

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

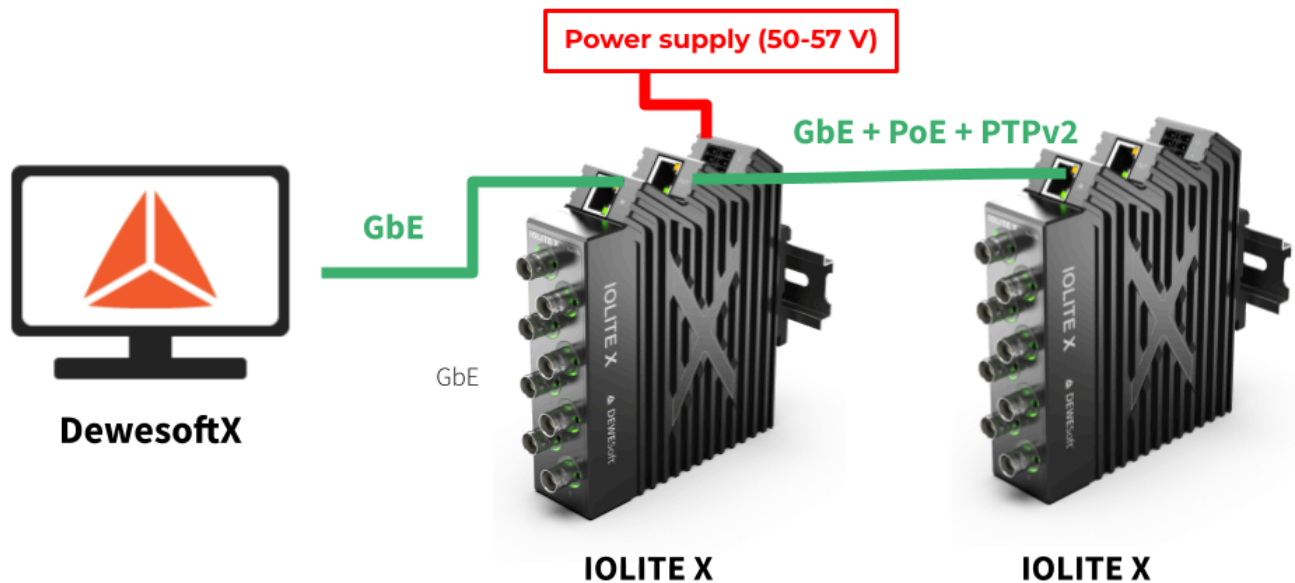
IOLITE X supports PTPv2 IEEE 802.3 which is only compatible with X-line devices (SIRIUS X, IOLITE X).

IOLITE X

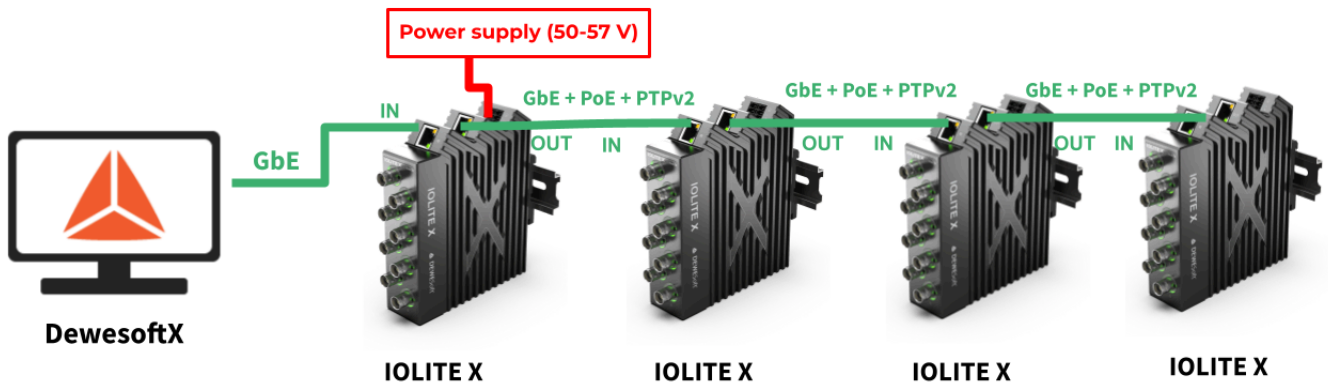
First connect the power supply cable to the PWR IN 2x3 TBLOCK connector. Then connect RJ-45 cable to the IN connector. Finally connect the other side (RJ45) to the LAN port of the PC.

3.2.1. Default configurations

3.2.1.1. Connection to the PC



3.2.1.2. Daisy chain connection with PoE



Important

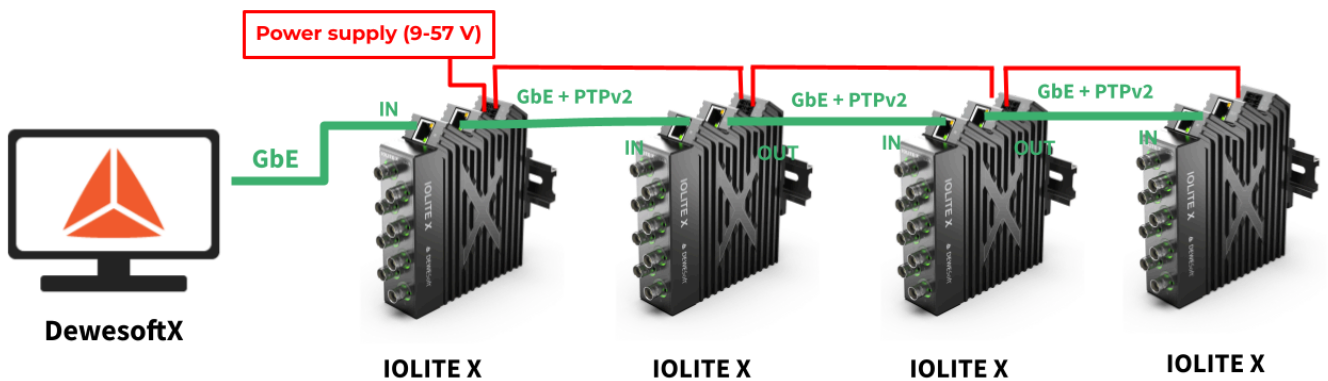
This device supports PoE++ power delivery and requires a certain voltage level to work! The device that is first in line has to be powered with **48 V - 57 V to enable the PoE.**



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. System Overview

IOLITE X

Small in size, but powerful and easily distributed for monitoring and industrial applications.

openDAQ SDK compliant.



Voltage



Current



Resistance



Potentiometer



Strain / Stress



Quarter Bridge



Half Bridge



Full Bridge

IEPE

IEPE



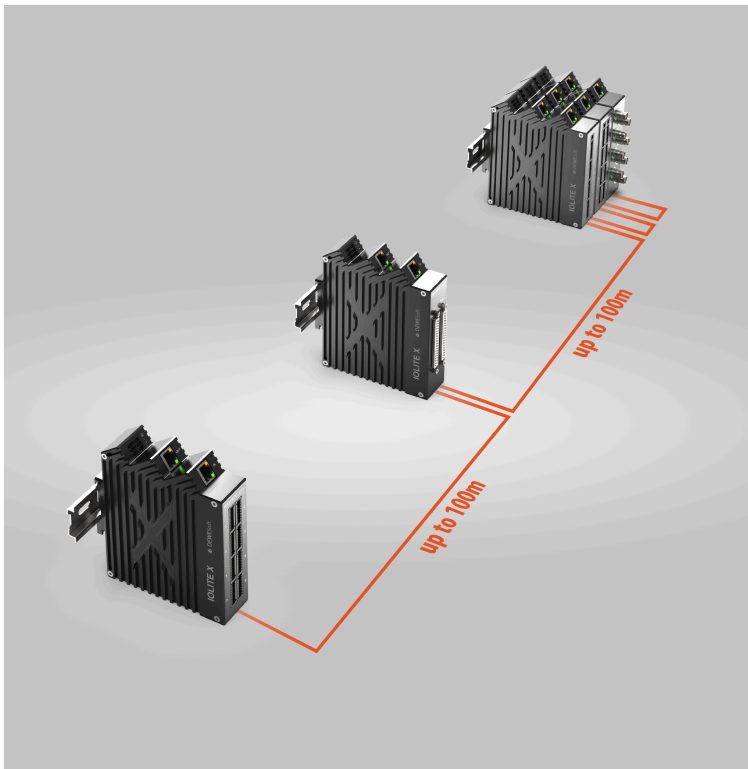
DSI Compatible



TEDS Compatible

4.1. Main features

- **GREAT SIGNAL CONDITIONING:** IOLITE X features high-quality amplifiers which offer great signal quality and up to 200kS/s sampling rate.
- **POWER OVER ETHERNET:** Active PoE++ (Power over Ethernet) power delivery, makes it easily daisy chainable.
- **PTPv2 SYNCHRONIZATION:** Precision Time Protocol (PTPv2) synchronization for easier connectivity and synchronized measurements.
- **OpenDAQ COMPLIANT:** IOLITE X devices are compliant with the OpenDAQ, open data acquisition platform. Discover, configure and receive data from any OpenDAQ compatible sensors, devices and instruments in your favorite programming environment.
- **GREAT PRICE/PERFORMANCE:** IOLITE X offers a great price/performance ratio and is suitable for test-bed and industrial applications.
- **SOFTWARE INCLUDED WITH FREE LIFETIME UPGRADES:** Easy to use, yet very robust in functionality, award-winning DewesoftX® software is included. The software comes with lifetime free upgrades and no hidden costs, bringing you intuitive configuration, smart sensors, advanced storage and analysis capabilities.



4.1.1. Perfect for industrial applications

IOLITE X chassis offers an easy clip-in mechanism for mounting to all standard industrial DIN rail mounts. This makes them perfect for mounting in industrial cabinets. IOLITE X devices use RJ45 connectors which allow easy connection of modules up to 100m and reduce cost by using standard low-cost Ethernet cables.

4.1.2. Intuitive and easy to use

Easy connectivity due to the need for only one cable for data, power and synchronization. Plug-and-play technology with smart sensors and advanced TEDS is supported by default. This makes performing measurements with the Dewesoft DAQ systems easier than riding a bike. You will be ready to measure in no time.

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.

5.3. VIBRATION AND SOUND MEASUREMENT

The IOLITE X product family includes solutions for vibration and sound measurement with:

- IOLITE X 8xACC

Together with our software these modules are also a good choice for machine condition monitoring solutions for rotating machinery.

5.3.1. IOLITE X 8xACC

The IOLITE X 8xACC module is a perfect choice for sound and vibration measurements with IEPE channels.

IOLITE X 8xACC modules have channel-to-ground isolation and come with BNC connectors.



IOLITE X-8xACC

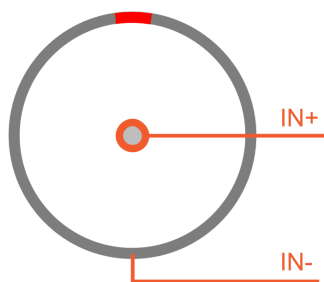
5.3.1.1. IOLITE X 8xACC: Specifications

Analog inputs		IOLITE X 8xACC			
Input type		Voltage, IEPE			
Number of channels		8			
ADC Type		24-bit delta-sigma with anti-aliasing filter (-3 dB @ 160 kHz) Butterworth 2nd order			
Sampling Rate		Simultaneous 200 kS/s per channel (software-selectable)			
Voltage Mode					
Voltage Ranges		±10 V	±5 V	±1 V	±0.2 V
Input Accuracy	DC	±0.02 % of reading ±0.02 % of range			
Noise floor, Typ.	10 kS/s / 100 kS/s / 200 kS/s	-116 dB / -107 dB / -105 dB	-116 dB / -107 dB / -105 dB	-115 dB / -105 dB / -103 dB	-105 dB / -95 dB / -93 dB
Dynamic Range, Typ.	10 kS/s / 100 kS/s / 200 kS/s	-158 dB / -149 dB / -150 dB	-156 dB / -150 dB / -150 dB	-155 dB / -152 dB / -148 dB	-145 dB / -140 dB / -139 dB
CMR, Typ. 0 dBFS sine wave @ 50 Hz / 400 Hz / 1 kHz	10 kS/s	117 dB / 117 dB / 117 dB	117 dB / 115 dB / 116 dB	115 dB / 115 dB / 114 dB	106 dB / 105 dB / 104 dB
	100 kS/s	107 dB / 107 dB / 107 dB	107 dB / 107 dB / 107 dB	105 dB / 105 dB / 104 dB	96 dB / 96 dB / 95 dB
	200 kS/s	106 dB / 106 dB / 106 dB	106 dB / 106 dB / 106 dB	103 dB / 103 dB / 102 dB	93 dB / 93 dB / 93 dB
THD, Typ. -1 dBFS sine wave @ 1 kHz	10 kS/s / 100 kS/s / 200 kS/s	-105 dB / -103 dB / -99 dB	-104 dB / -102 dB / -98 dB	-103 dB / -102 dB / -98 dB	-101 dB / -101 dB / -99 dB
SFDR, Typ. -1 dBFS sine wave @ 1 kHz	10 kS/s / 100 kS/s / 200 kS/s	106 dBc / 106 dBc / 101 dBc	106 dBc / 105 dBc / 101 dBc	106 dBc / 105 dBc / 90 dBc	98 dBc / 97 dBc / 90 dBc
SNR, Typ. -1 dBFS sine wave @ 1 kHz	10 kS/s / 100 kS/s / 200 kS/s	106 dB / 103 dB / 101 dB	102 dB / 100 dB / 98 dB	104 dB / 99 dB / 88 dB	92 dB / 87 dB / 87 dB
Gain Linearity		< 0.02 %			
Gain Drift		Typical 6 ppm/K, max. 15 ppm/K			
Offset Drift		Typical 0.5 μV/K + 0.5 ppm of range/K, max 2 μV/K + 2 ppm of range/K			
Channel Cross talk typ. @ 1 kHz		-130 dB	-130 dB	-130 dB	-125 dB
Input Coupling		DC, AC 0.1 Hz, 1 Hz			
Input Impedance		1 MΩ			
Overvoltage Protection		In+ to In-: 50 V continuous, 200 V peak (10 msec)			
Analog input performance					
Sample rate		SR ≤ 2 kS/s		SR > 2 kS/s	
Bandwidth (-3 dB)		0.489*fs		0.433*fs	
Alias-free Bandwidth		DC to 0.44*fs		DC to 0.499*fs	
Alias Rejection		-105 dB (all sample rates)			
Delay Through ADC		34 / fs			
Oversampling		128			
IEPE input					
Excitation		2 mA, 4 mA, 6 mA			

Excitation accuracy		10%
Compliance voltage		24 V
Output Impedance		>60 kΩ
Sensor detection		Shortcut: <4 V; Open: >19 V
Additional Specifications		
Modular		IOLITE X 8xACC
Input connector		BNC
Isolation voltage		250 V _{peak} channel to ground
TEDs support		IEPE mode only (class 1)
Power supply		9 - 57 V DC, Power over Ethernet: 48 - 57 V DC (PoE++ power delivery)
Power consumption	TB @Typ. 24 V / MAX. 56 V	Voltage mode: Typ. 5.88 W / Max. 7.4 W IEPE mode: Typ. 7.3 W @4 mA, 8.6 W @6 mA / Max. 7.9 W@4 mA, 9.3 W @6 mA
	PoE @Min. 48 V / MAX. 56 V	Voltage mode: min. 7.2 W / Max. 7.6 W IEPE mode: min. 8.5 W @4 mA, 8.9 W @6 mA / Max. 9.2 W@4 mA, 9.5 W @6 mA
Weight		600 g
Slice Dimensions		137 x 115.0 x 35.0 mm
Rev: 1712304000		

5.3.1.2. IOLITE X 8xACC: Connectors

5.3.1.2.1. IOLITE X 8xACC: BNC Connector: Pinout



ACC connector: pin-out (BNC)

Pin	Name	Description
1	IN+	Input +
2	IN-	Input -

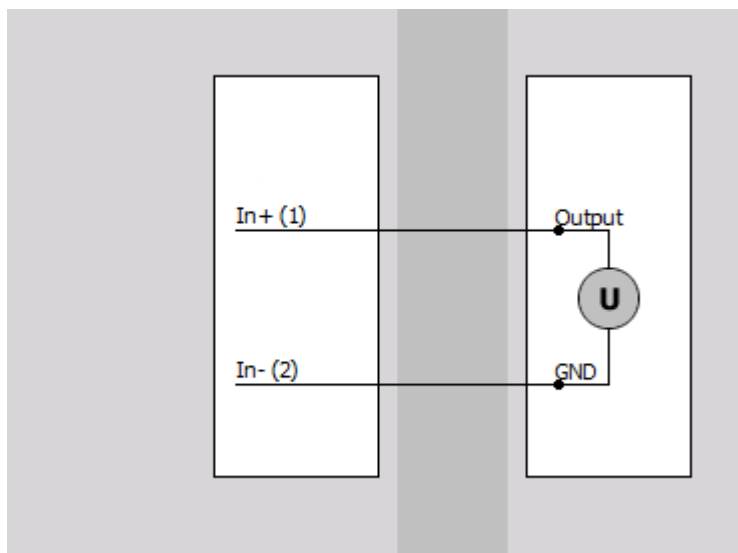


Note

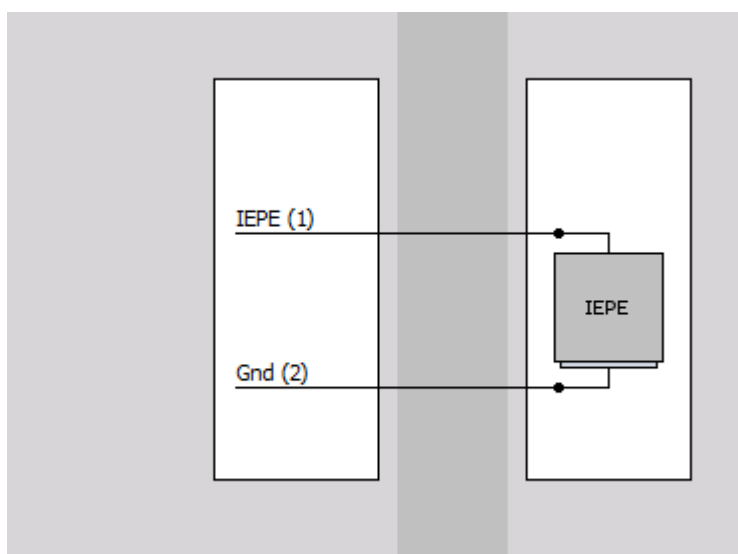
IOLITE X 8xACC has a single-ended input where IN- (Analog input -) represents isolated ground.

5.3.1.2.2. IOLITE X 8xACC: BNC Connector: Wiring schematics

Voltage



IEPE



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