

TECHNICAL REFERENCE MANUAL

VIBRO KIT V20-1



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2. Introduction

The new VIBRO-KIT is a small, compact tool for simulating rotating machinery measurements. It is meant for educational purposes, such as in a lab or university. It provides a playground for almost unlimited experiments.

It's made of solid aluminium. It consists of a small electric motor, two bearings, two optical strip-tape angle sensors, two encoders and a spring on one side.

The RPM can be controlled manually by a turn knob, or you can completely define ramps, cycles, etc. with the built-in display.

Furthermore an external analog voltage (or even PWM signal) can be used to control the RPM.

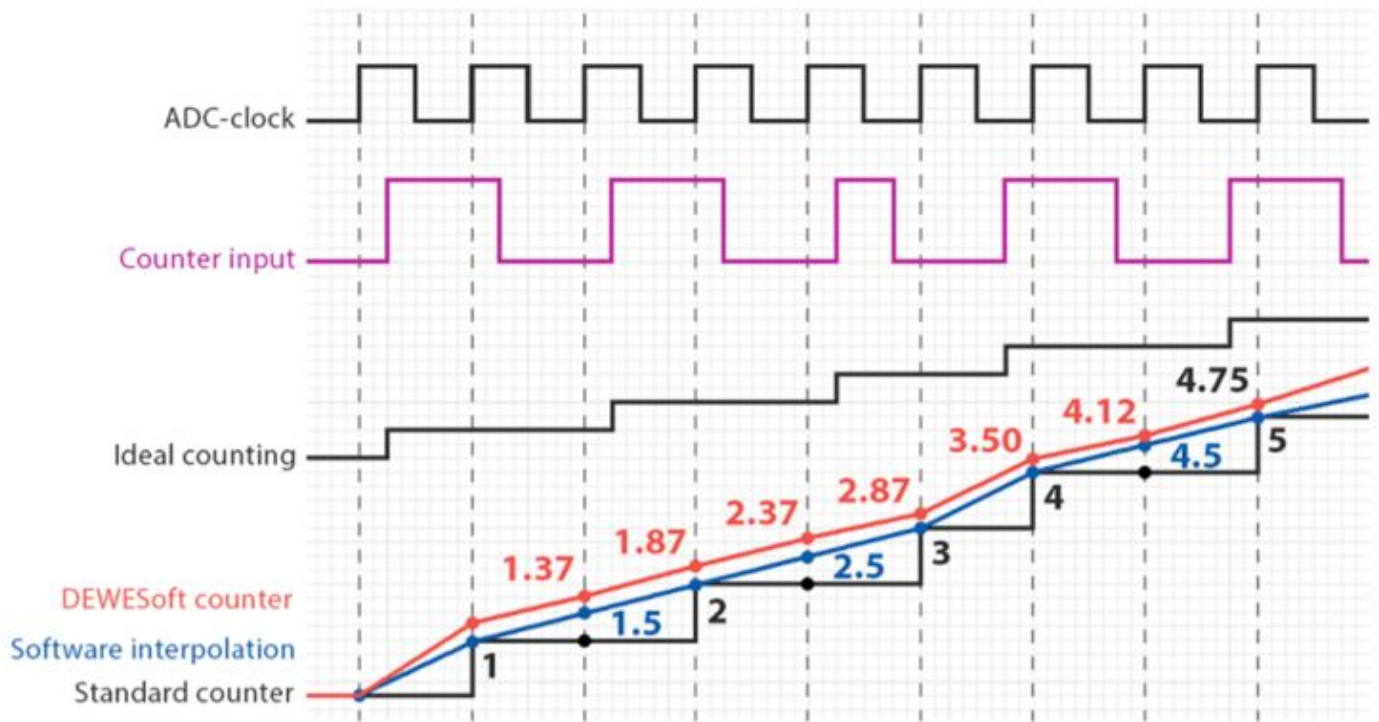
Functionalities:

- Manual RPM control (turn knob, display)
- Definable ramps (runup, coast down, hold time and multiple cycles)
- RPM control by external voltage (e.g. step curve)
- External PWM input
- Different angle sensors (2 optical strip tape, 2 Encoders)

3. Super-counters

Additional equipment: SIRIUS with at least one CNT module (ACC+, ...).

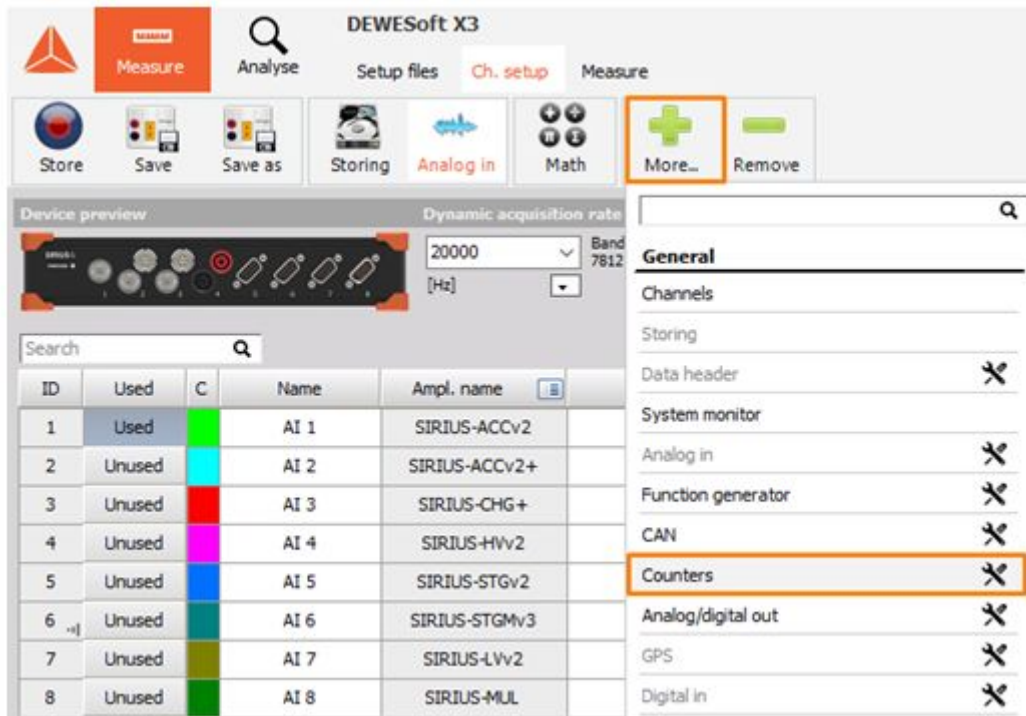
DEWESoft super-counters work on a 102.4 MHz internal time base, always, independent of the current sample rate. In comparison to standard counters, which only output whole numbers like 1,1,2,2,3,4, ... one sample later, DEWESoft is able to extract the accurate values like 1.37, 1.87, 2.37, ... fully time- and amplitude-synchronized. This is done by measuring the exact time of the rising edge of the signal with an additional counter.



Frequency/super-counter mode has many advantages over traditional counter measurements.

The problem with traditional counters is that the value of the counter is latched only at a sample rate interval. Therefore, we only have discrete values on each sample. Since the counters can measure exactly where the position of the pulse is between two samples, we can calculate two things out of this: the exact interpolated position of the counter at the sample point, as well as the exact frequency of the pulses.

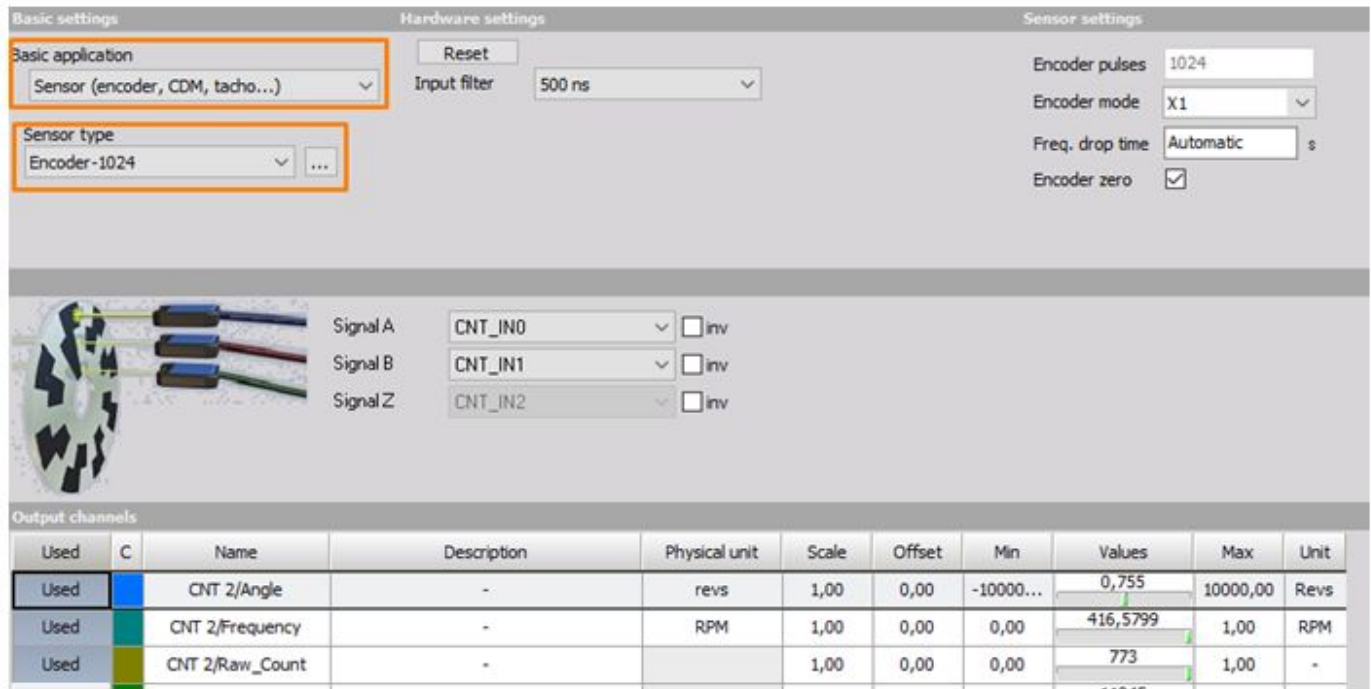
We connect the encoder to the CNT module. In DEWESoft software, we add the Counters.



In the Counter menu, you will see all the available counter channels. Enter the setup of the channel where your encoder is connected.

Change the Basic application to Sensor and choose the correct sensor from the dropdown list. If your sensor is not on the list, you can add it in the counter sensor editor.

Select the output channels that you want to show (angle, frequency, raw count).



Basic settings

Basic application: Sensor (encoder, CDM, tacho...)

Sensor type: Encoder-1024

Hardware settings

Reset

Input filter: 500 ns

Sensor settings

Encoder pulses: 1024

Encoder mode: X1

Freq. drop time: Automatic s

Encoder zero:

Signal A: CNT_IN0 inv

Signal B: CNT_IN1 inv

Signal Z: CNT_IN2 inv

Output channels

Used	C	Name	Description	Physical unit	Scale	Offset	Min	Values	Max	Unit
Used		CNT 2/Angle	-	revs	1,00	0,00	-10000,00	0,755	10000,00	Revs
Used		CNT 2/Frequency	-	RPM	1,00	0,00	0,00	416,5799	1,00	RPM
Used		CNT 2/Raw_Count	-		1,00	0,00	0,00	773	1,00	-

Enter the Measure mode and add a recorder visual control. Display the Angle and Raw count on the same recorder. When the Vibro Kit is running, press Freeze and zoom into the signal. You can see how DEWESoft interpolates the angle values and is not updated only when new pulse comes from the angle sensor. The raw count value is increased every time a new pulse comes from the sensor.

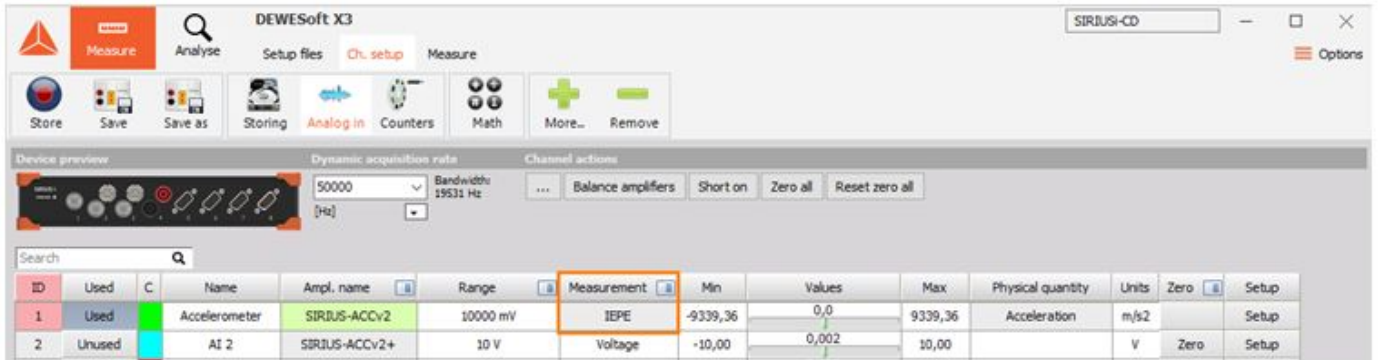


For more detailed explanation of the parameters, please visit:
<https://www.dewesoft.com/pro/course/digital-counters-13>

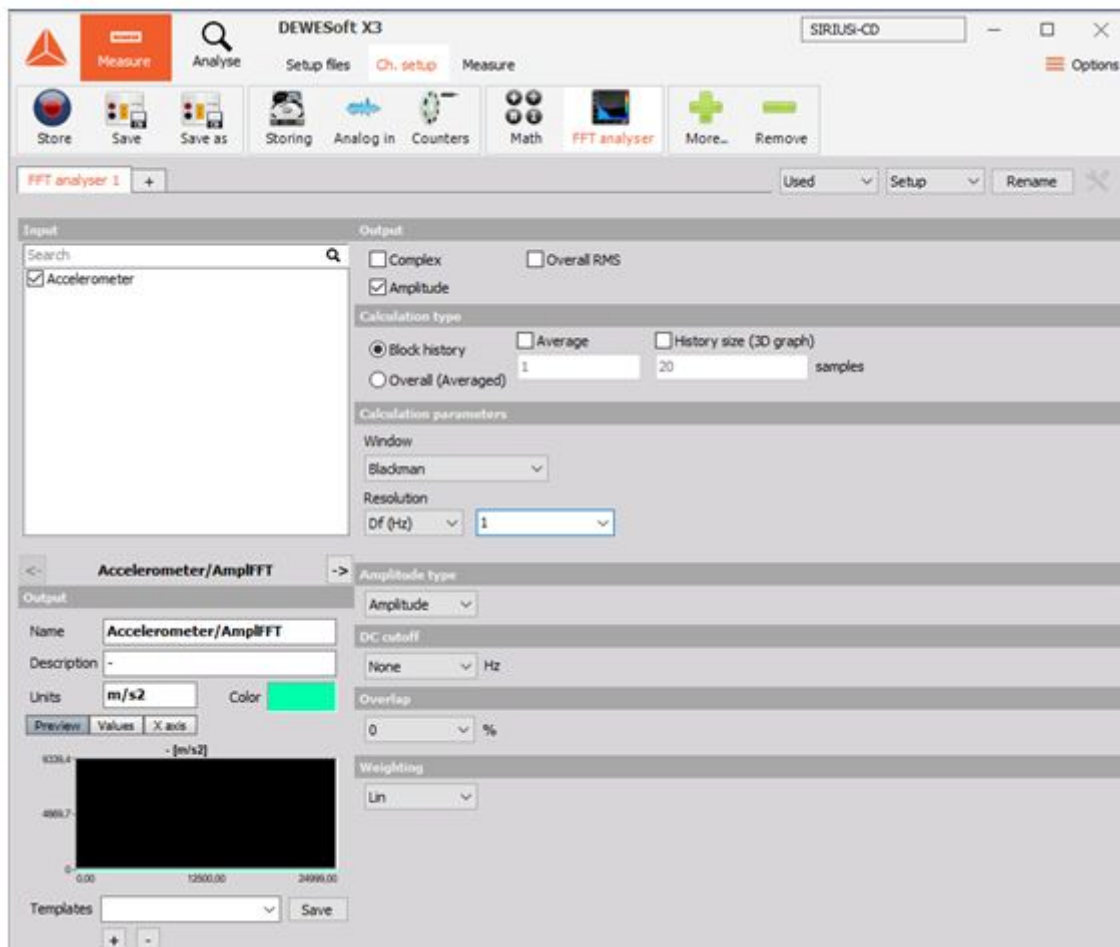
4. FFT analyser

Additional needed equipment: SIRIUS with one ACC, accelerometer.

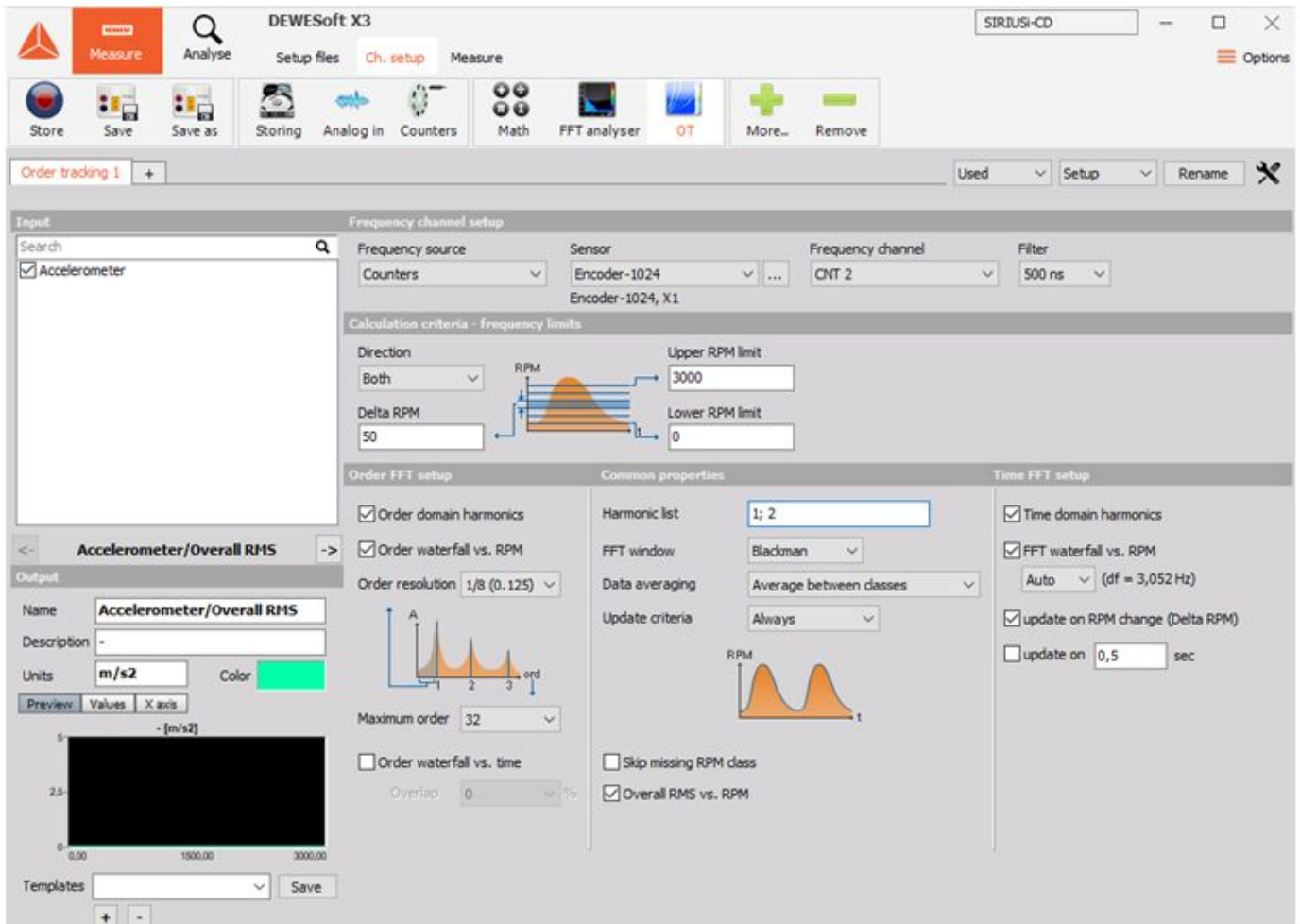
Glue the accelerometer on the Vibro Kit. Connect the accelerometer to the SIRIUS ACC module, and enter the channel setup. Select the IEPE mode – if the sensor has a TEDS chip, the sensitivity will be recognized. Otherwise, enter the setup and change the sensitivity of the sensor manually.



Add the FFT analyser math module (with the click on the plus button More). Select the input channel (accelerometer) and set up the math.



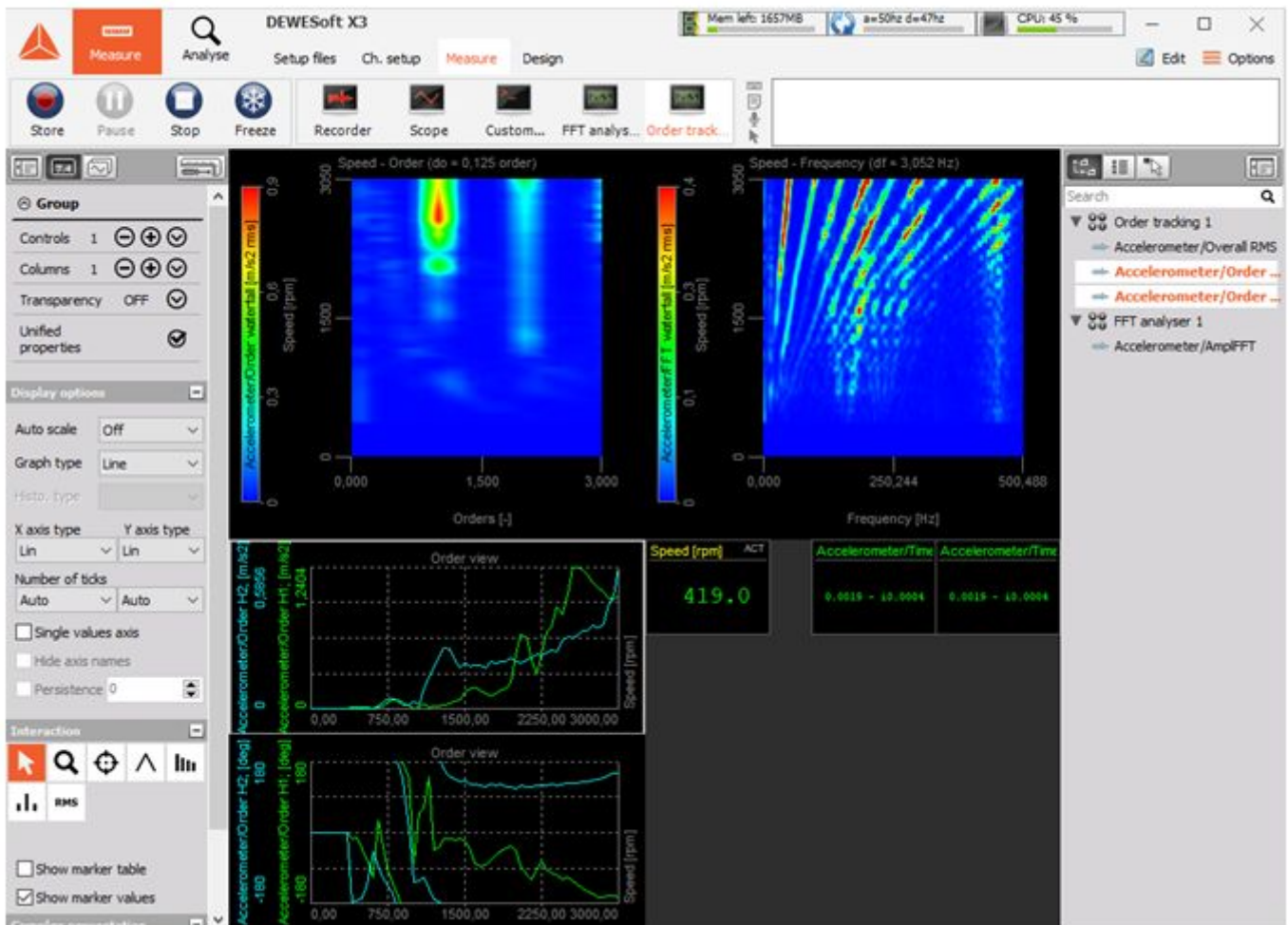
Enter the measure mode and add the FFT channel on a 2D graph. Run the machine and observe the FFT.



Select the vibration and the frequency input channel. Detailed description of all the parameters can be found here: <https://www.dewesoft.com/pro/course/order-tracking-31>

Enter the measure mode, and run the machine slowly from 0 RPM to 3000 RPM.

Order tracking module creates a display with two 3D graphs to show order and FFT waterfalls, two 2D graphs to show the order harmonics and phase of the harmonics and a digital meter to monitor the RPMs of the machine.



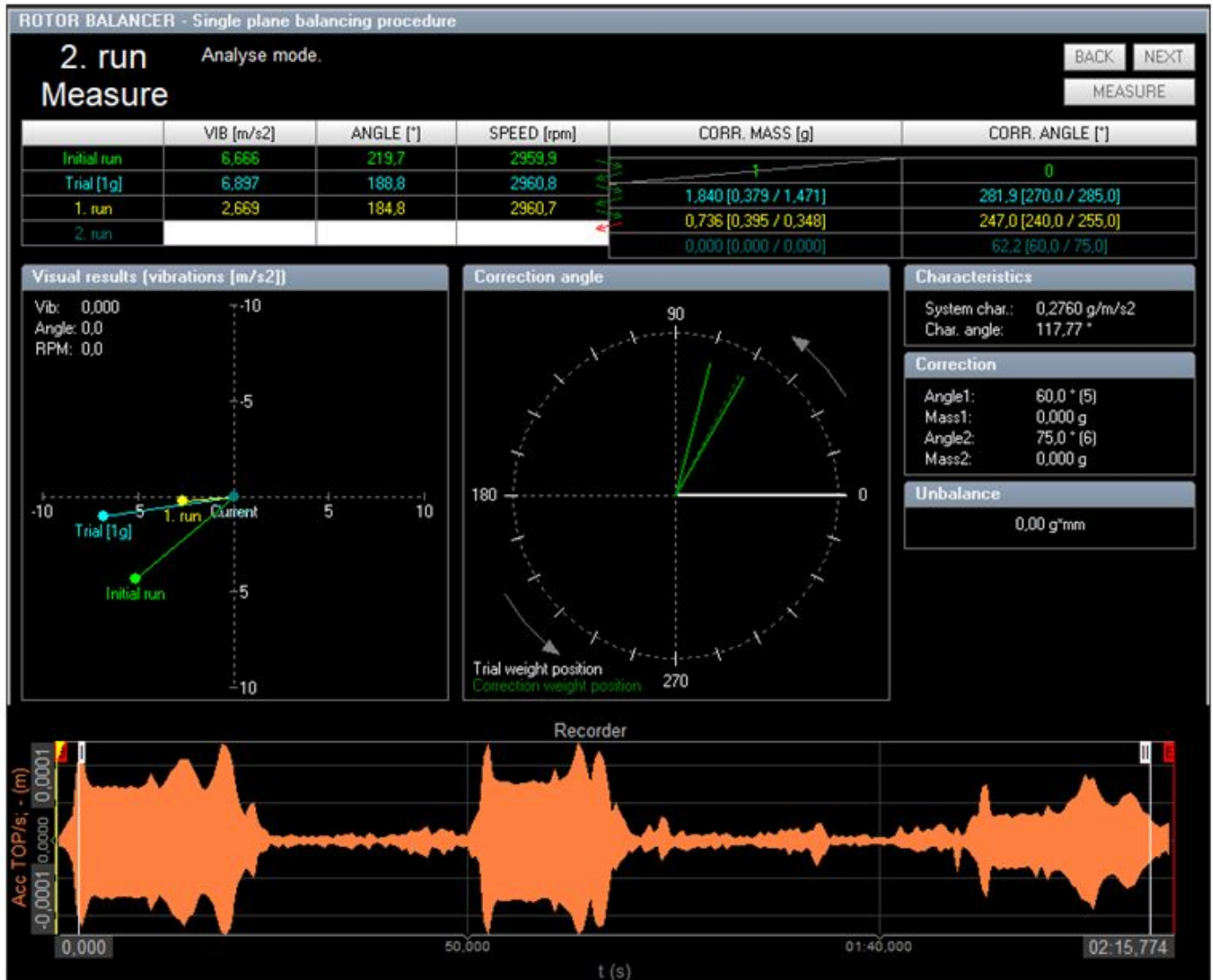
6. Balancing

Additional needed equipment: SIRIUS with one ACC (single plane balancing) or two ACC modules (dual plane balancing), accelerometer (single plane balancing) or two accelerometers (dual plane balancing), additional screws for balancing the rotor.

Select the input channel (vibration) and define the frequency source (counters, analog sensor, RPM channel). Balancing procedure should be done at constant RPMs.



Balancing is a step-by-step procedure. First you need to perform the initial run, to get the initial unbalance vector. After that, you attach trial weight, perform trial run to get another unbalance vector. From those two unbalanced vectors we calculate the correction mass that has to be added and the angle at which this should be added. You can perform as many steps as you wish.



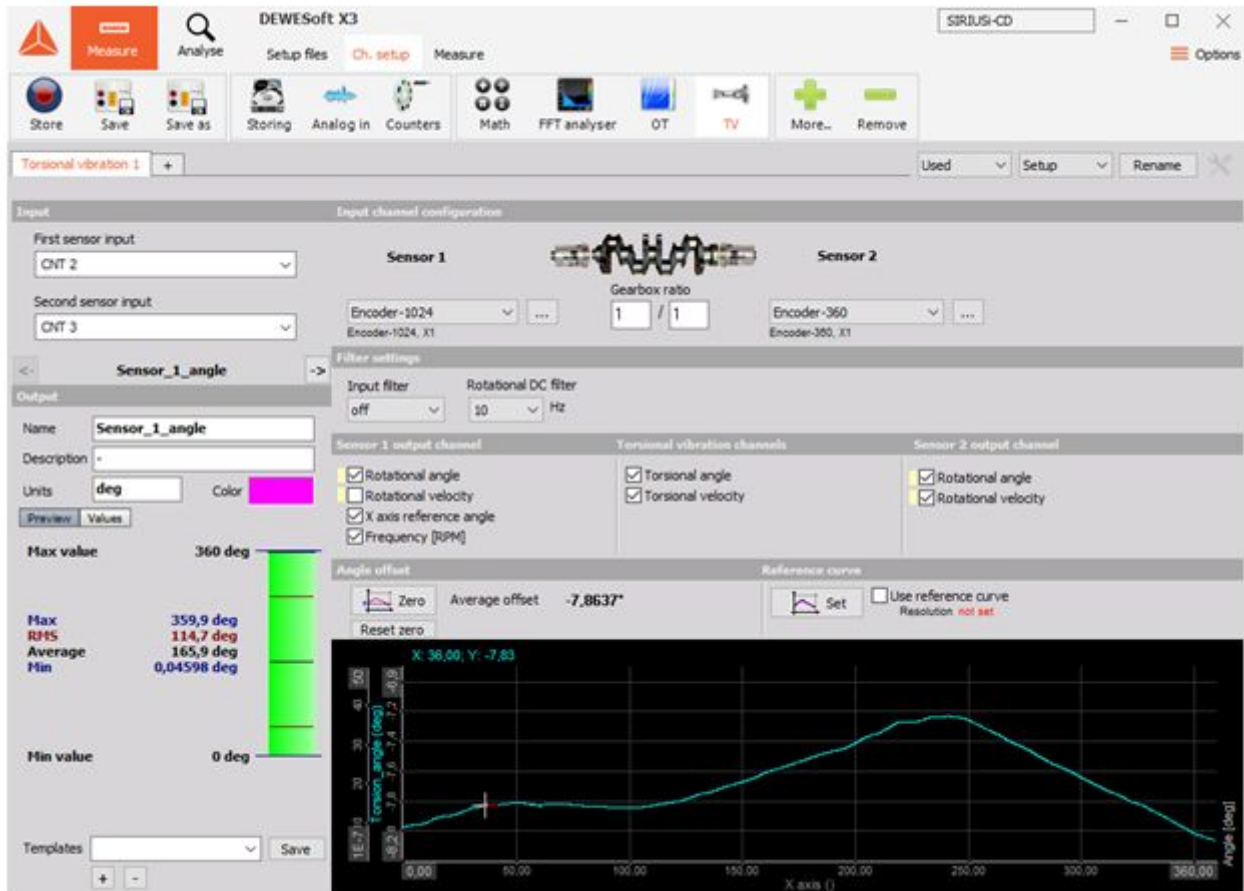
For more detailed explanation of balancing parameters and settings, please visit:
<https://www.dewesoft.com/pro/course/balancing-44>

7. Torsional vibration

Additional needed equipment: SIRIUS with 2 CNT modules and accelerometer.

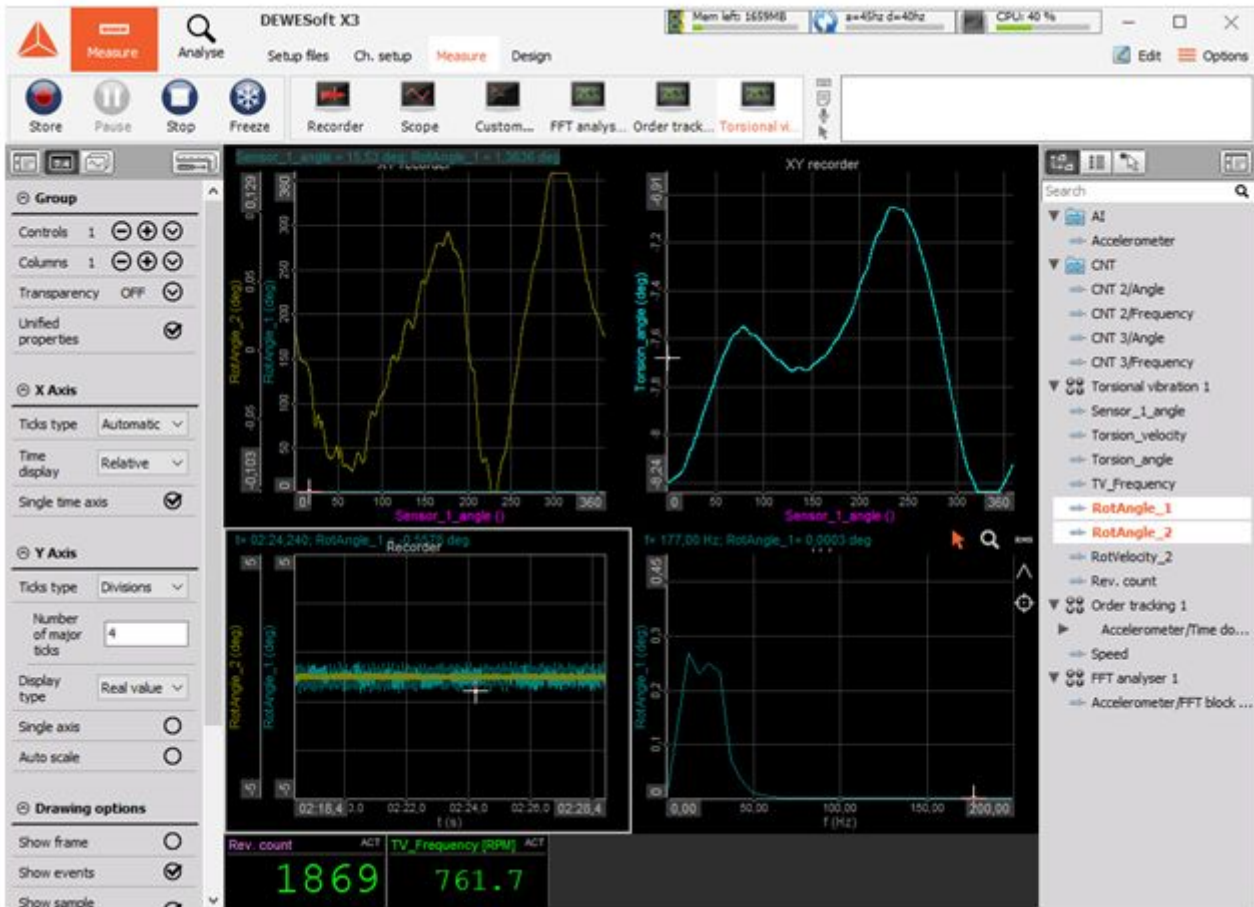
Connect two angle sensors to SIRIUS. Add a torsional vibration module. Select the first (reference) and second angle sensor input and assign sensors to the counter channels.

Select the wanted output channel from the module. Detailed description of the parameters and setting can be found here: <https://www.dewesoft.com/pro/course/rotational-and-torsional-vibration-34>



Enter the measure mode. Plugin creates a new display with 2 XY recorders for displaying the rotational angles and torsional angle against the reference angle sensor.

On the time recorder you can see the behaviour of the rotational angle and observe how the vibrations change with the RPM.



About this document

Documentation version history

Revision	Author	Date	Comment
1.0	Jernej Sirk	25/04/2018	Initial version

Table 1: Revision history

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.

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.

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)

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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Printing History

Version 2.0.0, Revision 217 Released 2015 Last changed: 23. July 2018 at 16:54.

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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 GmbH 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 I 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!
- 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.