

THE MEASURABLE DIFFERENCE.



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▼

OXYGEN TRAINING > EVENT BASED RECORDING





*What's event based recording?
Event based or triggered recording denotes
editing the recording state based on one or
several signal thresholds*

- > Overview
- > Event based waveform recording
 - > Event conditions
 - > Condition types
 - > Actions
 - > Recording actions
 - > Alarm actions
 - > Marker actions
 - > Snapshot actions
- > Statistics recording
- > Individual channel configuration



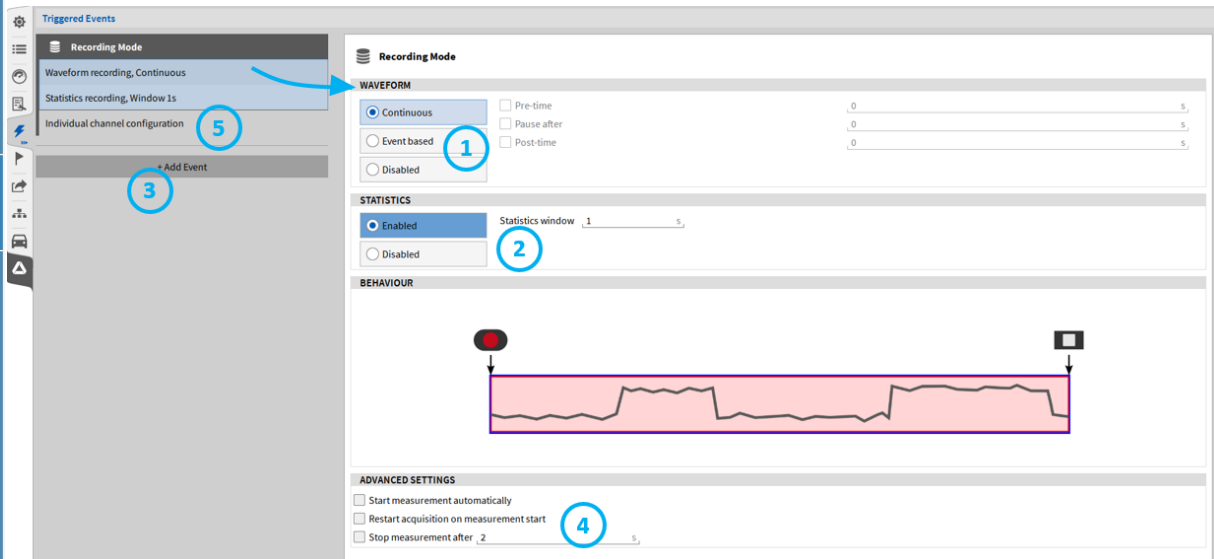
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MENU OVERVIEW

- ① Settings for *Waveform* recording
Waveform recording denotes storing data at full sample rate to the data file
- ② Settings for *Statistics* recording
Statistics recording denotes storing MIN, MAX, AVG and RMS of all channels for a selectable time window to the data file
- ③ Adds an event for event based waveform recording
- ④ Starts the measurement automatically after software startup or setup load
„Pressing the record button will become obsolete“

Restart the data acquisition on measurement start

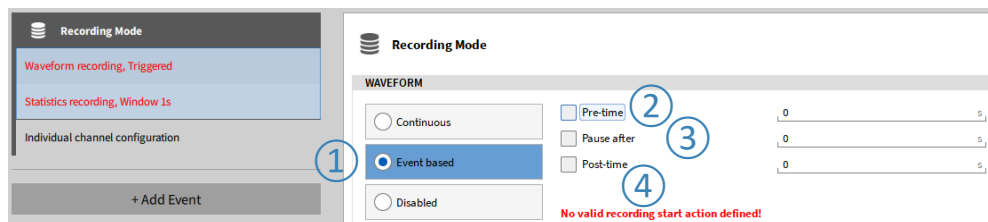
Stop measurement after a selectable time
- ⑤ Settings for individual channel configuration for the storing behavior



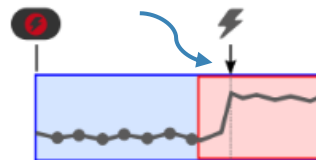


EVENT BASED WAVEFORM RECORDING

- 1 Select *Event based* Waveform Recording
- 2 Enter an optional *Pre-time* up to 100 s
- 3 Enter an optional *Pause after* time
- 4 Enter an optional *Post-time* up to 100 s
- 5 Press *Add Event* to create a recording event



> *Pre-time* means that the data of the time before the trigger event is activated, will be stored to the data file as well



- > *Pause after* means that recording is automatically stopped after the specified time has passed
- > *Post-time* continues Recording time after Stop recording action has been activated

An event consists of a condition to activate the event and an action that defines what shall be done in case the event is activated or active. The action might be a recording action or others



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EVENT BASED WAVEFORM RECORDING – EVENT CONDITIONS

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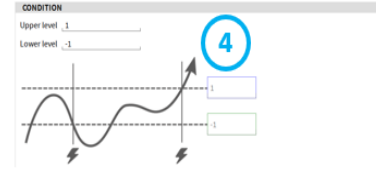
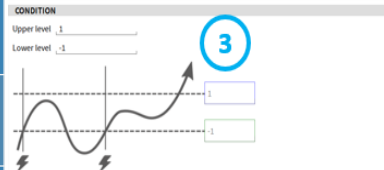
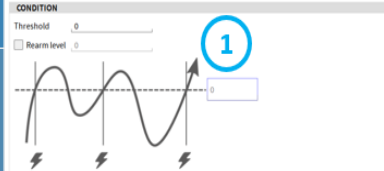
- 1 Click here to edit the *Condition* to activate the *Event*
- 2 Different *condition types* exist:
 - > Signal exceeds or decreases a threshold
 - > Signal is in or out a certain window
 - > Keyboard event
 - > Relative time event
- 3 Select the channel if a threshold shall be monitored
- 4 Enter the threshold
- 5 Indication if event is active or inactive
- 6 Preview window. Shows a preview of the base signal of the trigger event. Threshold is represented by the blue line, which becomes red, if trigger event is active. Rearm level will be represented by the green line. Range is the set range of the first assigned signal.

The screenshot displays the DEWETRON software interface for configuring event-based waveform recording. The main window is titled "Triggered Events" and shows a list of events on the left. The selected event, "Event 1", is configured with the condition "AI 3/1 Sim >= 6 (rearm @ -6)". The configuration panel on the right shows the "CONDITION TYPE" set to "Level HIGH" (indicated by a blue circle 2). The "CONDITION" section shows the "Threshold" set to 6 (indicated by a blue circle 4) and the "Rearm level" set to -6 (indicated by a blue circle 4). The "Preview window" (indicated by a blue circle 6) shows a waveform with a blue horizontal line at the threshold level (6) and a green horizontal line at the rearm level (-6). The waveform crosses the blue line, indicating the event is active. The "CHANNELS" list on the right shows the selected channel "AI 3/1 Sim" (indicated by a blue circle 3).



EVENT BASED WAVEFORM RECORDING – CONDITION TYPES

- ① Event will be activated if signal exceeds a certain *Threshold*;
Optional *Rearm level* that needs to be passed to reactivate the event and ignore noise can be defined
- ② Event will be activated if signal decreases a certain *Threshold*;
Optional *Rearm level* that needs to be passed to reactivate the event and ignore noise can be defined
- ③ Event will be activated if signal is within a certain range
- ④ Event will be activated if signal is out of a certain range
- ⑤ *True while hold*: Event is activated as long as the key (freely selectable) is pressed
Toggle when pressed: Event status is toggled (activated / deactivated) when key is pressed
- ⑥ Event will be activated for a certain duration and repeated, starting at a selectable absolute time.



Several channels could be selected;
Event will be activated if one channels fulfills the conditions (-> OR connection)

Several conditions could be created; Event will be activated if one condition is true(-> OR connection)



EVENT BASED WAVEFORM RECORDING - ACTIONS

- ① An action needs to be defined that prescribes what to do in case the event is activated or active
- ② Four different *Action Types* can be selected:
 - > Recording
 - > Alarm
 - > Marker
 - > Snapshot
- ③ Several Actions can be created

The screenshot displays the configuration interface for event-based waveform recording. On the left, the 'Triggered Events' list shows 'Event 1' with a condition 'AI 2/2@[RemoteNode] >= 0' and an action 'Start recording'. The right pane details the configuration for 'Event 1', showing the 'ACTION TYPE' as 'Record' and the 'ACTION' as 'Start recording'. A waveform diagram at the bottom illustrates the event trigger point with a red dot.



EVENT BASED WAVEFORM RECORDING – RECORDING ACTIONS

- ① Start Recording if event is activated
- ② Pause Recording if event is activated
- ③ Records as long as the event is active
- ④ Toggles Recording if event is activated
- ⑤ Stop Recording if event is activated

ACTION TYPE

Record Alarm Marker Snapshot

ACTION

Start recording Pause recording

Record event Toggle recording



ACTION TYPE

Record Alarm Marker Snapshot

ACTION

Start recording Pause recording

Record event Toggle recording



ACTION TYPE

Record Alarm Marker Snapshot

ACTION

Start recording Pause recording

Record event Toggle recording



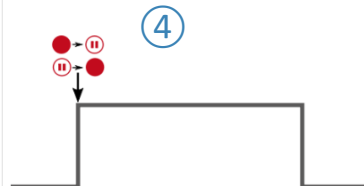
ACTION TYPE

Record Alarm Marker Snapshot

ACTION

Start recording Pause recording

Record event Toggle recording



ACTION TYPE

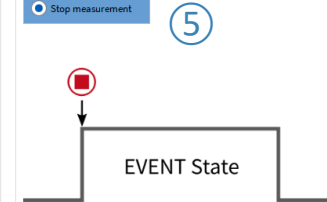
Record Alarm Marker Snapshot

ACTION

Start recording Pause recording

Record event Toggle recording

Stop measurement





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EVENT BASED WAVEFORM RECORDING – EXAMPLES

- ① If *Temperature* exceeds 30 ...
- ② ... Recording is started
- ③ Optionally stop Recording automatically after 30 seconds
- ④ As long as *Temperature* is within 25 ... 35 ...
- ⑤ ... data is recorded
- ⑥ Optionally record data 5 seconds prior to event

Recording Mode

Waveform recording, Triggered, Pre-time 5s

Statistics recording, Window 1s

Individual channel configuration

Event 1

Temperature >= 30

+ Add Condition

Start recording

+ Add Action

Event 1

CONDITION TYPE

HIGH LOW IN OUT Key Time

CONDITION

Threshold 30

Rearm level 0

Recording Mode

Waveform recording, Triggered, Pre-time 5s

Statistics recording, Window 1s

Individual channel configuration

Event 1

Temperature IN [25...35]

+ Add Condition

Start recording

+ Add Action

Event 1

CONDITION TYPE

HIGH LOW IN OUT Key Time

CONDITION

Upper level 35

Lower level 25

Recording Mode

Waveform recording, Triggered, Pre-time 5s

Statistics recording, Window 1s

Individual channel configuration

Event 1

Temperature >= 30

+ Add Condition

Start recording

+ Add Action

Event 1

ACTION TYPE

Record Alarm Marker Snapshot

ACTION

Start recording Pause recording

Record event Toggle recording

Recording Mode

Waveform recording, Triggered, Pre-time 5s

Statistics recording, Window 1s

Individual channel configuration

Event 1

Temperature IN [25...35]

+ Add Condition

Start recording

+ Add Action

Event 1

ACTION TYPE

Record Alarm Marker Snapshot

ACTION

Start recording Pause recording

Record event Toggle recording

Recording Mode

Waveform recording, Triggered, Stop after 30s

Statistics recording, Window 1s

Individual channel configuration

Event 1

Temperature >= 30

+ Add Condition

Start recording

+ Add Action

Recording Mode

WAVEFORM

Continuous

Event based

Pre-time 0

Stop after 30

Recording Mode

Waveform recording, Triggered, Pre-time 5s

Statistics recording, Window 1s

Individual channel configuration

Recording Mode

WAVEFORM

Continuous

Event based

Pre-time 5

Stop after 0

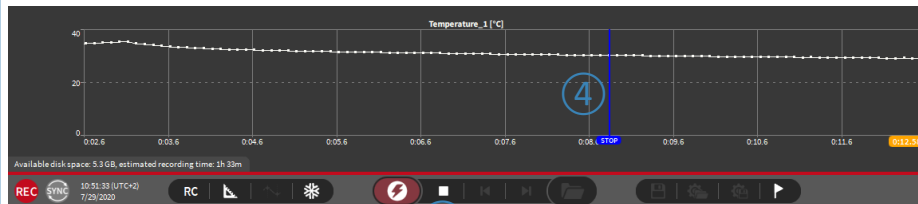
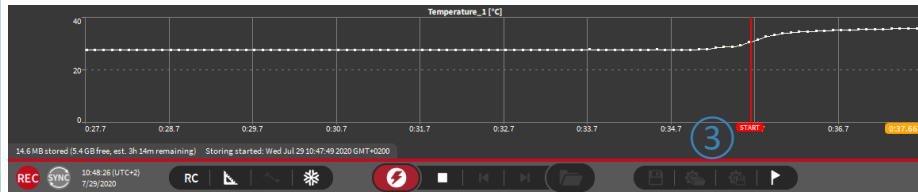
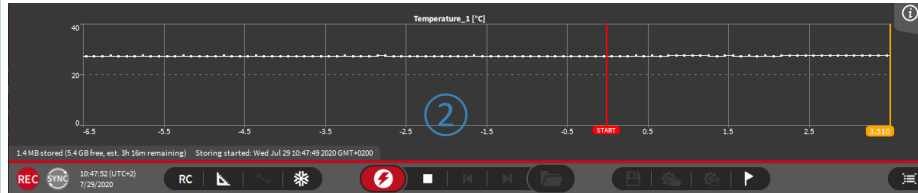
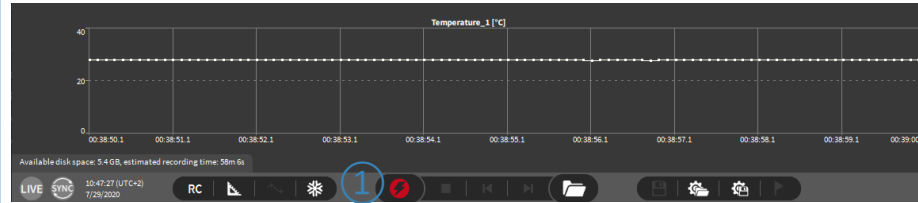


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EVENT BASED WAVEFORM RECORDING – MEASUREMENT START

- ① Press the *Record* button to start Statistics data storing and wait for the trigger for event based recoring
- ② Statistics data is stored and trigger is awaited
- ③ When trigger is received, waveform data and statistics data is recorded
- ④ Stop marker denotes the end of waveform recording
- ⑤ Measurement can be stopped with *Stop* button at any time
- ⑥ Exact timestamps and recording indicators can be found in the *Event List*



Event List

Event	Time
Triggers Armed	-0:00.000000000
Recording Start	-0:00.000000000
Start Trigger	0:02.012680000
Stop Trigger	0:08.620920000

MARKER
Add... Remove

The record can still be started manually by pressing the record button in case event based recording is selected

⑤



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EVENT BASED WAVEFORM RECORDING – ALARM ACTIONS

- ① Possibility to set a Digital Output to *High* or *Low* in case the event is activated
- ② Digital output can be selected from the list
- ③ Optionally set a marker
- ④ Optionally reset Digital Output after a certain time
- ⑤ Alarm Counter in the Action bar counts the number of alarms and can be reset by clicking on it

The screenshot displays the 'Recording Mode' configuration window. On the left, 'Event 1' is active with a condition 'Temperature >= 30'. The 'ACTION TYPE' section shows 'Alarm' selected. Under 'ACTION', 'Digital out - HIGH on alarm' is chosen. The 'CHANNELS' list on the right shows 'DEWE2-A4' and 'TRION-BASE' with 'DI 1/1 Sim' and 'DI 1/2 Sim' selected. Numbered callouts 1-5 point to the alarm action, channel selection, auto-reset time, marker option, and the alarm counter in the bottom bar.

The bottom status bar shows 'LIVE' and 'SYNC' indicators, a bell icon with '0' (alarm counter), the time '09:39:53 (UTC+2)' and date '7/24/2020', and a 'RC' button. A callout 5 points to the alarm counter.

Alarms could also be used during continuous waveform recording



EVENT BASED WAVEFORM RECORDING – MARKER ACTIONS

- ① Marker can be added to the data file in case the event is activated
- ② ... deactivated
- ③ ... or both if event is activated and deactivated
- ④ Marker text can be freely defined

The screenshot displays the 'Recording Mode' configuration window. It is divided into several sections:

- Recording Mode:** Shows 'Waveform recording, Triggered, Pre-time 5s' and 'Statistics recording, Window 1s'.
- Individual channel configuration:** A section for setting up specific channels.
- Event 1:** A toggle switch is turned on. Below it, a condition is defined: 'Temperature >= 30'.
- Action:** A list of actions is shown, with 'Add Marker "Event marker" (Active)' selected. A minus sign is visible to its right.

On the right side of the interface, there is a control panel for 'Event 1' with the action 'Add Marker'. It includes an 'ACTION TYPE' section with four icons: Record, Alarm, Marker (highlighted), and Snapshot. Below this is an 'ACTION' section where the 'Marker text' is set to 'Event marker' (circled with ④). Three radio button options are available: 'On active only' (selected and circled with ①), 'On inactive only' (circled with ②), and 'On active and inactive' (circled with ③).

Markers could also be used during continuous waveform recording



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EVENT BASED WAVEFORM RECORDING – SNAPSHOT ACTIONS

Snapshots could be used to query measurement values in case an event is activated

In the example on the right hand side, the average value for 1 s of channel AI 1/1 and AI 1/2 is queried in case the Temperature exceeds 30

The screenshot displays the DEWETRON software interface for configuring an event-based snapshot action. The interface is divided into several sections:

- Triggered Events:** Shows the recording mode (Waveform recording, Continuous) and statistics recording (Window 1s).
- Event 1 Configuration:**
 - Condition:** Temperature ≥ 30 (Step 1)
 - Action:** Snapshot of AI 1/2@TRIONet, AI 1/3@TRIONet (Step 2)
- Action Type:** Includes Record, Alarm, Marker, and Snapshot (selected).
- Action Configuration:**
 - Actual value:** Average value (selected) (Step 1)
 - MIN value:** (Step 1)
 - RMS value:** (Step 1)
 - Peak2Peak value:** (Step 1)
 - Snapshot window:** 1 s (Step 2)
- CHANNELS:** A list of channels with checkboxes for selection. Channels AI 1/2@TRIONet and AI 1/3@TRIONet are selected (Step 3).
- Channel List:** Shows the resulting channels for the snapshot: AI 1/2@TRIONet_AVG and AI 1/3@TRIONet_AVG (Step 4).

- ① Select the value to be queried: Actual, AVG, MIN, MAX, RMS, ACRMS, P2P
- ② Specify the time window for the statistics up to 10 s
- ③ Select the channels that shall be queried
- ④ Data will be written to new channels

Snapshots could also be used during continuous waveform recording



STATISTICS RECORDING

- ① If statistics Recording is enabled, MIN, MAX, AVG, and RMS for each channel is calculated and stored to a separate channel
- ② Statistics window can be set up to 1000s
- ③ Statistics data could be displayed in the Recorder ...
- ④ ... and is available for data export
- ... but cannot be found as separate channel in the Channel List

In case event based recording is activated, statistics data is also stored even if no recording even is active.

Thus, statistics data could be used to monitor the signal trend if no trigger is active to make sure the DAQ system was working properly without consuming much memory.



INDIVIDUAL CHANNEL CONFIGURATION



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Individual channel configuration denotes to apply channel specific recording options for waveform and statistics recording which differ from the global settings explained above.

I.e. it is possible to

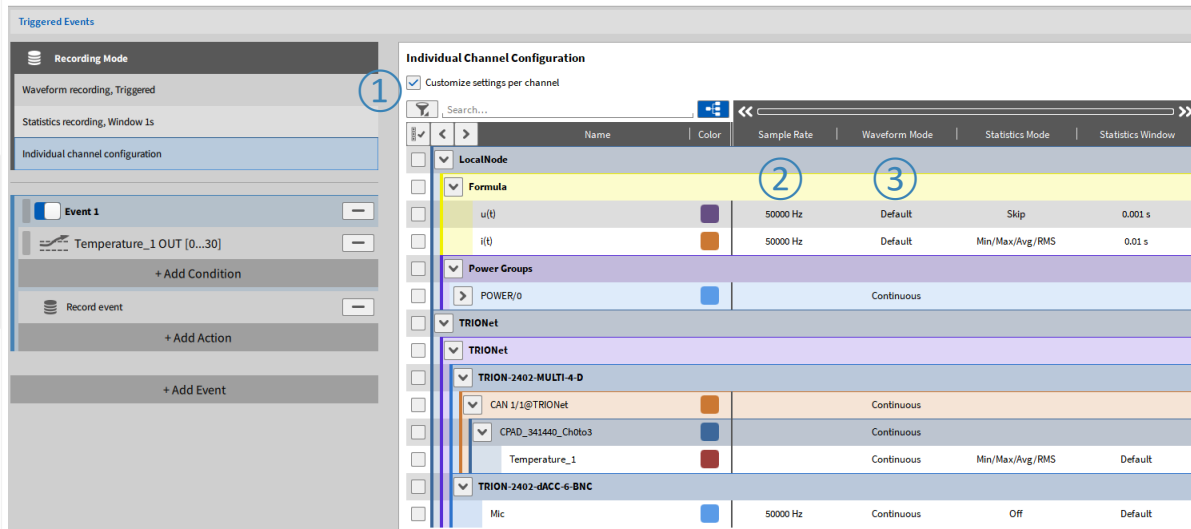
- *Continuously store the waveform data no matter if an event based recording event is active or not (in event based recording mode)*
- *Store channels at different sample rates if an event based recording event is active or not)*
- *Apply channel specific statistic recording options to single channels*

The screenshot displays two panels from a software interface. The left panel, titled 'Triggered Events', shows a 'Recording Mode' section with 'Waveform recording, Triggered' selected. Below it, 'Statistics recording, Window 1s' and 'Individual channel configuration' are visible. An 'Event 1' section is active, showing a condition 'Temperature_1 OUT [0...30]' and options to '+ Add Condition', '+ Add Action', and '+ Add Event'. The right panel, 'Individual Channel Configuration', has a checked 'Customize settings per channel' option. It features a search bar and a table with columns for Name, Color, Sample Rate, Waveform Mode, Statistics Mode, and Statistics Window. The table lists various channels and their configurations:

Name	Color	Sample Rate	Waveform Mode	Statistics Mode	Statistics Window
LocalNode					
Formula					
u(t)	Purple	50000 Hz	Default	Skip	0.001 s
i(t)	Orange	50000 Hz	Default	Min/Max/Avg/RMS	0.01 s
Power Groups					
POWER/0	Blue		Continuous		
TRIONet					
TRIONet					
TRION-2402-MULTI-4-D					
CAN 1/1@TRIONet	Orange		Continuous		
CPAD_341440_Ch0to3	Blue		Continuous		
Temperature_1	Red		Continuous	Min/Max/Avg/RMS	Default
TRION-2402-dACC-6-BNC					
Mic	Blue	50000 Hz	Continuous	Off	Default

INDIVIDUAL CHANNEL CONFIGURATION CONT'D

- ① To use the individual channel configuraton, check *Customize settings per channel*. This is to avoid unintended use of this feature
- ② The *Sample Rate* column shows the sample rate of each channel and can't be changed here. This has to be done in the Channel List menu
- ③ In the *Waveform Mode* columns, *Default* and *Continuous* can be selected
 - > *Default* means that the Waveform data is only stored in case the event based recording event is active
 - > *Continuous* means that waveform is always stored, no matter if event based recording event is active or not



Name	Color	Sample Rate	Waveform Mode	Statistics Mode	Statistics Window
LocalNode					
Formula					
u(t)	Purple	50000 Hz	Default	Skip	0.001 s
i(t)	Orange	50000 Hz	Default	Min/Max/Avg/RMS	0.01 s
Power Groups					
POWER/0	Blue		Continuous		
TRIONet					
TRION-2402-MULTI-4-D					
CAN 1/1@TRIONet	Orange		Continuous		
CPAD_341440_Ch0to3	Blue		Continuous		
Temperature_1	Red		Continuous	Min/Max/Avg/RMS	Default
TRION-2402-dACC-6-BNC					
Mic	Blue	50000 Hz	Continuous	Off	Default

This allows to exclude certain channels from an event based recording and store their data continuously

INDIVIDUAL CHANNEL CONFIGURATION CONT'D



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④ Statistics data is always recorded no matter if event based recording event is active or not

> *MIN/MAX/AVG/RMS* stores these values in separate channels; time window must be defined in *Statistics Window*

> *Skip* only stores the first sample of the *Statistics Window* to a separate channel

> *Off* does not store any statistics data

⑤ *Statistics Window* defines the Statistics time interval; Min: Waveform sample rate; Max: 10 s

Name	Color	Sample Rate	Waveform Mode	Statistics Mode	Statistics Window
LocalNode					
Formula					
u(t)		50000 Hz	Default	Skip	0.001 s
i(t)		50000 Hz	Default	Min/Max/Avg/RMS	0.01 s
Power Groups					
POWER/0			Continuous		
TRIONet					
TRION-2402-MULTI-4-D					
CAN 1/1@TRIONet			Continuous		
CPAD_341440_Ch0to3			Continuous		
Temperature_1			Continuous	Min/Max/Avg/RMS	Default
TRION-2402-dACC-6-BNC					
Mic		50000 Hz	Continuous	Off	Default

This allows to deactivate statistics recording for single channels and to store channels at sample rate „A“ when event based recording is not active and sample rate „B“ when event based recording is active

INDIVIDUAL CHANNEL CONFIGURATION - EXAMPLE



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- 1 The global recording mode is event based recording. Statistics data (MIN/MAX/AVG/RMS) is updated every second
- 2 Event based recording is active if *Temperature_1* is out the range from 0 ... 30 °C
- 3 Waveform of $u(t)$ and $i(t)$ is only recorded if event based recording is active
- 4 Waveform of *POWER/0*, *Temperature_1* and *Mic* will be stored always; no matter if event based recording is active or not
- 5 One sample of $u(t)$ will be stored every 0.001 s (stored with 1 kHz continuously)
- 6 MIN/MAX/AVG/RMS of $i(t)$ will be updated every 0.01 s
- 7 MIN/MAX/AVG/RMS of *Temperature_1* will be updated with default setting every 1 s
- 8 No statistics of *Mic* will be stored

The screenshot displays two main panels: 'Triggered Events' and 'Individual Channel Configuration'.

Triggered Events Panel:

- Recording Mode:** Waveform recording, Triggered (1)
- Statistics recording, Window 1s** (1)
- Individual channel configuration**
- Event 1** (2) with condition: *Temperature_1* OUT [0...30]
- Buttons: + Add Condition, Record event, + Add Action, + Add Event

Individual Channel Configuration Panel:

- Checkbox: Customize settings per channel
- Search bar: Search...
- Table with columns: Name, Color, Sample Rate, Waveform Mode, Statistics Mode, Statistics Window
- LocalNode** (5)
 - Formula**
 - $u(t)$ (3): Sample Rate 50000 Hz, Waveform Mode Default, Statistics Mode Skip, Statistics Window 0.001 s
 - $i(t)$: Sample Rate 50000 Hz, Waveform Mode Default, Statistics Mode Min/Max/Avg/RMS, Statistics Window 0.01 s
 - Power Groups** (6)
 - POWER/0*: Waveform Mode Continuous
 - TRIONet** (4)
 - TRIONet** (7)
 - CAN 1/1@TRIONet*: Waveform Mode Continuous
 - CPAD_341440_Ch0to3*: Waveform Mode Continuous
 - Temperature_1*: Waveform Mode Continuous, Statistics Mode Min/Max/Avg/RMS, Statistics Window Default
 - TRION-2402-dACC-6-BNC**
 - Mic*: Sample Rate 50000 Hz, Waveform Mode Continuous, Statistics Mode Off, Statistics Window Default (8)