5 kHz	±0.5 % of reading ± 0.01 % of range ±20 µV		
		>5 kHz to 10 kHz[2]	±1 % of reading ± 0.01 % of range ±20 µV		
Gain drift		typical 10 ppm/°C max. 20 ppm/°C			
Offset drift		typical 0.3 µV/°C + 10 ppm of range/°C, max 15 µV/°C + 20 ppm of range/°C			
Typical Signal-to-noise ratio, Spurious-free SNR, Effective number of Bits, VPP[2]		10 V range			
		SNR	SFDR[3]	ENOB[4]	Noise peak to peak
Sample rate		[dB]	[dB]	[Bit]	[mV_{pp}]
0.1 kS/s		127	130	20.8	0.015
1 kS/s		118	130	19.3	0.055
10 kS/s		109	130	17.8	0.22
20 kS/s		106	130	17.3	0.33
50 kS/s[2]		102[2]	130[2]	16.7	0.52
100 kS/s[2]		99[2]	130[2]	16.2	0.66
200 kS/s[2]		96[2]	125[2]	15.7	1.00
Linearity		<20 ppm			
Input configuration		differential			
Typical THD		-95 dB			

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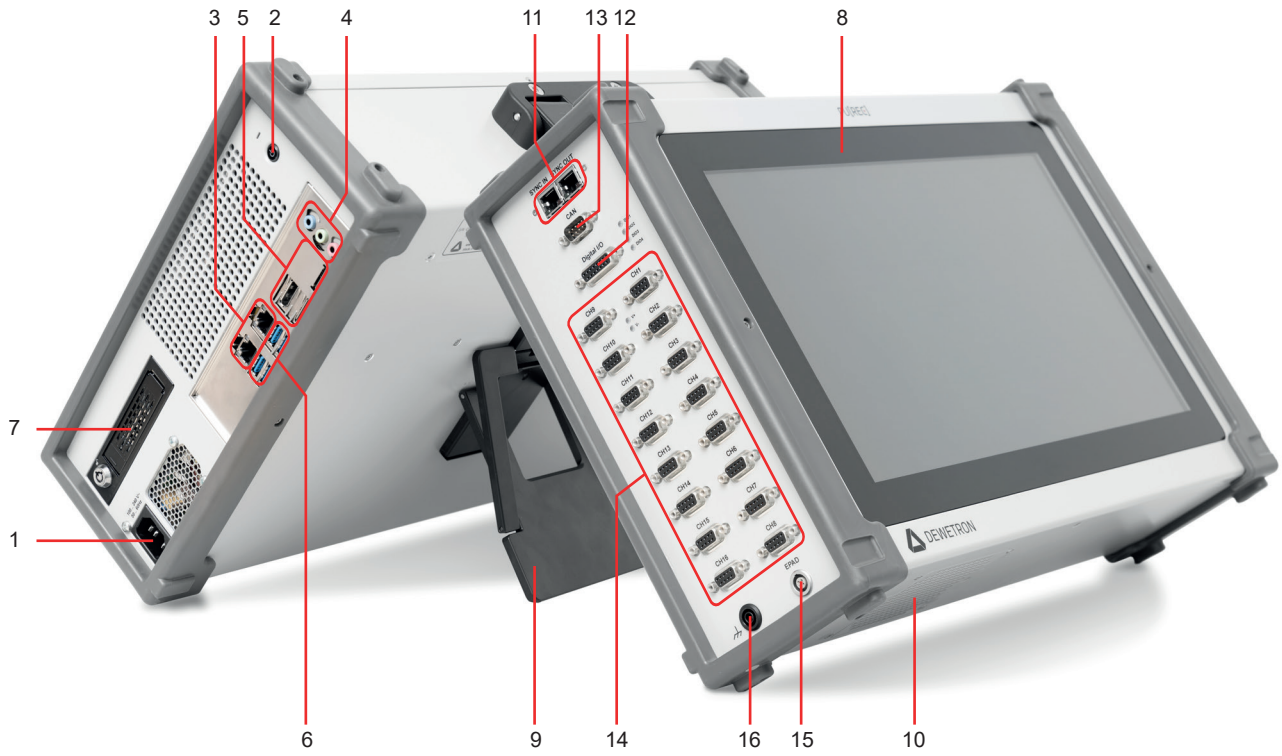
Typical CMRR in differential mode	100 dB @ 50 Hz; >70 dB @ 1 kHz
Low pass Filter (-3 dB, IIR)	1 Hz to 40 % of sample rate freely programmable or OFF
Characteristic	Bessel or Butterworth
Filter order	2nd , 4th, 6th, 8th
Analog antialiasing filter	3rd order Butterworth
Bandwidth (-3 dB, deactivated IIR filter)	70 kHz 3rd order Butterworth filter
Crosstalk fin 1 kHz [10 kHz]	>108 dB
Channel to channel phase mismatch	typically <30 nsec when using the same input range
Common mode voltage	±12.5 V_{DC}
Overvoltage protection (IN+, IN-, Sense)	±50 V_{DC}
Digital IN specification	
Digital Input	8 CMOS/TTL compatible digital inputs; weak pullup via 100 kΩ
Overvoltage protection	±30 V, 50 V_{PK} (for 100 ms)
Counter	2 counter channels; TTL input; shared with digital inputs
Counter modes	
Event counting	Basic event counting, gated counting, up/down counting and encoder mode (X1, X2 and X4)
Waveform timing	Period, frequency, pulse width duty cycle and edge separation
Sensor modes	Encoder (angle and linear)
Digital OUT specification	
Digital output	4 DO; TTL
Output indication	LED (green = high; off = low)
Maximium current	25 mA continuously
Power-on default	Low
Interfaces	
CAN bus	1 CAN Bus; not isolated
CAN specification	CAN 2.0B
CAN Physical Layer	High Speed
Bus pin fault protection	±36 V
Termination	Programmable: High impedance or 120 Ω

[1] 1 year accuracy 23 °C ±5 °C
[2] LP Filter in auto mode
[3] SFDR excluding harmonics
[4] ENOB calculated from SNR

Notes

PU[REC] at a glance

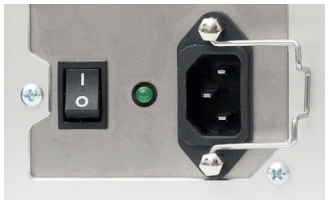
1 Power supply input connector
2 Power on/off push button
3 Dual LAN GBit connectors
4 Audio interface
5 2x Display port, 1x HDMI
6 4x USB 3.1 GEN2
7 SSD drive bay
8 15.6" multi-touch display
9 Fold-out stand
10 Intake vent and filter pad
11 SYNC-BUS
12 Digital Input & Output connector
13 CAN connector (optional)
14 16x analog input
15 EPAD2 interface connector
16 Chassis terminal



Note: The amount and location of the connectors might vary from system to system and depends on system configuration

MAIN SYSTEM

1 Power supply input connector



VOLTAGE	V	100 to 240 V_{AC} (max. 90 to 264 V_{AC})
FREQUENCY	Hz	47 to 63 Hz
POWER	P	300 W

2 Power on/off push button

The power on/off push button at the front of the system is used to switch on the system.

3 2x GBit Ethernet connector

The PU[REC] supports 10/100/1000 Dual LAN with standard RJ45 connectors.

4 Audio I/O interface

Line In / Line Out / Microphone.

5 2x Display port, 1x HDMI

The PU[REC] supports a maximum of 3 screens at the same time.

6 4x USB3.1 interface connectors

The USB3.1 Gen 2 interface connectors meet standard USB pin assignment.

7 SSD drive bay

Ejecting SSD:

1 Shut down the device and wait until it is switched off (green LED goes off)
2 If the drive is locked unlock it with the supplied keys
3 Press the drive tray ejection button
4 Push the cover of the tray to the side until it is detached from the bay
5 Pull out the tray with the drive

8 15.6" multi-touch display

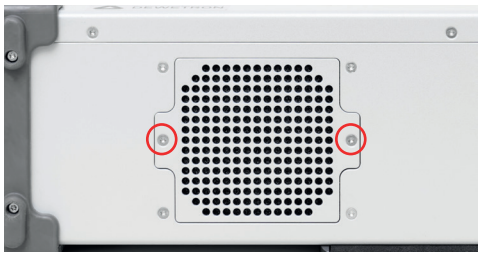
The PU[REC] is equipped with a bright 15.6" multi-touch panel (1920 x 1080 px) to control the instrument. Familiar gestures such as pinch and zoom are fully implemented within the operating system and will be described in chapter '*Operating with the touchscreen*'.

9 Fold-out stand

The fold-out stand on the PU[REC] is designed to guarantee a secure stand and to facilitate touchscreen operations.

10 Intake vent with filter pad

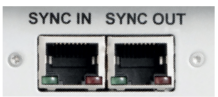
The intake vent with the filter pad is located at the bottom of the instrument and fixed with two Torx M3x6 screws.



Further information on how to clean the filter pad please refer to chapter '*Maintenance*'.

11 SYNC-BUS

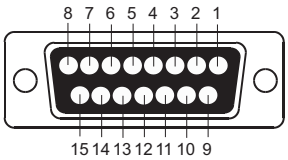
The SYNC-BUS consists of two RJ45 connectors, allowing to easily synchronize two or more PU[REC]s with software option OXY-OPT-NET.



Further information on how to synchronize two or more PU[REC]s please refer to chapter '*Synchronization options*'.

12 Digital input & output connector (Digital I/O)

15-pin D-SUB connector (female)



Schematic

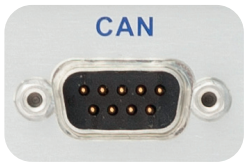
Pin 1:	DI1 / CNT1 Input_A	Pin 9:	DI2 / CNT1 Input_B
Pin 2:	DI3 / CNT1 Input_Z	Pin 10:	DI4 / CNT2 Input_A
Pin 3:	DI5 / CNT2 Input_B	Pin 11:	DI6 / CNT2 Input_Z
Pin 4:	DI7	Pin 12:	DI8
Pin 5:	DO1	Pin 13:	DO2
Pin 6:	DO3	Pin 14:	DO4
Pin 7:	GND	Pin 15:	NC
Pin 8:	+12 V (max. 600 mA)		

NC .. not connected

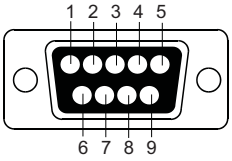
LED for digital output

green:	Output high
OFF:	Output low

13 CAN interface connector (optional)



9-pin D-SUB connector (male)

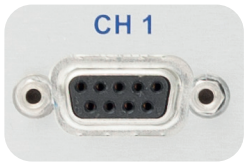


Schematic

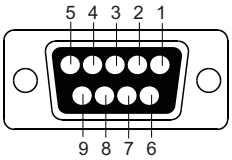
Pin 1:	+5 V out (max. 500 mA)
Pin 2:	CAN Low (isolated)
Pin 3:	GNDx CAN (isolated)
Pin 4:	NC
Pin 5:	NC
Pin 6:	GND Power
Pin 7:	CANx High (isolated)
Pin 8:	NC
Pin 9:	+12 V out (max. 600 mA)

NC .. not connected

14 16x analog input



9-pin D-SUB connector (female)



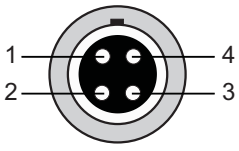
Schematic

Pin 1:	EXC+ (+5 V)
Pin 2:	IN+
Pin 3:	Sense-
Pin 4:	GND
Pin 5:	12 V
Pin 6:	Sense+
Pin 7:	IN-
Pin 8:	EXC (-5 V)
Pin 9:	TEDS

Housing connected to Chassis GND

15 EPAD2 connector

To connect EPAD2 modules to the instrument.



Lemo EGG.1B.304

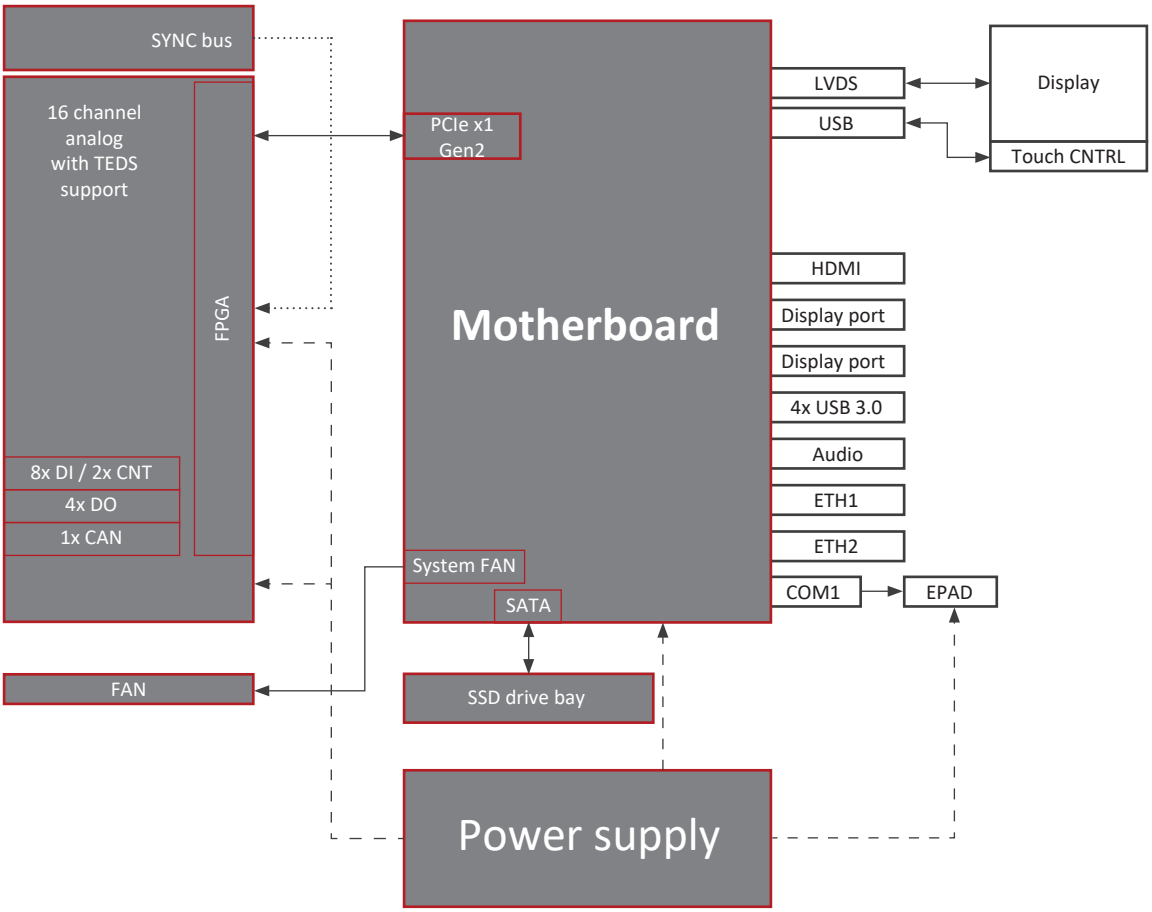
Pin assignment
1: RS-485 A
2: RS-485 B
3: +12 V
4: GND
Shield is connected on housing

Mating connector: LEMO FGG.1B.304.CLAD52Z (for cable diameter 4.1 to 5.0 mm)
LEMO FGG.1B.304.CLAD62Z (for cable diameter 5.1 to 6.0 mm)

16 Chassis GND

For some kind of measurements, it's necessary to provide the system with an additional ground connection.

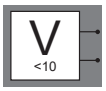
Block diagram



Notes

Signal connection

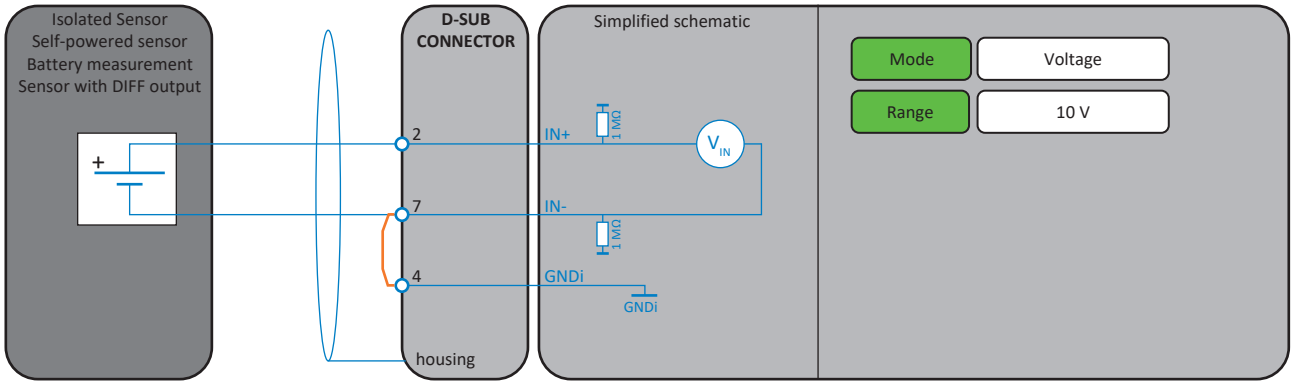
Direct voltage input



Voltage

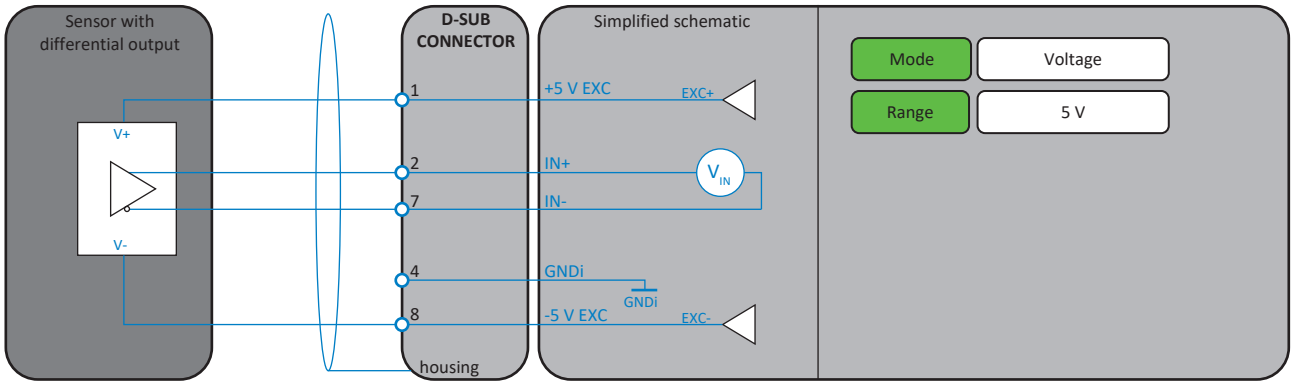
CAUTION: Input is not isolated. Do not exceed ±12.5 V common mode voltage.

Voltage measurement

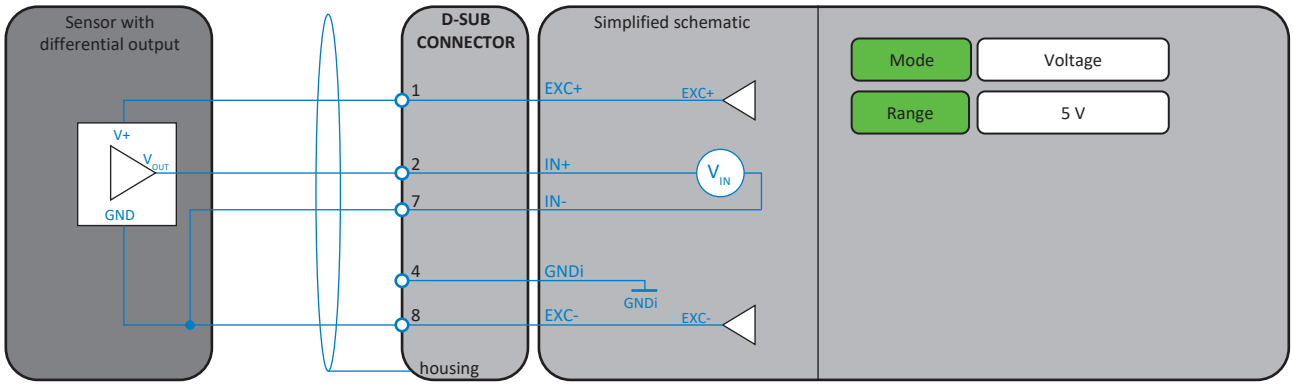


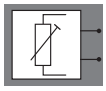
external solder bridge

Differential output sensor powered by the instrument

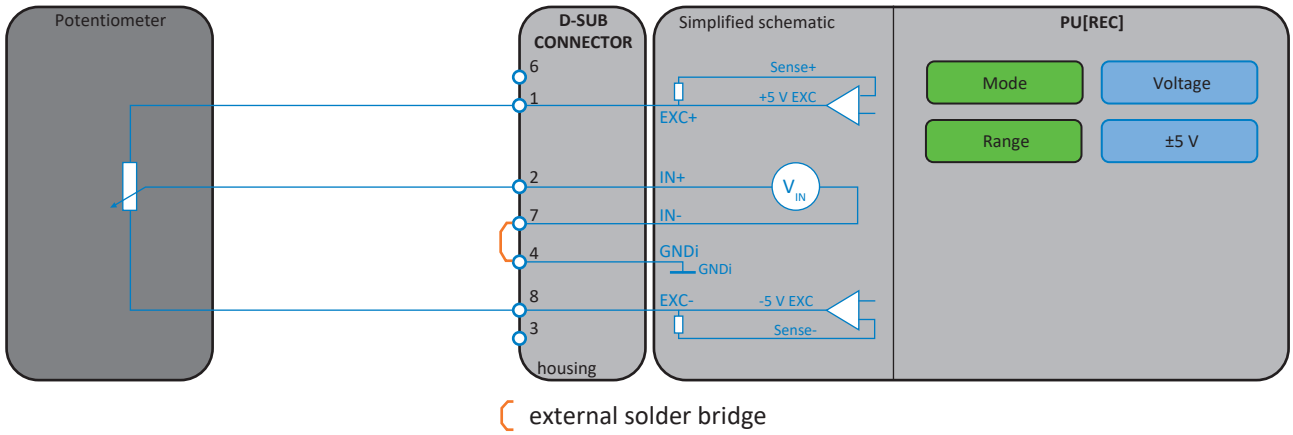


Single-ended sensor powered by the instrument





Potentiometric sensor



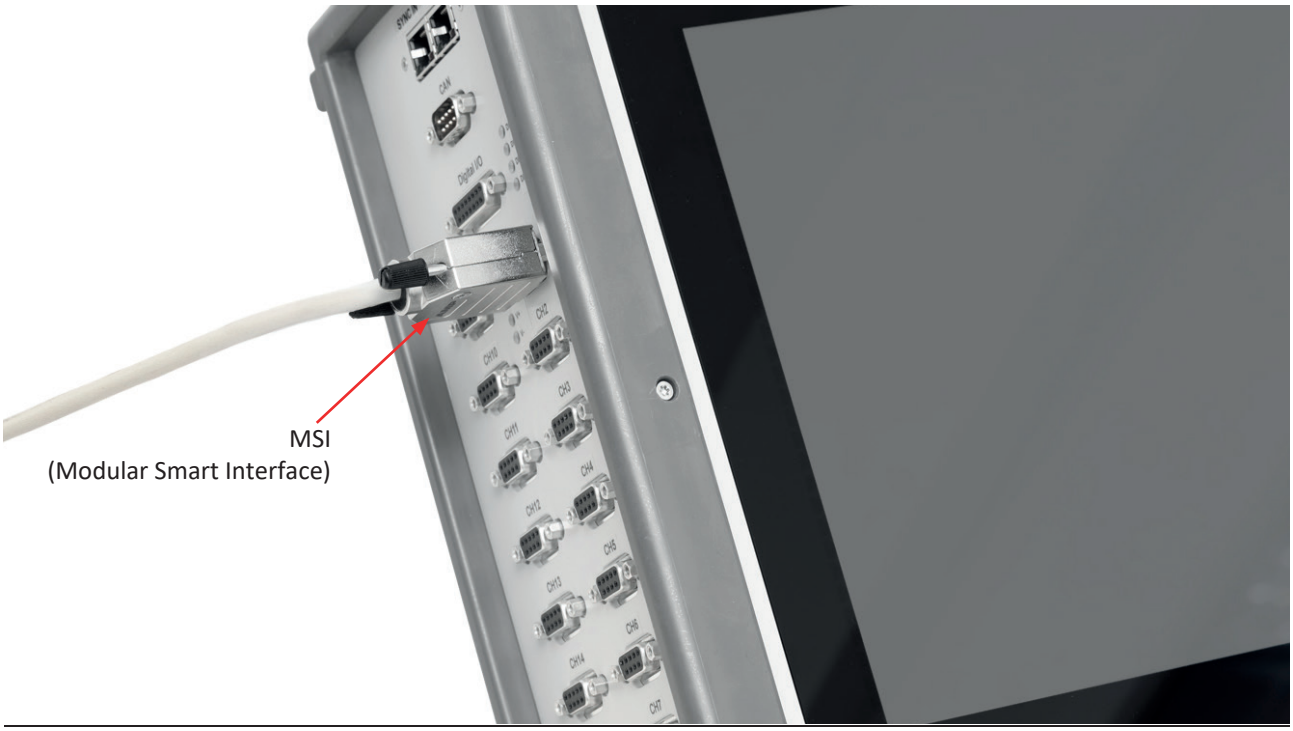
Signal connection via MSI (Modular Smart Interface)

General MSI functionality

Each MSI is a signal conditioner designed for a dedicated sensor type. By reading the TEDS chip, the measuring system gets any information necessary to adjust the amplifier accordingly.

The user doesn't have to worry about it, he automatically gets the right measuring ranges with the right unit displayed.

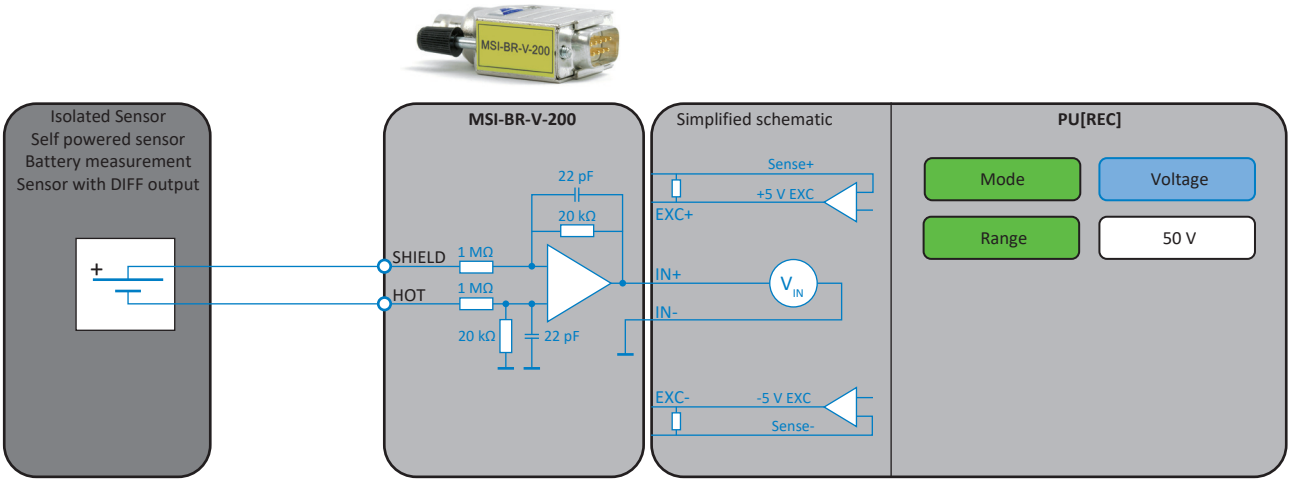
For traceability, important data, such as serial number or calibration date, are also read out and if necessary additionally stored with the measurement data file.



Voltage (<50 V) via

MSI-BR-V-200

MSI-BR-V-200				
Sensor connection	BNC			
Input attenuation	50 ±0.5 %			
Input type	Differential			
Rated input voltage to earth according to IEC/EN 61010-2-30	33 V_{RMS}, 70 V_{DC}, 46.7 V_{PK}			
Common mode voltage	IN+ and IN-: -200 V to +180V			
Overvoltage protection	±250 V			
Input impedance IN+	1 MΩ			
Input impedance IN-	1 MΩ			
Gain drift	typ. 25 ppm/K (max. 40 ppm/K)			
Input Offset drift	200 µV/K			
Bandwidth (-3dB)	60 kHz			
TEDS	For adapter identification and calibration data			
Voltage ranges	±200 V; ±100 V; ±40 V; ±20 V			
DC accuracy:	±0.05 % of reading ±20 mV			
Signal-to-noise ratio; spurious-free SNR; Effective number of Bits; Noise mV_{PP}		SNR	SFDR	ENOB	Noise $_{PP}$
	Sample rate	[dB]	[dB]	[Bit]	[mV_{PP}]
	5 kS/s	105	130	17.7	6.2
	10 kS/s	102	125	17.3	8.2
	20 kS/s	99	125	16.7	12.5
	50 kS/s	95	120	16.1	21
	100 kS/s	92	120	15.6	29
	200 kS/s	89	115	15.1	47
Typcial CMRR	100 dB @ 100 Hz 60 dB @ 10 kHz				

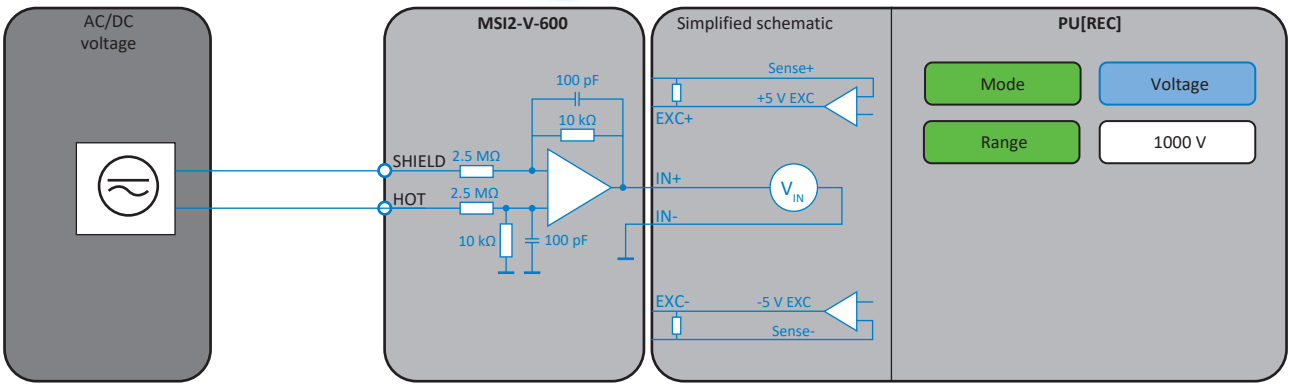


MAIN SYSTEM

High voltage via

MSI2-V-600

MSI2-V-600					
Sensor connection	4 mm safety banana sockets				
Input attenuation	250 ±0.5 %				
Input type	Differential				
Rated input voltage to earth according IEC/EN 61010-2-30	300 V CAT III / 600 V CAT II				
Common mode voltage	±1000 V				
Overvoltage protection	1500 V_{PK} / 1000 V_{RMS} (1 min)				
Input impedance	5 MΩ differential / 2.5 MΩ to earth				
Gain drift	typ. 25 ppm/K (max. 40 ppm/K)				
Input Offset drift	200 µV/K				
Bandwidth (-3dB)	60 kHz				
TEDS	For adapter identification and calibration data				
Voltage ranges	±1000 V; ±500 V; ±200 V; ±100 V				
Accuracy	DC to 1 kHz ±0.1 % of reading ±100 mV >1 kHz to 5 kHz ±0.5 % of reading ±100 mV >5 kHz to 10 kHz ±1 % of reading ±100 mV				
Signal-to-noise ratio; spurious-free SNR; Effective number of Bits; Noise mV_{PP}		SNR	SFDR	ENOB	Noise $_{PP}$
	Sample rate	[dB]	[dB]	[Bit]	[mV_{PP}]
	5 kS/s	102	130	16.7	37.4
	10 kS/s	99	127	16.2	51.2
	20 kS/s	96	122	15.7	77
	50 kS/s	92	119	15.0	126
	100 kS/s	89	117	14.6	177
	200 kS/s	87	113	14.1	265
Typcial CMRR	74 dB @ 100 Hz 50 dB @ 10 kHz				



CAUTION: *Voltage measurement up to 600 V_{RMS} only with safety banana plug cords!*

Strain gauge measurement via

MSI2-STG

> Full, half or quarter bridge

> 120 and 350 Ω quarter bridge

> 5 V or 10 V excitation with remote sense

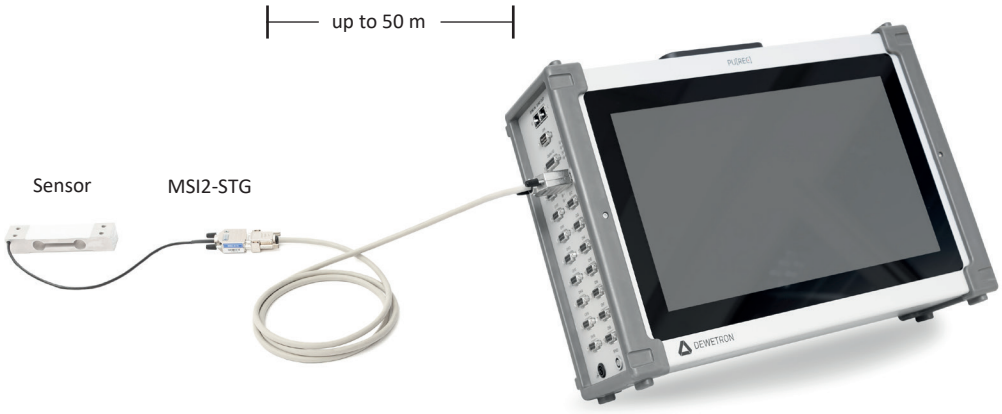
> Simple connection without soldering

MSI2-STG				
Input range	20 mV/V $_{\text{at 5V excitation}}$			
Sensor excitation voltage	5 V or 10 V (±5 V); remote sense support			
Maximum current	40 mA per channel			
Protection	Continuous short to ground; short circuit limit is 70mA			
Supported bridge-types	Full bridge 4 or 6-Wire Half bridge 3 or 5-Wire Quarter bridge 3-Wire; 120 Ω and 350 Ω bridge completion			
DC accuracy	±0.2 % of reading ±5 µV/V			
Bandwidth (-3 dB)	60 kHz			
Signal-to-noise ratio; spurious-free SNR; Effective number of Bits; Noise µV/V_{PP}	20 mV/V range			
	SNR	SFDR	ENOB	Noise $_{PP}$
Sample rate	[dB]	[dB]	[Bit]	[µV/V_{PP}]
5 kS/s	101	124	16.5	0.88
10 kS/s	98	125	16.0	1.4
20 kS/s	95	123	15.5	1.9
50 kS/s	91	120	14.9	3.3
100 kS/s	88	115	14.4	4.5
200 kS/s	86	110	13.9	7
Drift	Offset: 0.4 µV/°C; Gain: max 50 ppm°C			
Sensor connection	Push-in spring connection; 0.14 to 0.5mm²; AWG 26 to 20			
TEDS	For adapter identification and calibration data			

The MSI2-STG is designed to connect nearly every strain gauge sensor.

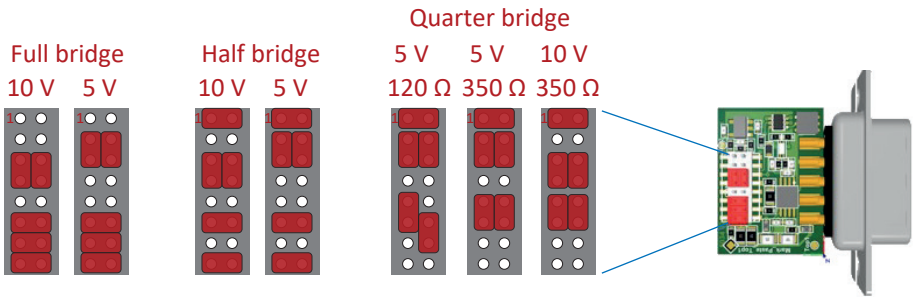
Various bridge-types can be configured by jumper. That makes it very flexible and an ideal solution for strain gauge measurement on **fixed installations**.

It is also a perfect solution for **harsh electronic environment**. Because this tiny amplifier can be mounted directly next to the sensor with very short cables in between. The signal is immediately amplified by a factor of 50. This reduces the impact of electromagnetic disturbances by the same factor. The maximum cable length between MSI and the PUREC is 50 meters.



MAIN SYSTEM

Jumper settings



Connecting a sensor

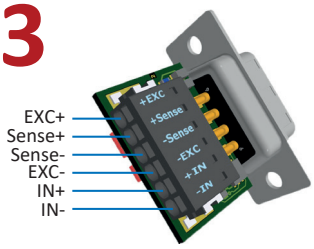
1

Check the sensor datasheet and determine the correct connection.

2

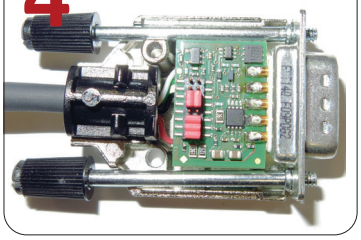
Prepare the sensor cable

3



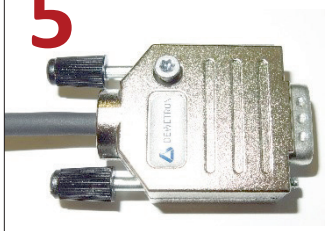
Connect the cable to the PCB; the shield must be placed between housing and plastic.

4



Apply the jumper according to the sensor

5

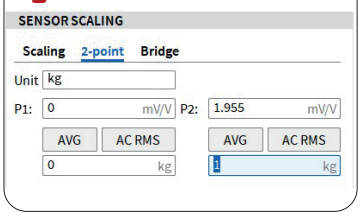


Close the housing

6

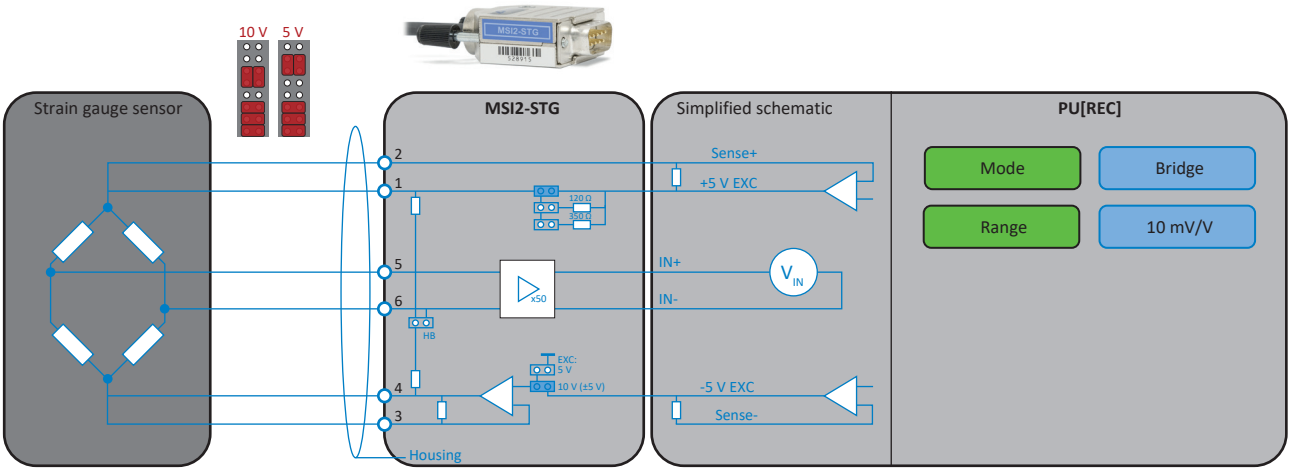
Connect the sensor directly or via extension cable

7

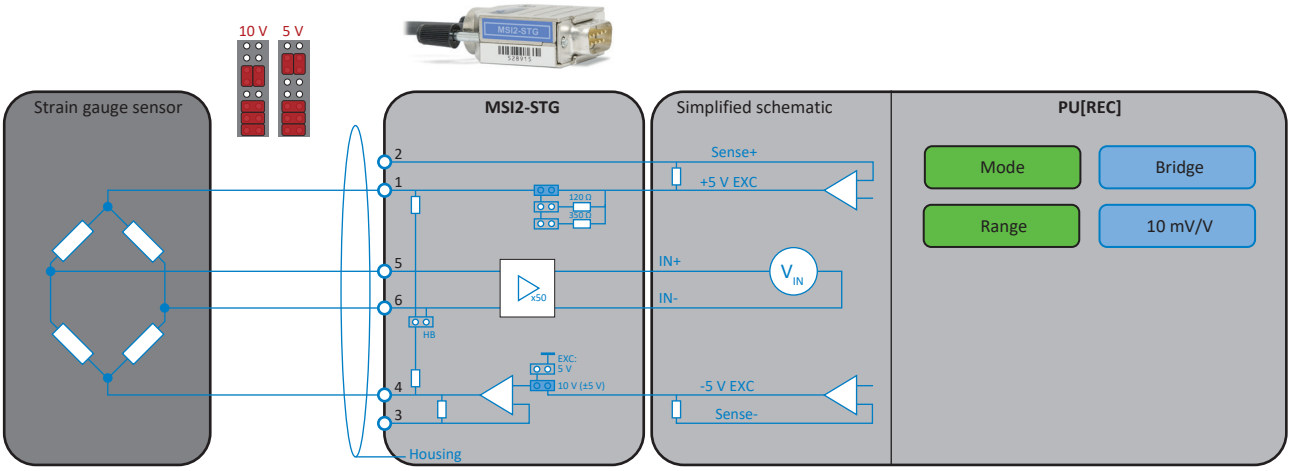


MSI2-STG is detected automatically. Just apply sensor scaling.

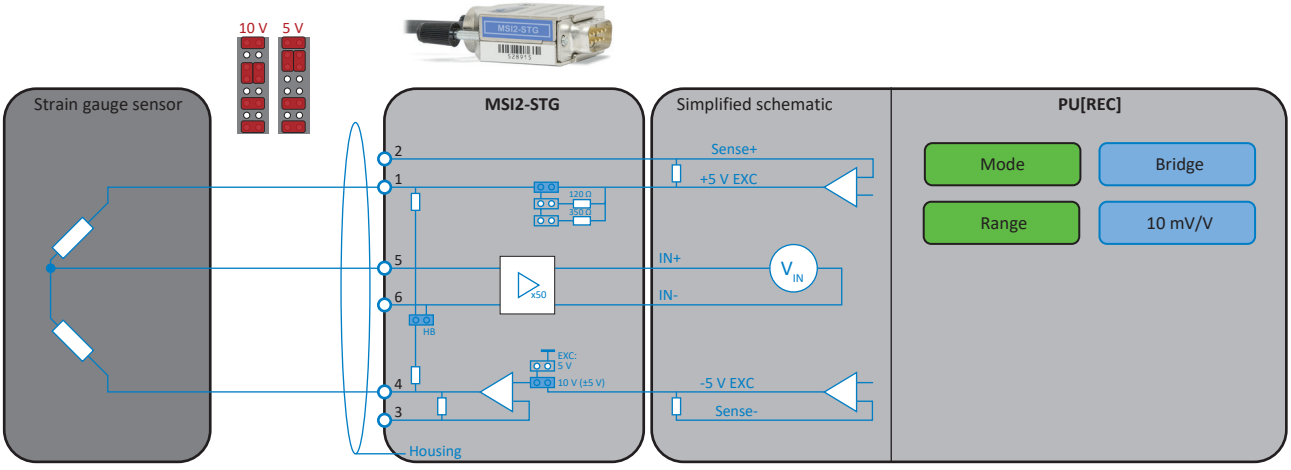
Full bridge 6-wire



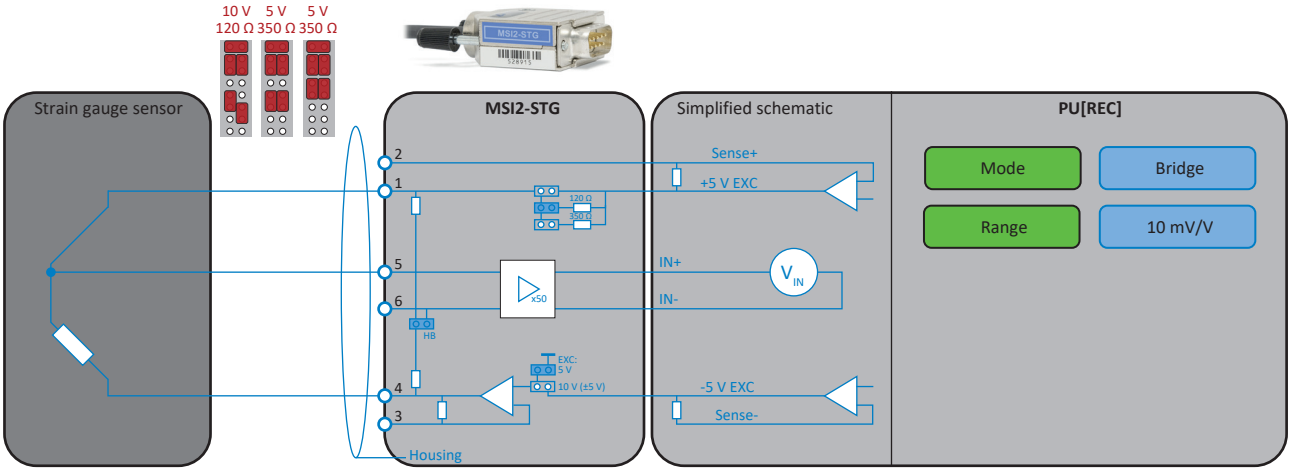
Full bridge 4-wire



Half bridge 3-wire



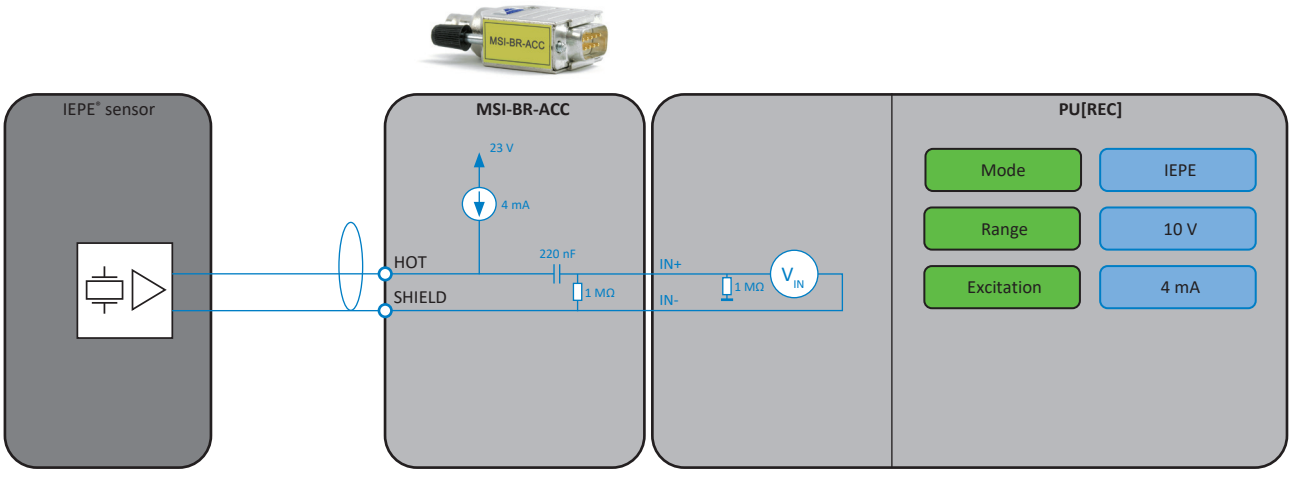
Quarter bridge 3-wire



IEPE® via

MSI-BR-ACC

MSI-BR-ACC				
Input Range	± 10V			
Sensor Excitation	4 mA ±10 %			
Compliance voltage	>23 V			
Accuracy	30 Hz to 30 kHz: 0.2 %			
Power consumption	Max. 380 mW			
Input coupling	AC 1.4 Hz			
Bandwidth	70 kHz limited by instrument			
Signal-to-noise ratio; spurious-free SNR; Effective number of Bits; Noise µV/V_{PP}	SNR	SFDR	ENOB	Noise $_{PP}$
Sample rate	[dB]	[dB]	[Bit]	[µV/V_{PP}]
5 kS/s	101	124	17.1	0.88
10 kS/s	98	125	16.6	1.4
20 kS/s	83	123	14.1	1.9
50 kS/s	79	120	13.5	3.3
100 kS/s	76	115	13.0	4.5
200 kS/s	73	110	12.5	7
Sensor connection	BNC			
TEDS	For adapter identification			

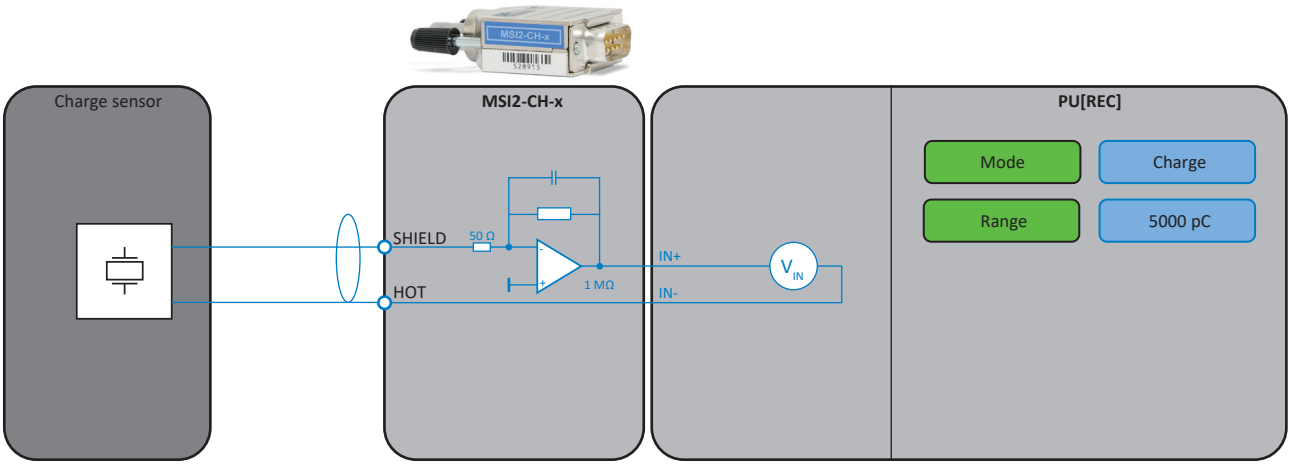


MAIN SYSTEM

Charge via

MSI2-CH-x

MSI2-CH-x				
Input Range				
MSI2-CH-5	±5 000pC			
MSI2-CH-100	±100 000pC			
Accuracy	3 Hz to 30 kHz: 0.5 %			
Gain drift	50 ppm/ °C			
Input coupling	AC 0.14 Hz			
Bandwidth	70 kHz limited by instrument			
Signal-to-noise ratio; spurious-free SNR; Effective number of Bits; Noise pC_{PP}	SNR	SFDR	ENOB	Noise $_{PP}$
Sample rate	[dB]	[dB]	[Bit]	[pC_{PP}]
10 kS/s	101	130	17.1	0.24
20 kS/s	99	130	16.7	0.35
50 kS/s	95	125	16.0	0.55
100 kS/s	92	120	15.5	0.8
200 kS/s	89	115	15.1	1.15
Sensor connection	BNC			
TEDS	For adapter identification and calibration data			



Thermocouple via

MSI2-TH-x

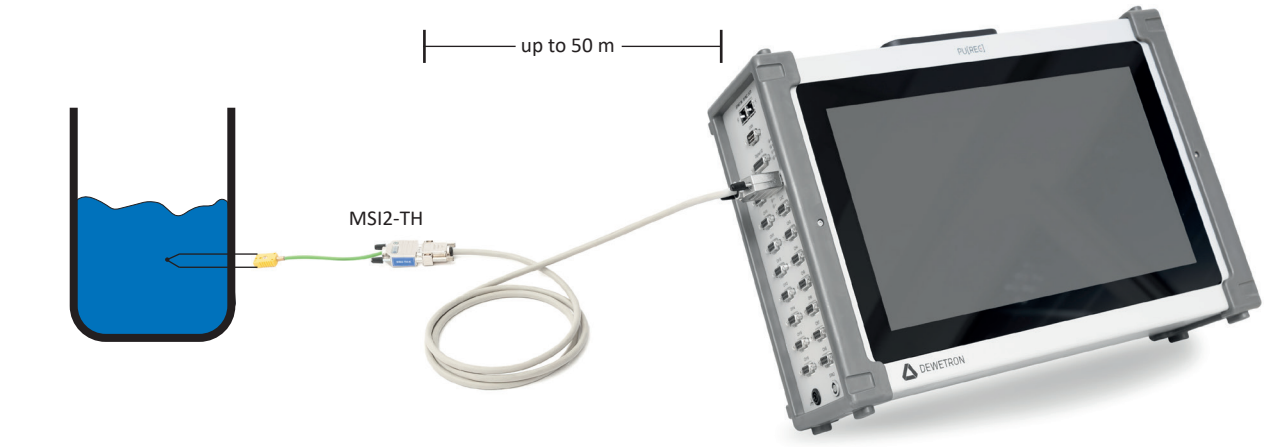
MSI2-TH-x	
Thermocouple types	Type K, J, T, C
Sensor connection	1m cable with standard miniature thermocouple connector according to TC type
Preamplifier	Integrated; cable drive capability 50 m
Open thermocouple detection	100 MΩ pullup; broken sensor shows positive full scale
CJC accuracy	1.0 °C
Input impedance	>10 Ω
Bias current	50 nA
Linearization	Through software according to sensor type
Bandwidth	30 kHz
Typical peak to peak noise for sensor type K	
1 kHz bandwidth	0.50 °C
100 Hz bandwidth	0.25 °C
10 Hz bandwidth	0.04 °C
TEDS	For adapter identification and calibration data

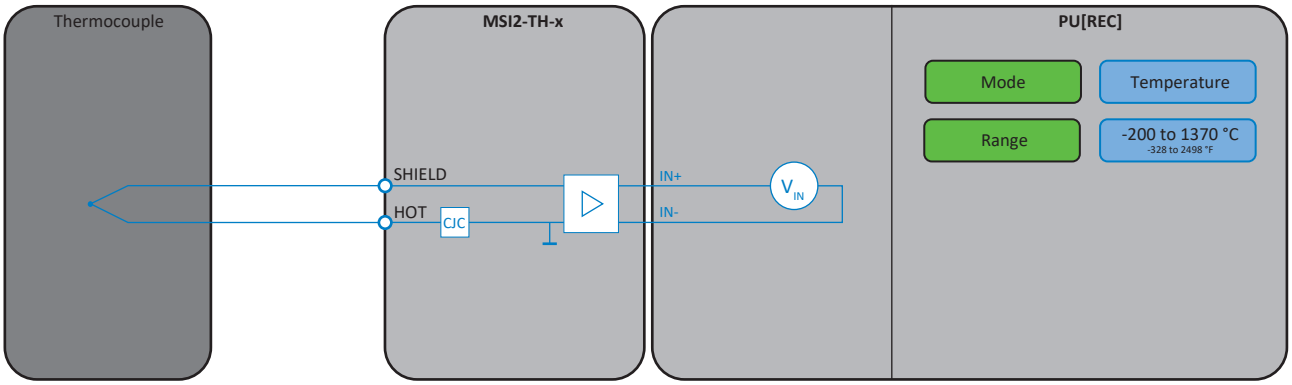
Accuracy incl. CJC error			
MSI2-TH-K	**Type K**	**(DIN-EN 60584-1)**	
Input ranges			-200 to 1370 °C [-328 to 2498°F]
Accuracy incl. CJC error		-200 to -100 °C	±1.2 °C
		-100 to 1370°C	±0.6°C
MSI2-TH-J	**Type J**	**(DIN-EN 60584-1)**	
Input ranges			-210 to 1200 °C [-346 to 2192°F]
Accuracy incl. CJC error		-200 to -100 °C	±1.1 °C
		-100 to 1200°C	±0.6°C
MSI2-TH-T	**Type T**	**(DIN-EN 60584-1)**	
Input ranges			-270 to 400 °C [-454 to752°F]
Accuracy incl. CJC error		-250 to -100 °C	±3 °C
		-100 to 400°C	±0.8°C
MSI2-TH-C	**Type C**	**(ASTM E988-96)**	
Input ranges			0 to 2300 °C [32 to 4172°F]
Accuracy incl. CJC error		0 to 1600 °C	±1 °C
		1600 to 2300°C	±1.5°C

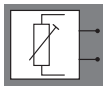
MAIN SYSTEM

Functional description

The MSI2-TH-x series is the improved version of the previous MSI series. The accuracy is approximately 3 times higher than at the previous version. A calibrated high precision cold junction compensation is included in the adapter. It comes with an integrated preamplifier that boosts the tiny thermocouple voltage up to a few volts. That's why the V2 series can be directly placed next to the sensor. Use extension cables up to 50 m between the MSI and the PUREC system instead of having long thermocouple lines with small signal level. That can greatly improve your signal quality in harsh electronic environment.







RTD via

MSI-BR-RTD

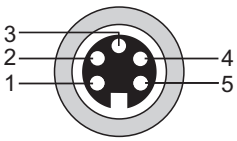
> Support of Pt100, Pt200, Pt500, Pt1000, Pt2000

> 2-, 3- or 4 wire connection

MSI-BR-RTD	
Supported sensors	Resistance, Pt100, Pt200, Pt500, Pt1000, Pt2000
Temperature range	-200 °C to 850 °C
Constant current	1.25 mA
Constant current accuracy	±0.02 % from calibrated value
Constant current drift	22 ppm/ °C
Linearization	Through software according to sensor type
Connection types	2-, 3- or 4-wire
Typical peak to peak noise for Pt100	
1 kHz bandwidth	0.25 °C
100 Hz bandwidth	0.08 °C
10 Hz bandwidth	0.02 °C
Power consumption	
Sensor connection	5-pin BINDER connector series 712
TEDS	For adapter identification and calibration data

Accuracy		
Type	Range	Accuracy
Pt100 (DIN EN 60751)	-200 to 850 °C	0.05 % of reading ±0.65 °C
Pt200 (DIN EN 60751)	-200 to 850 °C	0.05 % of reading ±0.36 °C
Pt500 (DIN EN 60751)	-200 to 850 °C	0.04 % of reading ±0.17 °C
Pt1000 (DIN EN 60751)	-200 to 850 °C	0.04 % of reading ±0.11 °C
Pt2000 (DIN EN 60751)	-200 to 260 °C	0.04 % of reading ±0.10 °C

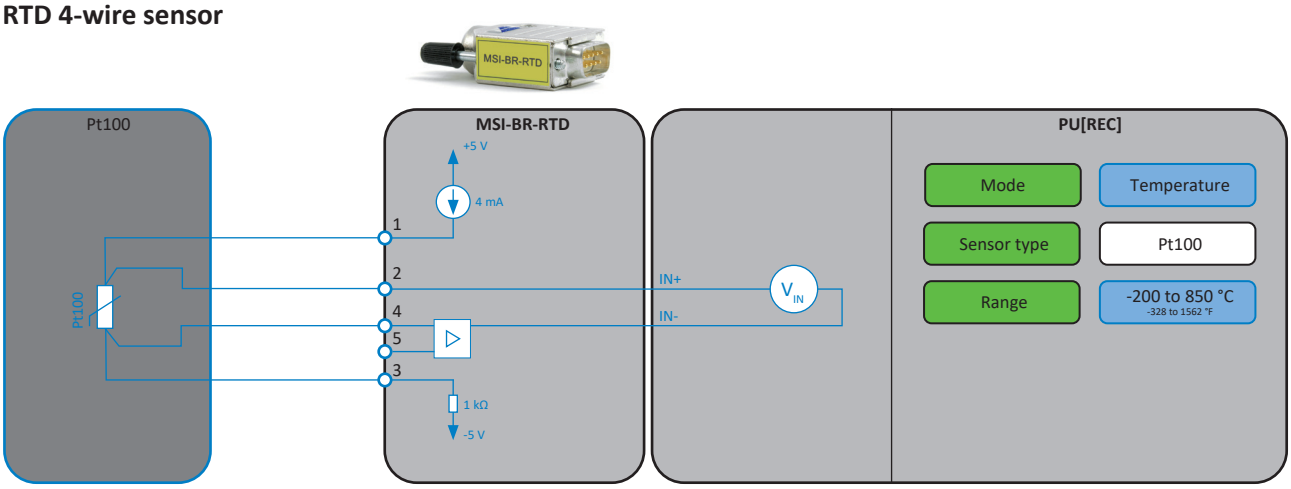
Sensor connector



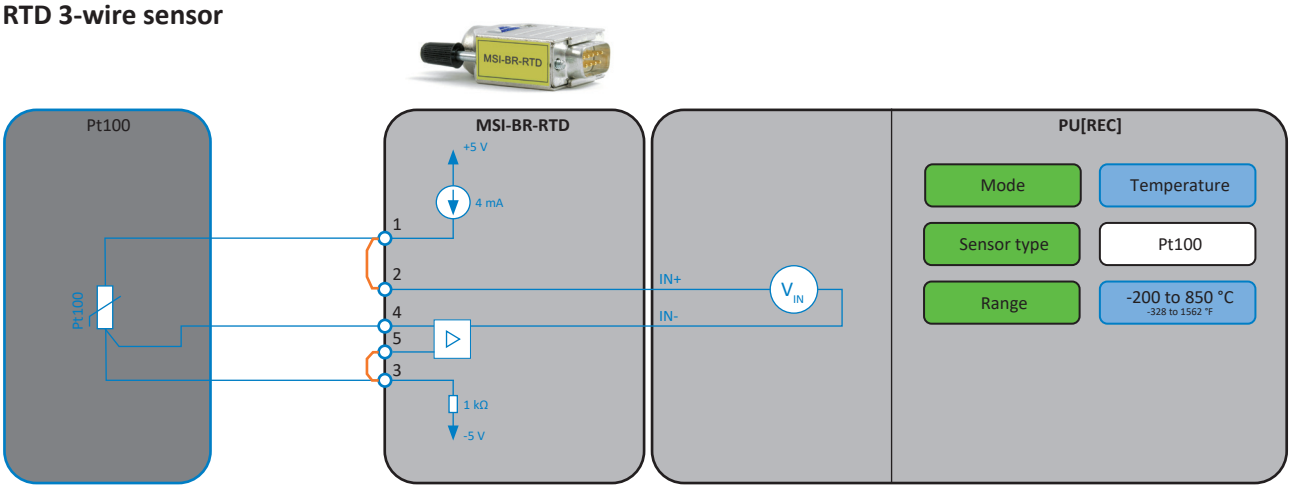
Pin assignment:

1 EXC+
2 SENSE+
3 EXC-
4 SENSE-
5 3-wire connector

RTD 4-wire sensor

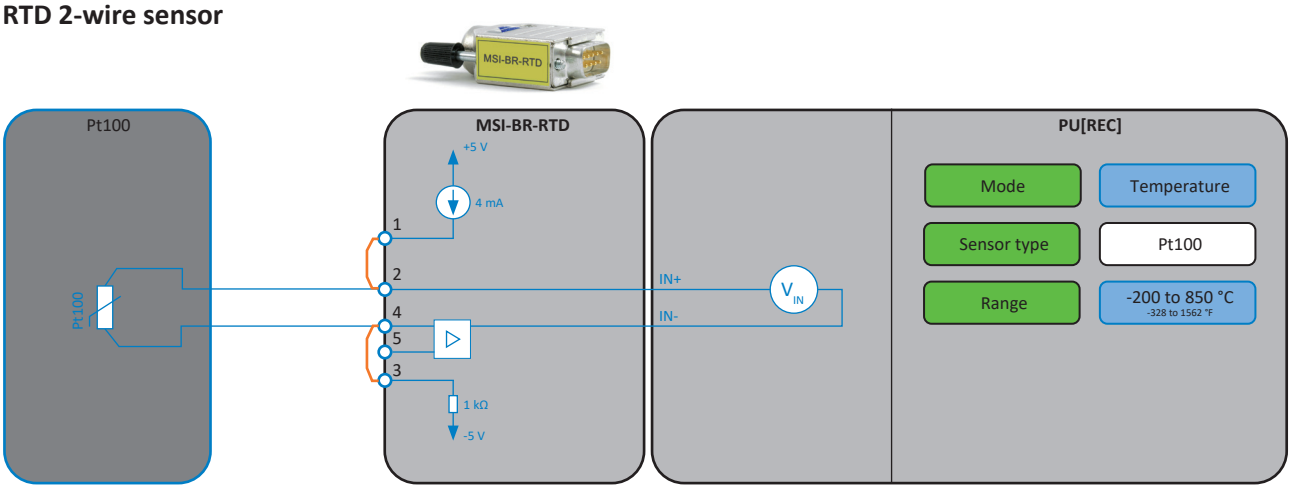


RTD 3-wire sensor

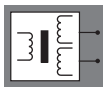


external solder bridge

RTD 2-wire sensor



external solder bridge



LVDT via

MSI2-LVDT

	MSI2-LVDT
Transducer type	LVDT with 5 or 6 electrical connections (wires)
Sensor connection	Soldering
Excitation voltage	3 V_{RMS}
Excitation frequency	2.5 kHz, 5 kHz, 18 kHz selectable by jumper (H, M, L; ±5 %)
Output at stroke ends	280 mV/V to 1666 mV/V at full scale (+/-5 V), adjustable by gain-potentiometer

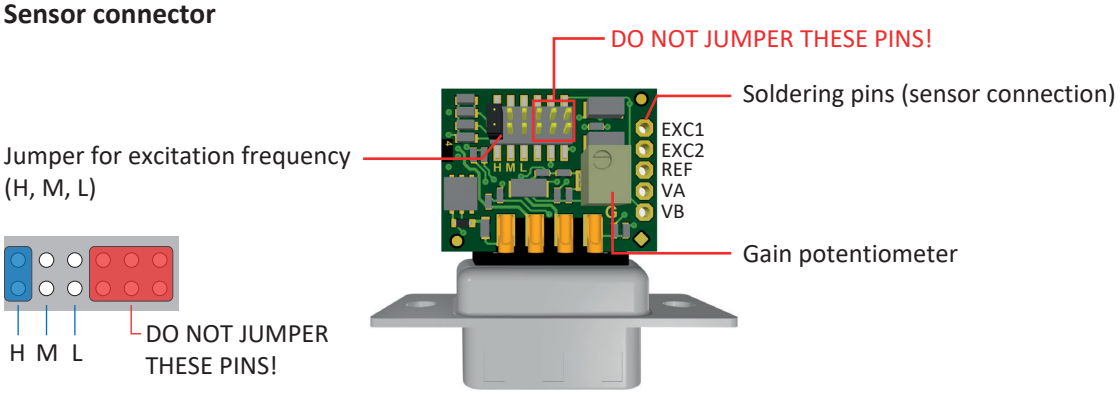
Functional description

The MSI2-LVDT is a high reliability conditioner for measurement of displacement with an LVDT (Linear Variable Differential Transformer). It can be used with 5- or 6-wire transducers.

The MSI2-LVDT provides the sine wave sensor excitation and converts the sensor output into a linear voltage output. With the gain potentiometer the MSI2-LVDT can be adjusted to a measuring range from 280 mV/V to 1666 mV/V. This allows a rough adjustment to the sensor. The best way is to bring the sensor to the end position and adjust the output to about 4.5 V. The exact adjustment of the sensor should be done by two point scaling in the software.

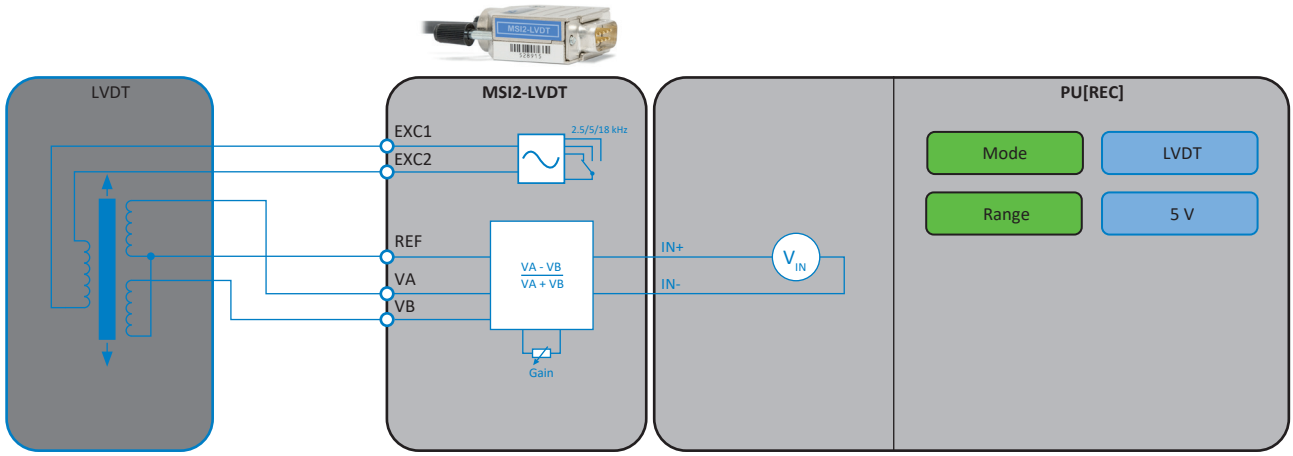
Thereby the MSI2-LVDT sensitivity is equivalent to 5 V/stroke end length (in mm or inch) [V/mm(inch)].
Once that is done apply the strain relief brackets and close the MSI.

Sensor connector



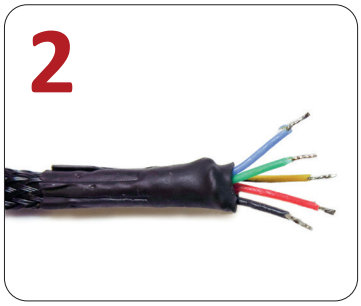
H = 18 kHz
M = 5 kHz
L = 2.5 kHz

MAIN SYSTEM

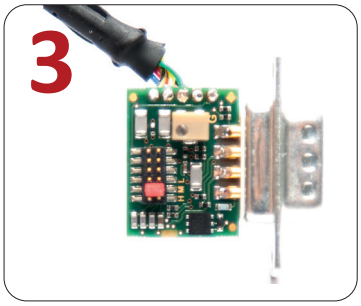


Connecting a sensor

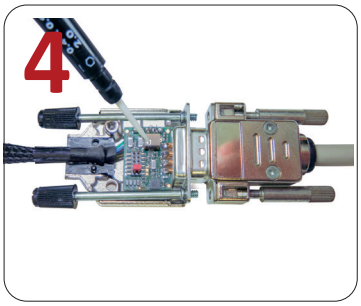
Check the sensor datasheet and determine the correct connection.



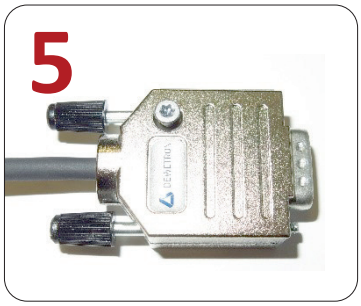
Prepare the sensor cable



Solder the wires onto the printed circuit board.

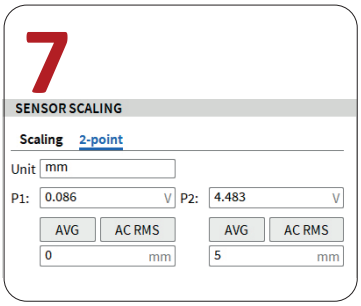


Connect the MSI2-LVDT to the measurement system with an extension cable. Adjust gain-potentiometer roughly.



Close the housing.

Connect the sensor directly or via extension cable.



Fine adjust sensor with sensor scaling.

4 to 20 mA sensor via

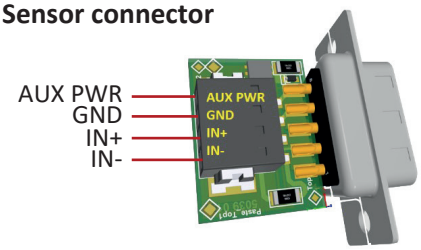
MSI2-LA-250R-20mA

> Direct connection of loop powered sensors

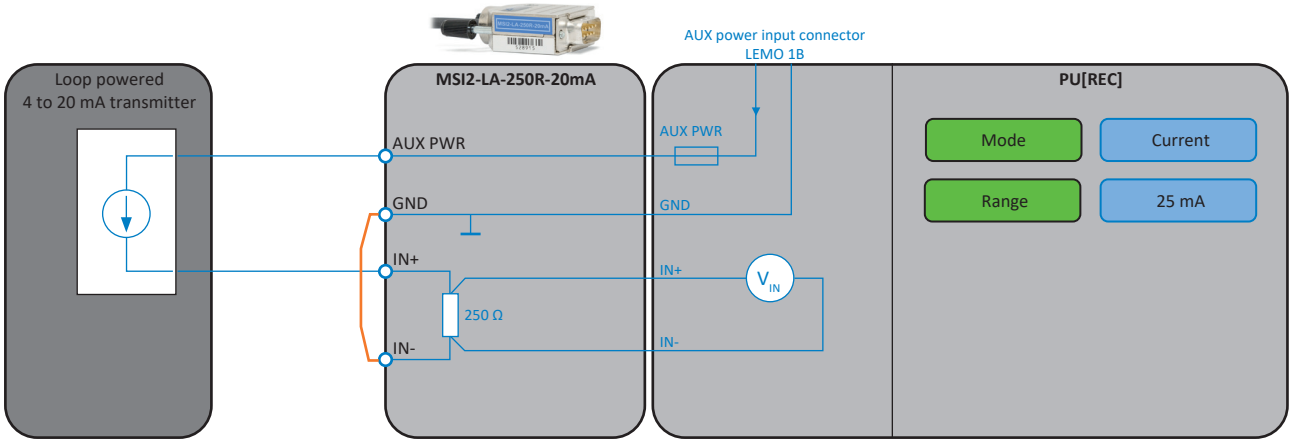
> Simple connection without soldering

MSI2-LA-250R-20mA	
Supported sensors:	4 to 20 mA; loop powered sensors
Sensor connection:	Push-in spring connection; 0.14 to 0.5 mm²; AWG 26 to 20
Input Range:	±25 mA
accuracy:	0.05 % of reading ±4 µA
Excitation Voltage:	AUX Power; refer to simplified power schematic
Shunt resistor	250 Ω; 0.4W; 25 ppm/°C

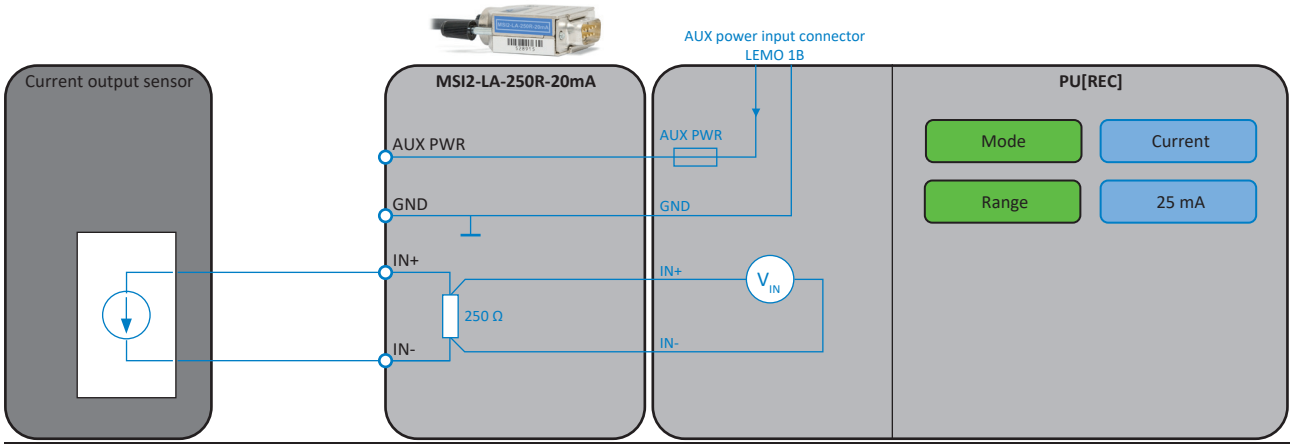
Sensor connector



Loop powered 4 to 20 mA transmitter



Current output sensor



Operating with the Touchscreen

Touchscreen gestures

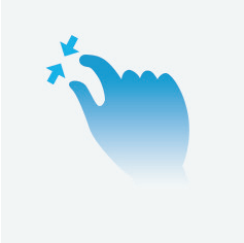
The PU[REC] is equipped with a bright 15.6" full HD wide screen multi-touch panel to control the instrument.
You can use your fingers on the touchscreen, like you would on a smartphone. For example, drag the sidebar from the right side across the screen to open the channel setup.

Tap? Swipe? Here's a glossary of touch gestures that you can use with the PU[REC].

Tap

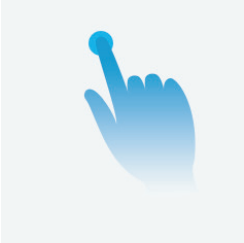
How to do it: Tap once on something.
What it does: Open, selects, or activates whatever you tap.
Similar to clicking with a mouse.

Pinch or stretch



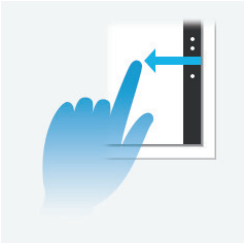
How to do it: Touch the screen with two fingers, and then move the fingers toward each other (pinch) or away from each other (stretch).
What it does: Zooms in or out of a graph or data.

Tap and hold



How to do it: Press your finger down and hold for about a second.
What it does: Rearranges objects on your main screen.

Swipe / Drag



How to do it: Drag your finger on the screen.
What it does: - Scrolls through recorded data (like scrolling with a mouse).
- Drags the sidebar from the right side across the screen to open the channel setup

Further information on how to operate with OXYGEN please find in the corresponding user manual available at:
https://ccc.dewetron.com/pl/oxygen

OXYGEN quickstart guide

Perform a measurement and export the data in just a few easy steps!

For a more detailed explanation of the OXYGEN software please refer to the OXYGEN Technical Reference Manual, which is available at *https://ccc.dewetron.com/pl/oxygen* or make sure to check out our latest PU[REC] videos on youtube available at *https://www.youtube.com/playlist?list=PLySNf48JXZNjxKw8XI6YwlFmOoC-hJ4dz* or scanning the QR code below.

Starting OXYGEN

When starting OXYGEN, the measurement screen is displayed. OXYGEN will instantly start to acquire data but will not store it yet. Figure 1 shows an overview of the measurement screen and some important buttons and menu tabs.

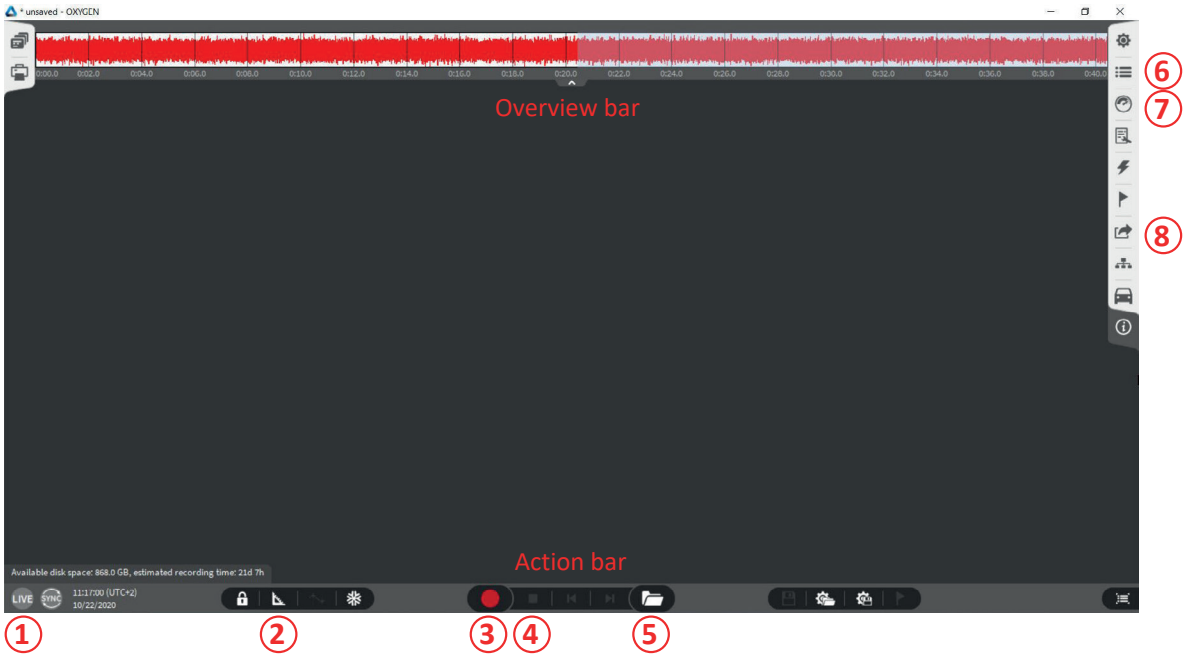


Figure 1

1 Software Mode Indicator
2 Design Mode
3 Record
4 Stop
5 Open Data File
6 Data Channel List Menu
7 Instruments Menu
8 Export Menu

Connect and set up signals and sensors

It is possible to directly measure ±10 V or to use MSIs to expand the input signal possibilities. Open the Data Channel List by double clicking/tapping on the menu tab on the right side or by swiping it over the whole measurement screen, seen in Figure 2.

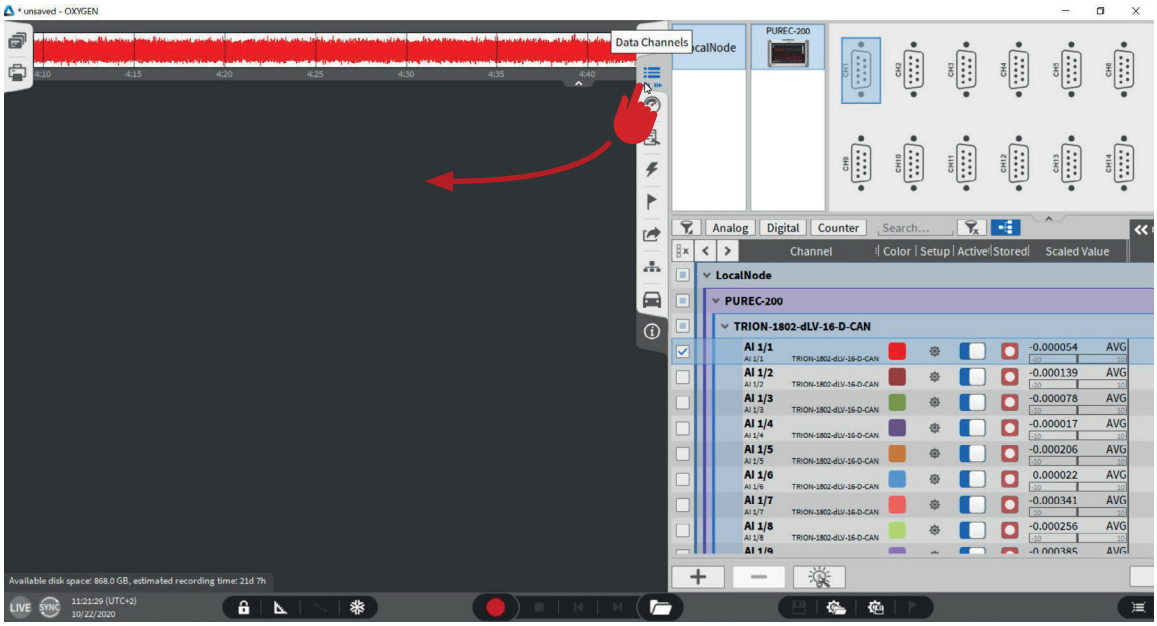


Figure 2

An analog signal of ±10 V or an MSI can simply be connected to the input. A preview of the signal is shown in the corresponding channel row (see Figure 3) and the MSI will get recognized automatically. This can be seen in the graphical overview, seen in Figure 3.

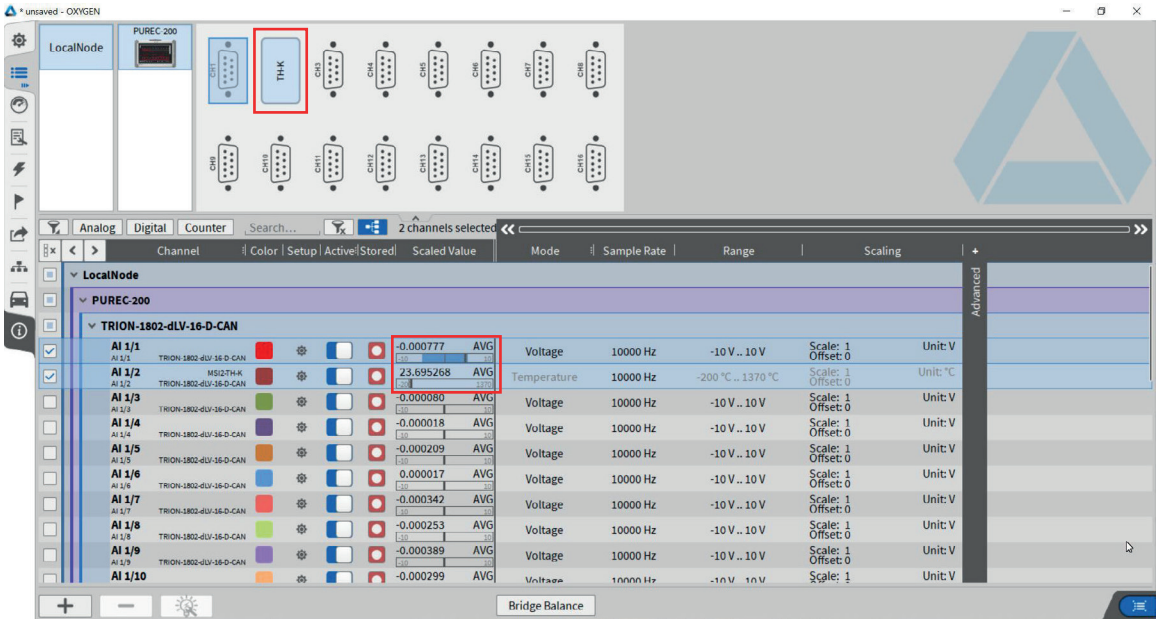


Figure 3

Changing channel settings

The next step is to change the channel settings. By simply clicking on the channel name in the list, a new name can be entered. Also, by clicking on the gear button the channel setting will open, seen in Figure 4. There different settings are available, like a sensor scaling if needed. Just enter the unit and a scaling or sensitivity factor. Table scaling for a non-linear scaling is also available here. All settings are automatically saved when entered and do not have to be saved separately.

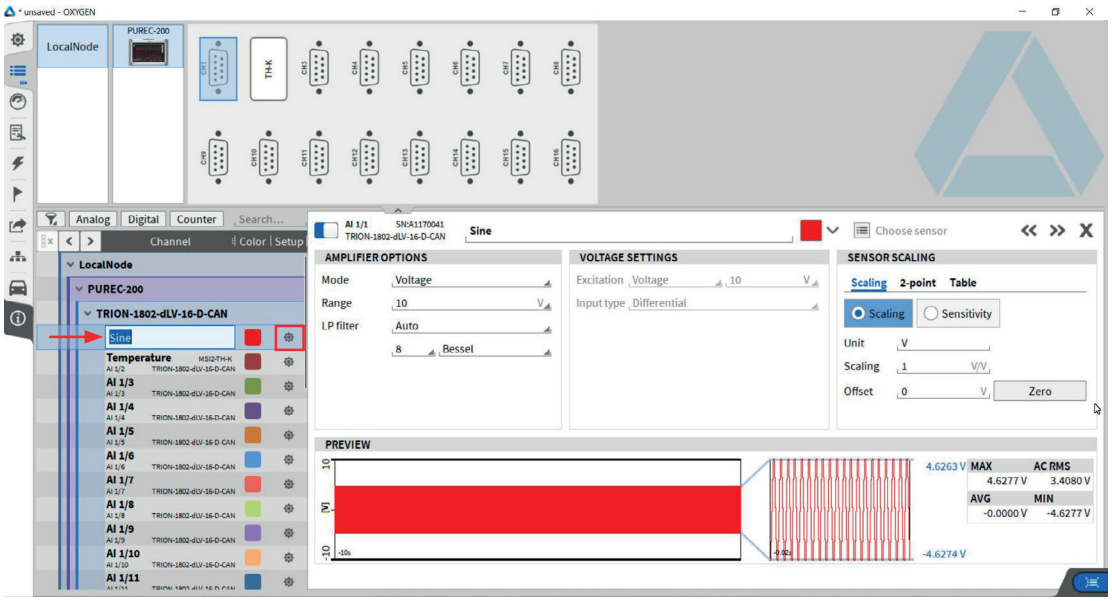


Figure 4

Design the measurement screen

After the channel settings are done, return to the measurement screen by again double clicking/tapping on the menu tab or swiping the menu to the right. Click or tap on the Instrument menu tab and drag and drop a recorder on the measurement screen. More instruments can be added and adjusted like this, when being in Design Mode (see 2 in Figure 1). Click on the Data Channel menu tab and add the signal by selecting the instrument and the signal to be shown or by drag and dropping the signal into the instrument. Disable the Design Mode.

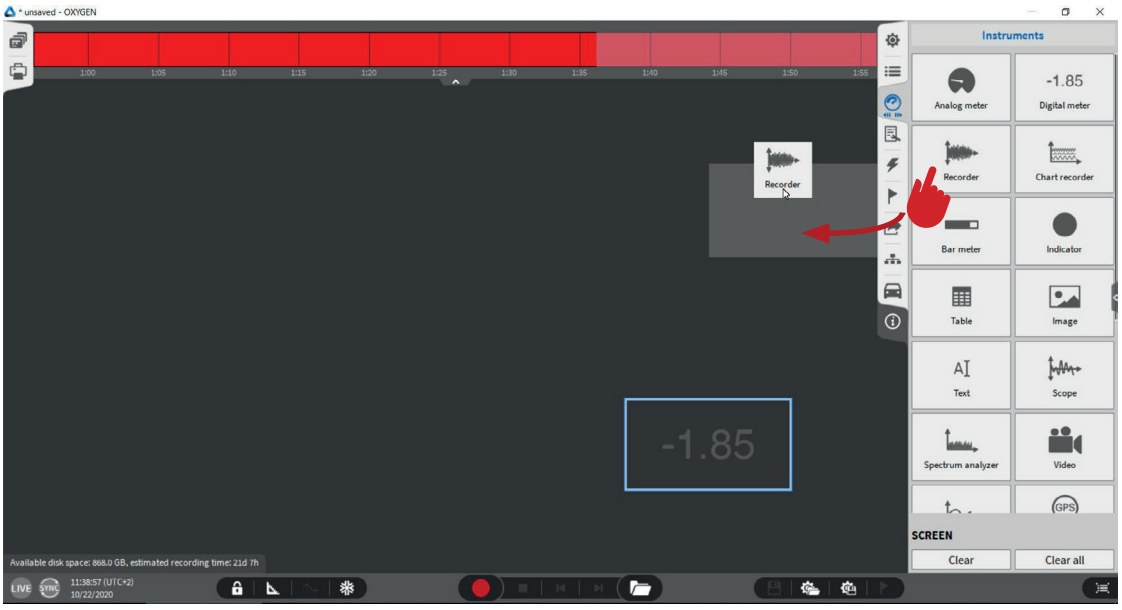


Figure 5

Figure 6

Record

To start the recording simply click on the record button. The red border and the REC indicator seen in Figure 7 in the lower left corner displays, that the recording is going on. Click on the Stop button to stop the recording.

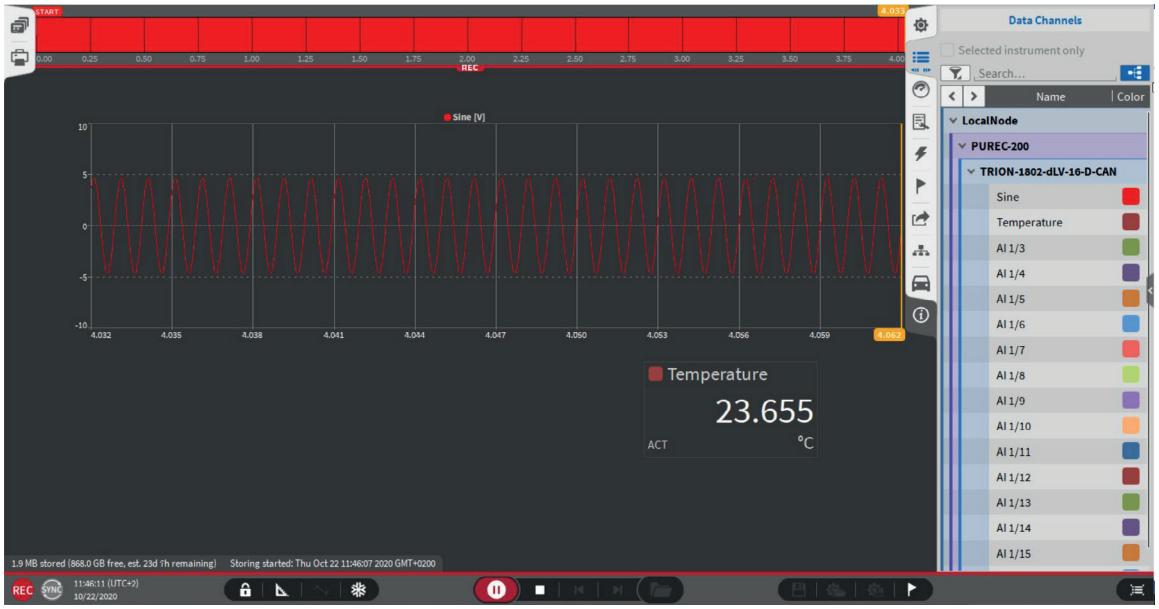


Figure 7

Open Datafile and Export

To open a datafile, click on the file button, and select the corresponding file (see Figure 8). The green border and PLAY indicator in the lower left corner indicate that a file is loaded for post-processing (see Figure 9). To export the data, click or tap on the Export Settings menu tab, select the desired format, channels to be exported and click on the export button seen in Figure 9.

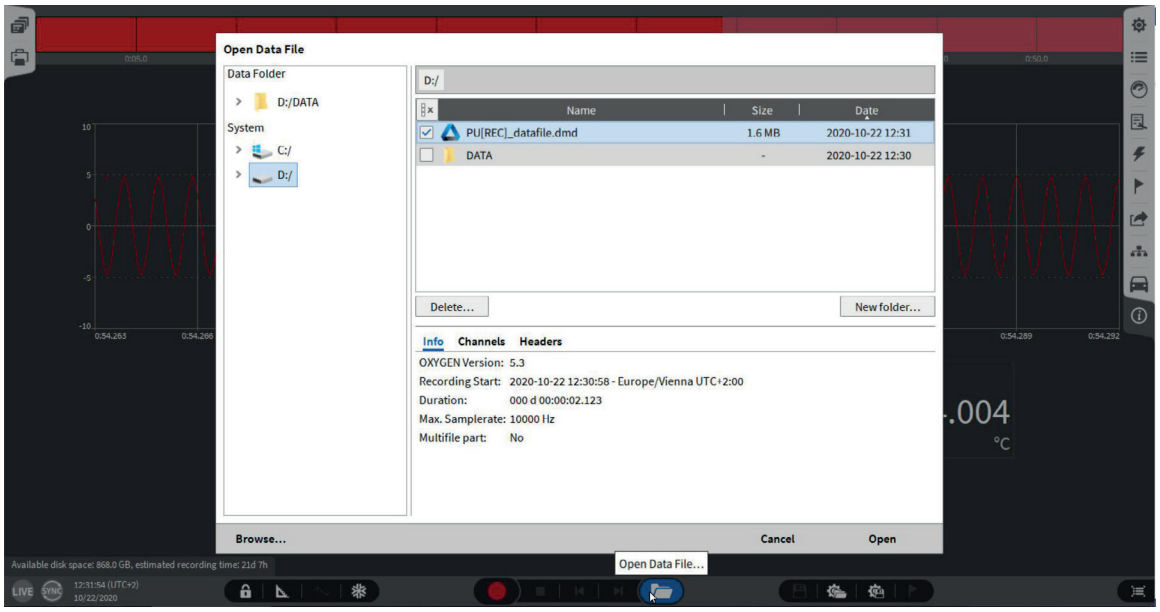


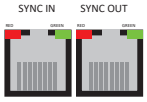
Figure 8

Figure 9

Synchronization options

Synchronization via SYNC-BUS

The SYNC-BUS (SYNC IN, SYNC OUT) is used to synchronize two or more PU[REC] systems with up to 100 m distance between each node. The SYNC-BUS consists of two RJ-45 sockets. One socket being a synchronization OUT, whilst the other is used as synchronization IN.



LED indication

	SYNC OUT	SYNC IN
RED (stable)	Clock detected	Receiving clock
GREEN (stable)	Acquisition running	Acquisition running

Depending on the usage of the SYNC (input or output) the LED indicates if the system clock is available or received correctly from another system. The green LED indicates that the acquisition is running. If the acquisition stops the LED will be off.

Data transfer (independent from synchronization)

The network topology is the responsibility of the customer. Any topology supported by the operating system can be used. In theory, the normal company network can also be used. However, DEWETRON recommends the use of a separate network which is only used for data transmission.

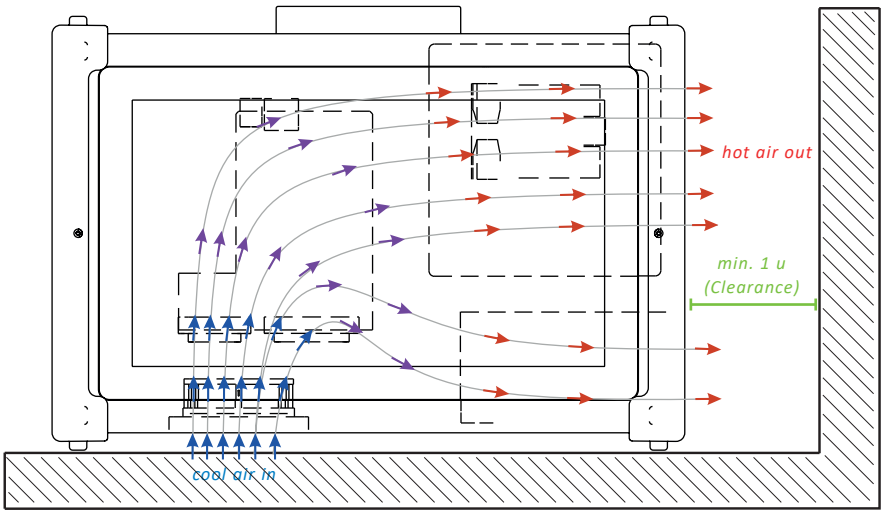
NOTE: Networked data acquisition (claiming multiple, distributed DEWETRON measurement systems) requires software option OXYGEN-NET (OXY-OPT-NET).

Cooling considerations

The intake vent of the PU[REC] is located at the bottom of the chassis, whereas the exhaust vent for the PU[REC] is at the right sidepanel of the chassis.

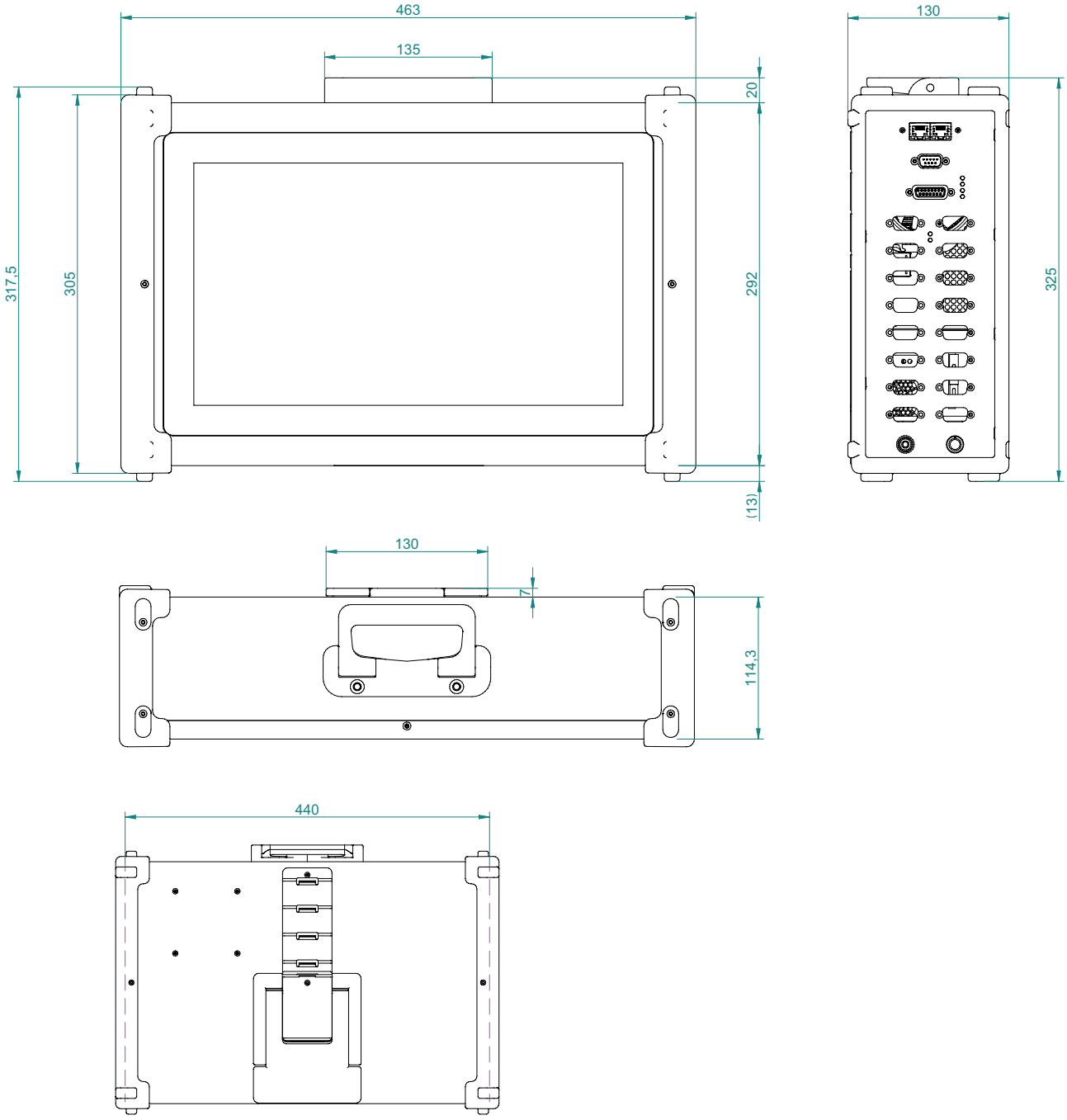
CAUTION: *Adequate clearance between the chassis and surrounding equipment or blockages must be maintained to ensure proper cooling of the internals of the chassis!*

PU[REC] front view



MAIN SYSTEM

Dimensions



* Dimensions in mm
(1 inch = 25.4 mm)

Maintenance

Maintenance intervals

DEWETRON recommends following maintenance intervals:

Actions	On demand	At least once a year	Every 5 years
Clean Filters	depending on environmental conditions	x	
Calibrate system		x	
Change CPU FAN			x
Change Chassis FAN			x
Change CMOS battery			x
Change power supply			x
Change SSD	depending on SSD health status		x

Intervals may vary. Depending on environmental conditions, runtime, etc.

DEWETRON offers various service and upgrade plans including cleaning/exchanging fans/power supply/CPU cooler (if required), BIOS, firmware and driver updates as well as reliabilty upgrades and full functionality check. Please do not hesitate to ask DEWETRON or your local distributor for further information and pricing.

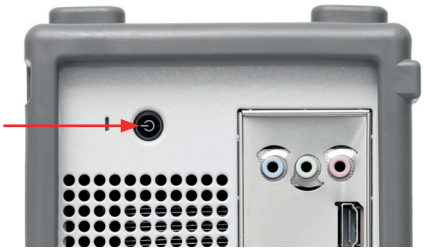
Removing the intake vent and cleaning the filter pad

Requirements:

> TORX T10 screw driver

WARNING: ***DO NOT*** *attempt to remove the intake vent when in operation!*
POWER OFF *the instrument first!*

1 Power off the instrument.



2 To access the filter pad simply losen the screws on both sides of the intake vent with a TORX T10 screwdriver.

To clean the filter pad use a dry velocity stream of air. Afterwards, make sure to reinstall the filter pad and tighten the screws.

WARNING: *The maximum length for screws is 6 mm! If a screw gets lost, replace it with M3x6 countersunk head screws only. Otherwise internals may get damaged!*

Letter of volatility

This describes the location and contents of volatile and non-volatile memory devices within the PU[REC].

Volatile memory

Type	Size	User modifiable	Function	Process to delete
Innodisk M4SI, DDR4 SODIMM	8 GB module (16 x 512 MB chips)	Yes	RAM	Power OFF
Intel i3 8100, cache	6 MB	No	Cache	Power OFF
DAQ board DDR3	512 MB	Yes	buffer for measurement data	Power OFF

Non-volatile memory

Type	Size	User modifiable	Function	Process to delete
WD-S100T2B0A, Solid State Drive	1 TB + 1 GB Cache	Yes	Main drive for operating system, programs, drivers and data	Remove drive
BIOS Chip EEPROM	32 MB	Yes	BIOS settings, firmware	Factory reset
EEPROM chip	128 Kbit	No	Serial number	Factory only (no sensible data)
CAL memory EEPROM chip	128 Kbit	No	Calibration data	Factory only (no sensible data)
EEPROM	2 Kbit	No	Configuration data	Factory only (no sensible data)
FLASH	16 MB	No	Firmware	Factory only (no sensible data)

Input ranges

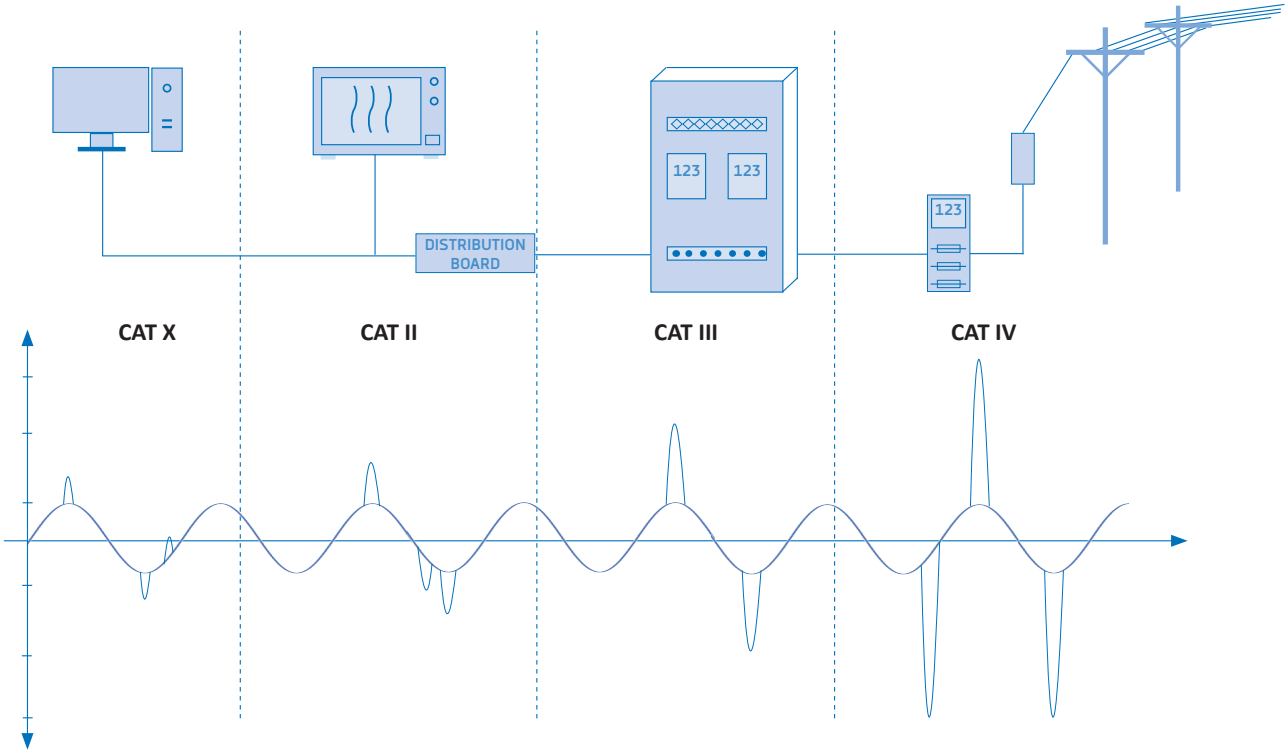
Like all measurement devices DEWETRON measurement equipment provides one or more *'Input ranges'*.
An *'input range'* indicates the highest possible value which can be displayed, similar to the limit position of a dial instrument.

Note: The value of the 'input range' does not give any information concerning the allowable scope of application (please refer to rated input according to IEC/EN 61010-2-30).

Rated input according to IEC/EN 61010-2-30

'*Rated input*' indicates the allowable scope of application of a measurement input according to the IEC/EN 61010-2-30 (Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use - Part 2-030: Particular Requirements for Equipment Having Testing or Measuring Circuits). DEWETRON equipment (respectively measurement inputs) are always specified according to this stated standard, the compliance tests are done by a 3rd party laboratory.

The value '*rated input*' specifies the highest possible voltage which can be applied to the measurement input. The IEC/EN 61010-2-30 additionally describes certain measurement categories within a public power grid (see also overvoltage categories IEC/EN 60664-1). Thus, measurement circuits are allowed to be applied according to their specification to the power grid categories as stated below.



The isolation is tested according to the IEC/EN 61010-2-30. The level of the isolation voltage depends on the rated input voltage and on the measurement category. Since potential overvoltage phenomena are higher within higher power grid categories, the isolation voltage needs to be higher too.

If there is no measurement category specified, the measurement input is not appropriate to be applied to a public power grid.

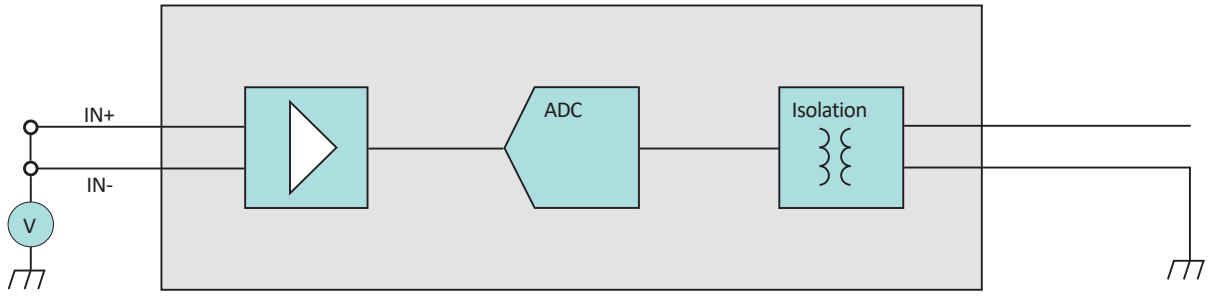
Examples:

> **Rated input 600 V CAT II:** The measurement input can be connected to a public power grid within the category II as long as the voltage of the grid does not exceed 600 VRMS. If there is a measurement category specified, the voltage value stated is always considered to be RMS.

> **Rated Input 600 VRMS:** This measurement input is not intended to be connected to a public power grid. The input would be suitable for measurements within an on-board power system of a train for instance.

Common mode voltage

'*Common mode voltage*' indicates the highest possible voltage between the two input pins of a channel (e.g. IN+ and IN-) and the reference potential (GND) without clipping the wanted signal.



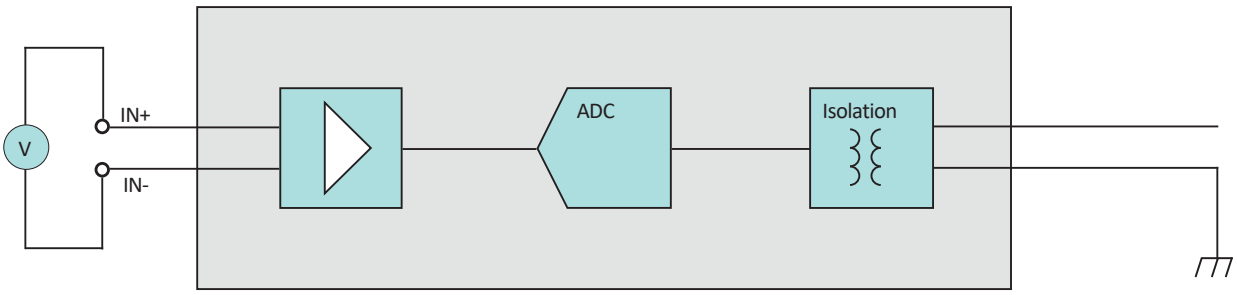
Common Mode Voltage

In the very most cases the value of the '*common mode voltage*' corresponds to the value of the '*isolation voltage*'.

Overvoltage protection

This value indicates the highest possible voltage which will not overload the input protection circuit when applied between two pins of one channel.

Exceeding this value causes the damage of the measurement input in most every case, also other components inside the measurement unit could be affected and it is furthermore a threat to life and physical condition (electric shocks, burn).



Overvoltage Protection

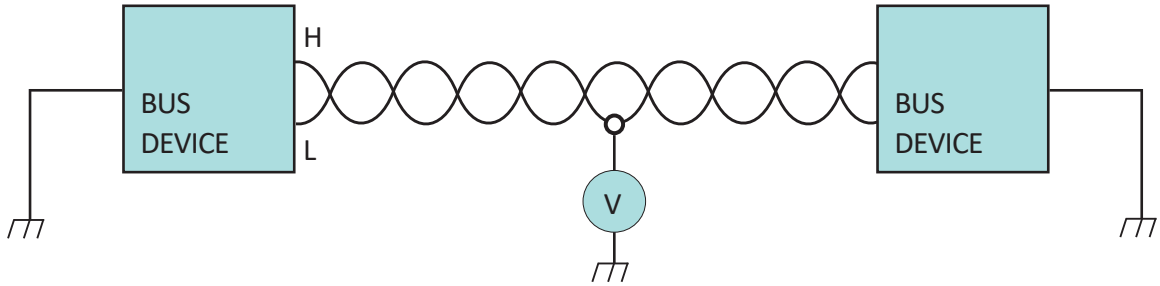
Max. DC voltage @AC coupling

The given value refers to input AC coupled inputs only.

'*Max. DC voltage @AC coupling*' specifies the highest allowed direct voltage component on the measurement input, when the coupling mode is switched to '*Coupling AC*'.

Bus pin fault protection

The specification '*Bus pin fault protection*' refers to the wiring of bus systems (e.g. CAN, RS-485, etc.) only. The value indicates the highest voltage which will not destroy the bus input or output when applied between the bus wiring and ground by accident.



DESCRIPTION OF VOLTAGE SPECIFICATIONS

Notes

CE-Certificate of Conformity

CE

Manufacturer: **DEWETRON GmbH**

Address:

Parkring 4
8074 Grambach, Austria

Tel.: +43 316 3070 0
Fax: +43 316 3070 90
e-mail: sales@dewetron.com
http://www.dewetron.com

Name of product: **PU[REC]**

Kind of product: *Data recorder*

The product meets the regulations of the following EC-directives:

2014/35/EU
"Directive of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of electrical equipment designed for use within certain voltage limits"

2014/30/EU
"Directive of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to electromagnetic compatibility (recast)"

The accordance is proved by the observance of the following standards:

LV	**Safety**	IEC 61010-1:2020	
EMC	**Emissions**	EN 61000-6-4	EN 55011 Class B
	Immunity	EN 61000-6-2	Group standard

Graz, November 02, 2020
Place / Date of the CE-marking

Ing. Thomas Propst / Manager Total Quality

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