Analog Out configurations in DewesoftX®

SOFTWARE USER MANUAL

Analog Out configurations V21-2

1. Table of contents

2. About this document

This is the users manual for Analog Output (AO) 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.

2.2. Requirements

Dewesoft SIRIUS® device with Analog Out

- AO8 option (8 outputs)

With this option the SIRIUS® device is manufactured with 8 BNC plugs on the rear side.

Image 1: Analog outputs on a back side of SIRIUS®.

Important
KRYPTON® 1xAO device is Analog Output device but doesn't support every option like shown below in this document. Only Alarms and Control output are available!

- or at least one MULTI module (1 output per amplifier)

The MULTI amplifier consists of 1 Analog in, 1 Counter in and 1 Analog out.

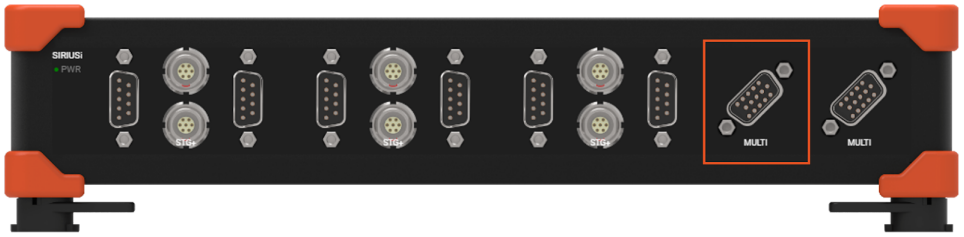


Image 2: Multi amplifier with DSUB-15 connector type.

3. Standalone amplifier

For some applications the Dewesoft instrument is used as a pure signal conditioner. No DewesoftX® software is needed, no USB cable connected. The SIRIUS® just converts the input signal of e.g. +/-1000 um/m to an output voltage of +/- 10V.
All the amplifier settings are permanently stored in the SIRIUS® instrument. You only need a power supply.

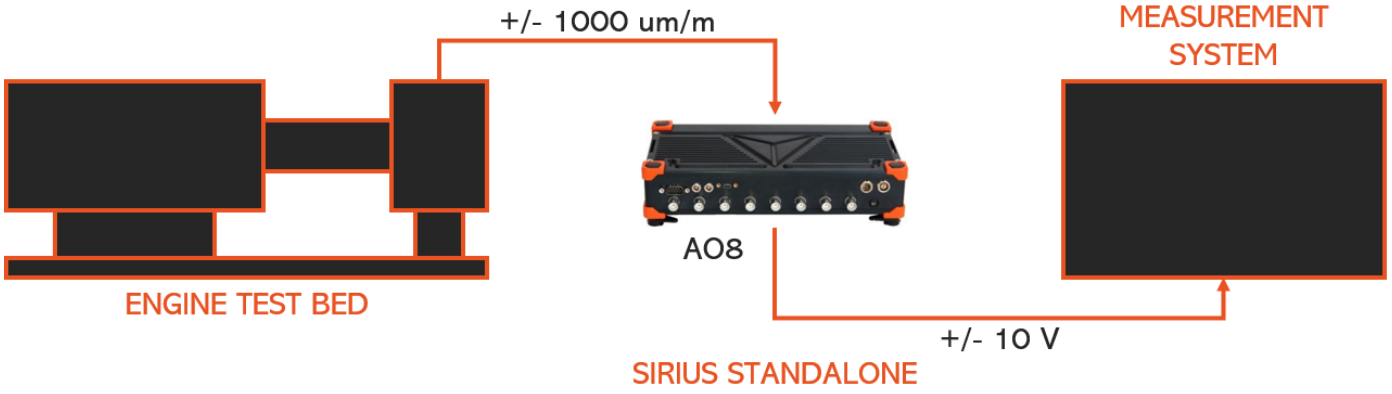


Image 3: Sirius® as standalone amplifier.

Important
The “Standalone mode” is ONLY available with the AO8 option on the backside of SIRIUS®.

Connect the tuning fork on STG amplifier (scaling is automatically set for strain in um/m) and set up the settings for the forks in the channel setup, if the TEDS is not implemented. Visit PRO training site for instructions of how to set up tuning forks.

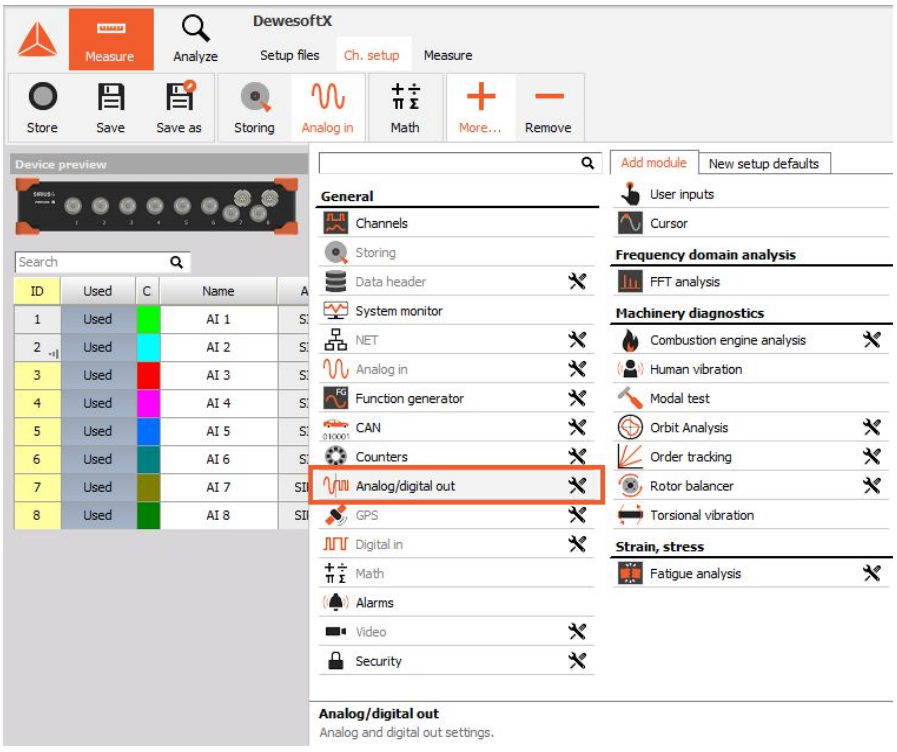


Image 4: Setting the Analog Input amplifier for fork.

Add the “Analog/digital out” module with the “More” button which enables modules in the DewesoftX®.

When you hit the fork, the input signal is about +/- 500 um/m peak, then it stays around +/150 um/m. Change the Min/Max channel limits to +/- 1000 um/m, this should be fine.

In Analog Output setup you can set the output Value comes Manual or from selected channel.

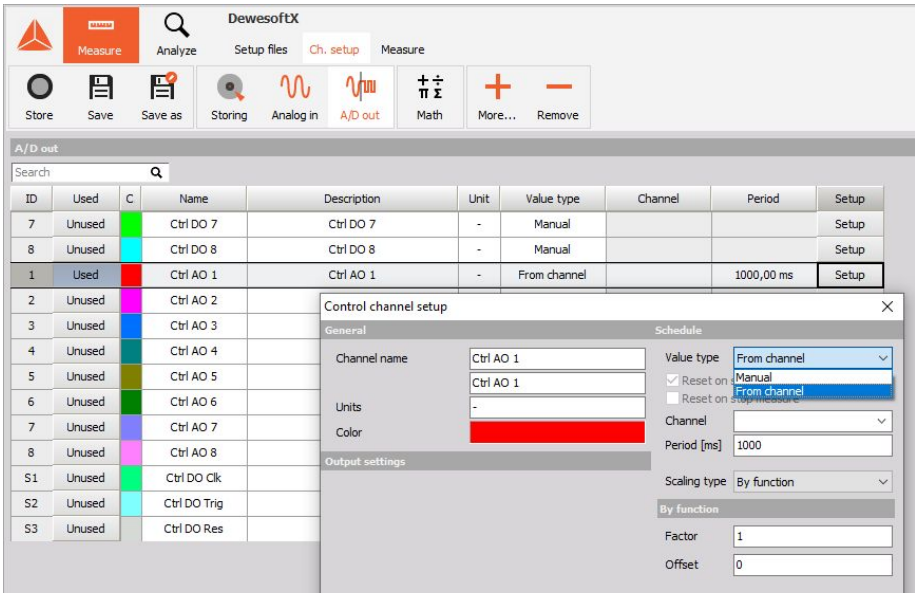


Image 5: Choosing a value type in Analog Output channel setup.

Signal conditioning is enabled in Analog in channel setup, you can edit the Signal conditioning function by clicking on the Edit button. On the right the setup window will show and you can choose modes in the dropdown menu. Channel Summation is needed for standalone mode, the possible channels are available to choose on the check box.

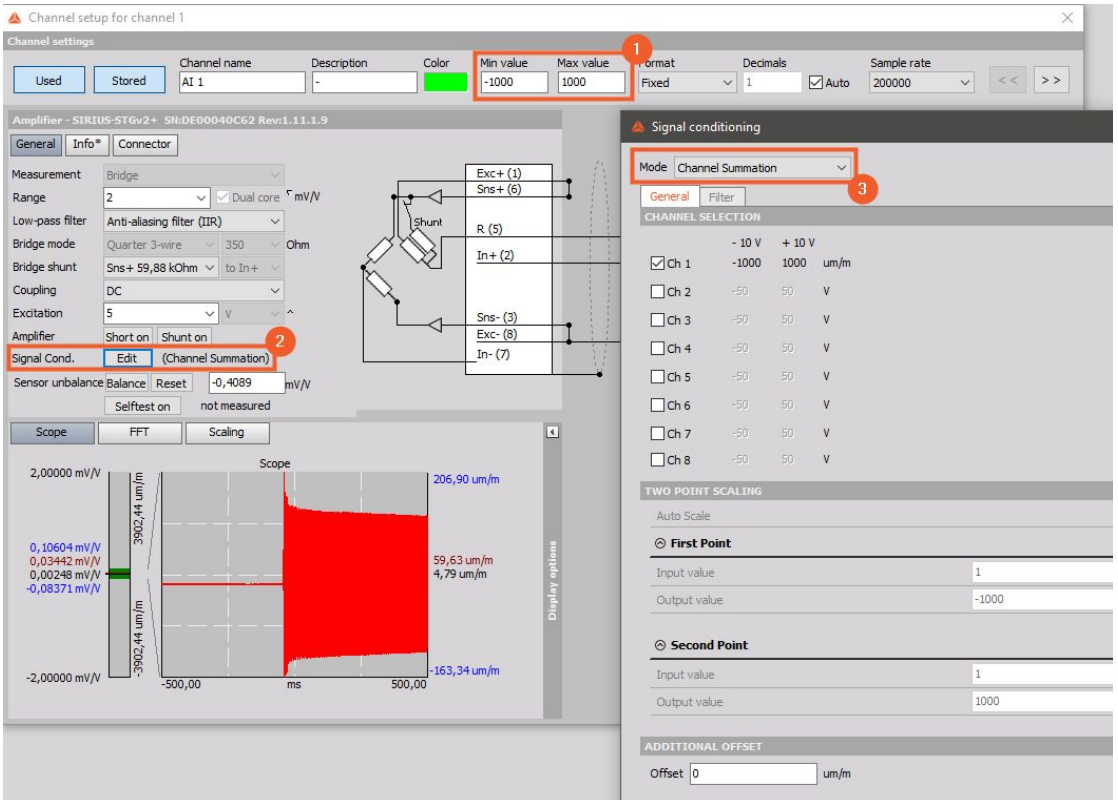


Image 6: Signal Conditioning setup at Analog Input channel setup.

Right clicking on the one of the marked tabs allows you to choose the “Set power on default” option.

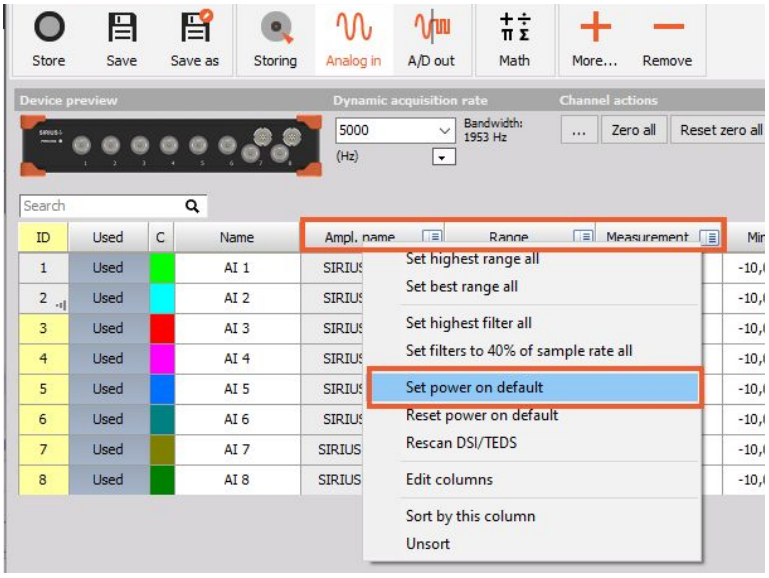


Image 7: Set power on default.

Important

The following procedure and sequence of steps are crucial for the system to work properly! First close DewesoftX® and then disconnect the POWER and USB cable. Then plug in only the POWER cable. Configuration will start to work.

Hit the tuning fork. The peak value is about +/-5 V (equals +/- 500 um/m), then it drops to around +/- 1 V (+/- 100 um/m).

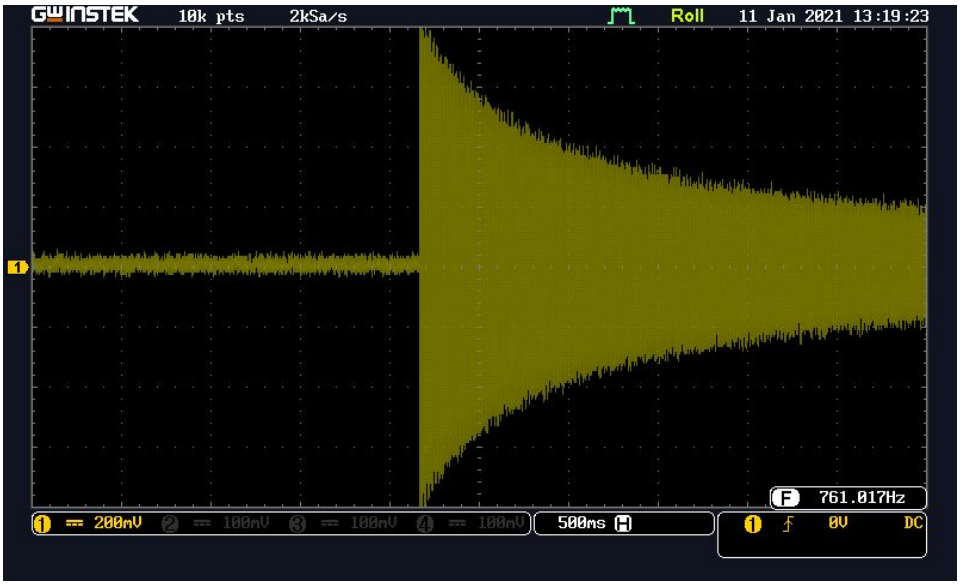


Image 8: Oscilloscope reading of fork signal.

Image 9: Test setup with oscilloscope connected on rear side AO (USB not connected).

4. File replay

4.1. With MULTI module AO

The MULTI module consists of Analog input, CNT input and Analog output. In this example we will do a measurement with the tuning fork on channel 5 (STG module) and replay the measured file to the Analog output of the MULTI module on channel 3. The output signal is measured by an oscilloscope.

Image 10: Multi port as an analog out.

We use a strain gage with strain scaling (um/m). Do one hit, store a datafile:

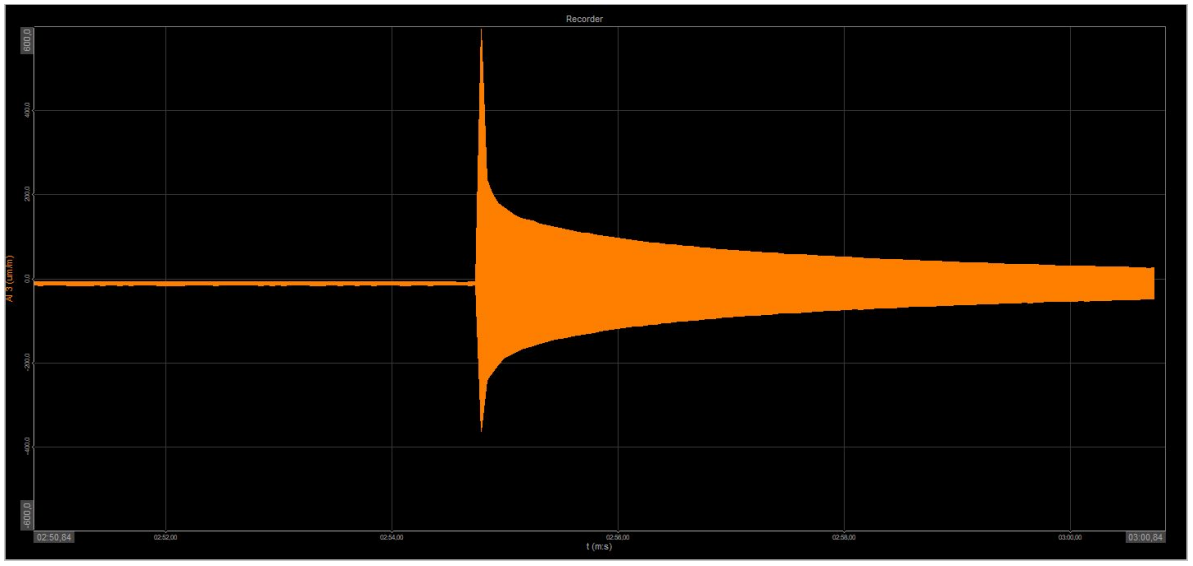


Image 11: Stored response from tuning fork.

In this example the max amplitude is approx. 600 um/m. Open the datafile and click on the “Analog out” button.

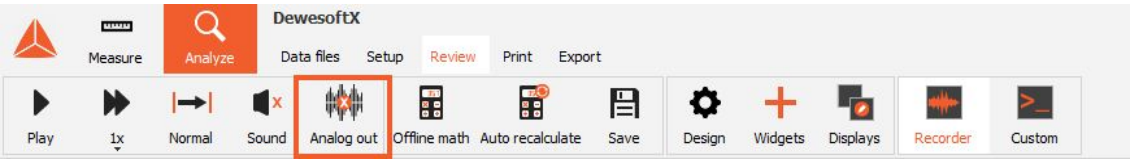


Image 12: Analog Out in Analyze mode.

A pop-up appears where you can see an 8 AO’s, one for each amplifier. In our case not every amplifier has an analog output. You have to take care about this yourself.

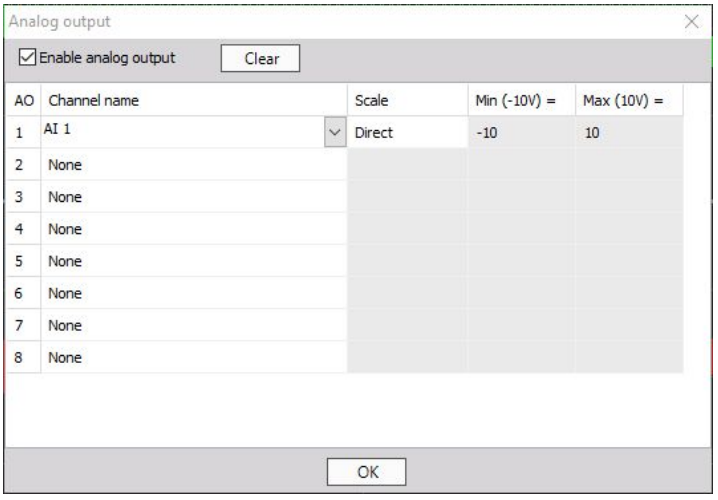


Image 13: Analog output window in analyse mode.

If you look on our Demo SIRIUS® slice, there are 2 MULTI modules, which means we have 2 AO (channel 3 and 4).

Image 14: SIRIUSi® DAQ with multi ports marked.

Let’s select for AO3 to put out the measured tuning fork signal (channel “in”).

There are four different scaling options:

- Direct
- From range
- From data
- Custom

4.1.1. Direct

Scale = 1; Offset = 0; This makes sense if you have an input amplifier with 10V input range and want to put out the signal 1:1. In our case the signal reaches much higher amplitude (+/- 600 um/m), so all parts above +/-10 um/m (+/-10V) will be clipped.

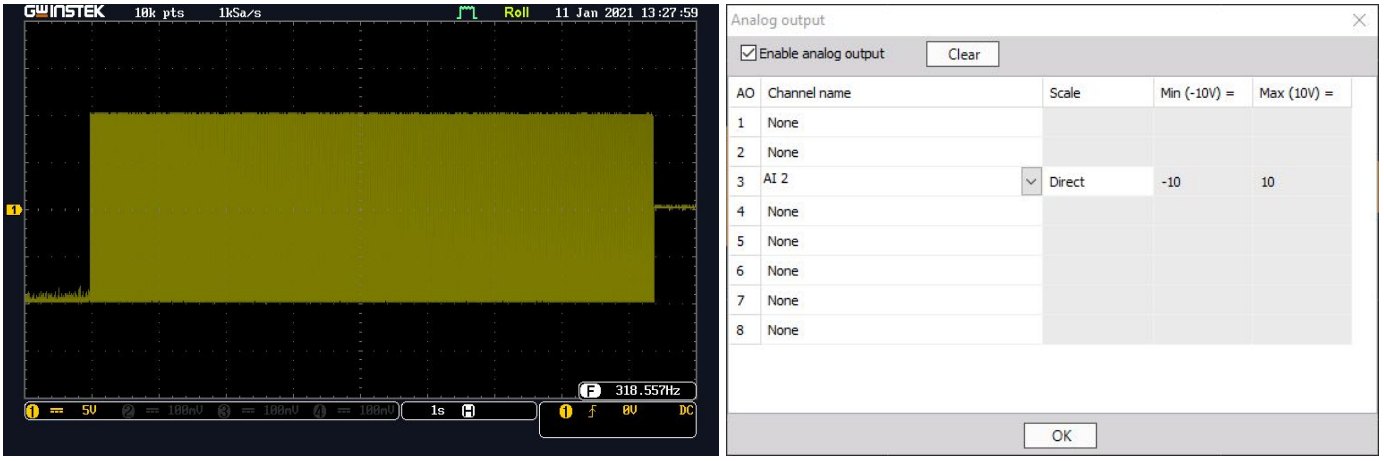


Image 15: Direct mode gives us +-10V.

4.1.2. From range

This takes the channel limits, which were adjusted before the measurement (in our case +/- 4000 um/m = +/- 10 V).

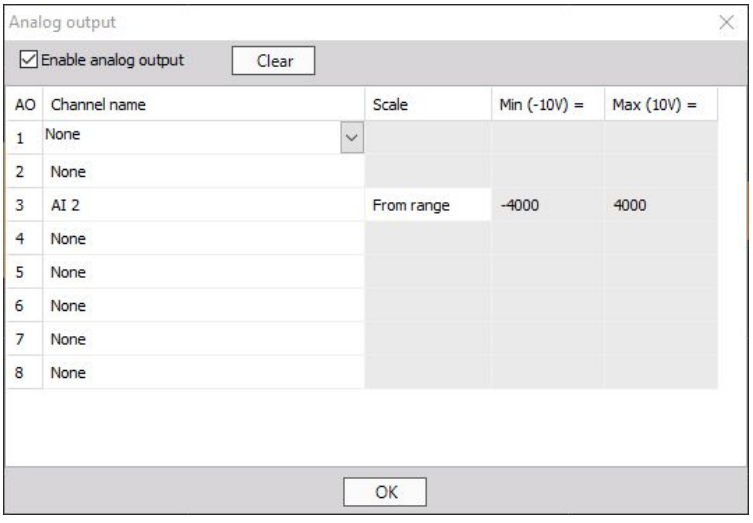


Image 16 : Analog output scale from range.

There is no possibility to change this afterwards. If different “custom” limits would have been entered before the measurement (e.g. +/1000 um/m) they would be shown here.

Custom channel limits can be entered in channel setup here:

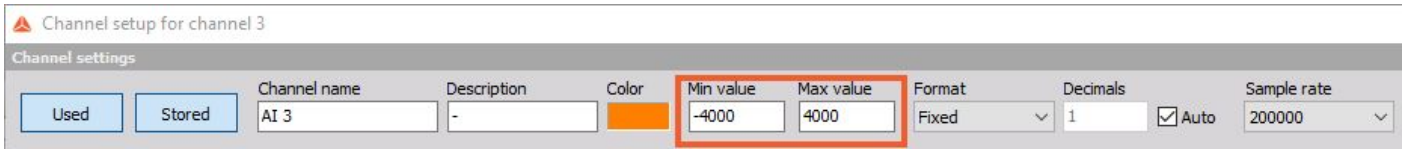


Image 17: Set min/max value that defines the range.

If 4000 um/m equals 10 V, 600 um/m equals 1,5 V. If we look at the oscilloscope, the max peak is 1500mV, OK.

4.1.3. From data

If you select from data, the min / max peak values of the signal are automatically overtaken (in our case -344 um/m and 607 um/m).

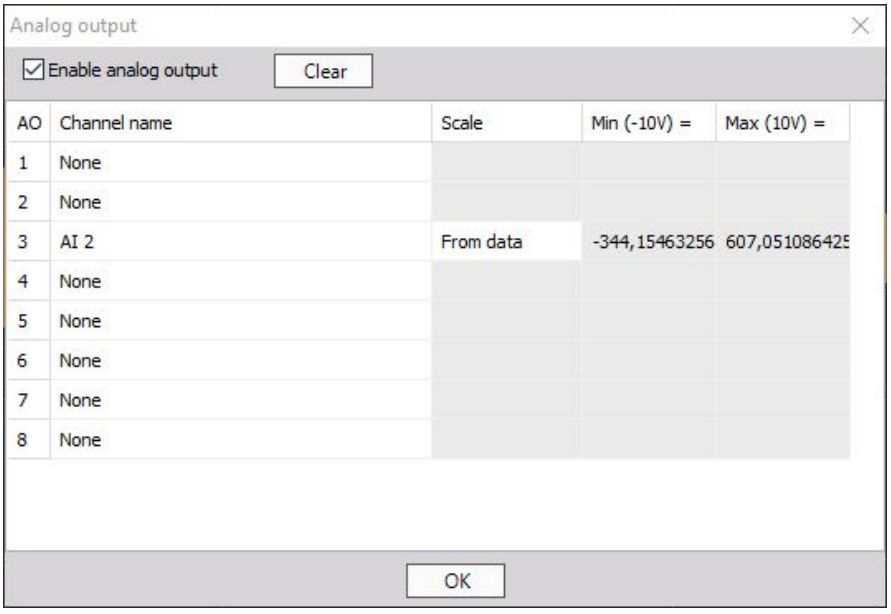


Image 18: Analog output scale from data.

Of course the disadvantage is, that the signal is not symmetrical any more.

Image 19: Read from scope, scale setting from data.

4.1.4. Custom

Usually this setting is the most useful one. For easier calculation, enter -1000 / +1000 um/m.

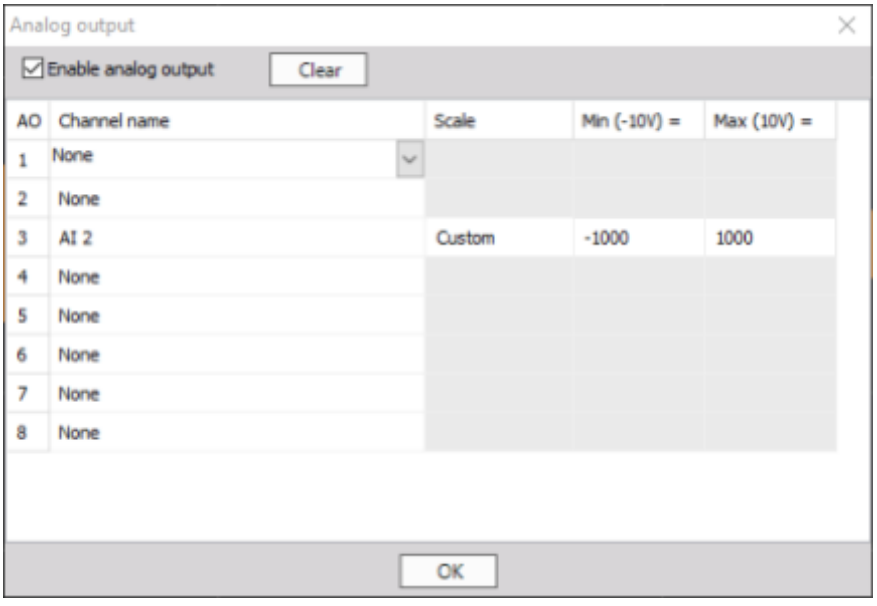


Image 20: Analog out custom scale.

As our signal reaches 600 um/m peak, the expected output signal should be 6 V now. The oscilloscope proves that.

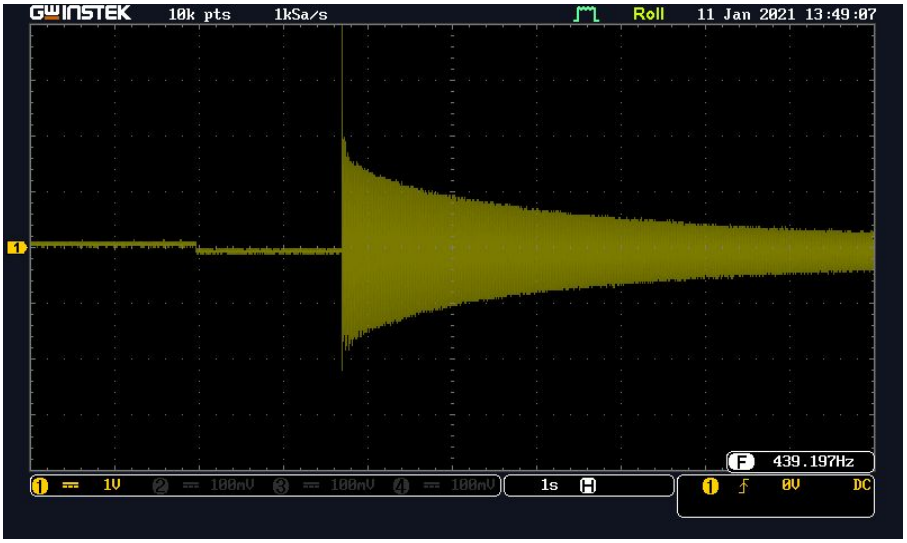


Image 21: Read on Scope with custom scale settings.

4.2. With AO8 option

The setup is very similar to the MULTI module, the only difference is that you can now use all 8 analog outputs on the rear side (8 BNC plugs), and you can route any signal to any output. You can also output the same signal on multiple outputs at the same time.

Image 22: AO on the back side of SIRIUS® connected on the oscilloscope.

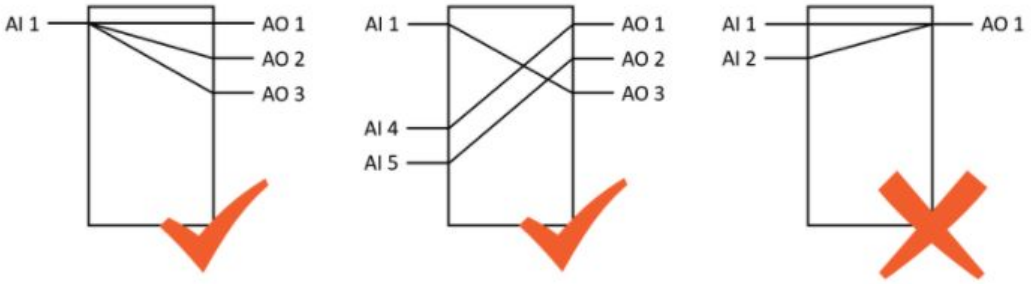


Image 23: Multiple Analog inputs can't be used for a single Analog Output.

5. User Input (Control channel)

You can use the Analog output also to manually output a value (changeable live during measurement, e.g. with a slider instrument). User inputs are added like A/D with a "More" button and are used for controlling things like digital outputs.

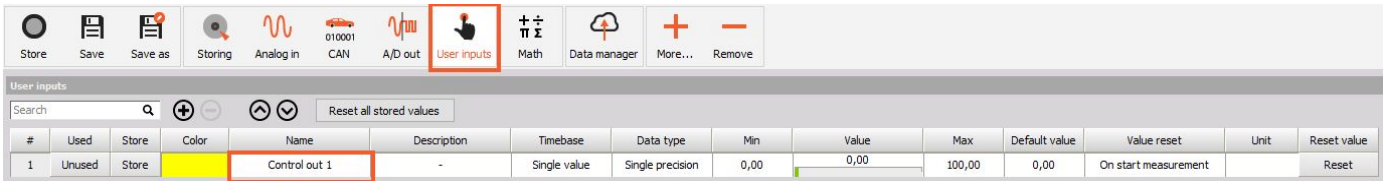


Image 24: User input setup.

When it is defined in user input you can see it under "A/D out" like a channel.

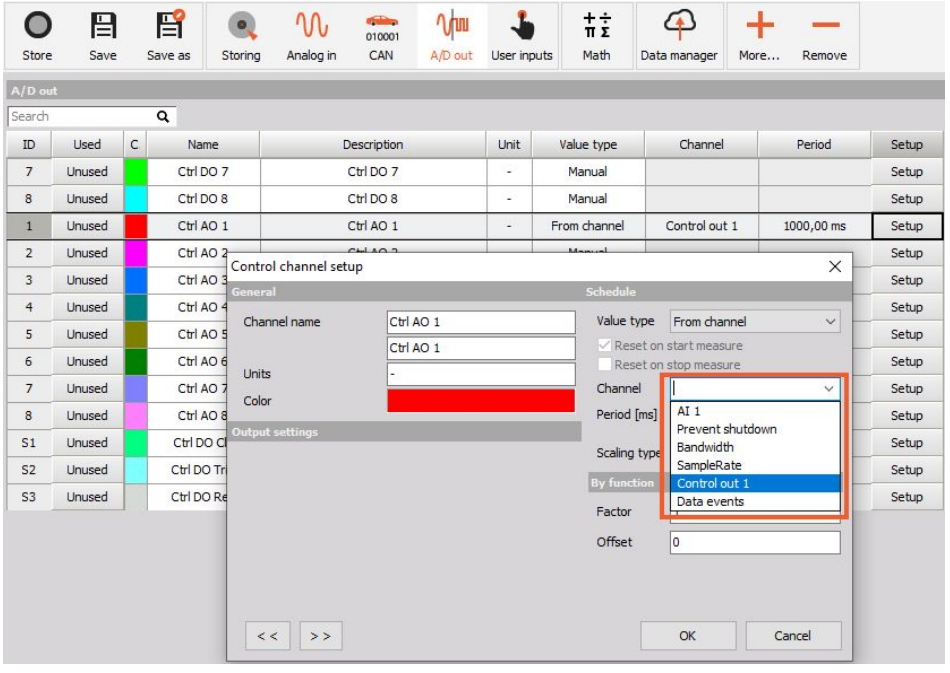


Image 25: A/D out setup, adding user input as a channel.

In measurement mode, we can see that our user input is directly controlling Voltage on analog output. For example we could control the LED light with this signal or any other low voltage actuator. In example below, we connected AO1 to AI1 with BNC cable and we can see output value in measure mode.

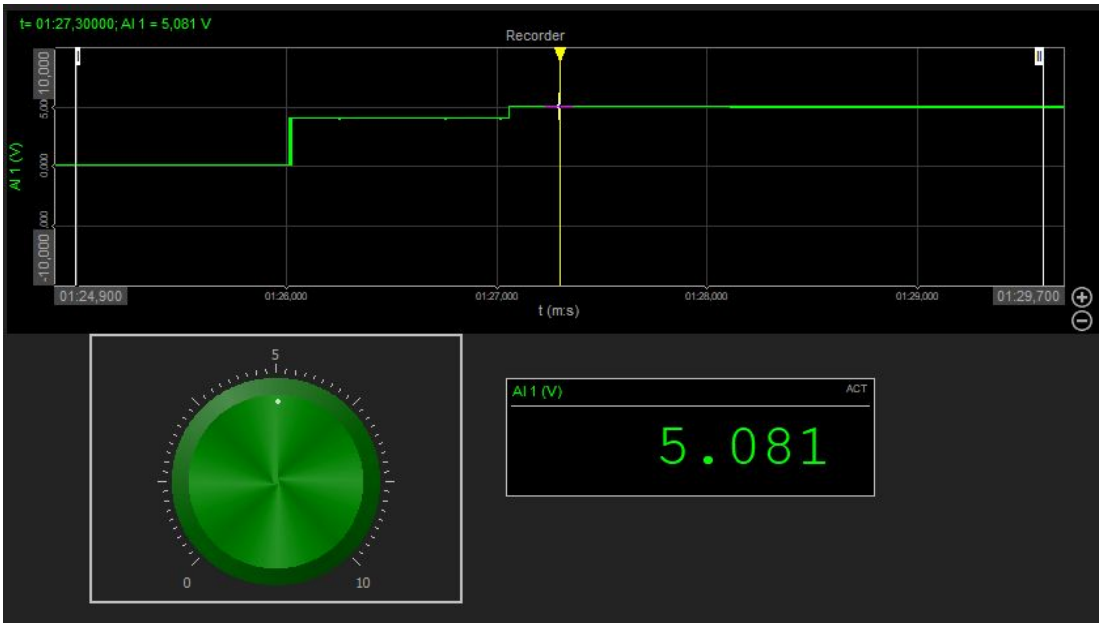


Image 26:Controlling analog output with user input.

For controlling the output we can set the user input as a fixed value or we must add a user input gadget in the measurement mode. In our case we choose “turn knob” and set the range from 0-10V.

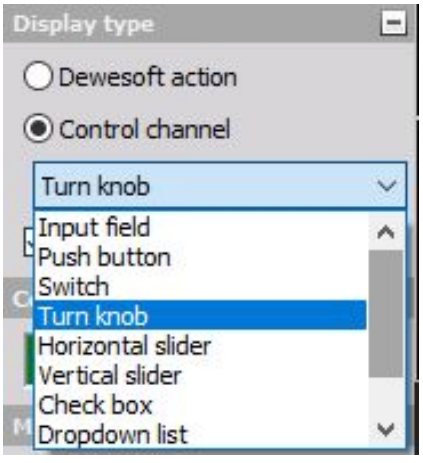


Image 27: User input type selection.

6. Function generator

Function generator is found under the “More” button which shows us the multiple functions and one of them is a function generator.

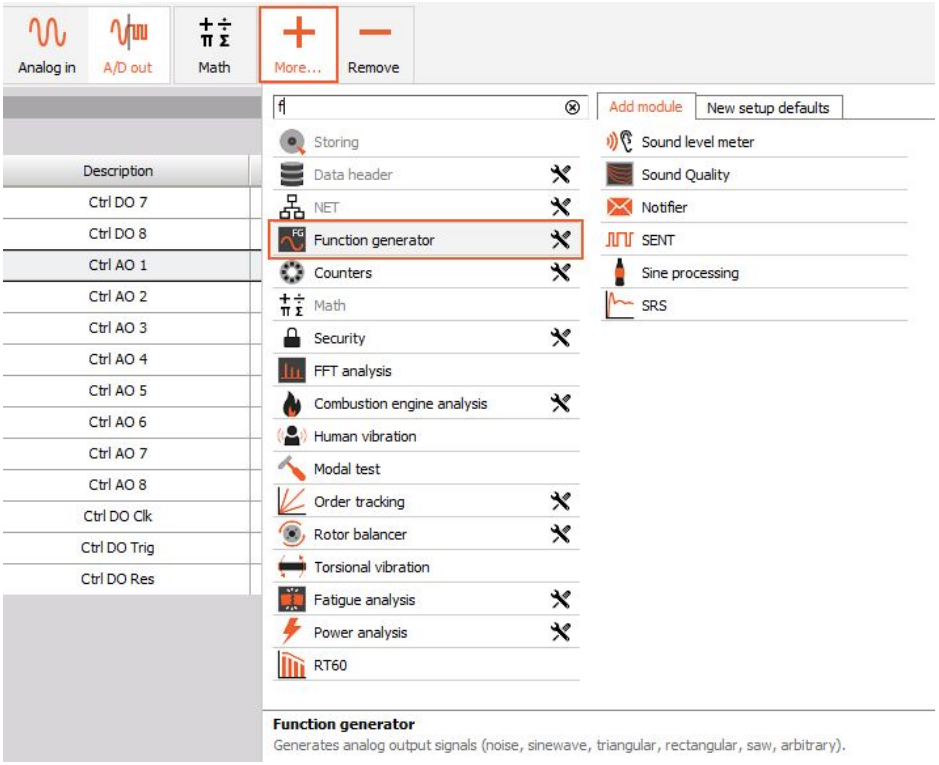


Image 28: Function generator module.

In case of having single MULTI modules instead of AO8 option the not usable outputs are marked with a grey not editable area in our case we only have one MULTI port at number 6.

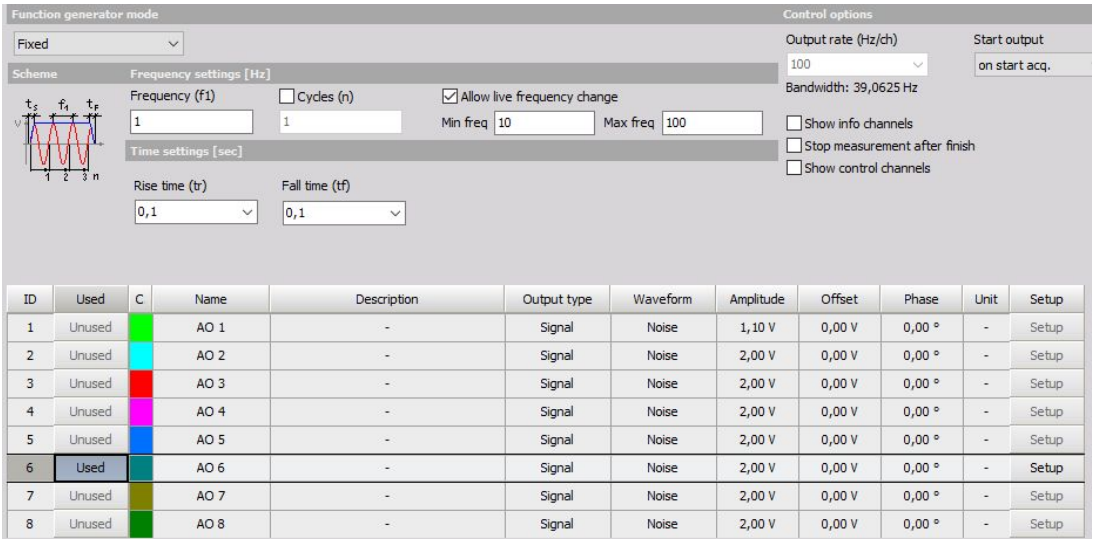


Image 29: Single MULTI channel for analog output example.

Multiple Waveforms can be chosen by the user (Sine, Triangular, Rectangular, Saw, Noise, Arbitrary).

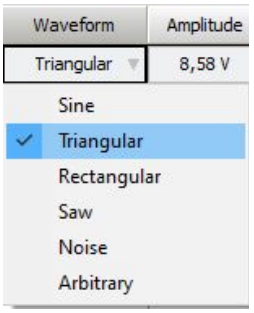


Image 30: Waveform options.

Other settings of the function generator we can set in the measurement mode if the “Show control channels” checkbox is checked, or we could set it on the setup screen in function generator mode.

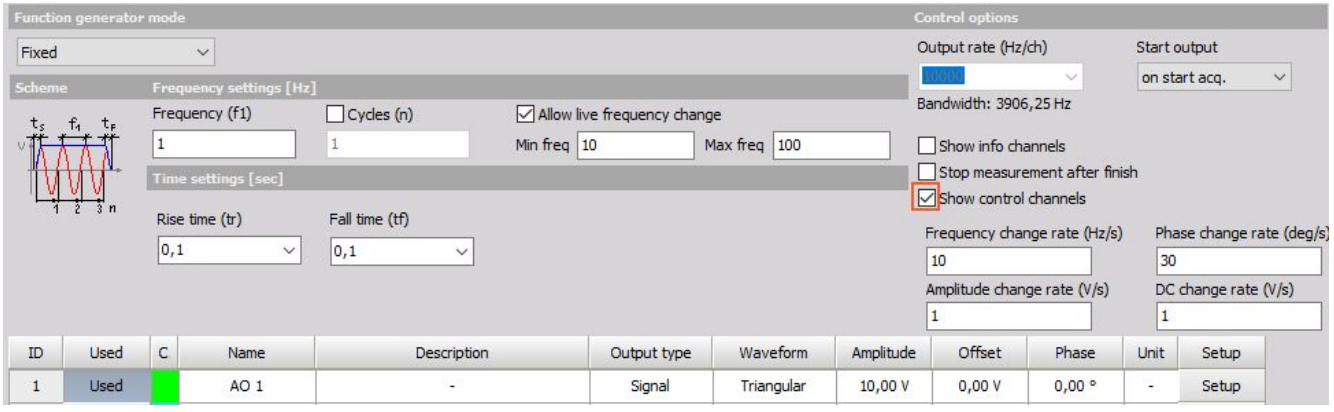


Image 31: Show control channels checkbox.

In measure mode we can now use “input control” for controlling each of the settings for the function generator or predefined knobs on the left side menu seen on the image below. In our case we changed the frequency of the Triangular signal from 10Hz to 1.893Hz. AO1 and AI1 are connected with BNC cable.

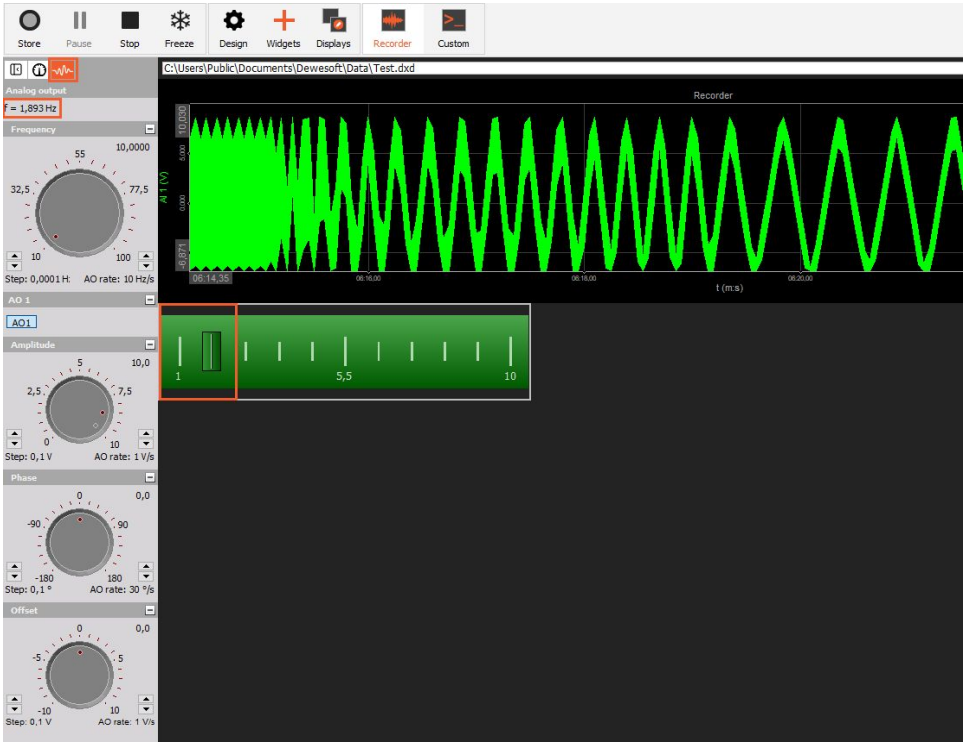


Image 32: Controlling the signal from predefined knobs or control input gadget.

The setup and changes are transferred into the Function generator setting when we leave the measure mode.

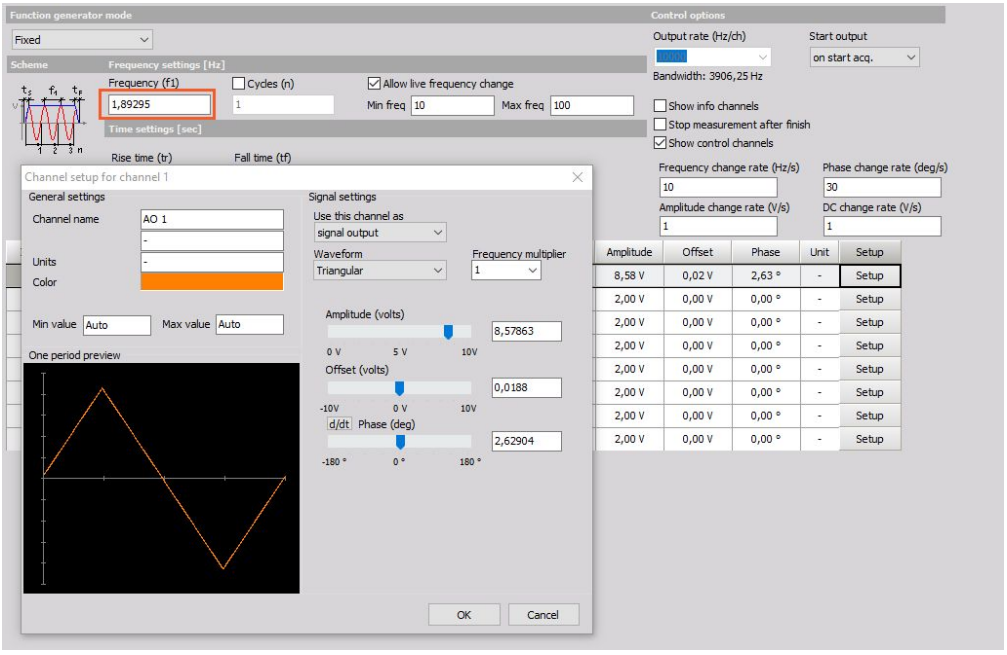


Image 33: Function generator setup options.

7. Channel output

Any channel (Analog In, CAN bus, Plugin channel, Math channel, etc.) can be written to the Analog Output during ongoing measurement. There are basically two different modes, which are explained below.

7.1. Slow rate / short response

This mode is appropriate, when a short delay (reaction) time is needed, from a change of a channel to the appearance of the analog output. Depending on the CPU performance, the Dewesoft settings such as Acquisition Update Rate and Sampling Rate, update rates down to approx. 5...10 ms can be achieved.

However, this mode is only useful for slow changing signals.

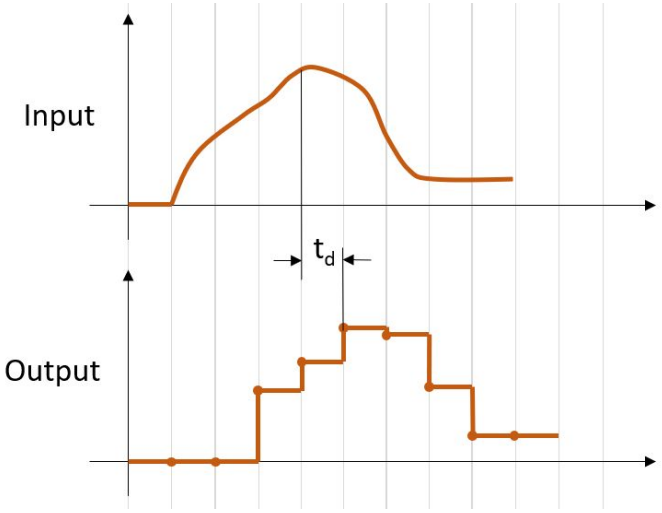


Image 34: Slow signal response rate.

The input signal is delayed for the time t_d in the graph, and also updated with this rate. This is the cycle time (update/refresh rate).

7.2. Fast rate / long response (deterministic)

In this mode Dewesoft can output any signal (even by math with each other calculated input channels) up to the full sampling rate (e.g. 200 kHz on SIRIUS®). However, to guarantee interruption-free output, the signal is delayed (buffered) for a fixed time of 1 sec (default value).

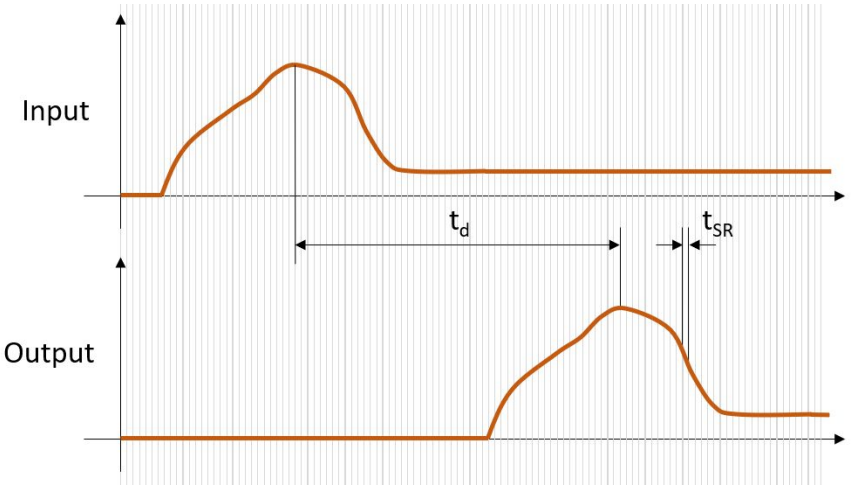


Image 35: Fast signals response rate delay.

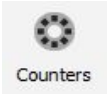
Since the delay is deterministic, this can be considered by following control elements.

7.3. Math output example

In this example we'll show the basic principle on a Frequency-to-Voltage-converter by using a Math formula.

Image 36: Encoder on left and scope on right connected to SIRIUS®.

The Encoder on the left side is mounted on a grinder bench. It is connected to the ACC+ counter input on channel 1. On the MULTI module on channel 4 a special split-adapter is connected, the analog output is routed to the oscilloscope.



We configure the counter to get a Frequency channel (0...3000 rpm)

Then we scale the frequency signal to a voltage (freq/3000*5 -> 0...5V)

Which we then put out via the “A/D out” section

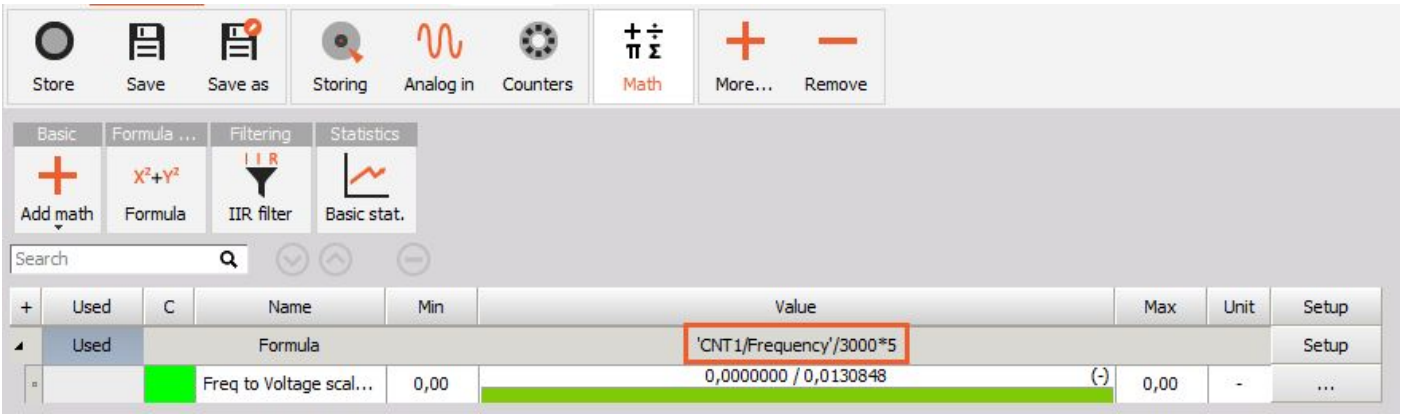


Image 37: Setting up math formula.

Go to the “A/D out” and activate the output channel to Used.

Then chose to take the value from the Math channel, here called “Freq to Voltage scaling math”. Output period is for example 1000 ms.

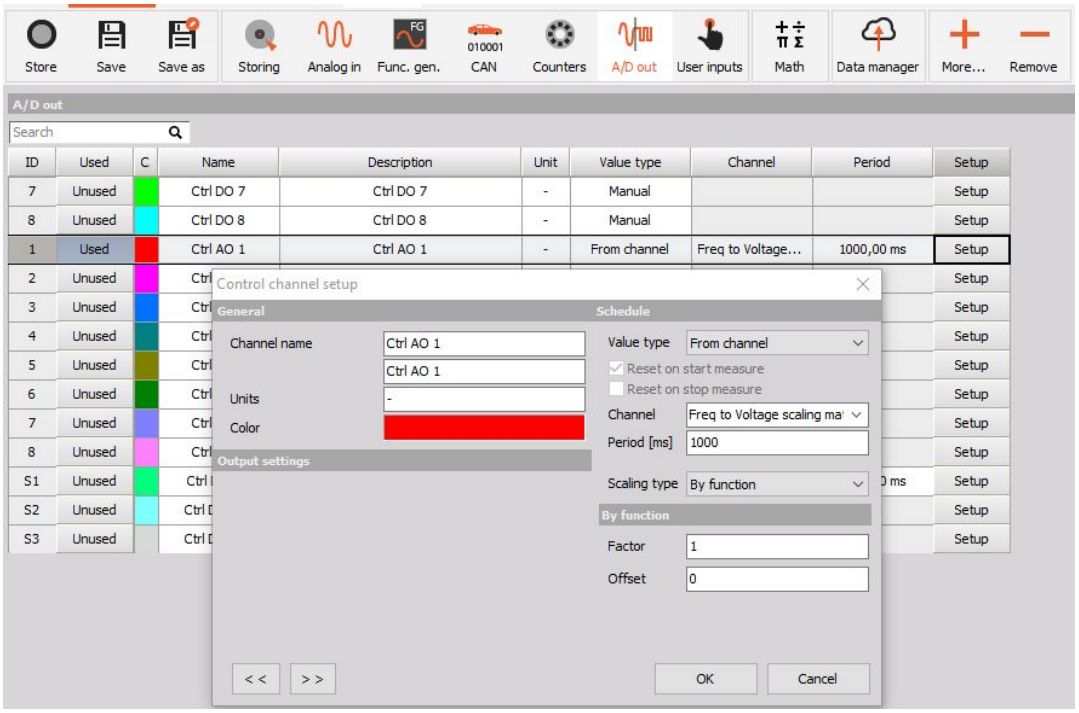


Image 38: Setting up analog output from Math formula.

We start the engine and turn it off again. The coastdown takes about 15 seconds. Below you see the three signals: the CNT input, the scaled math channel and the AO1.

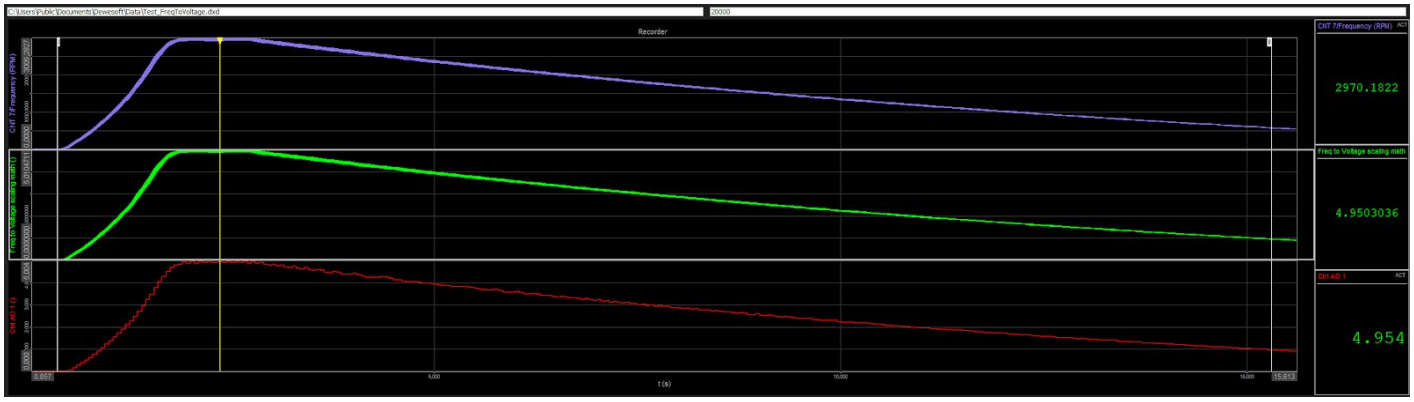


Image 39: Three signals 2dn and 3rd referring to the 1st one.

The max measured RPM is 3005, which equals 5,004V.

Image 40: Image from the oscilloscope.

Also on the scope you see the correct max RPM (approx. 5 V).
Of course the scope resolution is only 8 bit...

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8.1. 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.

8.2. 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)

8.3. 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.

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

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9. Safety instructions

Your safety is our primary concern! Please be safe!

9.1. 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.

9.2. 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.

9.2.1. Environmental Considerations

Information about the environmental impact of the product.

9.2.2. Product End-of-Life Handling

Observe the following guidelines when recycling a Dewesoft system:

9.2.3. 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.

9.2.4. 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.

9.3. Documentation version history

Version	Date	Notes
V21-1	15.01.2021	New template, updated images from DewesoftX®
V21-2	02.02.2021	Some Images were added