GRIDPHASE

DEWESoft®

TECHNICAL REFERENCE MANUAL

GRIDPHASE

1. Table of contents

About this document

This is the user's manual for GRIDPHASE.

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.

Online versions

Device Technical Reference Manual

The most recent version of this manual can be downloaded from our homepage:
https://dewesoft.com/download/manuals
In the *Hardware Manuals* section click the download link for the *Device® technical reference manual*.

Introduction

Dewesoft Gridphase is a phase identification system for use in power grids. The system comprises three main components namely the Gridphase Handheld device, Gridphase reference device and the Gridphase web multitenancy cloud application. This document describes the handheld device along with the Gridphase mobile application. The technical reference manual for Gridphase reference device is available in a separate document and for the Gridphase web application you should consult the Gridphase Software Users Manual. Detailed technical specifications are available in the corresponding datasheets for both Gridphase reference and Gridphase handheld devices.

Principle of operation

The system combines reference devices and handheld instruments to measure synchronized voltage signals. A GNSS clock signal ensures precise synchronization of voltage signal measurements between reference and handheld devices at different geographical locations. Through exchange of timestamped measurements, users can see phases measured at the reference point to those at the measurement point, enabling the identification of matching electrical phases as shown in Figure 1.

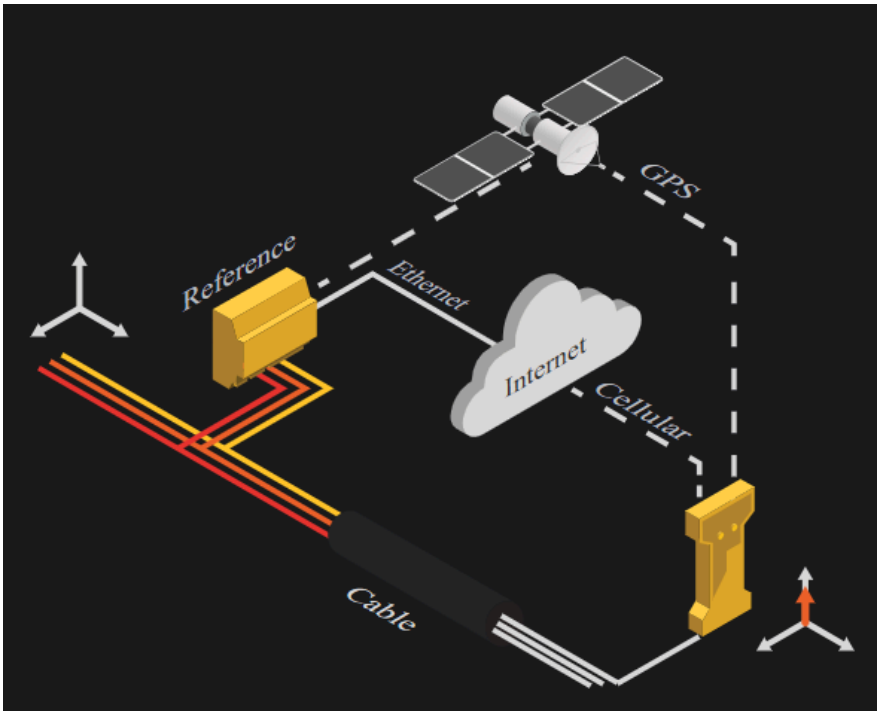

Figure 1

Mobile application

The Gridphase mobile application is required for the handheld device to be used, as the measurement exchange is done via the data connection of the mobile phone. The application is available for both iOS and Android platforms and is available here:

- iOS AppStore
- Google PlayStore

Once the application is installed you should give it permission to use the location services as location is used for speeding up the synchronization through the AGNSS (Assisted GNSS).

Operation description

Power on

Figure shows the handheld device. The user interface features a power button and a virtual point button, an indication of the measured voltage magnitude (50V, 230V, 400V), indication of phase (L1,L2,L3) and status LEDs for Power/Standalone, Bluetooth connectivity, Battery, Synchronization, and GPS (PPS timing signal presence). Once the device is powered on, its initialization takes around 5 seconds - the power LED lights on, the GPS led blinks and a short beep after that indicates that the initialization has been completed. The device is then ready to be connected to the smartphone and synchronized with the GNSS.

Important

If the device emits a prolonged beep, the **Battery LED flashes**, and then the device powers off, it means the battery is empty. If the Battery LED flashes when the device is powered on, this indicates that the battery is low.

Figure 2

Pairing with smartphone and synchronization

Open the Gridphase app and pair it with the device. Pairing is done straight from the mobile app, just select Pair Gridphase Device, as shown in Figure 3, and the device should be listed as “GridPhase_UART” (see Figure 4). Select the device and this will connect the device and begin the synchronization process as shown in Figures 5 and 6. The device should obtain at least 4 satellites to obtain the PPS timing signal and begin synchronization. Once the PPS is available it takes another 4 seconds to lock the internal phase-locked-loop (PLL). After that the measurement screen will appear as shown in Figure 7.

Important
When synchronizing the device the device should be horizontally pointed towards the open sky.

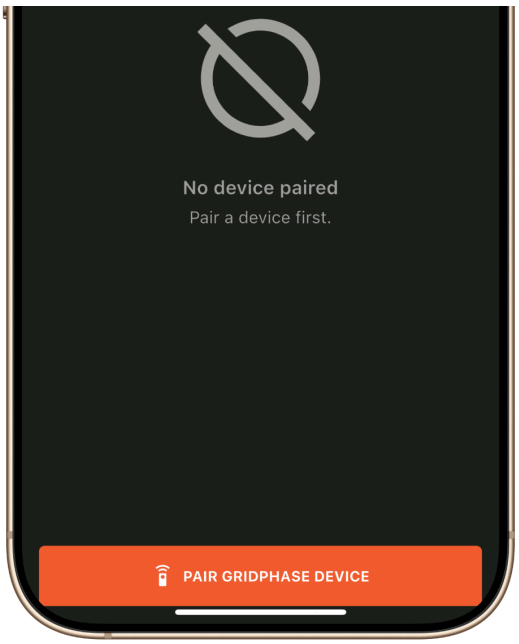

Figure 3

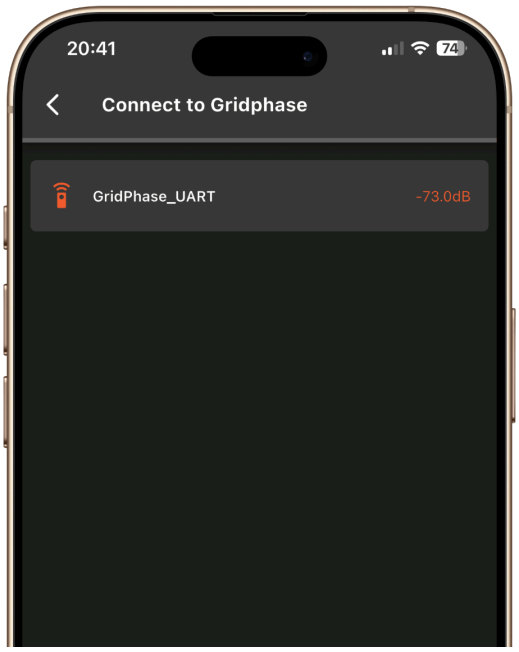

Figure 4

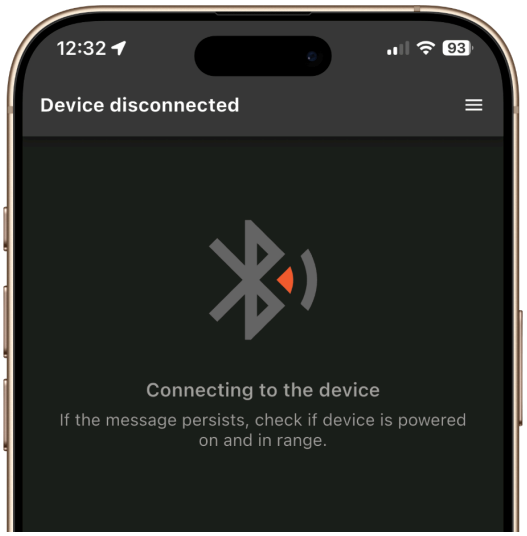

Figure 5

Figure 6

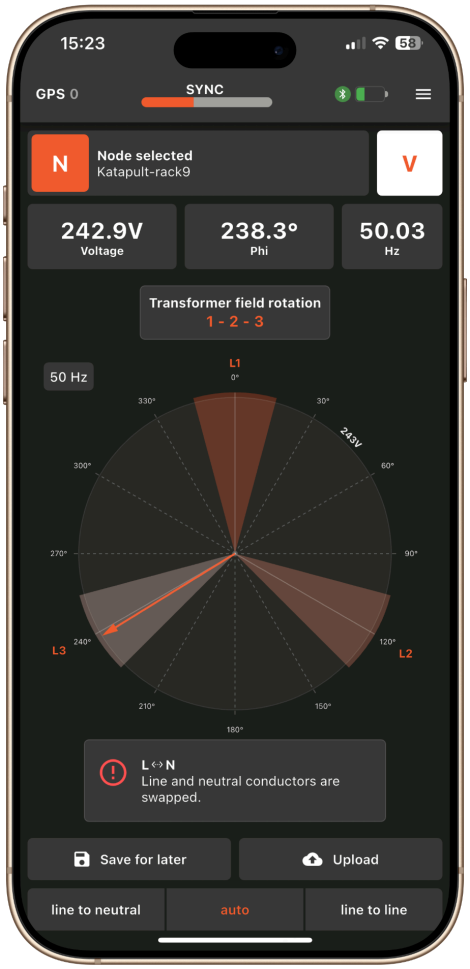

Figure 7

Once on the measurement screen, the device is ready for measurement.

Measurement modes

The device can measure in contact or contactless mode. In contact mode a wired connection to measurement point needs to be done, much like with a normal voltmeter. In contactless mode the device needs to be placed into the electric field of the energized conductor. The contactless mode is intended for measurements on medium and high-voltage overhead lines.

Both modes support both 50 Hz and 60 Hz grids.

Contactless mode

To measure in contactless mode, first activate the internal capacitive sensor. Press the “Settings” button, then choose “Contactless” under the Contact Mode menu (see Figure 8). You’ll notice the main screen update: instead of showing voltage magnitude, it displays one of three E-field intensity levels—LOW, MEDIUM, or HIGH.

For reliable readings, hold the device 20–40 cm from the MV or HV conductor. It doesn’t matter whether the conductor is insulated, but it must not be shielded—any screening blocks the E-field. The capacitive

sensor sits on the bottom of the device (Figure 9), so align it so it faces the E-field perpendicularly (Figure 10) at about 15–25 cm from the energized conductor.

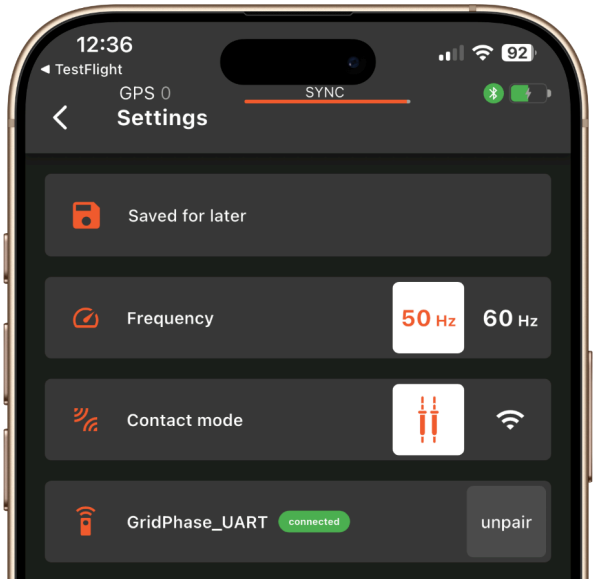

Figure 8

Figure 9

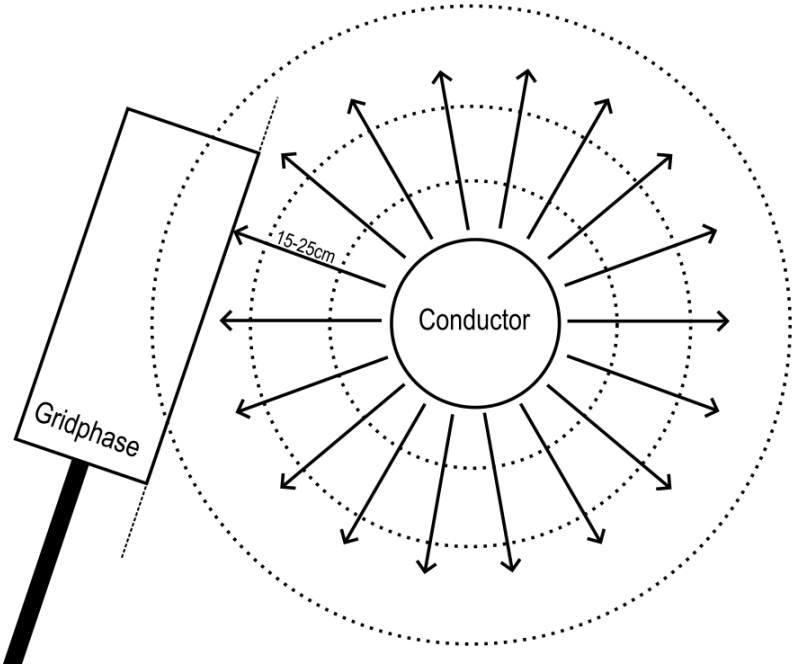

Figure 10

A phase shift of +-25° can be expected from positioning error. Figures 11 and 12, shows field examples of measurements on medium voltage (MV) and high-voltage conductors respectively.

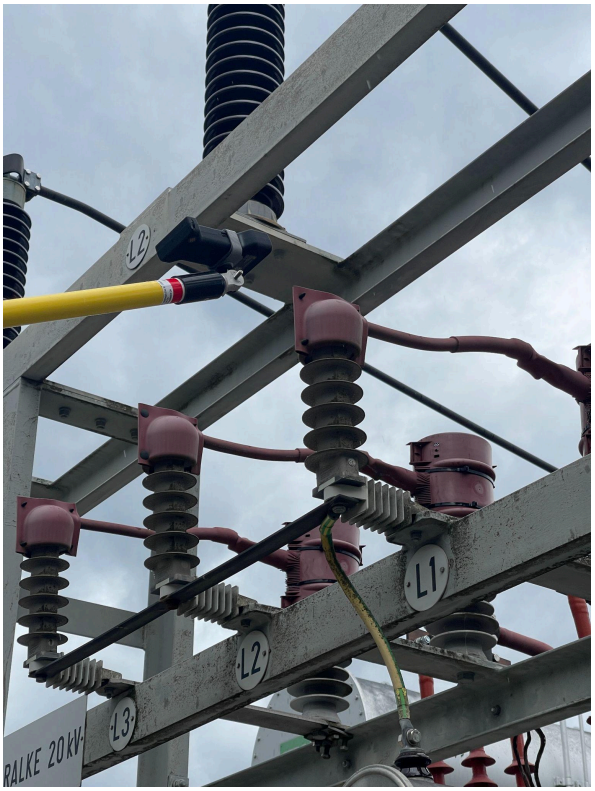

Figure 11

Figure 12

Important
For 60 Hz mode operation and measurements the reference device needs to be present in the same 60 Hz synchronous grid.

Reference point selection

When making phase identification we are always comparing against some reference device in the background. The measurement result can be a raw comparison or there can be a phase shift imposed to compensate for transformers in between. Gridphase enables various possibilities for that.

Raw angle comparison

For raw angle comparison, we select N (Figure 13) for node selection and then select the “Select device” menu (Figure 14), which lists all the reference devices in your organization.

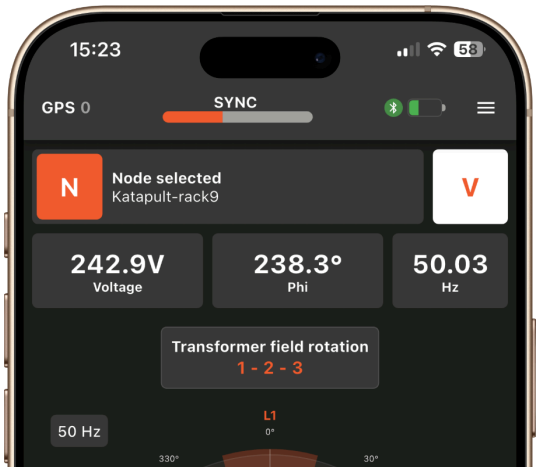

Figure 13

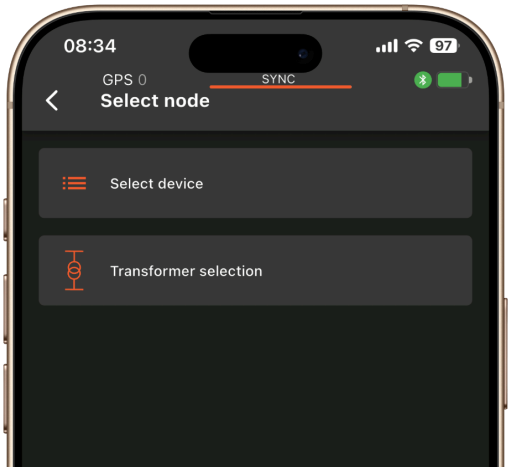

Figure 14

Selecting the reference device then enables raw angle comparison to the selected reference.

Manual vector group compensation

Mobile application allows for manual selection of compensation of vector groups. By selecting V (Figure 15) and then enabling the appropriate Transformer Vector Groups for high-voltage to medium-voltage transformation and for medium-voltage to low-voltage transformation (if applicable) as shown in Figure 16.

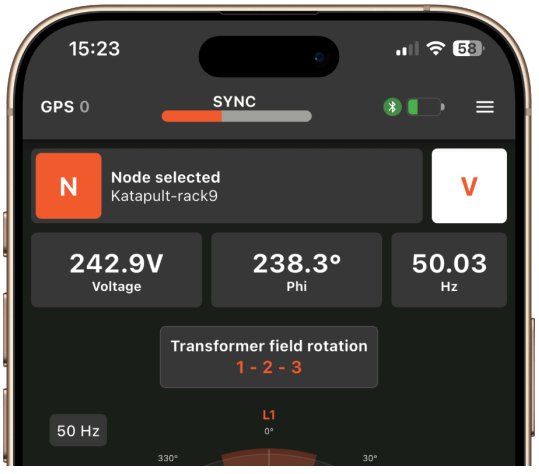

Figure 15

Figure 16

Virtual point referencing

Some applications only need a quick comparison between two points in the grid or a building installation. With Gridphase, you can define a “virtual reference” at any location and then compare every subsequent measurement against that reference. Virtual point is established by selecting V (Figure 17), measuring at the point of reference and setting that measurement as reference point (Figure 18).

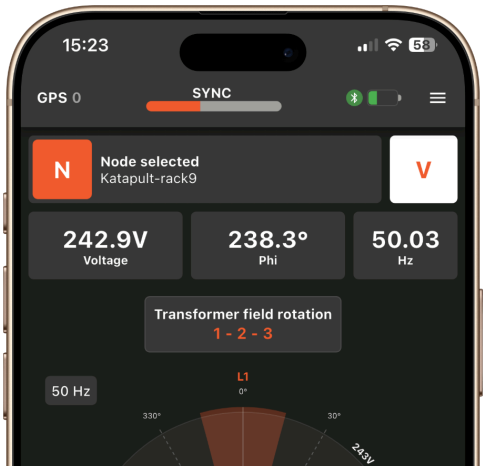

Figure 17

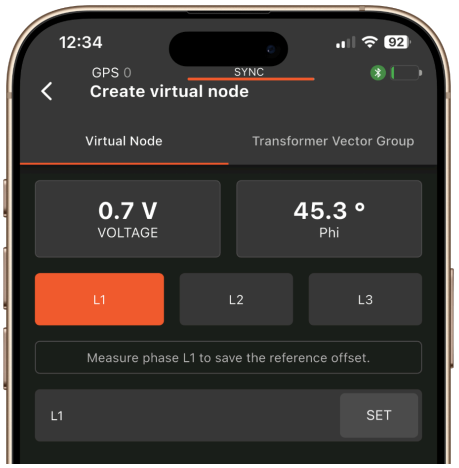

Figure 18

Transformer selection

Transformer vector groups can introduce tricky phase shifts that overwhelm many field crews. For this purpose Gridphase has an option of background network model that enables the field user to select its first upstream supply point (transformer) and the vector group compensation happens automatically in the background. This option is accessed by N -> Transformer selection (Figure 19) -> selection of supply transformer (Figure 20).

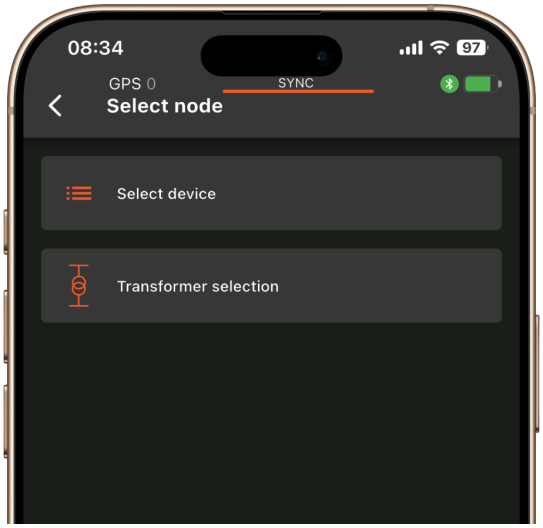

Figure 19

Figure 20

Warranty information

Notice
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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.

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.

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.

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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)

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.

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Safety instructions

Your safety is our primary concern! Please be safe!

Safety symbols in the 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.

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.

Environmental Considerations

Information about the environmental impact of the product.

Product End-of-Life Handling

Observe the following guidelines when recycling a Dewesoft 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 its end of life! Please recycle this product in an appropriate way to avoid 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 2002/96/EC on waste electrical and electronic equipment (WEEE). Please find further information about recycling on the Dewesoft web site www.dewesoft.com

Restriction of Hazardous Substances
This product has been classified as Monitoring and Control equipment and is outside the scope of the 2002/95/EC RoHS Directive. However, we take care of our environment and the product is lead-free.

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.

Documentation version history

Version	Date	Notes
V25-1	19.03.2025	Initial version