

SIRIUS®

 DEWESoft®

TECHNICAL REFERENCE MANUAL

SIRIUS® V25-1



9.2. Support	361
9.3. Service/repair	361
9.4. Restricted rights	361
9.5. Copyright	362
9.6. Trademarks	362
10. Safety instructions	363
10.1. Safety symbols in the manual	363
10.2. General Safety Instructions	363
10.2.1. Environmental considerations	363
10.2.2. Product End-of-Life handling	363
10.2.3. System and components recycling	364
10.2.4. General safety and hazard warnings for all Dewesoft systems	364
11. Documentation version history	367
11.1. Previous versions history	368

2. About this document

This is the Technical Reference Manual for SIRIUS® Systems.

SIRIUS is a versatile data acquisition hardware line which comes in many different form factors and can be equipped with a wide range of different amplifiers, so that you can use it for virtually any measurement task. Each system also includes a professional license for our award-winning Dewesoft data acquisition software.

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

- A detailed description of the SIRIUS hardware and the main combination and expansion options
- 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

Gives you important information about a subject.
Please read carefully!



Hint

Gives you a Hint or provides additional information about a subject.



Example

Gives you an example of a specific subject.

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.

2.2. Online versions

2.2.1. SIRIUS® Technical Reference Manual

The most recent version of this manual can be downloaded from our homepage:
<https://dewesoft.com/download/manuals>

2.2.2. DewesoftX® User Manual

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

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



Important

Read safety instructions first in chapter Safety instructions

4. System Overview

SIRIUS

The world's most versatile USB and EtherCAT data acquisition system.
Any signal, any sensor, packed with cutting edge technology.



Voltage



Strain / Stress



Quarter Bridge



Half Bridge



Full Bridge



Thermocouple



Digital IO



IEPE



Charge



Current



Shock rating



RTD



Resistance



DSI Compatible



TEDS
Compatible



EtherCAT



IP50



-10 °C to +50 °C



High Voltage



LVDT



Counter
Encoder



CAN BUS



OBDII



J1939



Analog out



USB 2.0

4.1. Main features

- **USB/ETHERCAT INTERFACE:** SIRIUS DAQ system can be connected via USB or EtherCAT to any Windows compatible PC or to one of our high-performance [SBOX data loggers](#).
- **ANY SENSOR:** Array of different amplifiers are available that can acquire data from virtually any sensor on the market. IEPE, voltage, high voltage, charge, full / half / quarter bridge, LVDT, RTD, thermocouples, current, resistance, counter, encoder, and digital inputs are available.
- **UNIVERSAL ANALOG INPUTS:** Universal analog amplifiers can accept voltage and full / half / quarter bridge signals natively as well as IEPE, charge, thermocouples, RTD, current, resistance, and LVDT signals with the use of [DSI adapters](#).
- **160 dB DYNAMIC RANGE:** Our DualCoreADC® technology boosts dual 24-bit delta-sigma ADC's with an anti-aliasing filter on each analog channel, achieving astonishing 160 dB dynamic range in time and frequency domain with 200 kHz sampling rate per channel.
- **1 MHz SAMPLING RATE:** A combination of software and hardware allows for acquisition speeds up to 1 MHz per channel on SIRIUS HS devices with real-time data processing and streaming to disk.
- **HIGH ISOLATION:** High channel-to-channel and channel-to-ground isolation prevents damage to the systems from excessive voltage and avoids ground loops.
- **FLEXIBLE AND SCALABLE:** SIRIUS DAQ system can grow with your needs. You can start with a single channel and scale the system to thousands of channels at any time.
- **SENSOR POWER SUPPLY:** Amplifiers provide channel-independent, programmable power supply for sensor excitation.
- **DIGITAL/COUNTER/ENCODER INPUTS:** Each channel is capable of 3x digital inputs, 1x event counter, encoder, period, pulse-width, duty-cycle, and precise frequency and angle measurement using patented SUPERCOUNTER® technology.
- **ISOLATED CAN INPUT:** High speed CAN 2.0b channels with 1 Mbit/sec data throughput with additional support for CCP, OBDII, J1939, and CAN output.
- **ANALOG OUTPUTS/FUNCTION GENERATOR:** SIRIUS slice can be configured with 8 analog outputs which can also function as a multi-channel function generator (software option upgrade required), analog replay, or control device with the output voltage signal of ± 10 V.
- **FULLY SYNCHRONIZED:** Each channel, analog, digital, or CAN is synchronized with microsecond accuracy.
- **SOFTWARE INCLUDED WITH FREE LIFETIME UPGRADES:** The easy-to-use but rich in functionality, award-winning [DewesoftX® software](#) is included. All upgrades to the software are free forever with no hidden licensing costs.

This chapter contains all information about SIRIUS® systems. The various measurement modules have their own chapter: SIRIUS® Measurement Modules.

SIRIUS® is a data acquisition system, which offers the highest flexibility for inputs like the voltage, current, temperature, strain, vibration, pressure, counters, CAN and more. The data transfer to the PC can be done via USB or EtherCAT®.

The SIRIUS® system consists of Slices which contain up to 8 measurement Modules

Each SIRIUS® module typically has one analog channel. The HD-series has 2 channels per module. Some modules are available with an additional counter channel - those modules have a plus sign + at the end: e.g. SIRIUS ACC+ or, SIRIUS STGM+.

Optionally available is a version with 8 analog outputs on the rear side of a Slice.

Multiple Slices can be combined and synced together to get a multi-channel solution.

4.1.1. Naming of variants, suffix description



Important

See table below for SIRIUS, Rack and SBOX suffix descriptions / abbreviations.

Suffix	Device	Description
i	SIRIUSi	Isolated version
e	SIRIUSe SBOXe	EtherCAT version SBOX with integrated Sync Junction
f	SIRIUSf	Fanless version
r	SIRIUSr	Rack version
m	SIRIUSm	Mini 4-channel SIRIUS version
im	SIRIUSim	Isolated Mini 4-channel CAN SIRIUS version
ie	SIRIUSie	Isolated EtherCAT version
if	SIRIUSif	Isolated Fanless version
ir	SIRIUSir	Isolated Rack version
fe	SIRIUSfe SBOXfe	Fanless EtherCAT version Fanless SBOX with integrated Sync Junction
re	SIRIUSre SBOXre	EtherCAT version for Rack instruments SBOX with integrated Sync Junction for Rack instruments
se	SBOXse	EtherCAT version for Rack instruments Slim version
we	SIRIUSwe SBOXwe	Watertight EtherCAT version Watertight SBOX with integrated Sync Junction
ife	SIRIUSife	Isolated Fanless EtherCAT version
ire	SIRIUSire	Isolated Rack EtherCAT version
iwe	SIRIUSiwe	Isolated Watertight EtherCAT version
rt	Rack rt	Real Time EtherCAT slave port version
D	Rack d	Rack with display version
B	Rack b	Rack with battery power version
DB	Rack db	Rack with display and battery version

4.2. Enclosure Overview

SIRIUS® systems are available in different enclosure types. The following list provides a short high-level overview and the following sub-chapters cover the details.

- **Modular Solution:** Rugged slices with up to 8 measurement modules. This solution is very flexible because you can use each slice independently or combine multiple slices for a single measurement.
- **Compact Systems:** A compact box that can contain up to 4 measurement slices and an optional SBOX slice. This solution is more compact than using 4 single slices and also more convenient because all the slices are wired together internally: you don't need to interconnect the slices with external USB / Sync / Power / GND cables.
- **Rack:** A rugged solution for up to 8 measurement slices with integrated SBOX: This solution has all the advantages of the Boxed Solution, but double the channel count. Moreover, there are versions with integrated display and batteries available.
- **Instruments:** A rugged and portable solution including SBOX, display and optional batteries with 1 or 2 measurement slices.

Enclosure	Modular solution	Compact Systems				High-channel rack mountable systems			Portable all-in-one systems		Lab system
	SIRIUS	R4 / R4 HUB	R2 / R2 HUB	R2rt / R4rt	R1B / R2B	R8	R8D	R8DB	R2DB	R1DB	R3
Input type	ch-ch isolated (SIRIUSi), pair isolated (SIRIUSi HD) or differential slices (SIRIUS)										
Max SIRIUS slices	Flexible	4	2	2 / 4	1 / 2	8			2	1	3
Max DualCore/HS channels	8 per slice	32	16	16 / 32	8 / 16	64			16	8	24
Max HD channels (no counters possible)	16 per slice	64	32	16 / 32	16 / 32	128			32	16	48
Max counters	8 per slice	32				64			16	8	24
Max digital input/digital outputs	24 DI / 8 DO	96 DI / 32 DO				192 DI / 64 DO			48 DI / 16 DO	24 DI / 8 DO	72 DI / 24 DO
Analog out	Only USB with fan	Yes	Yes		No	Yes	No		No		Yes
Max CAN ports	1	4	2		1	8			2	1	
Computer system	Optional SBOXe, SBOXfe	Integrated SBOXse				Integrated SBOXre			Integrated SBOXse		Standard PC
Display	External (MOB DISP 12)		External			External	Integrated 17" Full-HD		Integrated 12" Full-HD		External
Batteries	External BP2i, BP4i	External BP2i, BP4i				External BP2i, BP4i		Integrated	Integrated		-
Power Supply	9-36 V DC	12-36 V DC	12-36 V DC	12-36 V DC	12-36 V DC	12-36 V DC	12-36 V DC	18-24 V DC	9-36 V DC	9-36 V DC	110 V / 220 V AC

4.11. SIRIUS-R8 SYSTEMS

High channel count data acquisition system with built-in data logger and powerful data processing computer, touch screen display (R8D) and internal batteries (R8B, R8DB) for maximum portability.



SIRIUS-R8DB

Main Features:

- **HIGH-END SIGNAL CONDITIONING:** R8 data acquisition systems are built around SIRIUS DAQ technology and feature the same versatile and powerful amplifiers for world-leading signal conditioning. Visit SIRIUS product page for detailed SIRIUS DAQ technology overview.
- **ALL-IN-ONE INSTRUMENT:** R8 instruments are high channel count, standalone DAQ systems with built-in powerful data processing computer, SSD data logging capabilities, touch-screen LED display (R8D and R8DB), and internal Li-Ion batteries (R8B/R8DB) for maximum portability.
- **UP TO 128 ANALOG INPUTS:** Systems can be configured with up to eight SIRIUS DAQ slices for a total of 128 analog inputs for virtually any sensor.
- **UP TO 64 COUNTER/ENCODER INPUTS:** R8 DAQ system can be configured with up to 64 counter/encoder or 192 digital input channels, all equipped with our patented SUPERCOUNTER® technology.
- **UP TO 8 ISOLATED CAN PORTS:** Configure up to 8 high speed CAN 2.0b channels with 1 Mbit/sec data throughput with additional support for CCP, OBDII, J1939, and CAN output.
- **UP TO 64 ANALOG OUTPUTS:** R8/R8B can be configured with up to 64 analog outputs and can function as a multi-channel function generator, analog replay, or control device with the output voltage signal of $\pm 10V$.
- **ETHERCAT MASTER PORT:** R8 DAQ systems include an EtherCAT master port with built-in synchronization for easy connection and extension of any of our EtherCAT based DAQ system like KRYPTON DAQ modules or SIRIUS DAQ system.
- **ALL INTERFACES:** Interfaces for Wireless LAN, dual GLAN or 2.5GLAN (depending on SBOX version), 4x USB 3.0, GPS, HDMI, 2x synchronization are available.
- **100 Hz GPS WITH RTK:** Optional 10 Hz or 100 Hz GPS receiver with additional RTK support can be built straight into R1DB/R2DB DAQ system.



Hint

The analog out option is available only on SIRIUS-R8B and SIRIUS-R8.

4.11.1. SIRIUS-SBOXre

At the heart of every R8 DAQ system is a powerful SBOX computer powered by Intel CPU. Together with variable memory, fast internal SSD storage, and a removable data SSD hard drive it provides enough storage and power for processing data from thousands of channels. Please check the specifications tables below for more information about the computer specifications. The R8 SBOX computer is also equipped with all the modern interfaces for connectivity and expansion:

- Network interfaces: 2x GLAN or 2x 2.5GLAN, optionally with WLAN instead of one GLAN or 2.5GLAN ports (depending on SBOX version).
- USB 3.0: 4x USB 3.0 ports for data acquisition devices like SIRIUS, DEWE-43A, and peripherals like mouse, keyboard, printers and external hard drives.
- EtherCAT master port: for connecting any of our EtherCAT data acquisition devices like KRYPTON or SIRIUS.
- HDMI and VGA video: for connecting an external display.
- GPS receiver: optional built-in 10 Hz or 100 Hz GPS receiver with an option to connect external GPS display.



Hint

There are two different versions - SBOXre and SBOXre-WIFI where the difference is that the SBOXre has two LAN connectors and no WLAN, while SBOXre-WIFI has WLAN and one LAN connector.

On the newer version of SBOXre, there is a bit different LED lights configuration on LAN connectors. See table below.

Speed LED	
10 Mb/s	OFF
100 Mb/s	OFF
1000 Mb/s	Yellow
2500 Mb/s	Green
Link Activity LED	
Link is up	Green
Transmit / Receive	Blinking green



SBOXre



SBOXre-WIFI

On the front side of the SBOXre you can find these connectors:

Name	Description
LAN	2 Ethernet (SBOXre) or 1 Ethernet and 1 WLAN (SBOXre-WIFI), RJ45 connector
WLAN ANT	RP-SMA Female WLAN antenna: WiFi 802.11 b/g/n (not for SBOXre-2GLAN)
DVI	DVI Video out (VGA and HDMI compatible)
GPS ANT	SMA Female GPS antenna
SSD	Removable Solid State Drive
EtherCAT	8-pin LEMO 1B Series female connector
PWR Led light	Green when Power is available and switched on
PWR switch	To switch the SBOX on/off.
GPS	DSUB-9 female GPS connector
PWR OUT	2-pin LEMO 1B Series female connector
SYNC	2x 4-pin LEMO 00 Series male sync connector
USB 3.0	4x USB 3.0
POWER	Power in 2-pin LEMO 2B Series male connector
GND	Protective Ground banana plug and M4 insert

4.11.5. SIRIUS-R8: Rear side



SIRIUS-R8 EXT CAL



SIRIUS-R8 Analog Out



SIRIUS-R8rt

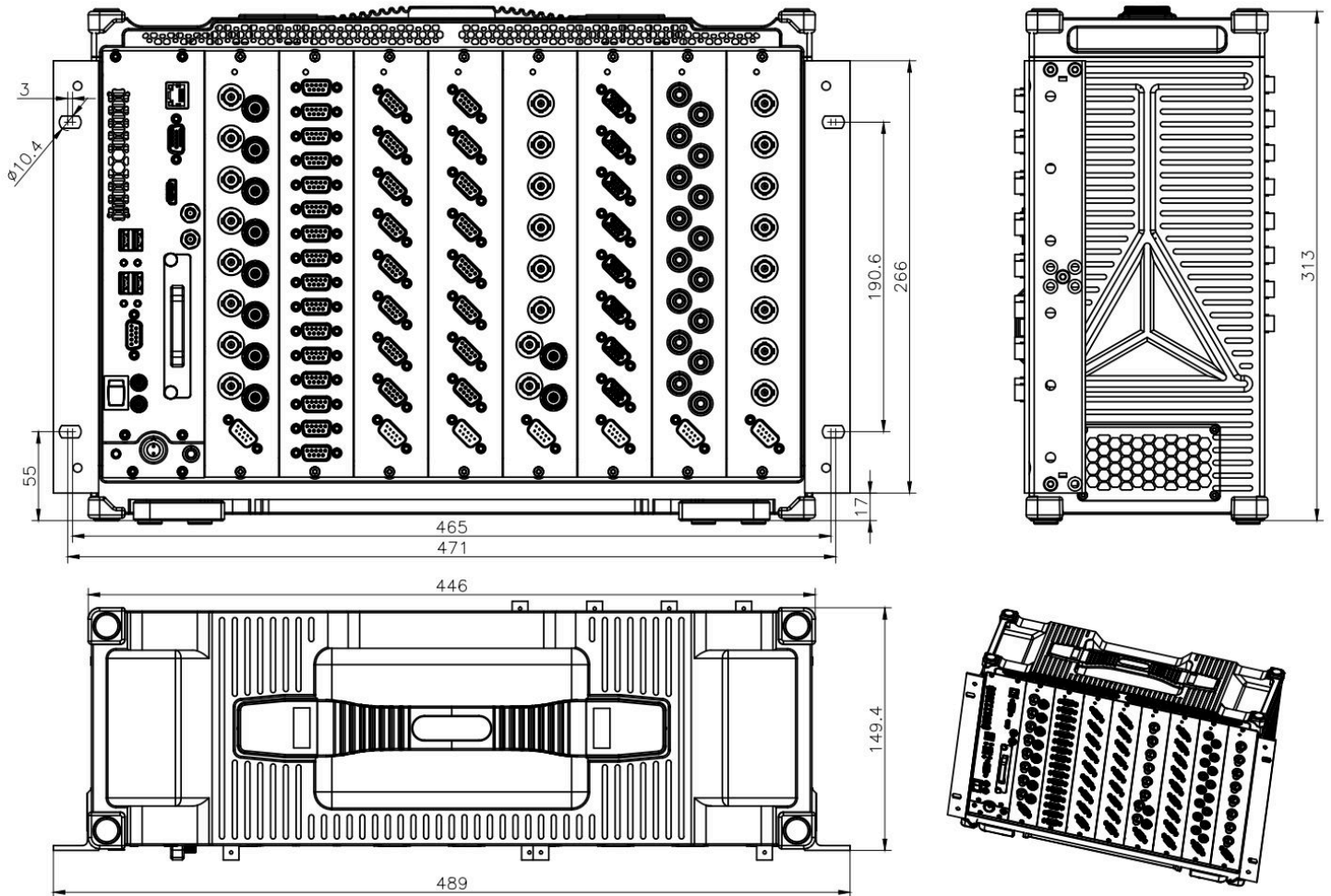
Name	Description
EXT CAL	R8 system features (optional) cal reference input. External calibration reference can be connected via a single BNC connector on the rear side of the R8 and can be switched in the software to all input channels at once to check the amplifier performance and accuracy.
AO 1 to 8	8x BNC connectors per slice (optional) Up to 64 analog outputs
EtherCAT IN	EtherCAT® slave port (optional) 8-pin LEMO male connector
EtherCAT OUT	EtherCAT® slave port (optional) 8-pin LEMO female connector



Important

See chapter “EtherCAT® slave port” for details.

4.15.11. Dimensions: R8



Dimensions: SIRIUS-R8

9. 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>.

9.1. 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.

9.2. 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>
The telephone hotline is available Monday to Friday from 07:00 to 16:00 CET (GMT +1:00)

9.3. Service/repair

The team of Dewesoft also performs any kind of repairs to your system to assure 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>.

9.4. Restricted rights

Use Slovenian law for duplication or disclosure. Dewesoft d.o.o. Gabrsko 11a, 1420 Trbovlje, Slovenia / Europe.

9.5. Copyright

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9.6. Trademarks

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.

10. Safety instructions

Your safety is our primary concern! Please be safe!

10.1. Safety symbols in the manual



Warning

Calls attention to a procedure, practice, or condition that could cause 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.

10.2. 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.

10.2.1. Environmental considerations

Information about the environmental impact of the product.

10.2.2. Product End-of-Life handling

Observe the following guidelines when recycling a Dewesoft system:

10.2.3. 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.

10.2.4. General safety and hazard warnings for all Dewesoft systems

The 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 any 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 of 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 the 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 the 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 applications 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 our homepage: <http://www.dewesoft.com/download>.
- 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. Acclimatize 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.