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OXYGEN Training
> TRION3-AOUT-8 Support

OVERVIEW

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5 different output modes available

1. Monitor Output
   (supported by TRION3-18x0-MULTI-AOUT-8 only)
2. Math Output
   (supported by TRION3-18x0-MULTI-AOUT-8 only)
3. Constant Output
   (supported by TRION3-AOUT-8 and TRION3-18x0-MULTI-AOUT-8)
4. Function Generator
   (supported by TRION3-AOUT-8 and TRION3-18x0-MULTI-AOUT-8)
5. Stream Output aka File Replay
   (supported by TRION3-AOUT-8 and TRION3-18x0-MULTI-AOUT-8)

- This presentation will explain the software functions for the TRION3-AOUT-8 module in OXYGEN.
- In order to use some functionalities, the TRION3-AOUT-8 in combination with a TRION3-18xx-MULTI (TRION3-18x0-MULTI-AOUT-8) is required
- Requires OXYGEN R5.4 and TRION Applications R5.4 or higher
- TRION3-AOUT boards provide the following two functions:
  - Conditioned signal output
  - Calculated channel output
- Conditioned Signal Output
  A direct or processed output of each conditioned analog input of the TRION3-18x0-MULTI is available here. This can be an analog signal as direct output or RMS or average value for the same ranges as processed output.
- Calculated channel output
  Any channel or the TRION3-18x0-MULTI can be used for basic calculations on the FPGA
- Voltage or current output is available for both functions with the following ranges:
  ±5 V, ±10 V, 0 - 5 V or 0 - 10 V ±30 mA, 0 - 30 mA

CHANNEL SETUP - OVERVIEW

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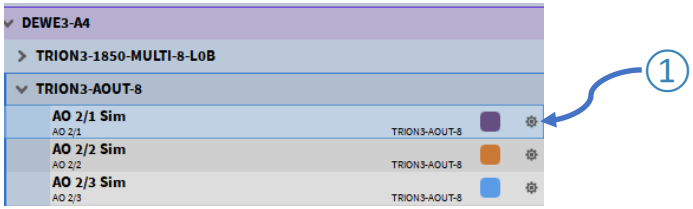
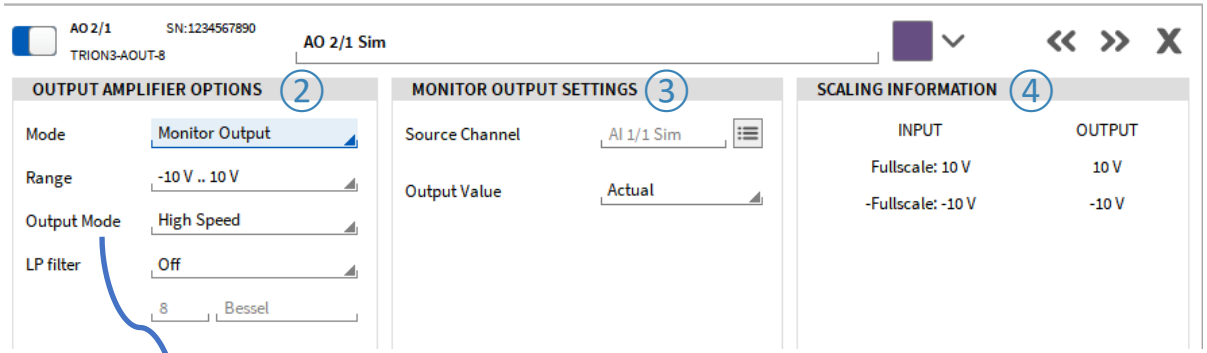
① Click on the gear button to access the Channel Setup

② Output Amplifier Options. Selection of
- Mode
- Range
- Output Mode
- LP Filter

③ Includes specific settings depending on the Channel Mode

④ Includes the scaling information from Input to output
Can be edited by changing the reference channel's input range or the output channel's range





Output Mode	High-speed Mode	High-resolution Mode
Update Rate	2.5 MS/s	500 kS/s
Resolution	16 bit	32 bit
Latency	< 5 µs	< 100 µs

CHANNEL SETUP – MONITOR OUTPUT SETTINGS

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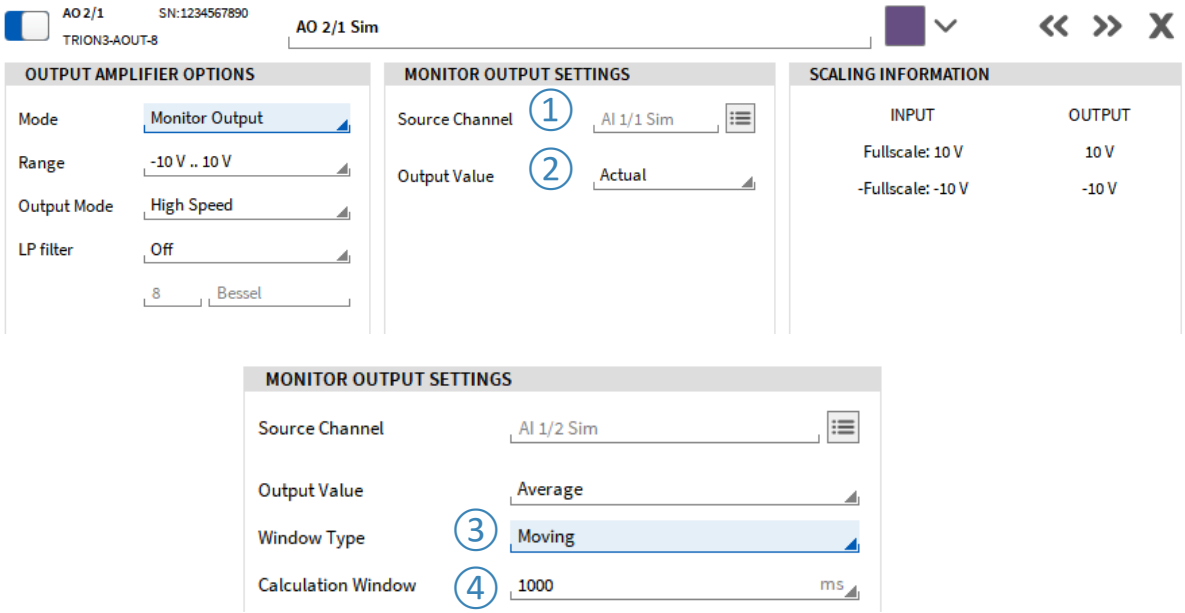
1. Select the reference input channel which shall be output
2. Select the output value Actual, Average or RMS
3. In case output value is *Average* or *RMS*, a *Moving* or *Fixed Window Type* can be selected
4. Calculation Window can be set from 1 … 1000 ms



- Monitor output provides the same functionality a as signal conditioner
- If *Output Value* is *Average* or *RMS*, the calculations will be done on the board's FPGA to ensure minimum latency times

CHANNEL SETUP – MATH OUTPUT

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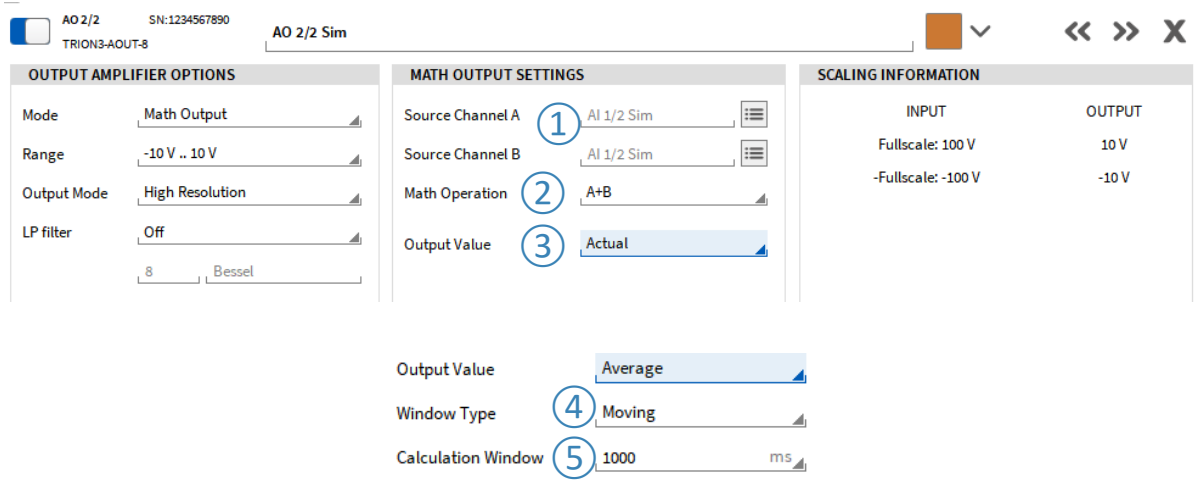
1. Select the reference input channels
2. Select the Mathematical operation *A+B*, *A-B* or *A*B*
3. Select the output value Actual, Average or RMS
4. In case output value is *Average* or *RMS*, a *Moving* or *Fixed Window Type* can be selected
5. Select the output value Actual, Average or RMS
   Calculation Window can be set from 1 … 1000 ms



- Math Output can be used to output the sum, difference or product of two reference input channels
- The calculations will be done on the board‘s FPGA to ensure minimum latency times

CHANNEL SETUP – CONSTANT OUTPUT

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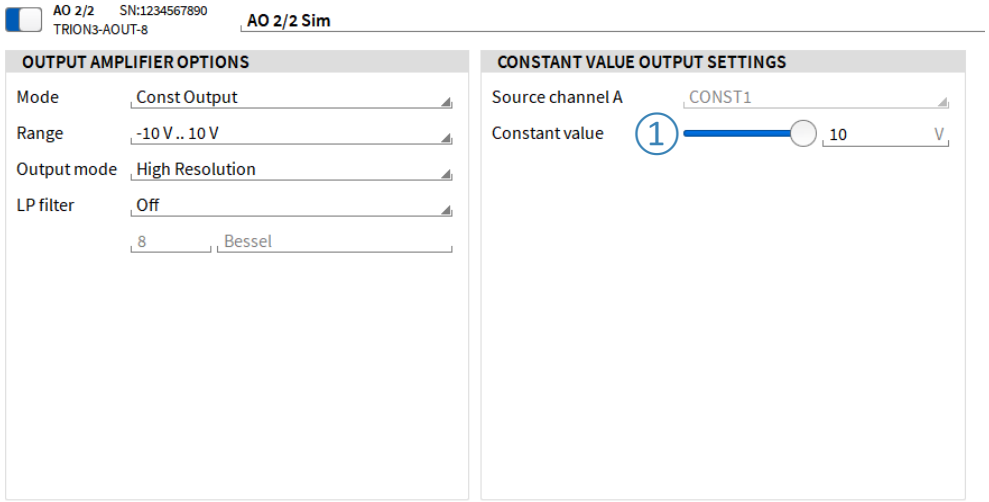
① Select the desired constant value



➢ Constant Output can be used to output a constant reference value within the selected channel Range

CHANNEL SETUP – FUNCTION GENERATOR

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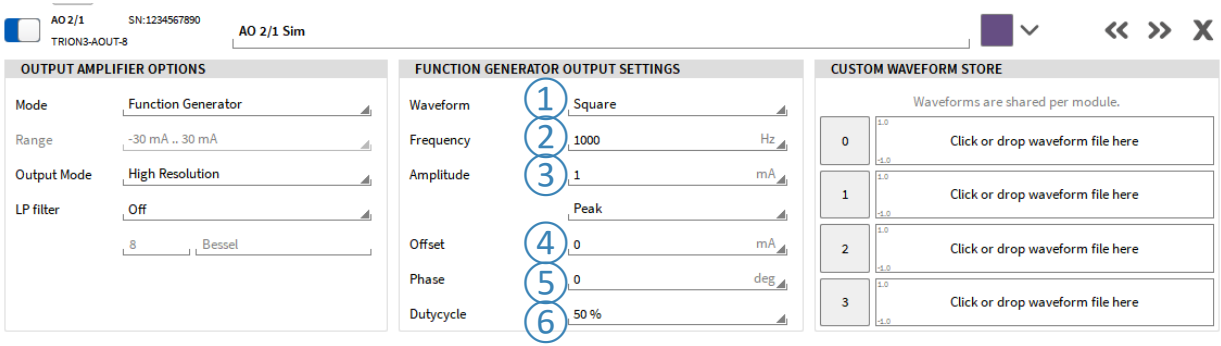
1. Select the desired waveform: Sine, Square, Triangle or a customized pattern
2. Select the desired signal frequency from 1 mHz to 1 MHz
3. Select the signal amplitude from 0 … 10 V or 0 … 30 mA as *Peak* or *RMS* value
4. Select a signal offset within the output range
5. Select a phase shift from -180° … 180°
6. Select a Dutycyle from 0.01 … 100% Only available from Square and Triangular signals



- Function generator provides the ability to output different predefined waveforms or customized patterns
- The calculations will be done on the board's FPGA to ensure minimum latency times

CHANNEL SETUP – CUSTOM WAVEFORM PATTERNS

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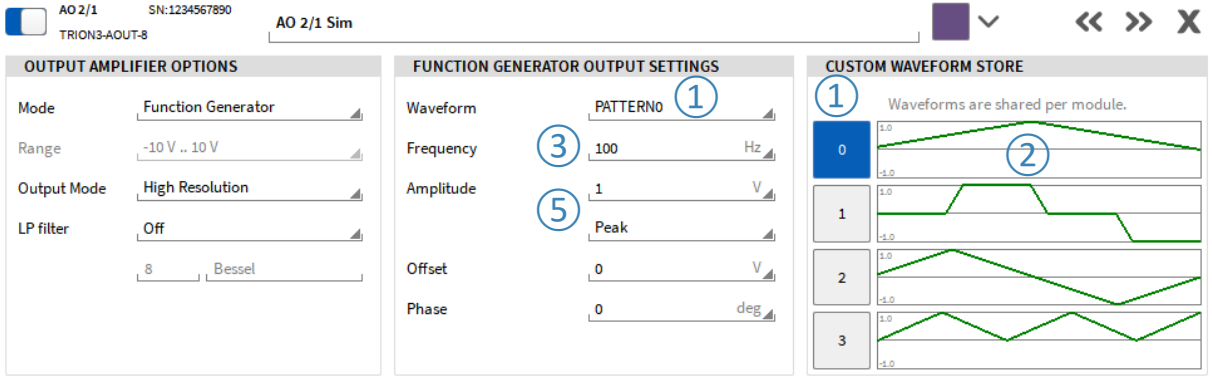
- Instead of a predefined Sine, Rectangular or Triangular, a customized waveform can be used
- 4 customized waveforms are shared by the entire module
- Waveforms are stored to the dms-setup file
- One waveform can be selected per channel

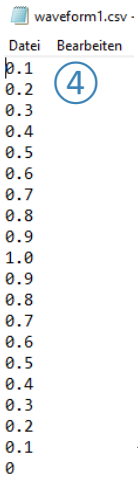
① Select the desired pattern in the waveform dropdown or select the desired wavfeorm directly in the custom waveform menu

② Load a waveform by dragging and dropping the file into the respective wavfeorm field or by clicking on the field to open a dialog window

③ The defined waveform corresponds to one period and will be repeated periodically. Output rate can be defined by using the Frequency selection



- The waveform file must fulfill the following demands:
  - The file must be a .csv format (④)
  - Each row is one value or sample
  - Only values between -1 and 1 are allowed
    The signal will be scaled according to the selected Amplitude (⑤)
  - The separator must be a . (dot)
  - A maximum of 16384 rows are allowed

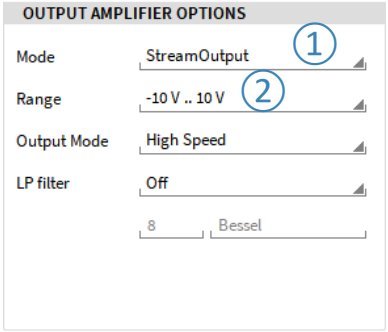


CHANNEL SETUP - STREAM OUTPUT

- The Stream Output functionality can be used to output scalar channels via the analog output channels of the TRION3-AOUT board, this is also possible with channels of a previously recorded OXYGEN file.
- To use this option, the software must be in *LIVE* (data acquisition) or REC mode
- This mode is not supported in *PLAY* mode

① To enable this mode enable *Stream Output* in the output amplifier options of each channel that shall be used for data output

② The output signal (voltage or current) and its range can be specified



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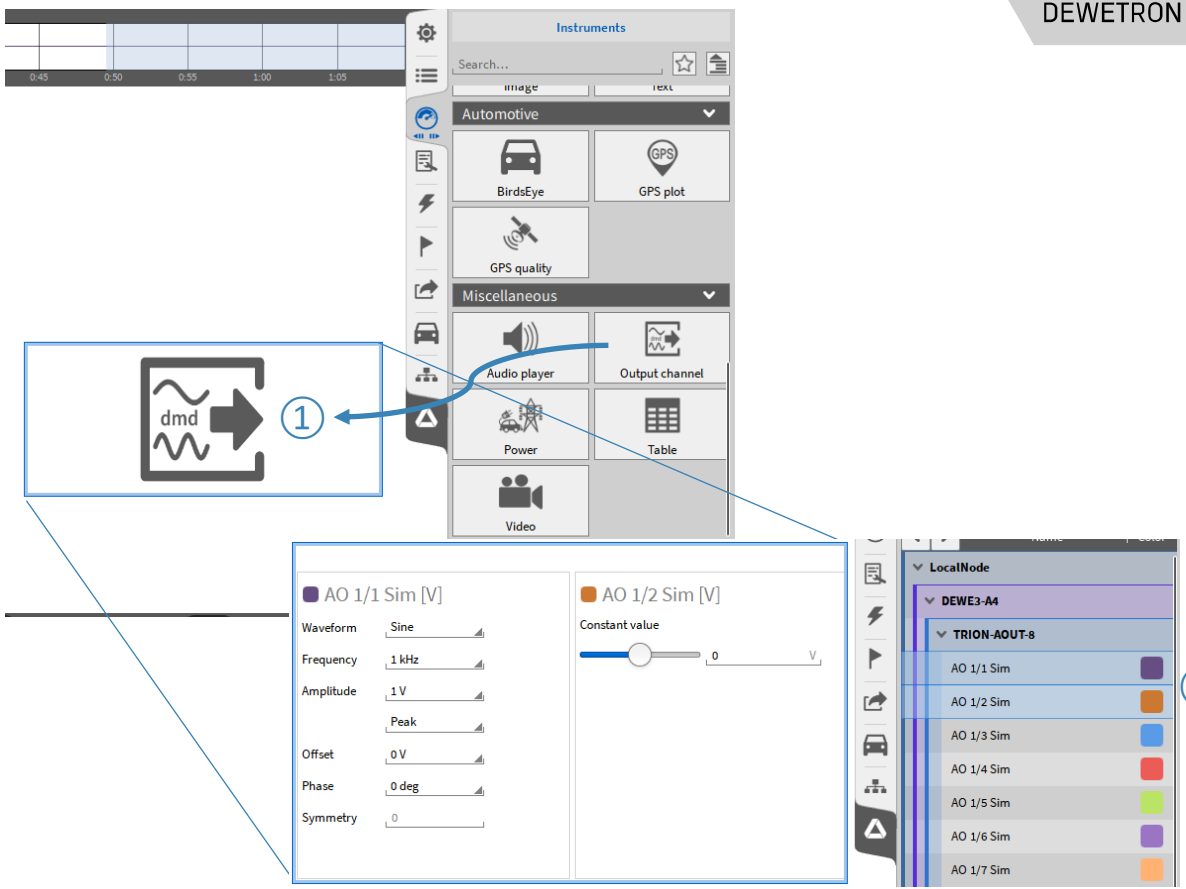
OUTPUT CHANNEL INSTRUMENT FOR CONST OUTPUT AND FUNCTION GENERATOR

- Const Output Channels and
- Function Generator Channels

can be displayed and changed on the measurement screen

① The Output Channel instrument can be found in the Instruments menu and can be dragged and dropped to the measurement screen

② Selecting the output channels from the channel list will display them in the Output Channel instrument.
The const value can be changed via the slider or the numeric input field
The function generator can be customized via drop-down-menus



OUTPUT CHANNEL INSTRUMENT FOR STREAM OUTPUT

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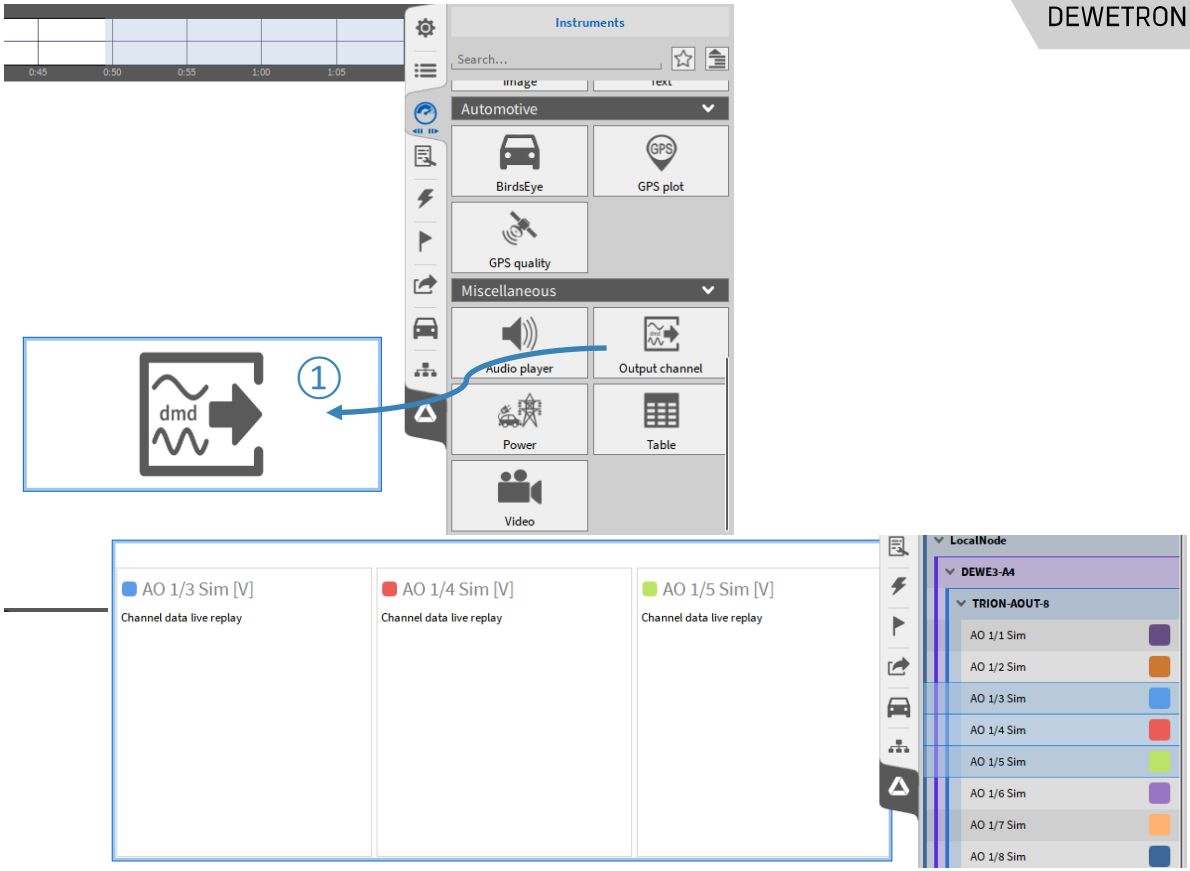
- A separate Instrument exists for loading the desired data file that shall be replayed
- This Output Channel instrument is also used to assign the channels that shall be output from the data to the respective Analog Output channel

① The Output Channel instrument can be found in the Instruments menu and can be dragged and dropped to the measurement screen

② The analog output channels that shall be used for data replay must be assigned to the Output Channel instrument.

The channel‘s output mode must be set to Stream output.



OUTPUT CHANNEL INSTRUMENT PROPERTIES

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① Load the data file to be replayed

② Assign the input channel to the output channel

③ Change the output scaling factor (Adjustable by scroll + CTRL on black scale)

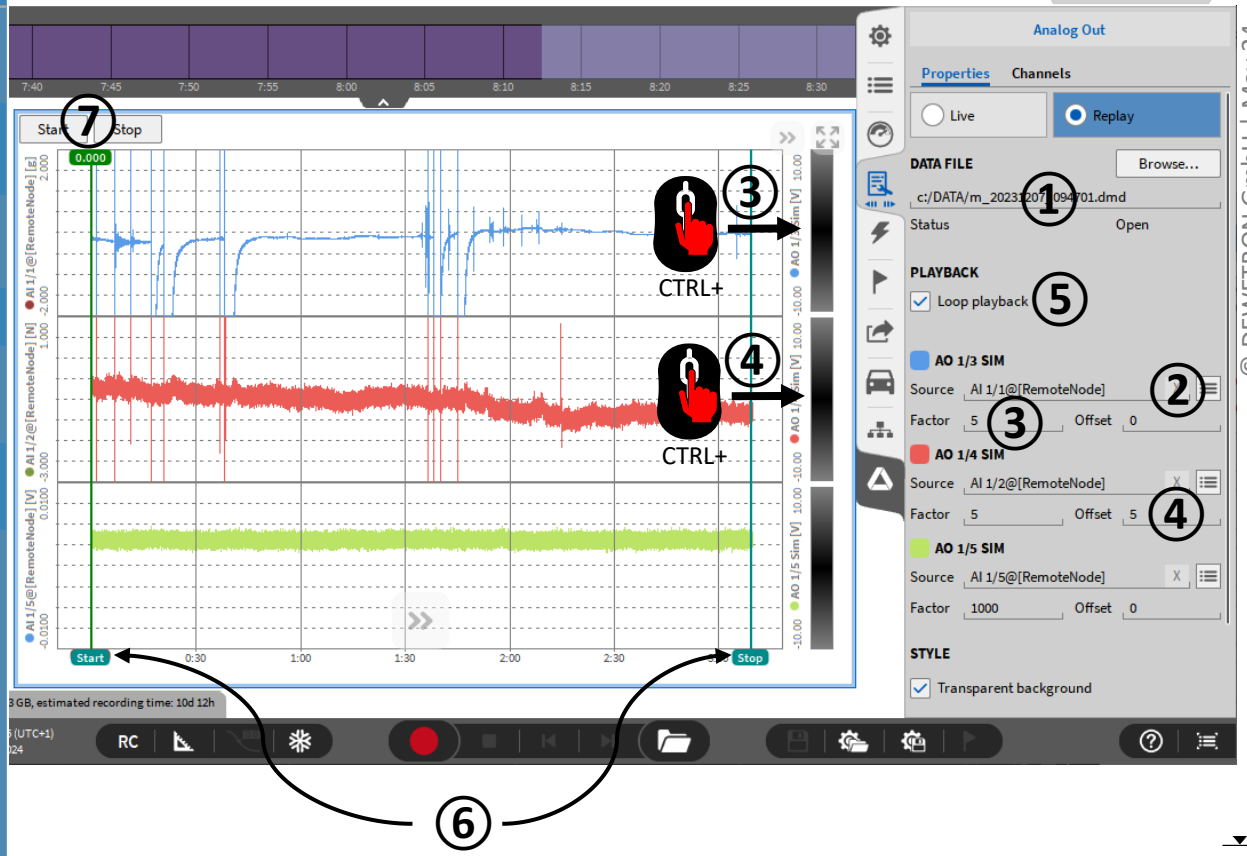
④ Change the output offset (Adjustable by scroll + CTRL on black scale)

⑤ Loop the playback

⑥ Use the cursors to replay only a certain data file part

⑦ Start / Stop and pause the playback

⑧ Playback mode "Replay" is used to play back channels of a previously recorded OXYGEN file. Playback mode "Live" is used to play back scalar channels of the current measurement, no data is displayed in the instrument. In "Live" mode, the instrument is only used to set the channels to be transmitted, which are directly output as AOUT channels.



OUTPUT Mode – Channel Sum

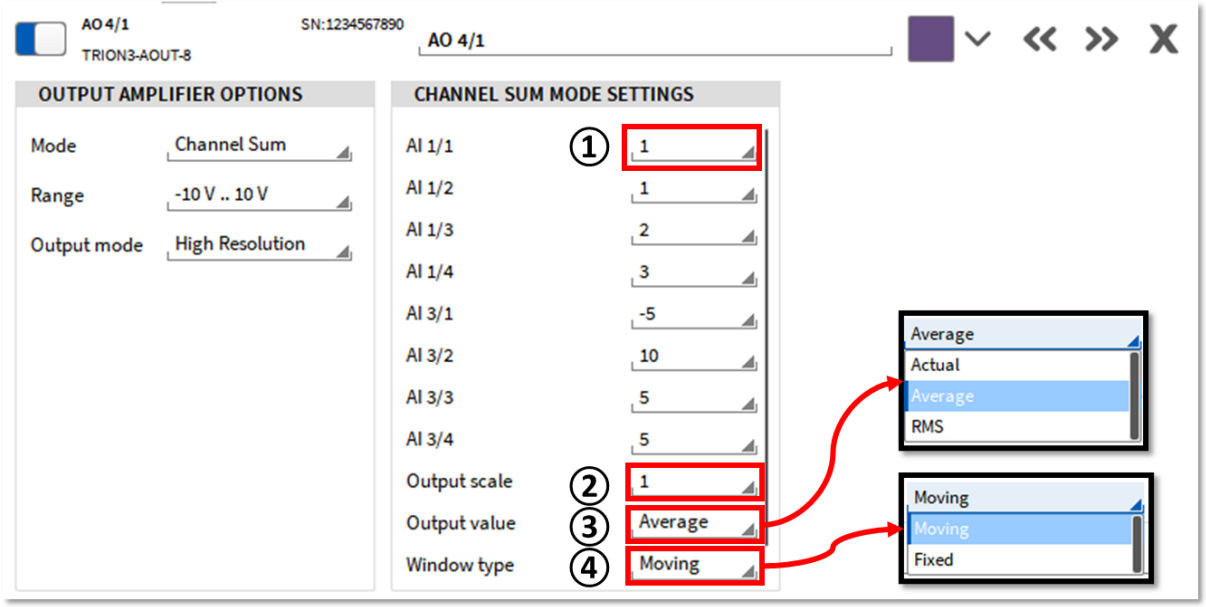
Switch to the „Channel Sum“ Mode.

① Select the scaling per analog channel between -10 and 10.
The first 8 analog channels can be chosen.

② To scale the output as a whole, use the „Output scale“ between -100 and 100.

③ To use the average or RMS, switch the „Output value“

④ For the two statistic modes „average“ and „RMS“ the window can be set between moving and fixed.



OUTPUT RATE VS SAMPLE RATE

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① The output rate (sample rate of the D/A converter) is only depending on the selected output mode.
High Speed mode corresponds to 2.5 MS/s
High Resolution mode corresponds to 500 kS/s

② The output channels can also be stored to the dmd-file. The sample rate for storing the channels can be selected in the *Sample Rate* column of the Channel List