

How to use CAN output



SOFTWARE USER MANUAL

How to use CAN output V21-1



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2. About this document

This is the users manual for CAN bus module.

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.

3. Introduction

3.1. CAN output option

The CAN output functionality is included in DewesoftX® without the need of any additional option and no download required. You need the DewesoftX® and a device that supports CAN bus interface.

3.2. Enabling CAN output

First we have to make the CAN transmit “Tx” button visible in DewesoftX®. Therefore go to Options → Settings → Devices → and set the according CAN port to “Read/write/acknowledge”.

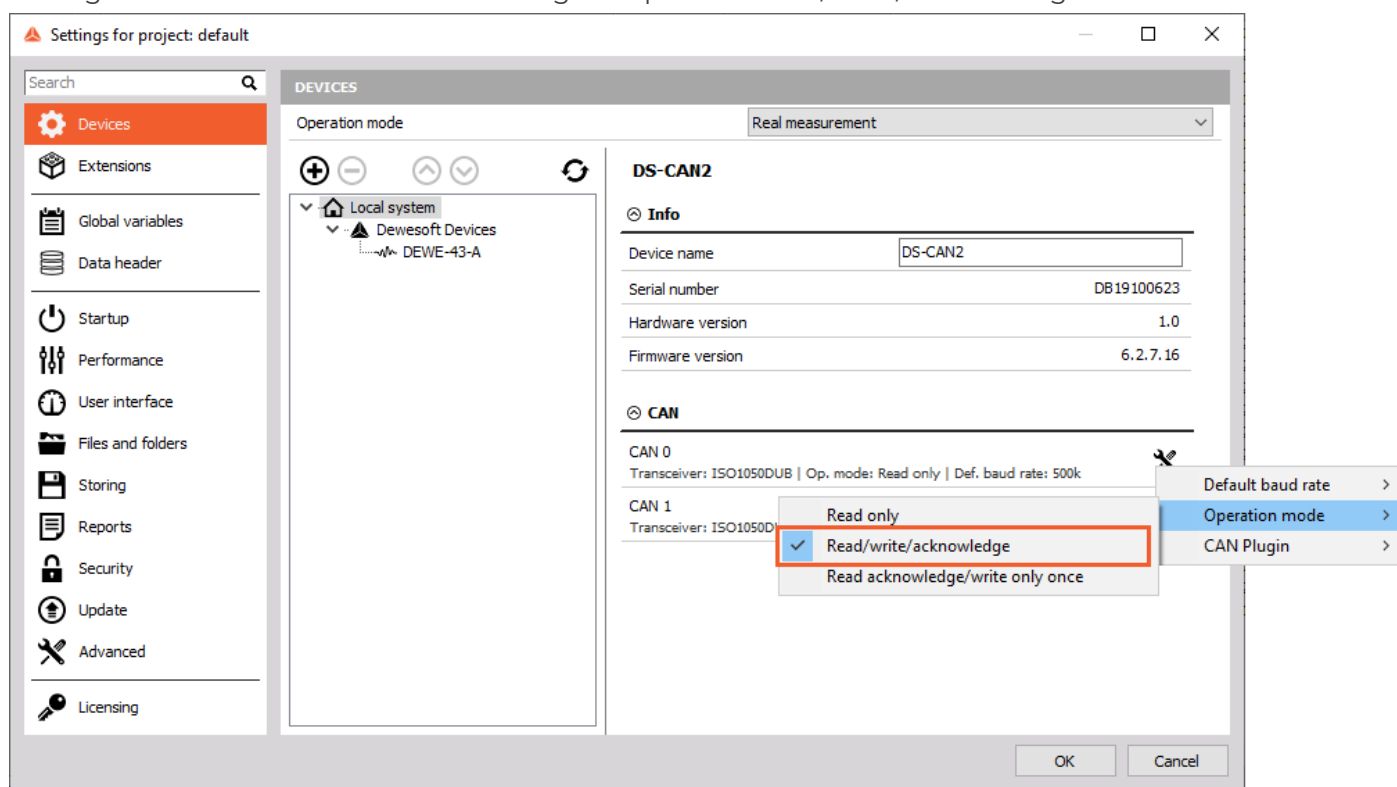


Image 1: Enabling CAN transmit options in Settings.



Important

Don't forget to use a 120 ohm termination resistor within the CAN cable.

Go to the CAN channel setup and add a new transmit message with the “+Tx” button, then add a channel with the “Add” button. Assign the ID, in this example 14 hex. For the different sending options please see the next pages.

3.3. Acquisition loop time

In order to use the large speed improvements of DewesoftX® regarding the outputs, you have to change the acquisition loop time from default 50 Hz to e.g. 1000 Hz.

The setting can be found in Options → Settings → Performance → Acquisition update rate.

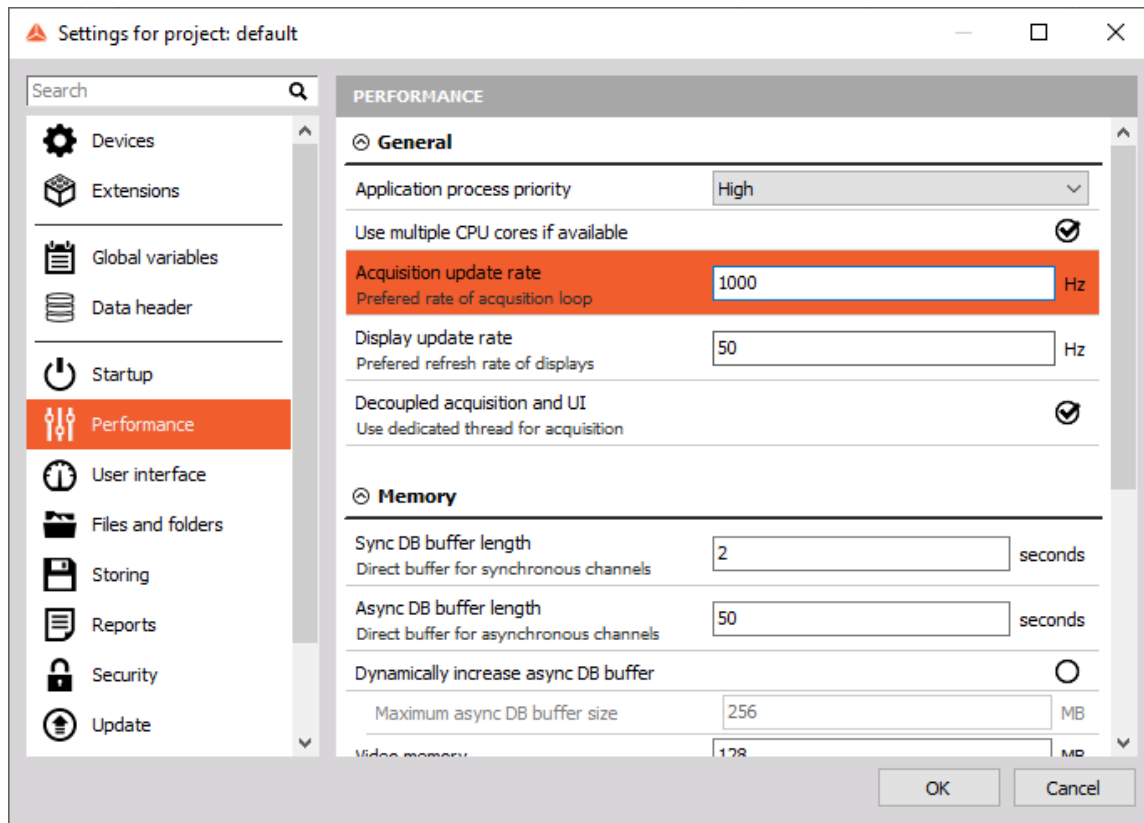


Image 2: Adjusting acquisition update rate in Settings.

3.4. Test setup

For the next examples we use a “loopback-setup” with a DEWE-43, with CAN0 connected to CAN1 (with termination resistor inside). CAN0 will send the messages, and is therefore set to “Acknowledge”, CAN1 will only receive CAN data

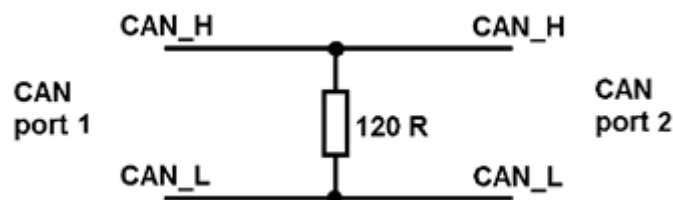


Image 3: Electrical scheme of connection and termination resistor inside.

4. Transmit options

In the “Schedule” field we have several options

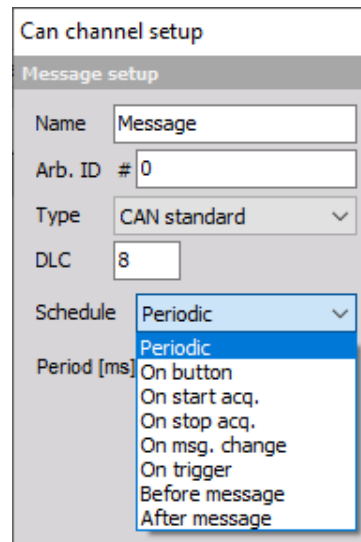


Image 4: Transmit options in CAN channel setup.

- Periodic → Enter the update rate in [ms], the sent message will automatically be updated
- On button → Specify a “User input” channel first, assign it to a button, the message will be sent during measurement when someone clicks the button
- On start acq. → When switching from Ch Setup to Measure, or when start storing, the message will be sent; option for specifying a delay (waiting time after Start) in [ms]
- On stop acq. → When stopping the measurement, message will be sent
- On msg. change → Message will be transmitted whenever one value of the message changes (at least one bit). So it'll be sent at the start.
- On trigger → Enter a channel and trigger level (larger than or smaller than logic) to send the message
- Before message → Specify another CAN message, before that this one is sent
- After message → Specify another CAN message, after that this one is sent

On the next pages there will be examples for the most commonly used ones.

4.1. Transmit periodic

Let's transmit a value periodically, each 100ms (the maximum output rate depends on the used computer). As "Value type" select a Constant value of e.g. 43:

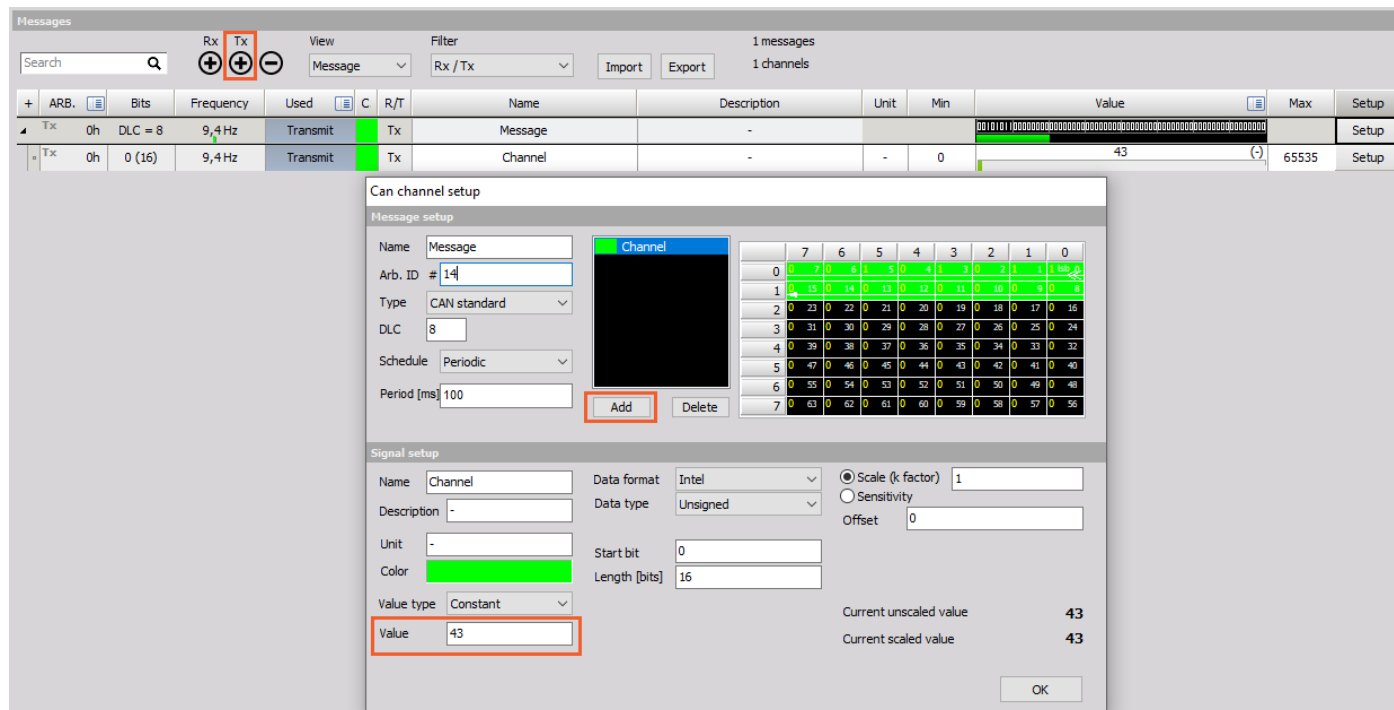


Image 5: CAN channel setup for transmit option.

In this example we have a DEWE-43, the first CAN port (sending) is connected to the second CAN port (receiving). Go to the second CAN port and add a new message with the "+" button, add one channel, and set Arb. ID to 14.

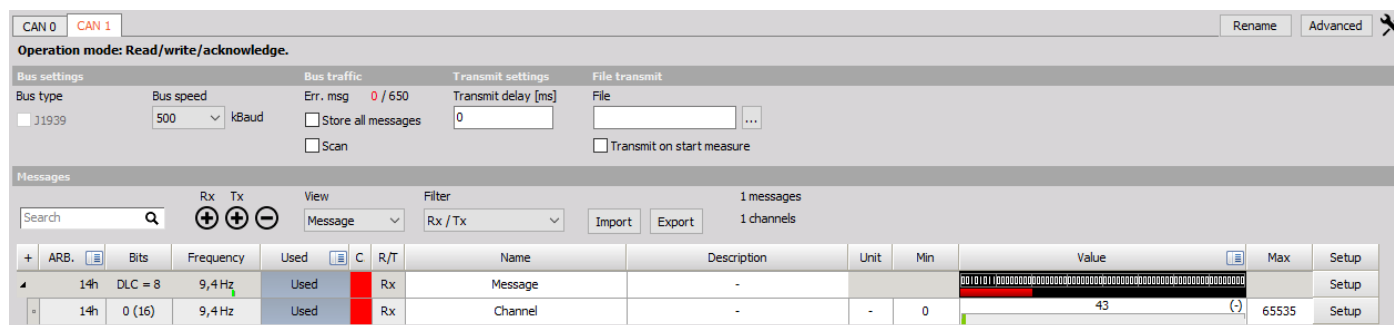


Image 6: Set up the receive option on the second CAN port.



Hint

You can also use the "Copy" function to copy the Tx channels then use the right-click in the second CAN port and paste the messages "Paste (swap Rx/Tx)".

The value received will be "43", in periodic time intervals.

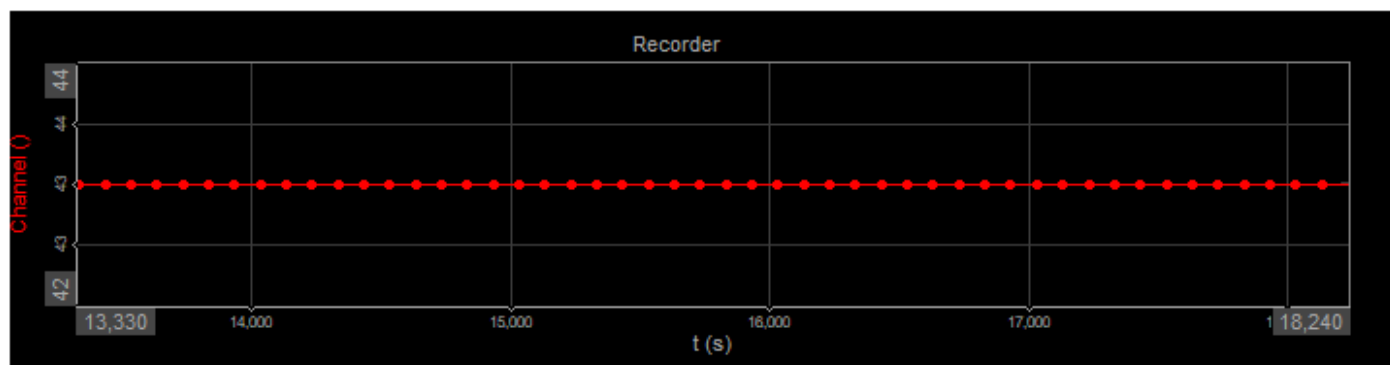


Image 7: Displaying measured value on the Recorder.

4.2. Transmit on button

At first we need to add a channel for the button, we do this by clicking the More and searching for “User inputs”. After adding you get an additional module.

The figure shows the 'User inputs' module interface. It includes a toolbar with icons for Store, Save, Save as, Storing, Analog in, CAN, User inputs, Math, More..., and Remove. Below the toolbar is a search bar and a 'Reset all stored values' button. A table lists the channels:

#	Used	C...	Name	Description	Data type	Min	Value	Max	Default value	Value reset	Unit	Reset value
1	Used		Control out 1	CAN transmit	Single precision	0,00	0,00	100,00	0,00	On start measurement		Reset

Image 8: Adding the Control channel.

In the CAN channel setup select **Schedule** as “On button” and **Button ch.** to “Control out 1”. Again, we want to send a constant value of 43 on ID 14, so keep the settings the same.

Can channel setup

Message setup

Name: Message

Arb. ID #: 14

Type: CAN standard

DLC: 8

Schedule: On button

Button ch.: Control out 1

Add Delete

	7	6	5	4	3	2	1	0
0	0	7	0	6	1	5	0	4
1	0	15	0	14	0	13	0	12
2	0	23	0	22	0	21	0	20
3	0	31	0	30	0	29	0	28
4	0	39	0	38	0	37	0	36
5	0	47	0	46	0	45	0	44
6	0	55	0	54	0	53	0	52
7	0	63	0	62	0	61	0	60

Signal setup

Name: Channel

Description: -

Unit: -

Color:

Value type: Constant

Value: 43

Data format: Intel

Data type: Unsigned

Start bit: 0

Length [bits]: 16

Scale (k factor): 1

Sensitivity:

Offset: 0

Current unscaled value: 43

Current scaled value: 43

OK

Image 9: CAN channel setup.

In Measure mode, we add the new widget named "Input control".

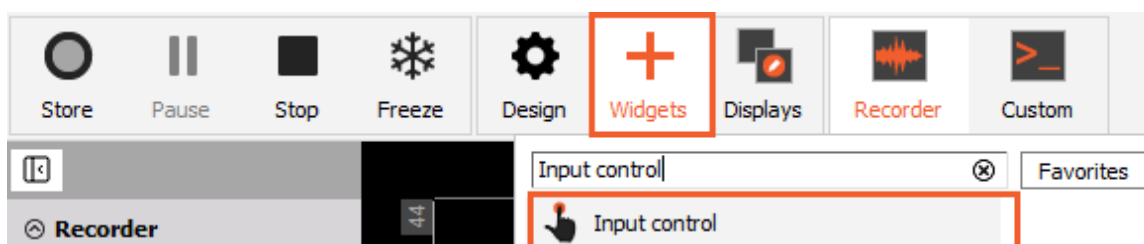


Image 10: Adding the Input control widget in Measure mode.

From the control instrument properties on the left side, select "Control channel" and "Push button". Then assign the channel "Control out 1" from the channel list on the right to the instrument.

The receive CAN channel shows the value of "43", when pressing the button.

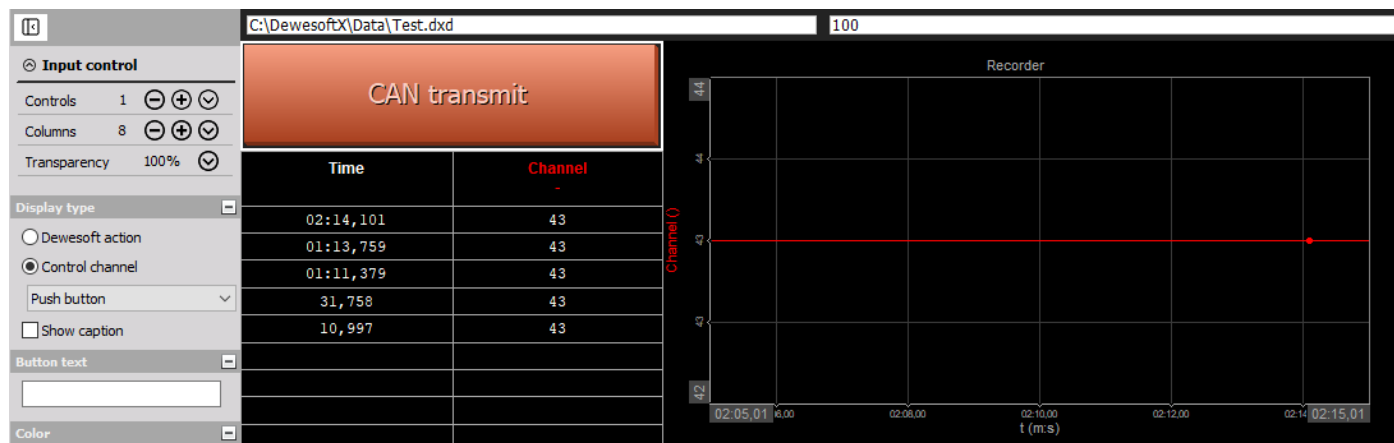


Image 11: Representation of transmitting on button press.

4.3. Transmit a math channel on CAN

In the following experiment we want to subtract two channels by math, and transmit the value over CAN.

A practical application would be the measurement of voltage and current, then adding the DewesoftX® Power module, calculating electrical Power P, Q, S and cos_phi and transferring the results in real-time to a test bed over CAN.

We apply two voltages to the DEWE-43 inputs, AI 1 = 3,867 V and AI 2 = 1,642 V.

Device preview: DEWE-43 A

Dynamic acquisition rate: 20 (kHz) Bandwidth: 7812 Hz

Channel actions: ... Zero all Reset zero all

ID	Used	C	Name	Ampl. name	Range	Measurement	Min	Values	Max	Units	Scale	Zero	Setup
1	Used		AI 1	DW43	10 V	Voltage	-10,00	3,8685	10,00	V	1,00	Zero	Setup
2	Used		AI 2	DW43	10 V	Voltage	-10,00	1,6417	10,00	V	1,00	Zero	Setup
3	Unused		AI 3	DW43	10 V	Voltage	-10,00	-0,0957	10,00	V	1,00	Zero	Setup
4	Unused		AI 4	DW43	10 V	Voltage	-10,00	-0,0701	10,00	V	1,00	Zero	Setup
5	Unused		AI 5	DW43	10 V	Voltage	-10,00	-0,0331	10,00	V	1,00	Zero	Setup
6	Unused		AI 6	DW43	10 V	Voltage	-10,00	0,0289	10,00	V	1,00	Zero	Setup
7	Unused		AI 7	DW43	10 V	Voltage	-10,00	-0,0392	10,00	V	1,00	Zero	Setup
8	Unused		AI 8	DW43	10 V	Voltage	-10,00	-0,0784	10,00	V	1,00	Zero	Setup

Image 12: Channel setup of DEWE-43.

In mathematics we add a formula: AI 1 – AI 2. As expected the result is 2,22 V.

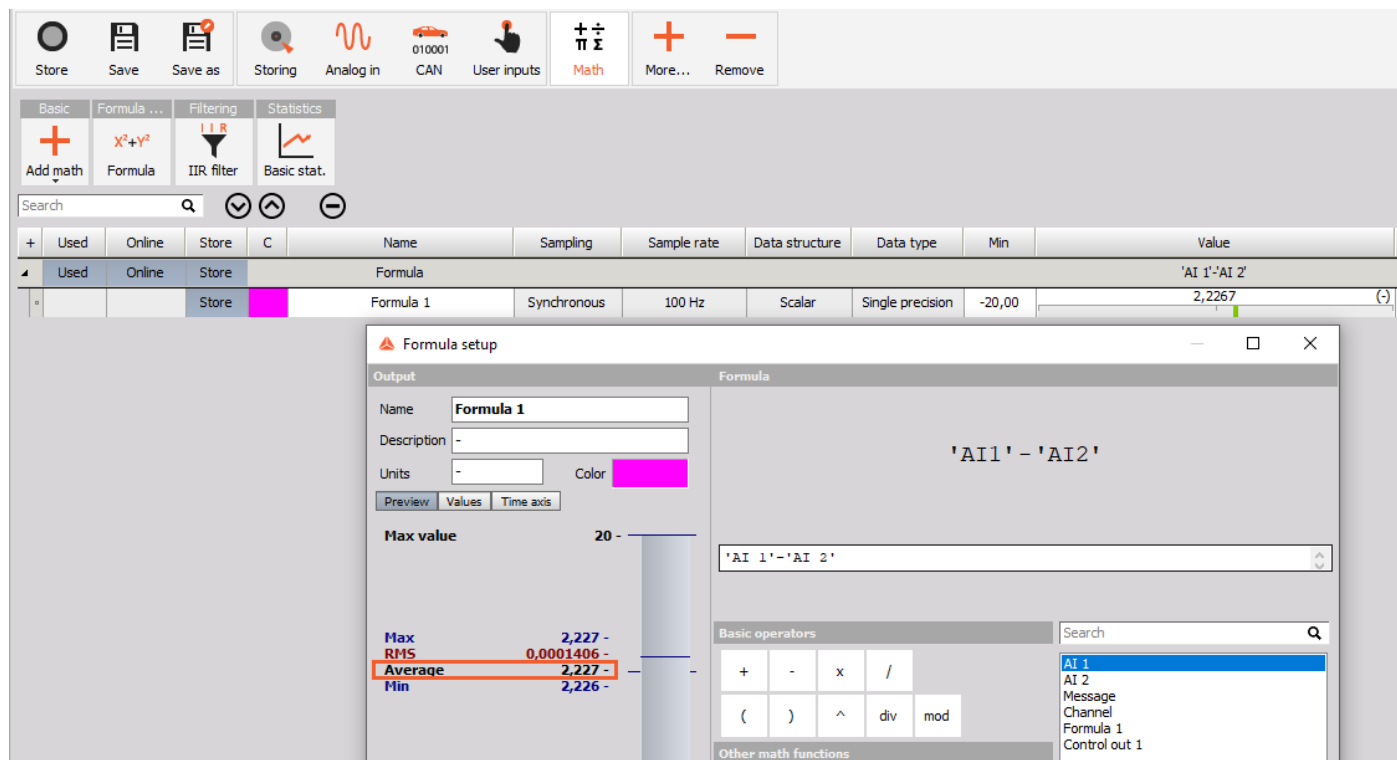


Image 13: Adding a new formula under the Mathe channel.

In the CAN 0 port, which is our sending port, we add a message with the “+Tx” button. On Arb. ID 14 we add a channel, transmitting periodically with e.g. 5ms the value (Value type = Channel) of the math formula “Formula 1”.

If we would now directly transfer the math value 2,227 over CAN, it would cut all the digits after the comma and transfer a value of 2. Therefore we apply a scaling factor of 0.001 before transferring.

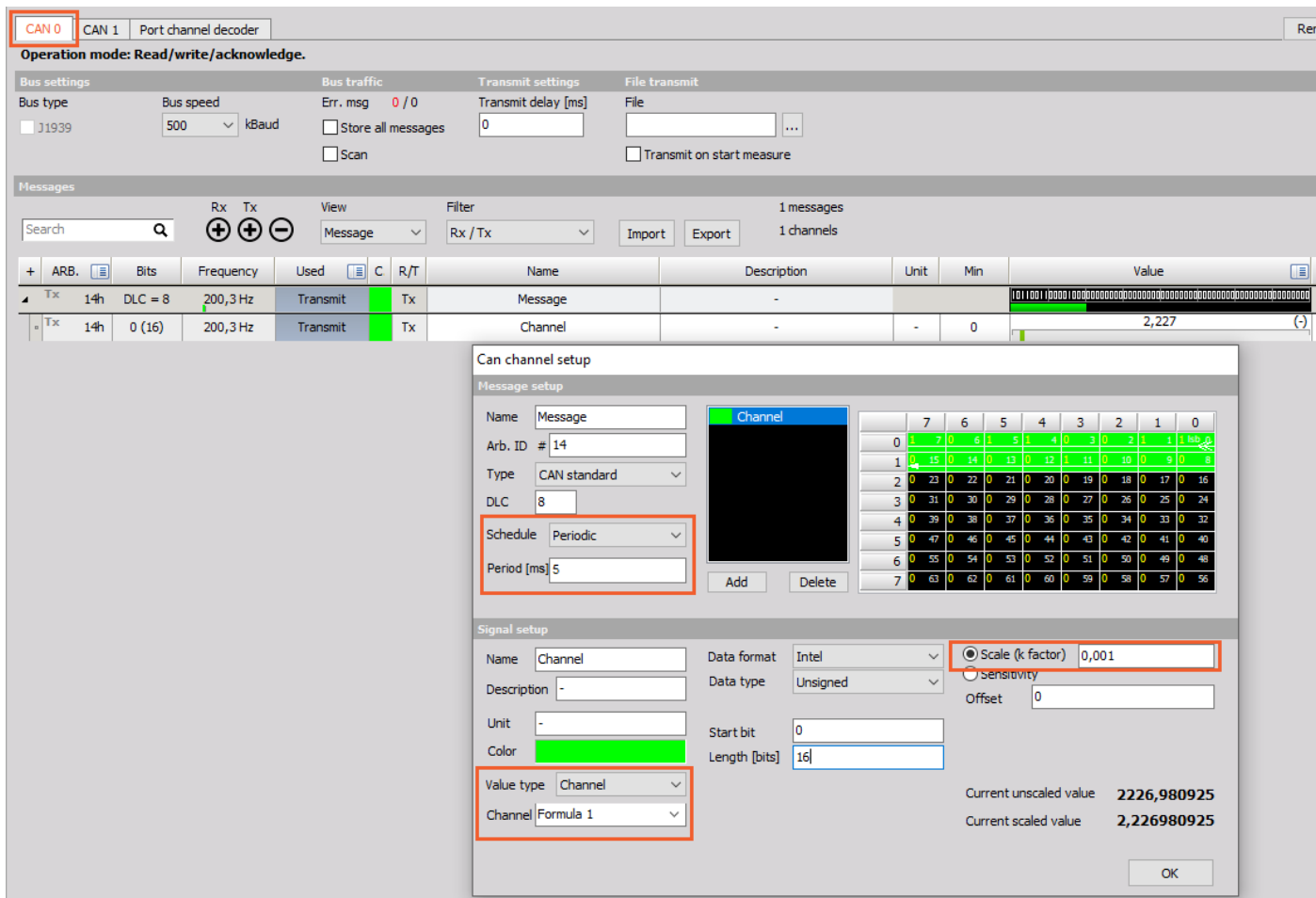


Image 14: Using the Formula 1 for CAN transmit value.

In the CAN 1 receiving port, we add a message with 1 channel on the same Arb. ID. As we have scaled the data with a factor of 1000 before (scale = 0,001), we need to apply a scaling of 0,001 now when decoding.

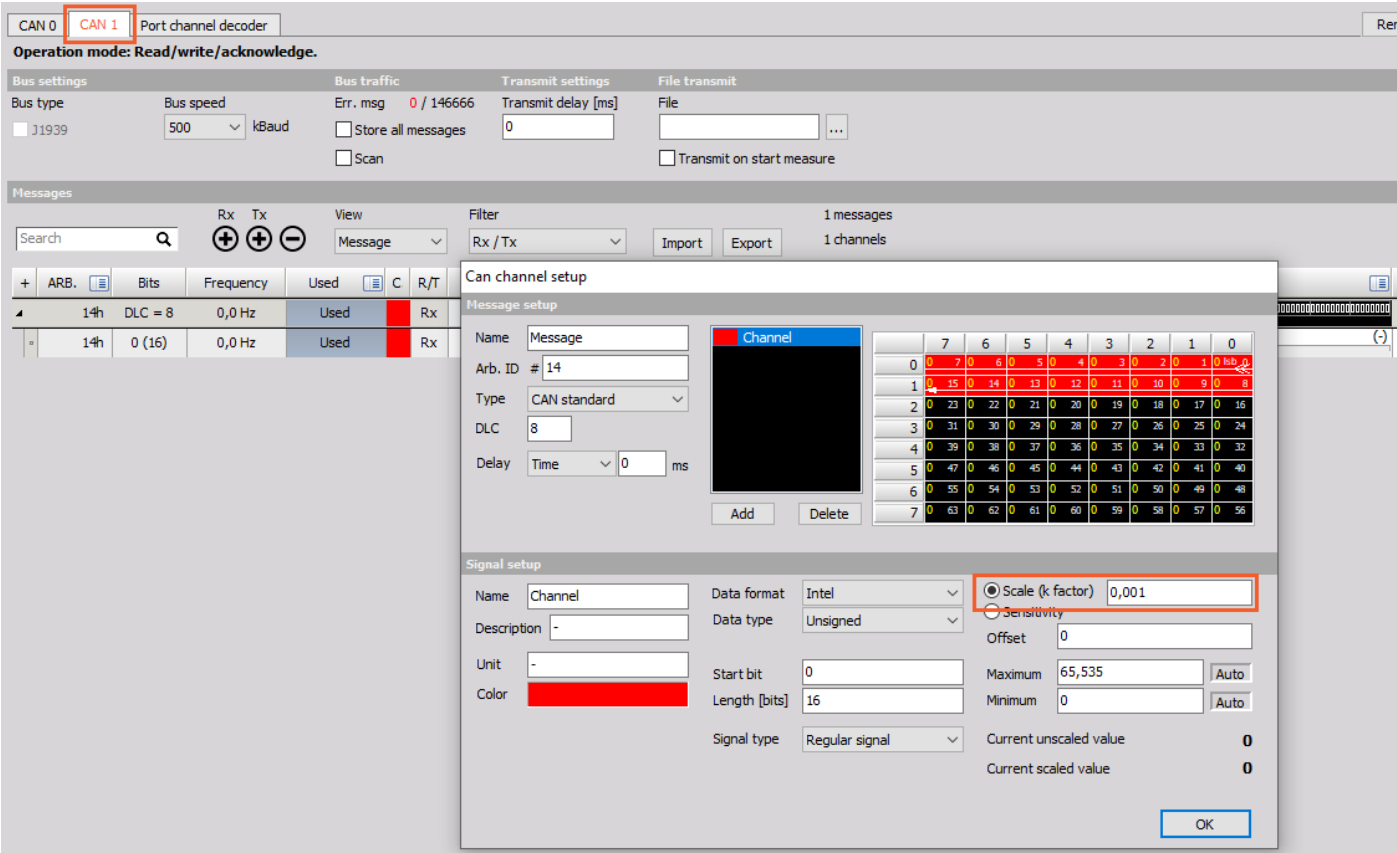


Image 15: CAN channel setup for receive.

The result can be seen in the screenshot below. When we change the voltage on the input, we can see how the math formula (orange) and CAN port (red) follow the input (purple) change at the time (update rate 5 ms).

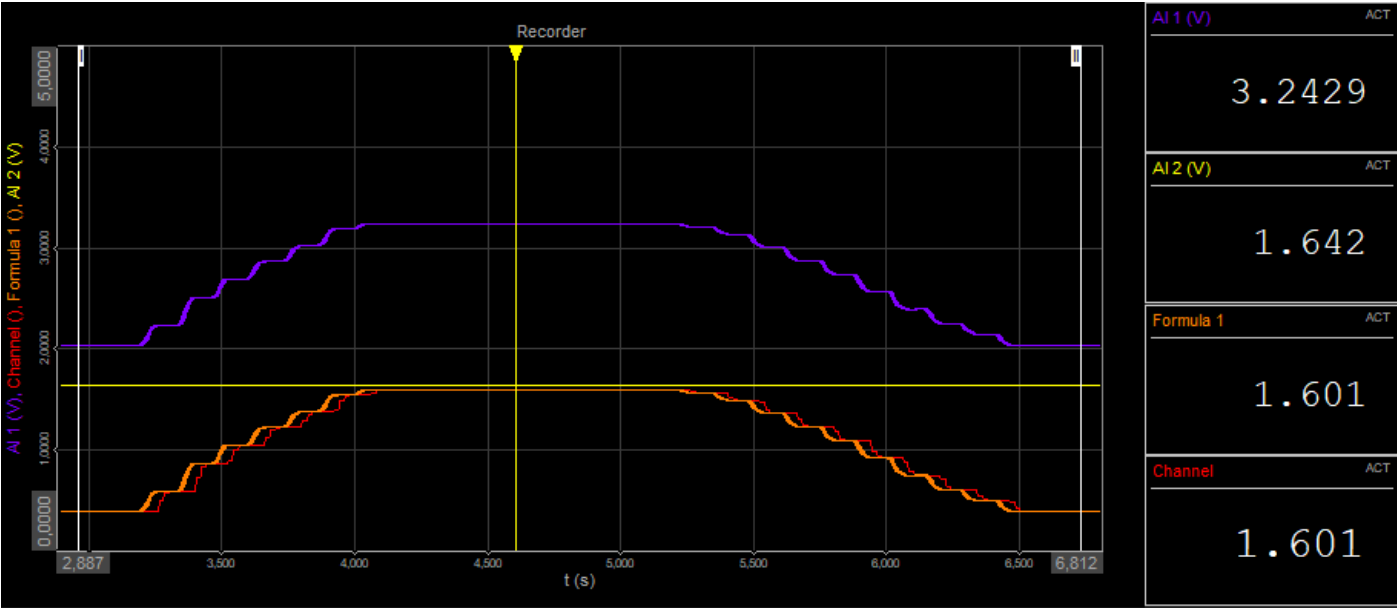


Image 16: Display of changing input voltage and outputting value over CAN output.

In the same manner all different data types, like outputs from modules such as Torsional vibration, Combustion analysis or Order tracking in DewesoftX® can be output over CAN.

5. Benchmarks

5.1. AI to CAN out - delay time

With the improvements regarding real-time-ability in DewesoftX® (see chapter Acquisition loop time), the question arises how fast an analog input, with some additional calculations, can be processed and sent out on CAN.

For this test we used a DEWE-43, and connected CAN0 to CAN1. We subtract a random value (-1) from our analog input channel 'AI 1', periodically every 2 seconds. With the other math formula we measure the time delay between the formula result and the received CAN value.

+	Used	Store	C	Name	Min	Value	Max	Unit	Setup
▲	Used	Store		Formula		if(time mod 2, 'AI 1'-1, 'AI 1')			Setup
"		Store		Formula 1	-6,00	5,4606 (-)	5,00	-	...
▲	Used	Store		Formula		stopwatch('Formula 1'>5,'Channel'>5)*1000			Setup
"		Store		delay	0,00	177 (-)	10000,00	-	...

Image 17: Adding a formula to calculate the delay.

To get the fastest possible output, we set the period time to 1 ms.

Can channel setup

Message setup

Name

Message

Arb. ID #

14

Type

CAN standard

DLC

8

Schedule

Periodic

Period [ms]

1

Add

Delete

Channel

	7	6	5	4	3	2	1	0
0	0	7	1	6	0	5	1	4
1	0	15	0	14	0	13	1	12
2	0	23	0	22	0	21	0	20
3	0	31	0	30	0	29	0	28
4	0	39	0	38	0	37	0	36
5	0	47	0	46	0	45	0	44
6	0	55	0	54	0	53	0	52
7	0	63	0	62	0	61	0	60

Signal setup

Name

Channel

Description

-

Unit

-

Color

Value type

Channel

Channel

Formula 1

Data format

Intel

Data type

Unsigned

Start bit

0

Length [bits]

16

Scale (k factor)

0,001

Sensitivity

Offset

0

Current unscaled value

5460,597038

Current scaled value

5,460597038

OK

Image 18: Input the minimum Period value.

Result: The measured delay time AI-to-CAN varies from 1,79 ms ... 7,78 ms.

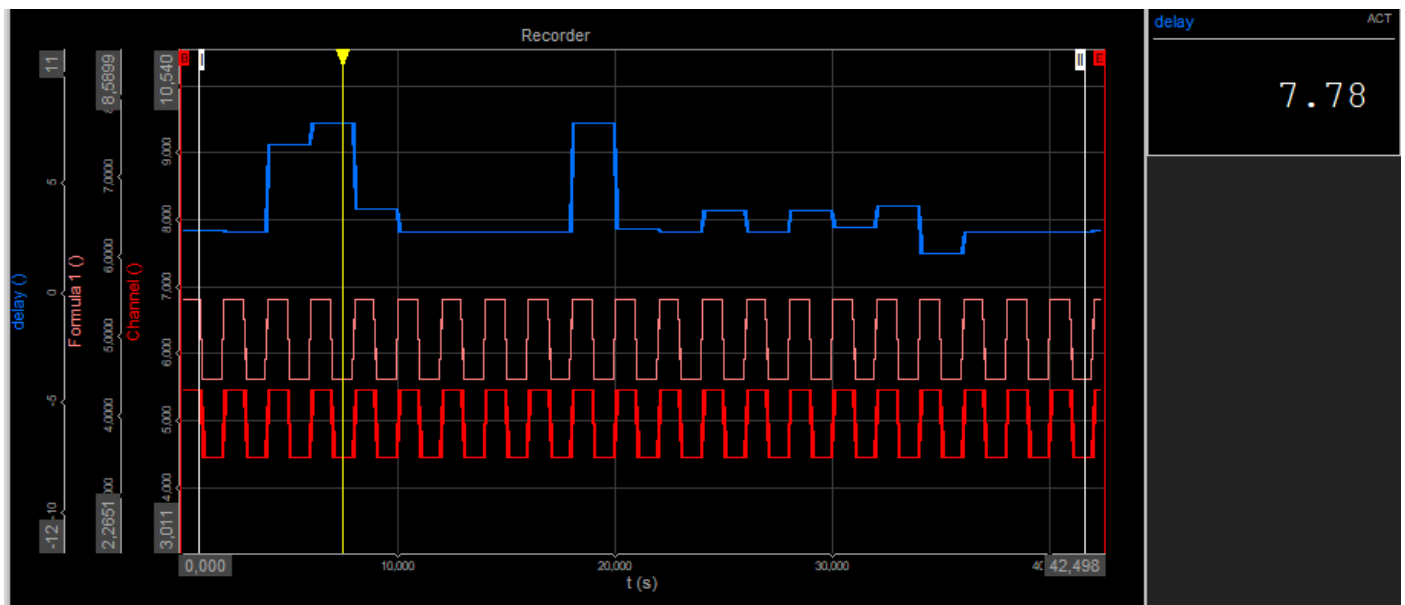


Image 19: Display of changing the delay (blue curve) between Formula 1 and CAN channel.

6. Warranty information

Notice

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

Note:

Dewesoft d.o.o. shall not be liable for any errors contained in this document. Dewesoft MAKES NO WARRANTIES OF ANY KIND WITH REGARD TO THIS DOCUMENT, WHETHER EXPRESS OR IMPLIED. DEWESOFT SPECIFICALLY DISCLAIMS THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. Dewesoft shall not be liable for any direct, indirect, special, incidental, or consequential damages, whether based on contract, tort, or any other legal theory, in connection with the furnishing of this document or the use of the information in this document.

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>.

6.1. 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.

6.2. 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)

6.3. 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>.

6.4. Restricted Rights

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

6.5. Printing History

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

6.6. Copyright

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7. Safety instructions

Your safety is our primary concern! Please be safe!

7.1. 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.

7.2. 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 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 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!

- 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.

7.3. Documentation version history

Version	Date	Notes
V21-01	6.1.2021	New template form, change the screenshots and review the content