

THE MEASURABLE DIFFERENCE.



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OXYGEN TRAINING > MATRIX SAMPLER





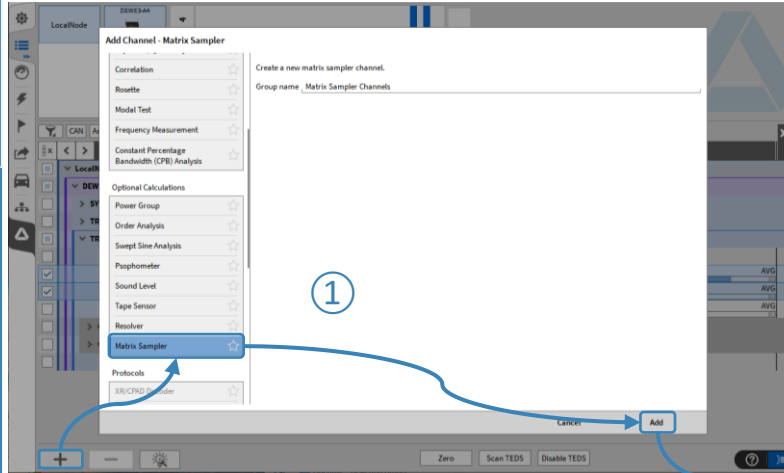
- > Creating a matrix sampler
- > Matrix sampler settings
- > Operating modes
- > Data visualization
- > Data export



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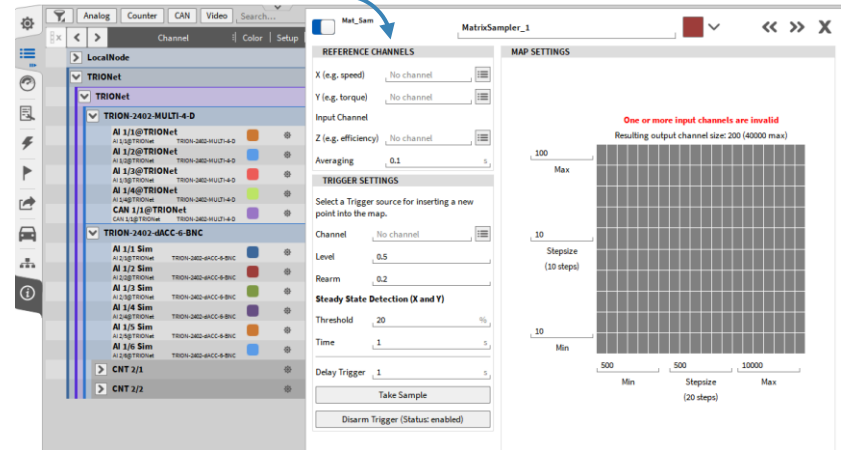
CREATING A MATRIX SAMPLER

- ① Either:
Press the + button, select *Matrix Sampler* and press *Add*
Settings will open afterwards



The matrix sampler displays the relation between two channels and an input channel in form of a color-coded matrix which is displayed in the Intensity Diagram instrument.

This feature can be used to create an Efficiency Map which shows the mechanical efficiency of a drive train in the dependency of torque and speed.





CREATING A MATRIX SAMPLER CONT'D

② Or:
Press the *Add efficiency map* button in the *Mechanical power group* settings if a power group is already existing

The screenshot illustrates the software configuration for creating an efficiency map. In the 'LocalNode' tree, the 'POWER/0' group is expanded to show 'Mechanical' settings. In the 'Wiring type Settings' panel, the 'Mechanical power analysis' option is selected. The 'ADVANCED SETTINGS' panel shows the 'Efficiency' analysis type and the 'Add AC -> Mech efficiency map' button. The 'MatrixSampler_1' configuration shows the 'REFERENCE CHANNELS' set to include speed, torque, and efficiency, and the 'MAP SETTINGS' configured for a 200x200 matrix with 10 steps in speed and torque, and 20 steps in torque.

The matrix sampler displays the relation between two channels and X input channel in form of a color-coded matrix which is displayed in the Intensity Diagram instrument.

This feature can be used to create an Efficiency Map which shows the mechanical efficiency of a drive train in the dependency of torque and speed.



MATRIX SAMPLER SETTINGS

- ① Enter the reference channel to be displayed on the X- and Y-Axes
- ② Enter the Input channel which shall be visualized in the dependency of X and Y
- ③ Enter an averaging time to calculate the average of Z which is added to the matrix (0.01 ... 1 s)
- ④ Select a trigger channel which is used as trigger to fill the matrix with data and define a trigger & rearm level
- ⑤ Instead of using a trigger channel to fill the matrix, a steady state detection of X and Y can be used as well. Define the threshold and the steady state time
- ⑥ Enter a time delay after which a sample will be put into the matrix after the trigger is activated from 0 ... 10 s
- ⑦ Fills the matrix manually with data
- ⑧ Disables channel trigger and Steady State detection

REFERENCE CHANNELS

X (e.g. speed)

Y (e.g. torque)

Input Channel

Z (e.g. efficiency)

Averaging s

TRIGGER SETTINGS

Select a Trigger source for inserting a new point into the map.

Channel

Level

Rearm

Steady State Detection (X and Y)

Threshold %

Time s

Delay Trigger s

MAP SETTINGS

Resulting output channel size: 200 (40000 max)

Nm

Max

Nm

Stepsize (10 steps)

Nm

Min

Min Stepsize Max (20 steps)



MATRIX SAMPLER SETTINGS CONT'D

- 9 Defines the number of matrix lines as minimum and maximum value and stepsize
- 10 Defines the number of matrix columns as minimum and maximum value and stepsize
- 11 Displays the resulting matrix size as cell numbers

REFERENCE CHANNELS

X (e.g. speed)

Y (e.g. torque) **1**

Input Channel

Z (e.g. efficiency) **2**

Averaging **3** s

TRIGGER SETTINGS

Select a Trigger source for inserting a new point into the map. **4**

Channel

Level

Rearm

Steady State Detection (X and Y) **5**

Threshold %

Time s

Delay Trigger **6** s

Take Sample **7**

Disarm Trigger (Status: enabled) **8**

MAP SETTINGS

Resulting output channel size: 200 (40000 max) **11**

9 Nm
Max

Nm
Stepsize
(10 steps)

Nm
Min

10 Min Stepsize Max
(20 steps)

REFERENCE CHANNELS

X (e.g. speed)

Y (e.g. torque)

Input Channel

Z (e.g. efficiency)

Averaging s

TRIGGER SETTINGS

Select a Trigger source for inserting a new point into the map.

Channel

Level

Rearm

Steady State Detection (X and Y)

Threshold %

Time s

Delay Trigger s

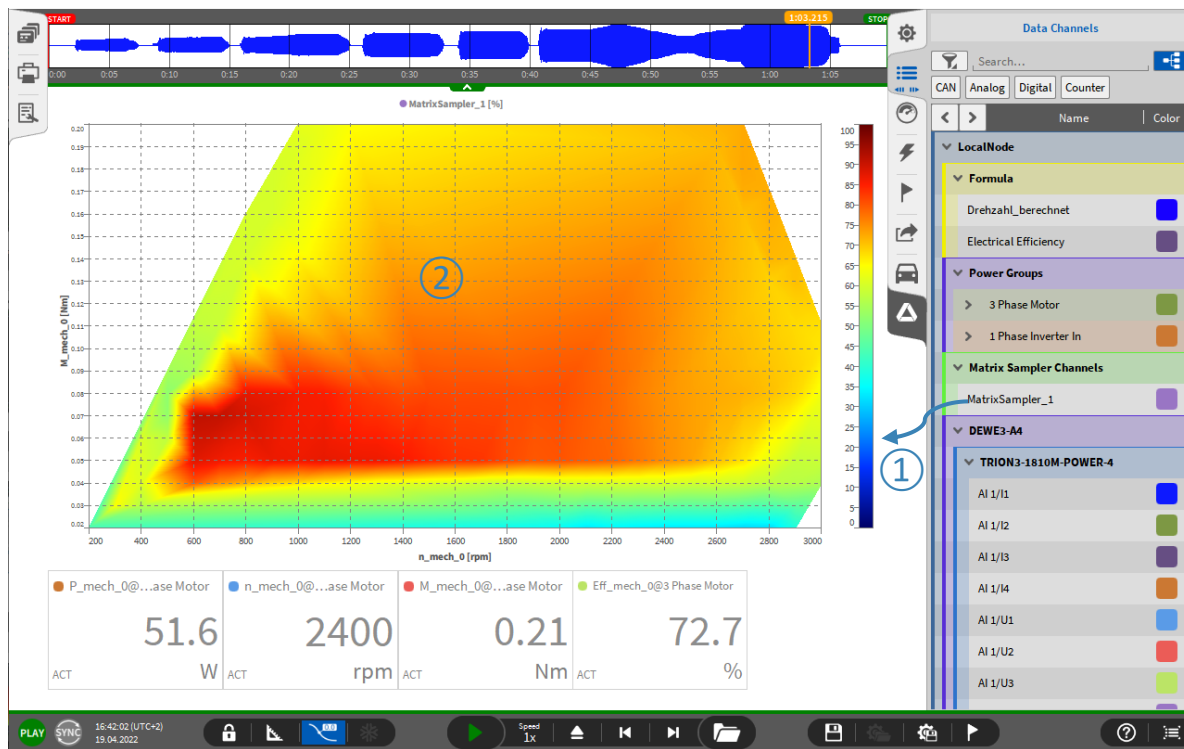
- > Testbed Controlled -> *Channel Trigger* ①
 - > Use a channel for triggering the sampling of the Map
 - > E.g. AI, DI, CAN or Ethernet Receiver
- > Semi-Automatic -> *Steady State Detection* ②
 - > If no external triggering is possible, one can use the build in stead state detection for semi-automatic operation
- > Manual -> Use *Take Sample* Button ③
 - > To manually sample a new value, the button can be used e.g. to correct a wrong measurement
- > Notes:
 - > If a channel is selected as trigger channel, the Steady State Detection is disabled. To use the Steady State Detection no channel can be selected as trigger channel or must be deleted
 - > The *Disarm/Arm Trigger* button is very useful if a specific measurement point needs to be repeated. In order not to overwrite the whole matrix, the trigger can be disarmed. Therefore, the matrix will not be updated for each trigger, and samples are not saved



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DATA VISUALIZATION

- 1 Drag and drop the Matrix Sampler channel to the screen
- 2 Data will be displayed in an intensity diagram

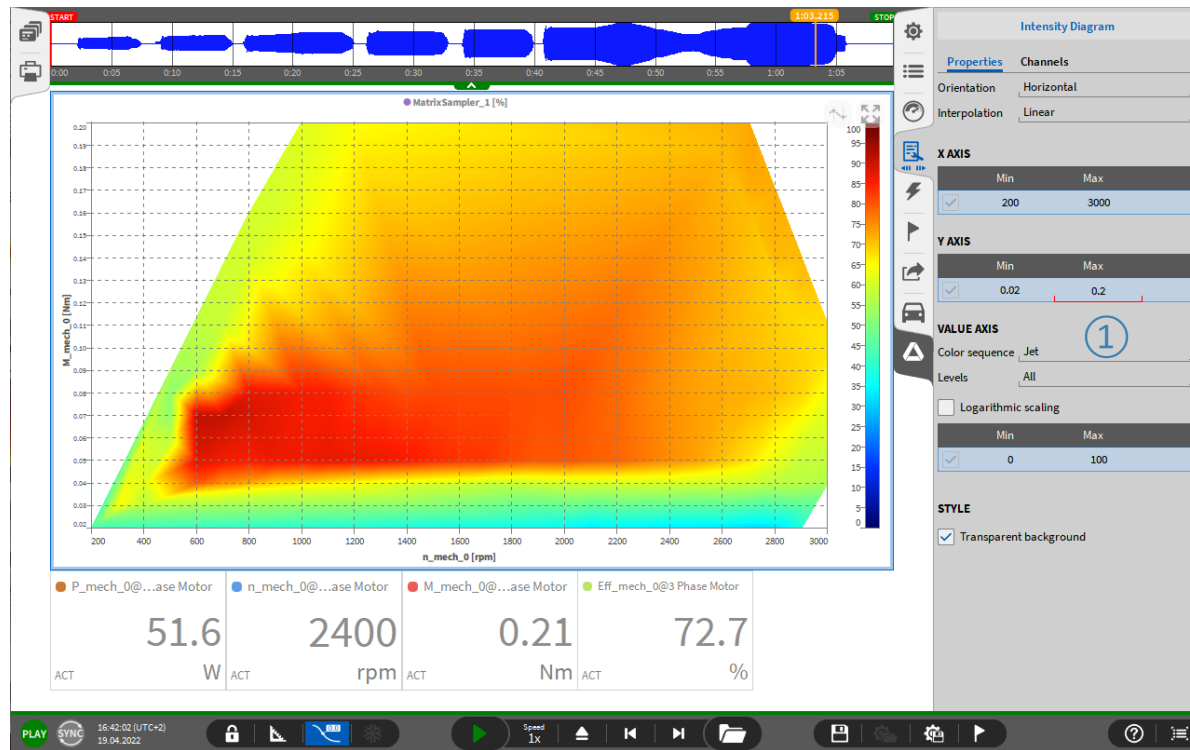




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DATA VISUALIZATION OPTIONS

① Visualization options can be found in the instrument properties that can be entered by double clicking on the intensity diagram

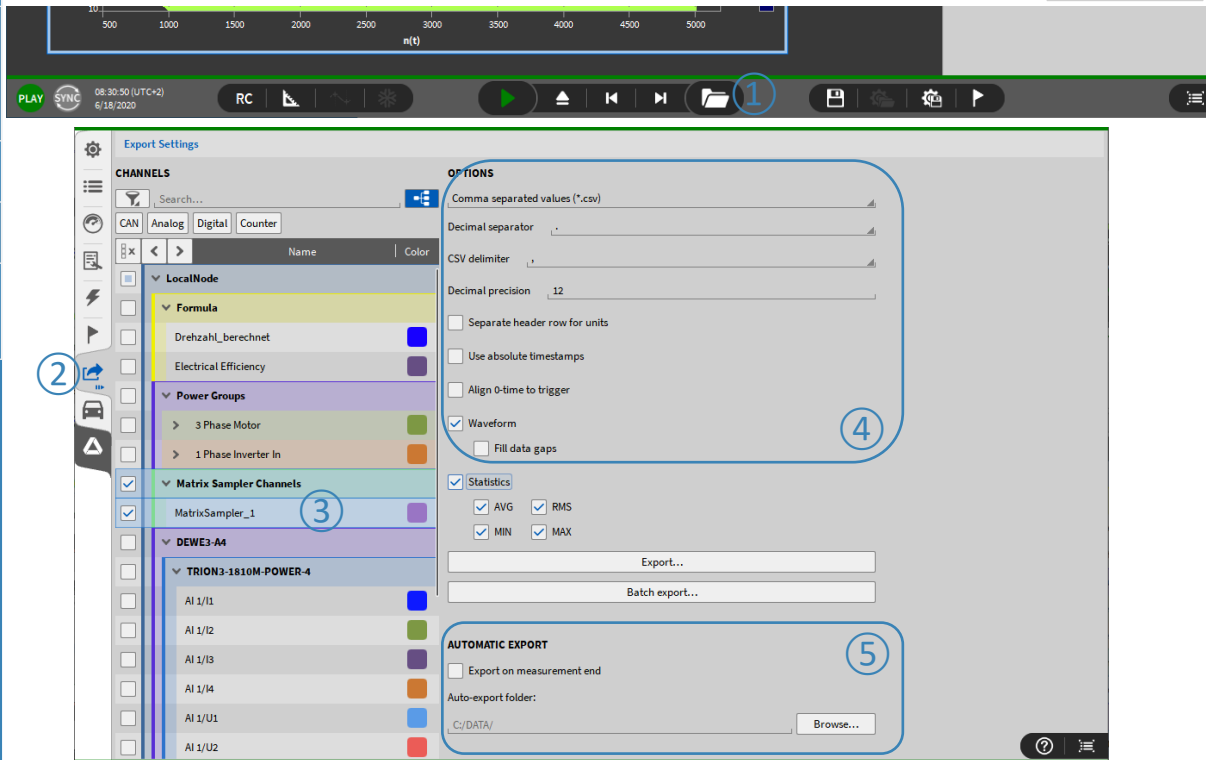




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DATA EXPORT

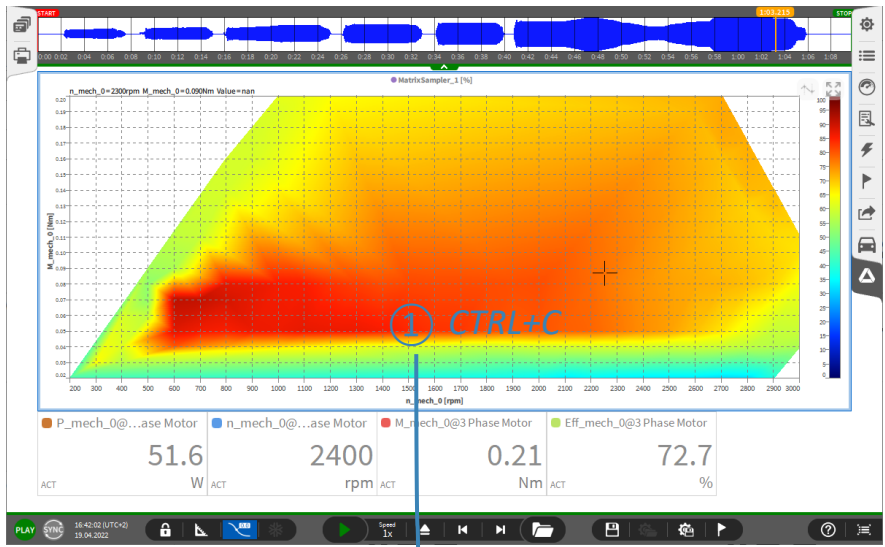
- 1 Open the correct data file
- 2 For data export (*.txt, *.csv, *.xlsx, *.mat and *.mdf4.0/4.1), open the export menu
- 3 Select the channels to be exported
- 4 Set additional options and press *Export...*
- 5 It is also possible to automatically export the data after measurement end





COPY AND PASTE DATA

- It is possible to copy and paste the order spectrum and frequency spectrum data displayed in an intensity diagram into another software package, like Excel
- ① Select the intensity diagram of the data you want to copy and press CTRL+C
- ② Open the software package, like Excel, to which the data shall be pasted and press CTRL+V
- As the data is stored to the clipboard, it can also be pasted into other software packages but Excel



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
1	n_mech_0	200.00 [rpm]	300.00 [rpm]	400.00 [rpm]	500.00 [rpm]	600.00 [rpm]	700.00 [rpm]	800.00 [rpm]	900.00 [rpm]	1000.00 [rpm]	1100.00 [rpm]	1200.00 [rpm]	1300.00 [rpm]	1400.00 [rpm]	1500.00 [rpm]	1600.00 [rpm]	1700.00 [rpm]	1800.00 [rpm]
2	0.02 [Nm]	43.21304042																
3	0.03 [Nm]		64.70485115	56.22235012														
4	0.04 [Nm]			61.21457036		79.5845871	74.60162099	72.04808655	68.79150518	67.58427938	65.66292429	64.00469637	62.40906398	61.90393257	60.88030052	60.30226101	58.85295931	58.733636
5	0.05 [Nm]					87.82868958	86.08802032	85.24157715	86.67046738	86.43882294	87.17449406	86.63284683	86.48371696	85.50106621	84.09023819	83.06497726	82.85133847	80.988819
6	0.06 [Nm]			60.38424683	57.50609843													
7	0.07 [Nm]				52.30202484	91.20003891	90.62648773	88.78909874										
8	0.08 [Nm]				51.91439514			87.34259491	86.56000392	85.69567108	85.26967185	83.10610008	81.98365021	80.79643758	81.30064049	80.97831587	80.96611647	80.829109
9	0.09 [Nm]				54.40703583	55.20644665												
10	0.10 [Nm]					56.24553895												
11	0.11 [Nm]					57.92441406	58.9925676											
12	0.12 [Nm]					59.82984261												
13	0.13 [Nm]																	
14	0.14 [Nm]																	
15	0.15 [Nm]																	
16	0.16 [Nm]																	
17	0.17 [Nm]																	
18	0.18 [Nm]																	
19	0.19 [Nm]																	
20	0.20 [Nm]																	

SAVE DATA AS IMAGE



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It is possible to save the order analysis data as an image file

- 1 Highlight instrument
- 2 Save as png
- 3 Copy to clipboard

