

TECHNICAL REFERENCE MANUAL

V26-1



2. About this document

This is the Technical Reference Manual for IOLITE® X Systems.

IOLITE® X is an industrial real time data acquisition hardware line that comes in a distributable form factor and offers different amplifiers. Each system also includes a professional license for our award-winning DewesoftX® data acquisition software.

The manual is divided into several chapters. You will find:

- A detailed description of the IOLITE® X hardware
- A description of the connection variants and the pin assignments on the inputs and outputs
- A comprehensive introduction to the configuration of the modules using DewesoftX®
- Detailed technical data: Specifications, etc.

2.1. Legend

The following symbols and formats will be used throughout the document.



Important

It gives you important information about the subject.
Please read carefully!



Hint

It gives you a hint or provides additional information about a subject.



Example

Gives you an example of a specific subject.

2.2. Online versions

2.2.1. Device Technical Reference Manual

The most recent version of this manual can be downloaded from our homepage:

<https://dewesoft.com/download/manuals>

2.2.2. DEWESoft® User Manual

The DEWESoft® User Manual document provides basics and additional information and examples for working with DEWESoft® and certain parts of the program.

The latest version of the DEWESoft® tutorials can be found here:

<https://dewesoft.com/download/manuals>

3.2. Connecting IOLITE® X

In this chapter, you can see the basic instructions for connecting IOLITE® X devices. Advanced connections are described in the following chapters.

The IOLITE X line has a GbE with PTPv2 synchronization and PoE++ power delivery (Power over Ethernet). This way you can connect, synchronize and power up multiple devices in a range of up to 100m (depending on the configuration).



Important

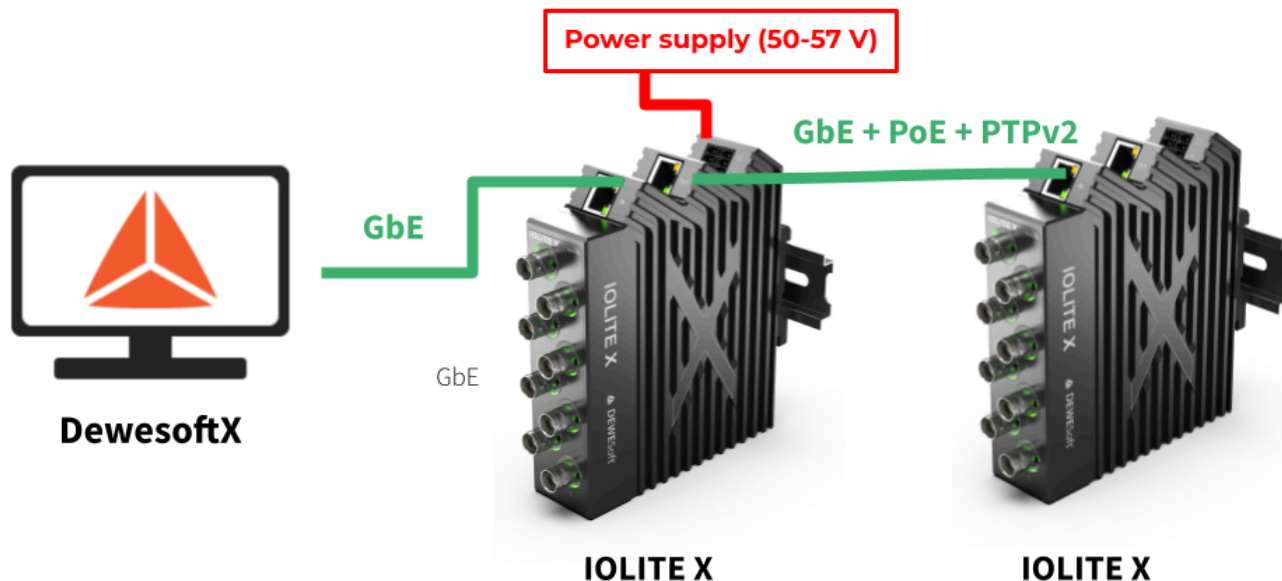
IOLITE X supports PTPv2 IEEE 802.3 which is only compatible with X-line devices (SIRIUS X, IOLITE X).

IOLITE X

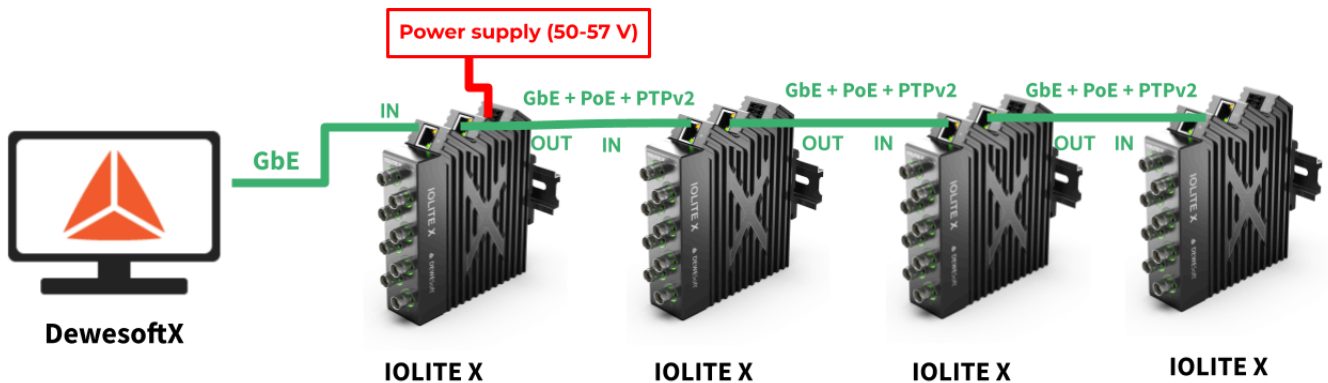
First connect the power supply cable to the PWR IN 2x3 TBLOCK connector. Then connect RJ-45 cable to the IN connector. Finally connect the other side (RJ45) to the LAN port of the PC.

3.2.1. Default configurations

3.2.1.1. Connection to the PC



3.2.1.2. Daisy chain connection with PoE



Important

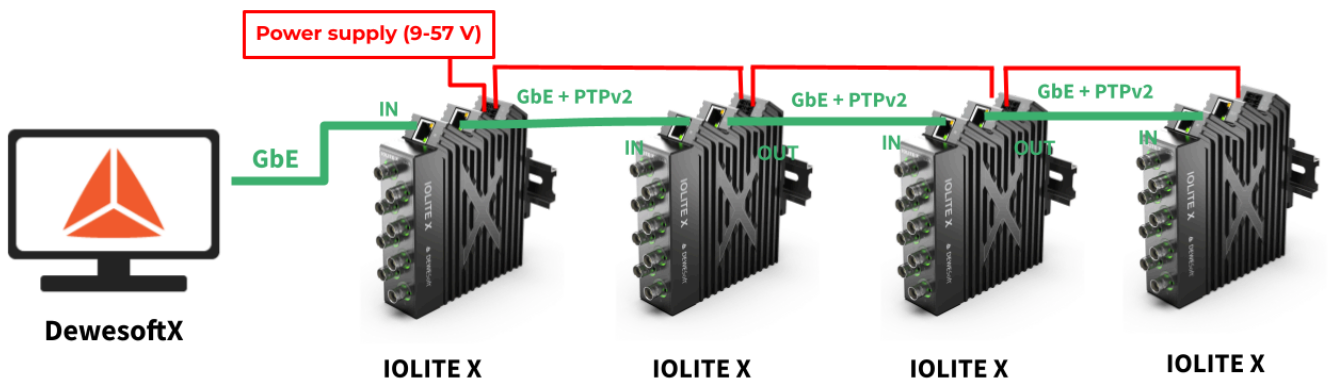
This device supports PoE++ power delivery and requires a certain voltage level to work! The device that is first in line has to be powered with **48 V - 57 V to enable the PoE.**



Caution

When connecting devices with Power over Ethernet be sure to connect them at least 2 cm apart to ensure better cooling of the devices. The devices can get extremely hot during operation.

3.2.1.3. Daisy chain connection without PoE



4.2. System specifications

IOLITE X	
GLAN	
Data interface	Ethernet 1 GbE incl. IEEE1588v2 synchronization (PTP IEEE 802.3) (RJ45)
Data Rate	1 Gbps
Sync Accuracy	100 ns
Bus connectors	Ethernet RJ45, single cable for data, power and sync, daisy chainable
Power over Ethernet	48 - 57 V DC (PoE++ power delivery)
Max. cable length between devices	100 m
Max. Throughput per Chain	up to 90W
Internals	
CPU type	ARM
Operating system	Linux
Software	Dewesoft RT
Device protocols	openDAQ, OPC-UA
Power	
Power supply	9 - 57 V DC
Power supply connector	SCDN-THR 3.81/04/90G 3.2SN BK BX
Environmental	
Operating Temperature	-40 to 70 °C
Storage Temperature	-40 to 85 °C
Humidity	95 %, no condensation
IP rating	IP20
Shock	Shock: SIST EN 60068-2-27:2009 10 g, 6 ms, half-sine 25x pos./neg in each axis 150x total
Vibration	Random: Profile breakpoints: 10 Hz - 0.75 g ² /Hz 150 Hz - 0.015 g ² /Hz Profile RMS / Peak = 3.5 g / 10.5 g 1 hrs in each axis, 3 hrs total
Physical	
Dimensions	137 x 119* x 35 (* depending on the front connectors)
Rev: 1712304000	

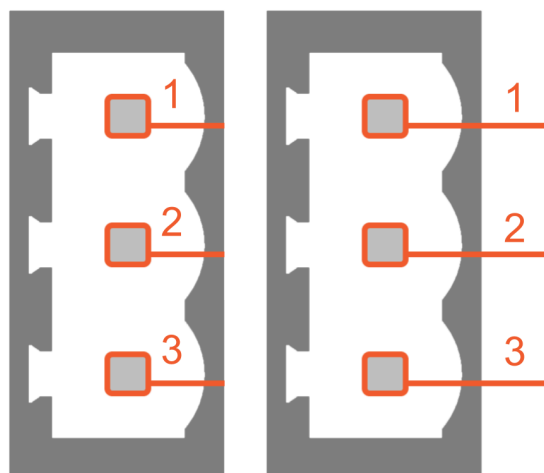


Important

IOLITE X supports PTPv2 IEEE 802.3 which is only compatible with X-line devices (SIRIUS X, IOLITE X). Compatibility with other lines (OBSIDIAN, SIRIUS-XHS) will be available when openDAQ will be supported on all the product lines.

4.2.1.3. IOLITE X - Multi channel: Connectors

4.2.1.3.1. IOLITE X - Multi channel: PWR IN



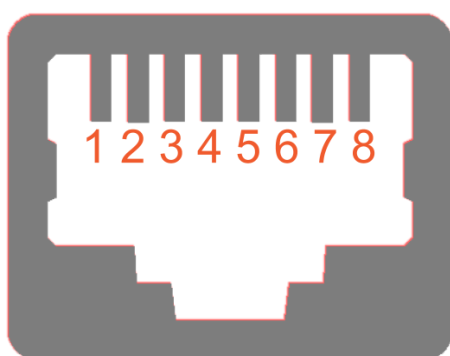
Power in connector: pin-out (two 3-pin connectors)

Pin	Name	Description
1	Chassis	Connected to chassis
2	-	PWR-
3	+	PWR +

Connector (on the device):
2x3 OMNIMATE SC 3.81/03/180

Mating Connectors (for the cable):
2x3 OMNIMATE BCF 3.81/03/180;

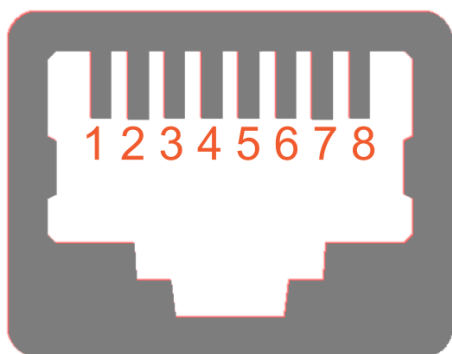
4.2.1.3.2. IN (Data, Sync, PWR)



IN connector: pin-out (RJ45 female)

Pin	Name	Description
1	P1_p	Pair 3 +
2	P1_n	Pair 3 -
3	P2_p	Pair 2 +
4	P2_n	Pair 1 -
5	P3_p	Pair 1 +
6	P3_n	Pair 2 -
7	P4_p	Pair 4 +
8	P4_n	Pair 4 -

4.2.1.3.3. OUT (Data, Sync, PWR)



OUT connector: pin-out (RJ45 female)

Pin	Name	Description
1	P1_p	Pair 3 +
2	P1_n	Pair 3 -
3	P2_p	Pair 2 +
4	P2_n	Pair 1 -
5	P3_p	Pair 1 +
6	P3_n	Pair 2 -
7	P4_p	Pair 4 +
8	P4_n	Pair 4 -



Caution

If PoE and PWR IN are connected at the same time, the device will be powered from PWR IN (9-57 V).

PoE on output is enabled if PWR IN voltage is in 48 V to 57 V range.

5. Module Overview

5.1. UNIVERSAL MEASUREMENT DEVICES

The IOLITE X product family offers a 4- and 8-channel universal module for high-speed data acquisition. List of universal measurement modules:

- IOLITE X 4xUNI
- IOLITE X 8xUNI

5.1.1. IOLITE X 4xUNI

IOLITE X 4xUNI is an 4-channel universal module with a simultaneous sampling rate of 200 kS/s per channel and 24-bit delta-sigma ADC. The module is equipped with a D-SUB9 input connector and supports TEDS through standard and DSI® adapters.



IOLITE X 4xUNI

5.1.1.1. IOLITE X 4xUNI: Specifications

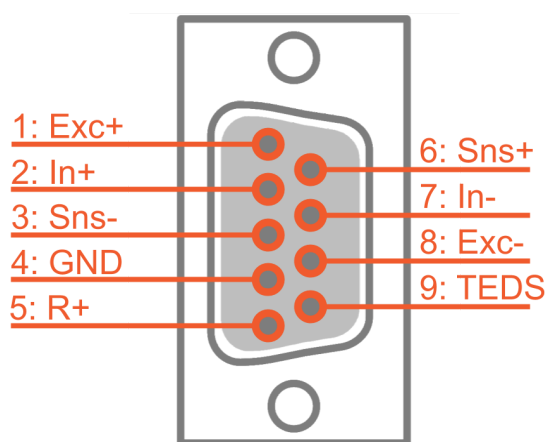
Analog inputs		IOLITEi X 4xUNI			
Input type		Voltage Full / Half / Quarter bridge strain (120 Ω and 350 Ω) Potentiometer, RTD, Resistance Current (ext. Shunt & int. Shunt) IEPE			
Number of channels		4			
ADC Type		24-bit, delta-sigma with anti-aliasing filter (-3 dB @ 400 kHz)			
Sampling Rate		Simultaneous 500 kS/sec per channel (software-selectable)			
Voltage mode					
Voltage Ranges		±100 V	±10 V	±1 V	±0.1 V
Input Accuracy	DC	±0.03 % of reading ±0.02 % of range			
Noise floor, Typ.	100 S/s / 1 kS/s / 10 kS/s / 100 kS/s / 500 kS/s	-135 dB / -127 dB / -117 dB / -108 dB / -99 dB	-137 dB / -128 dB / -118 dB / -109 dB / -103 dB	-134 dB / -125 dB / -116 dB / -106 dB / -99 dB	-116 dB / -108 dB / -99 dB / -90 dB / -81 dB
Dynamic Range, Typ.		-151 dB	-152 dB	-148 dB	-131 dB
CMR, Typ. -1 dBFS sine wave @ 50 Hz / 400 Hz / 1 kHz	10 kS/s	81 dB / 63 dB / 55 dB	85 dB / 85 dB / 85 dB	105 dB / 105 dB / 102 dB	99 dB / 99 dB / 98 dB
Gain Linearity		±0.01 %			
Gain Drift		Typical 10 ppm/K Max. 40 ppm/K			
Offset Drift		Typical 0.3 μV/K + 2 ppm of range/K Max 0.8 μV/K + 10 ppm of range/K			
Channel Cross talk typ. @ 1 kHz		-104 dB	-153 dB	-150 dB	-131 dB
Input Coupling		DC, AC 0.15 Hz			
Input Impedance		2 MΩ between IN+ and IN-	>1 GΩ between IN+ and IN-		
Max. Common Mode Voltage		±120 V	±12 V		
Overvoltage Protection		±200 V, continuous	±100 V continuous / ±200 V peak (10 ms)		
Current mode (internal shunt)					
Ranges		20 mA		2 mA	
Input Accuracy		±0.03 % of reading, ±0.02 % of range, ±2.1 μA			
Internal Shunt Resistor		47 Ω			
Excitation Voltage					
Excitation Voltage		Free programmable (16-bit DAC)			
Predefined levels		1, 2.5, 5, 10, 12, 15, 20, 24 V			

Accuracy	±0.05 % ±2 mV		
Drift	±10 ppm/K ±100 µV/K		
Load stability	< 0.01 %		
Noise @ 10 V / 350 Ω	<150 µVrms @ 10 kS/s		
Line regulation over 20 Ω of change	<0.005 % @ 120 Ω load		
Sense Impedance to Exc / to GND	100 kΩ / >100 MΩ		
Current limit	100 mA (max. 800 mW)		
Protection	Continuous short to ground		
Excitation Current			
Excitation Current	Free programmable (16-bit DAC)		
Predefined levels	0.1, 1, 2, 5, 10, 20, 60 mA		
Ranges	0.1 - 1 mA	>1 - 20 mA	>20 - 100 mA
Accuracy	±0.2 % ±0.5 µA	±0.15 % ±2 µA	±0.1 % ±10 µA
Drift Typical	±5 ppm/K ± 5 nA/K	±10 ppm/K ± 10 nA/K	±40ppm/K ± 200 nA/K
Compliance voltage	24 V, max. 800 mW		
Output Impedance	>100 MΩ		
Bridge Connection Types			
Bridge types	Full / Half / Quarter bridge (3-wire or 4-wire) / Quarter Constant Current (2-wire or 4-wire)		
Ranges	2 - 1000 mV/V free programmable		
Internal Bridge Completion	½ bridge and ¼ bridge 120 Ω and 350 Ω		
Typ. Bridge Completion Accuracy	0.05 %; TCR: 2 ppm/K		
Internal Shunt Resistor	100 kΩ, software selectable		
Typ. Shunt Resistor Accuracy	0.05 %; TCR: 10 ppm/K		
Input Short, Sensor Offset Adjust	Software selectable		
IEPE mode			
IEPE Current	Free programmable (16-bit DAC)		
Predefined levels	2, 4, 8, 12, 16 and 20 mA		
Compliance voltage	24V		
Output Impedance	>100 kΩ		
Sensor detection	Shortcut: <4 V; Open: >19 V		
Additional Specifications			
Modular		IOLITEi X 4xUNI	
Input connector		D-SUB9	
Isolation voltage		CH - GND and CH - CH isolated, CAT II 250V (Secondary circuits)	
TEDs support		Standard + DSI® adapters	
Power supply		9 - 57 V DC Power over Ethernet: 48 - 57 V DC (PoE++ power delivery)	
Power consumption	Lemo 24 V / 57 V	Excitation OFF: Excitation 0.8 W / Ch:	7.1 W / 8.7 W 14.8 W / 16.5 W
	PoE 48 V / 57 V	Excitation OFF: Excitation 0.8 W / Ch:	8.4 W / 8.9 W 17.8 W / 18.3 W

Weight	640 g
Slice Dimensions	136.75 x 115.0 x 35.0 mm
Rev: 1779350400	

5.1.1.2. IOLITE X 4xUNI: Connectors

5.1.1.2.1. IOLITE X 4xUNI: DSUB-9 Connector: Pinout



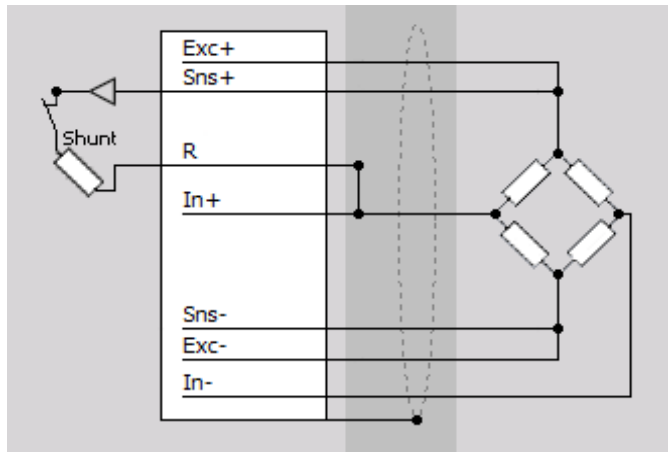
IOLITE X 4xUNI connector: Pin-out (DSUB-9 female)

Pin	Name	Description
1	Exc +	Excitation +
2	In+	Input +
3	Sns-	Sense -
4	GND	Ground
5	R+	$\frac{1}{4}$ Bridge/Shunt
6	Sns+	Sense +
7	In-	Input -
8	Exc-	Excitation -
9	TEDS	TEDS

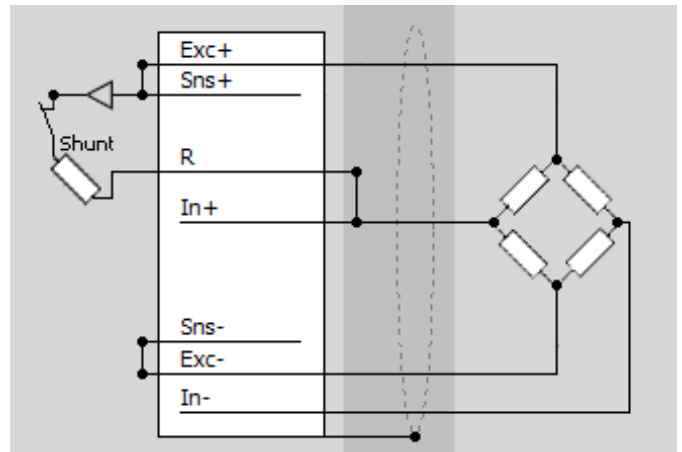
5.1.1.2.2. IOLITE X 4xUNI: DSUB-9 Connector: Wiring schematics

Bridge

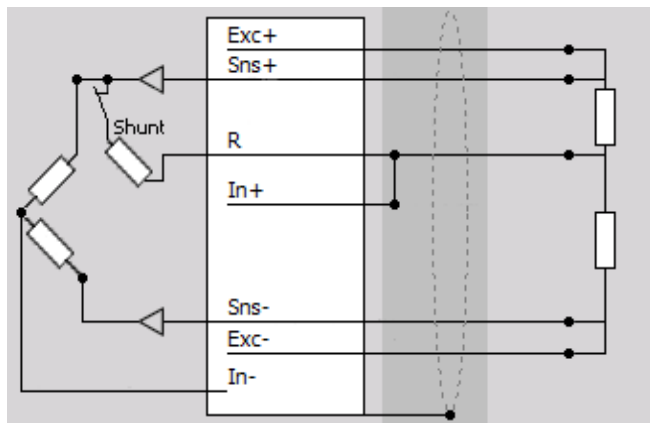
Full bridge (6-wire)



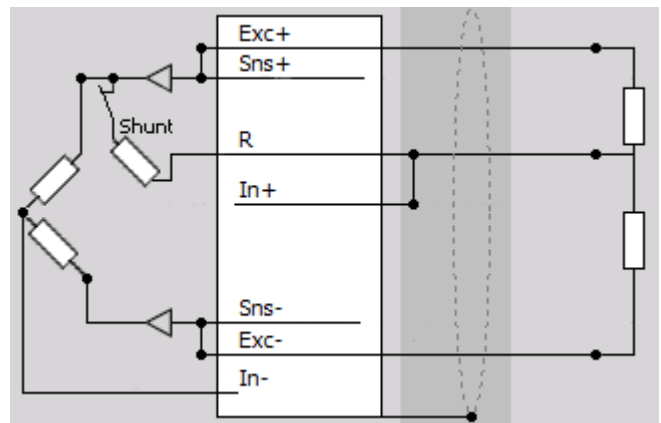
Full bridge (4-wire)



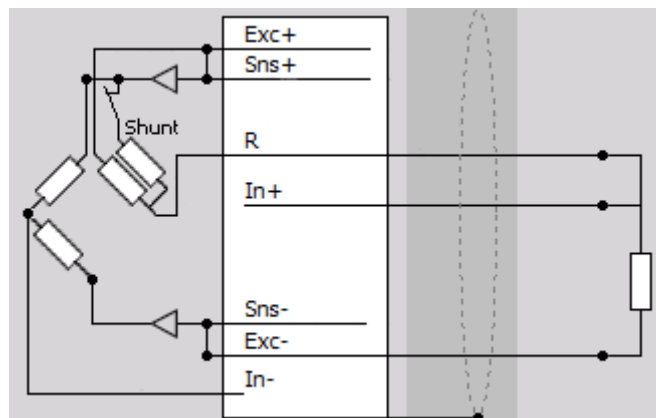
Half bridge (5-wire)



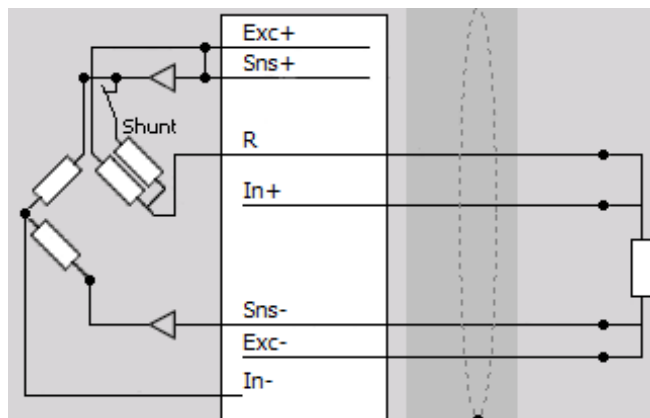
Half bridge (3-wire)



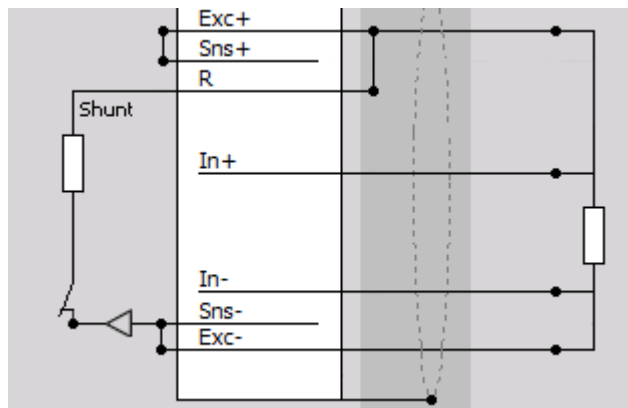
Quarter bridge (3-wire)



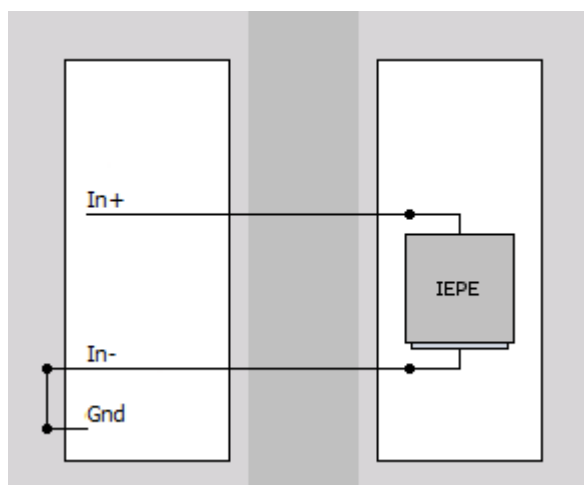
Quarter bridge (4-wire)



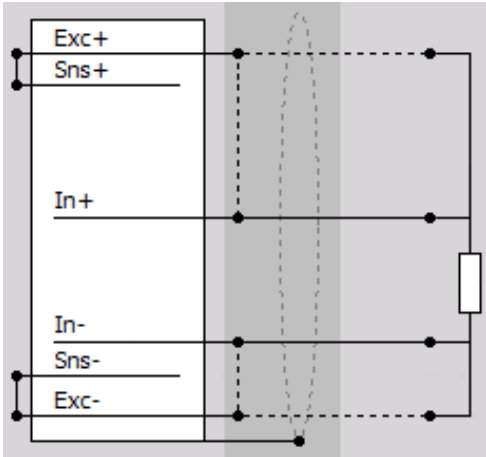
Quarter Bridge CC



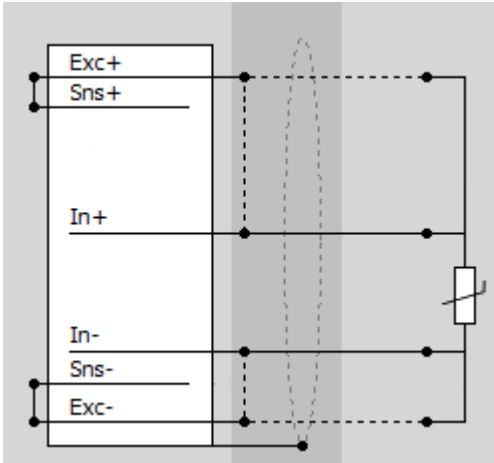
IEPE mode



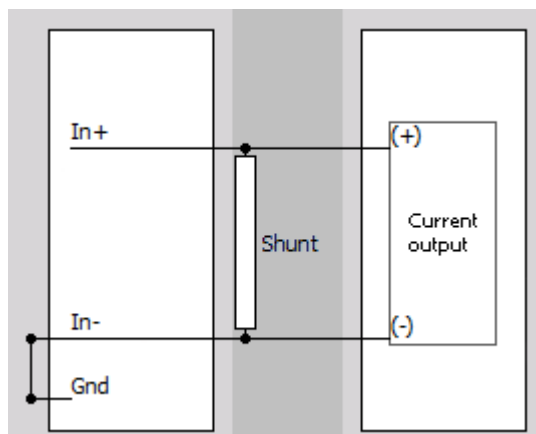
Resistance



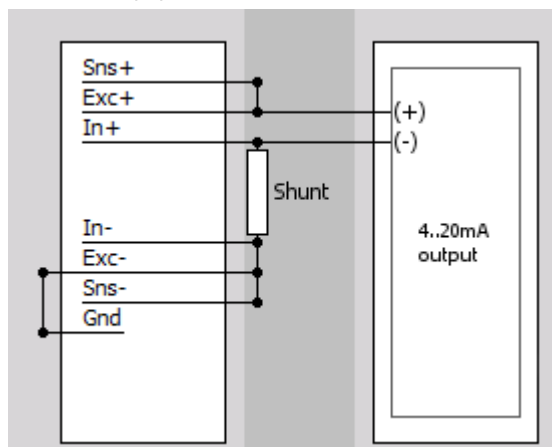
Temperature



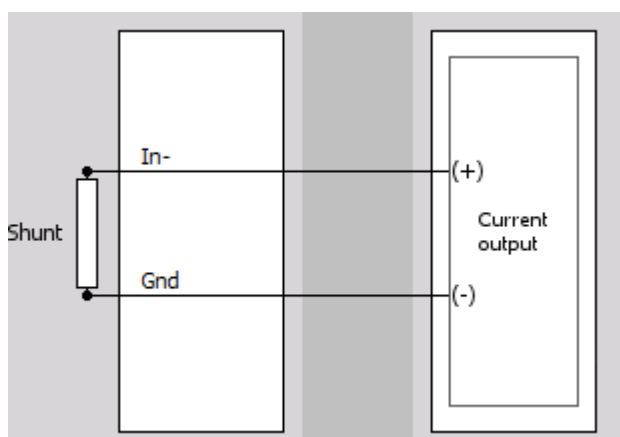
Current external shunt



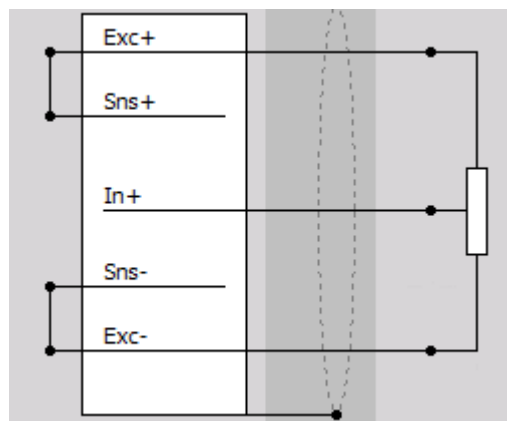
Current loop powered



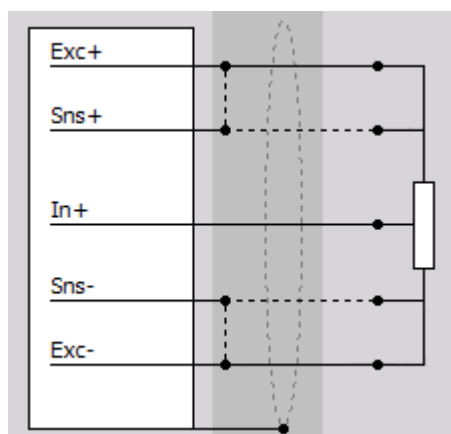
Internal shunt



Potentiometer 2W



Potentiometer 4W



6. IOLITE X Accessories

Manuals for optional IOLITE X Accessories and Sensors can be found in separate documents depending on the functionality, which are available for download from our homepage:

<https://dewesoft.com/download/manuals>

7. Warranty information

Notice

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

Note:

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The copy of the specific warranty terms applicable to your Dewesoft product and replacement parts can be obtained from your local sales and service office. To find a local dealer for your country, please visit

<https://dewesoft.com/support/distributors>.

7.1. Calibration

Every instrument needs to be calibrated at regular intervals. The standard norm across nearly every industry is annual calibration. Before your Dewesoft data acquisition system is delivered, it is calibrated. Detailed calibration reports for your Dewesoft system can be requested. We retain them for at least one year, after system delivery.

7.2. Support

Dewesoft 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 Dewesoft directly.

Dewesoft d.o.o.
Gabrsko 11a
1420 Trbovlje Slovenia

Europe Tel.: +386 356 25 300
Web: <http://www.dewesoft.com>
Email: support@dewesoft.com

The telephone hotline is available Monday to Friday from 07:00 to 16:00 CET (GMT +1:00)

7.3. Service/repair

The team of Dewesoft also performs any kinds of repairs to your system to assure a safe and proper operation in the future. For information regarding service and repairs please contact your local distributor first or Dewesoft directly on <https://dewesoft.com/support/rma-service>.

7.4. Restricted Rights

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We take pride in our products and we take care that all key products and technologies are registered as trademarks all over the world. The Dewesoft name is a registered trademark. Product families (KRYPTON, SIRIUS, DSI, DS-NET, IOLITE) and technologies (DualCoreADC, SuperCounter, GrandView) are registered trademarks as well. When used as the logo or as part of any graphic material, the registered trademark sign is used as a part of the logo. When used in text representing the company, product or technology name, the ® sign is not used. The Dewesoft triangle logo is a registered trademark but the ® sign is not used in the visual representation of the triangle logo.

8. Safety instructions

Your safety is our primary concern! Please be safe!

8.1. Safety symbols in the manual

Safety reference manual for the IOLITE Data Acquisition Devices can be found in <https://dewesoft.com/download> section. Search for keyword: **Safety technical reference manual**



Warning

Calls attention to a procedure, practice, or condition that could cause the body injury or death



Caution

Calls attention to a procedure, practice, or condition that could possibly cause damage to equipment or permanent loss of data.

8.2. General Safety Instructions



Warning

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. Dewesoft d.o.o. assumes no liability for the customer's failure to comply with these requirements.

All accessories shown in this document are available as an option and will not be shipped as standard parts.

8.2.1. Environmental Considerations

The product is an electronic instrument designed with consideration for environmental impact during its design and use phase. The materials and components used comply with the requirements of the RoHS Directive (2011/65/EU) and the REACH Regulation (EC No. 1907/2006), with no intentional use of restricted or prohibited hazardous substances. During normal operation, the product does not generate direct environmental emissions and features low power consumption. The device is designed for long-term use and serviceability, supporting an extended product lifetime. The product enclosure is made of aluminum, and selected components of the product are suitable for material recycling.

8.2.2. Product End-of-Life Handling

At the end of its service life, the product shall not be disposed of as unsorted municipal waste and shall be collected separately in accordance with the WEEE Directive (2012/19/EU).



The crossed-out wheeled bin symbol on the product, packaging, or accompanying documentation indicates that the equipment must be returned to an authorized collection point for waste electrical and electronic equipment. Recycling, recovery, and disposal

activities shall be carried out by authorized operators in compliance with applicable local, national, and EU environmental regulations.

For proper treatment, recovery and recycling of old products and batteries, please take them to applicable collection points in accordance with your national legislation. Penalties may be applicable for incorrect disposal of this waste, in accordance with national legislation.

8.2.3. General safety and hazard warnings for all Dewesoft systems

Safety of the operator and the unit depend on following these rules.

- Use this system under the terms of the specifications only to avoid any possible danger.
- Read your manual before operating the system.
- Observe local laws when using the instrument.
- DO NOT touch internal wiring!
- DO NOT use higher supply voltage than specified!
- Use only original plugs and cables for harnessing.
- You may not connect higher voltages than rated to any connectors.
- The power cable and connector serve as Power-Breaker. The cable must not exceed 3 meters, the disconnect function must be possible without tools.
- Maintenance must be executed by qualified staff only.
- During the use of the system, it might be possible to access other 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 advice 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.
- Ground the equipment: For Safety Class 1 equipment (equipment having a protective earth terminal), a non-interruptible safety earth ground must be provided from the mains power source to the product input wiring terminals.
- Please note the characteristics and indicators on the system to avoid fire or electric shocks. Before connecting the system, please read the corresponding specifications in the product manual carefully.
- The inputs must not, unless otherwise noted (CATx identification), be connected to the main circuit of category II, III and IV.
- 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.
- DO NOT use the system if equipment covers or shields are removed.
- If you assume the system is damaged, get it examined by authorized personnel only.
- Adverse environmental conditions are Moisture or high humidity Dust, flammable gases, fumes or dissolver Thunderstorm or thunderstorm conditions (except assembly PNA) Electrostatic fields, etc.
- The measurement category can be adjusted depending on module configuration.
- Any other use than described above may damage your system and is attended with dangers like short-circuiting, fire or electric shocks.
- The whole system must not be changed, rebuilt or opened.
- DO NOT operate damaged equipment: Whenever it is possible that the safety protection features built into this product have been impaired, either through physical damage, excessive moisture, or any other reason, REMOVE POWER and do not use the product until the safe operation can be verified by service-trained personnel. If necessary, return the product to Dewesoft sales and service office for service and repair to ensure that safety features are maintained.

- 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 environments. The system has been exposed to heavy shipment strain.
- Warranty void if damages caused by disregarding this manual. For consequential damages, NO liability will be assumed!
- Warranty void if damage 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).
- Be careful with voltages >25 VAC or >35 VDC! These voltages are already high enough in order to get a perilous electric shock by touching the wiring.
- The product heats during operation. Make sure there is adequate ventilation. Ventilation slots must not be 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 circuit and fire hazard!
- DO NOT use the system before, during or shortly after a thunderstorm (risk of lightning and high energy over-voltage). 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 circuits 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 refer to enclosed specifications.
- Use measurement leads or measurement accessories aligned with the specification of the system only. Fire hazard in case of overload!
- Lithium ion batteries are classified as not hazardous when used according to the recommendations of the manufacturer described in Battery Safety Data Sheet, which is available for download from [this link](#).
- 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 be charged, even if the system has been removed from the power supply.
- The electrical installations and equipment 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 observed by skilled personnel.
- The measuring systems are not designed for use in 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.
- Please also consider the detailed technical reference manual as well as the security advice of the connected systems.

- This product has left the factory in safety-related flawlessness and in proper condition. In order to maintain this condition and guarantee safety use, the user has to consider the security advice 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 the protection of buildings, are excluded from the scope of IEC 61326-3-1.

8.3. Documentation version history

Version	Date	Notes
V24-1	13.4.2024	Initial version - Product line release
V24-2	13.9.2024	- Additional information on connectivity - Specs and functionality update after additional SW testing for DeweosftX 2024.4 Release
V25-1	2.6.2025	Added X STGS
V26-1	21.5.2026	Added X UNI and CAN-FD