DEWETRON

OXYGEN TRAINING
> Shock Response Spectrum (SRS)

SHOCK RESPONSE SPECTRUM - General

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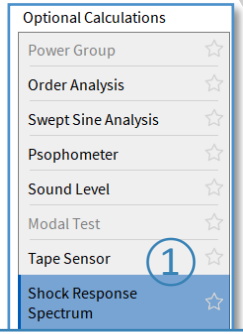
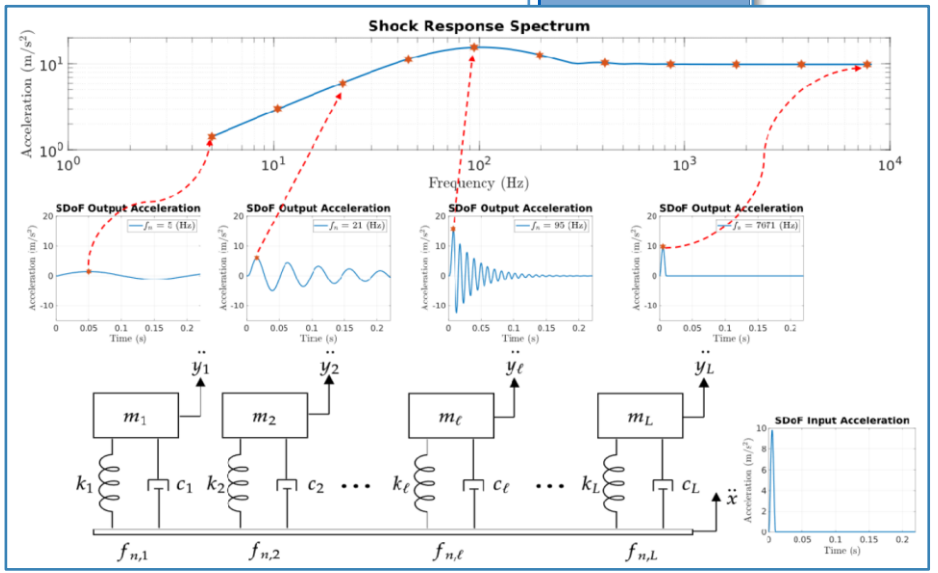
- New offline calculation method to determine Shock Response Spectra (SRS) based on a measured acceleration signal (①)
- The acceleration signal excites a set of parallel spring-mass-damper-systems each representing a definable frequency bandwidth
- Used to simulate system responses to shock events, because it's impractical, expensive, or impossible to physically test a system under various shock loading conditions
  - Evaluation of system stability or material fatigueness
  - Identification of potential failure modes or design optimization





Source: https://de.mathworks.com/help/signal/ug/practical-introduction-to-shock-waveform-and-shock-response-spectrum.html [06.05.2025]

SHOCK RESPONSE SPECTRUM - General

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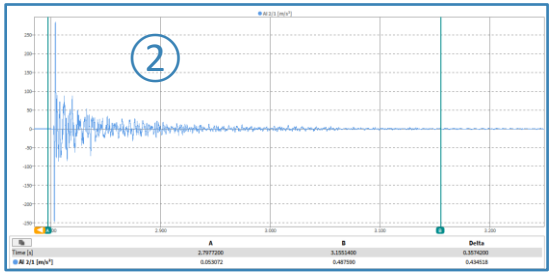
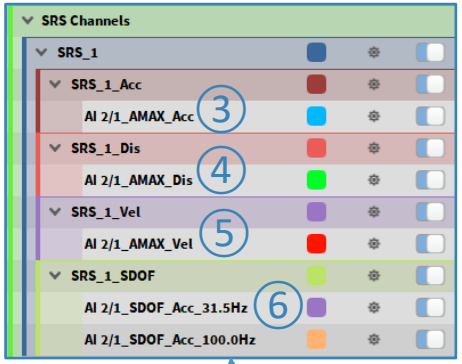
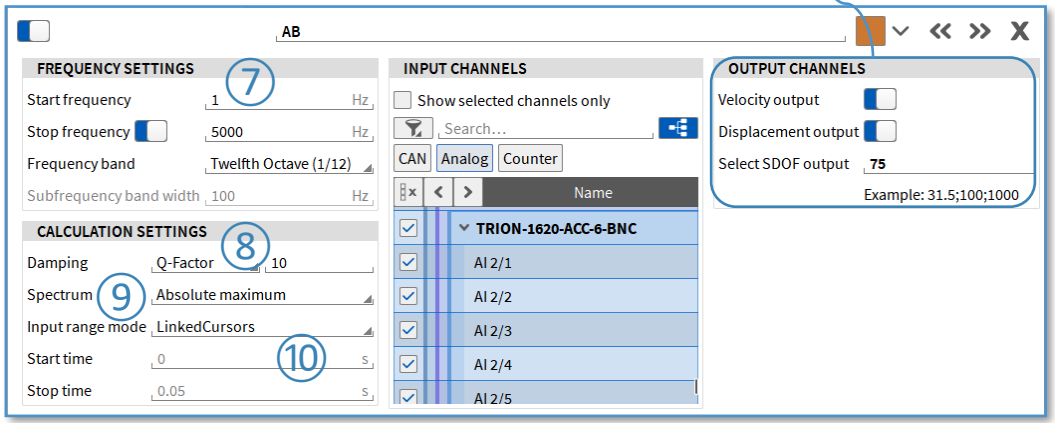
- Input signal: One time discrete shock, typically measured by accelerometer (②)
- Output parameters:
  - Shock response spectrum (SRS) as acceleration (③), velocity (④) and displacement (⑤)
  - Output acceleration-time response of SDOF systems for selected frequencies (⑥)
- Calculation properties
  - Define frequency range and line resolution (⑦)
  - Define damping factor or Q-factor (⑧)
  - Select spectrum type Absolute maximum, Maximum or Minimum (⑨)
  - Select calculation timeframe by time or linked cursors (⑩)







SHOCK RESPONSE SPECTRUM - General

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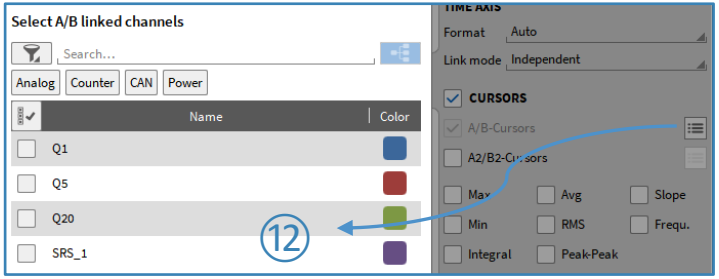
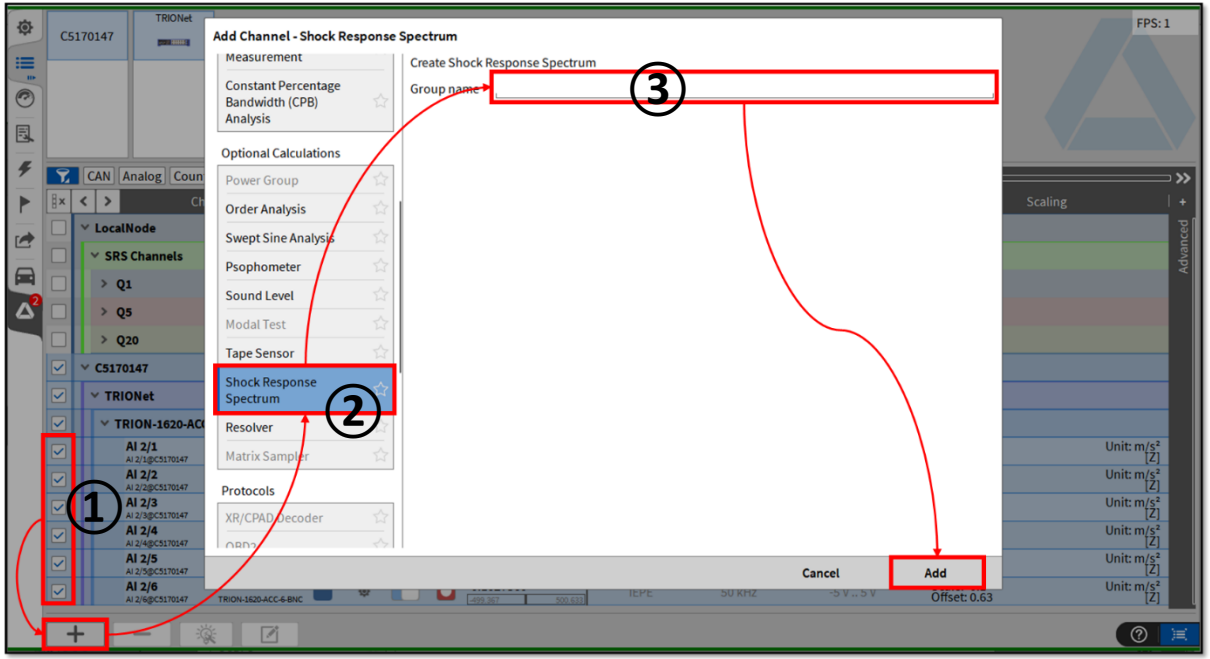
- Selection of timeframe via Recorder cursors (⑪)
- Assignment of cursorpair to SRS calculation group (⑫)
- Acceleration, Velocity and Displacement are plotted over frequency in an Array Chart (⑬)
- An individual acceleration-time response at e.g. 50 Hz can be displayed in a Recorder (⑭)



Please note that this is an optional feature and requires OXY-OPT-SRS!

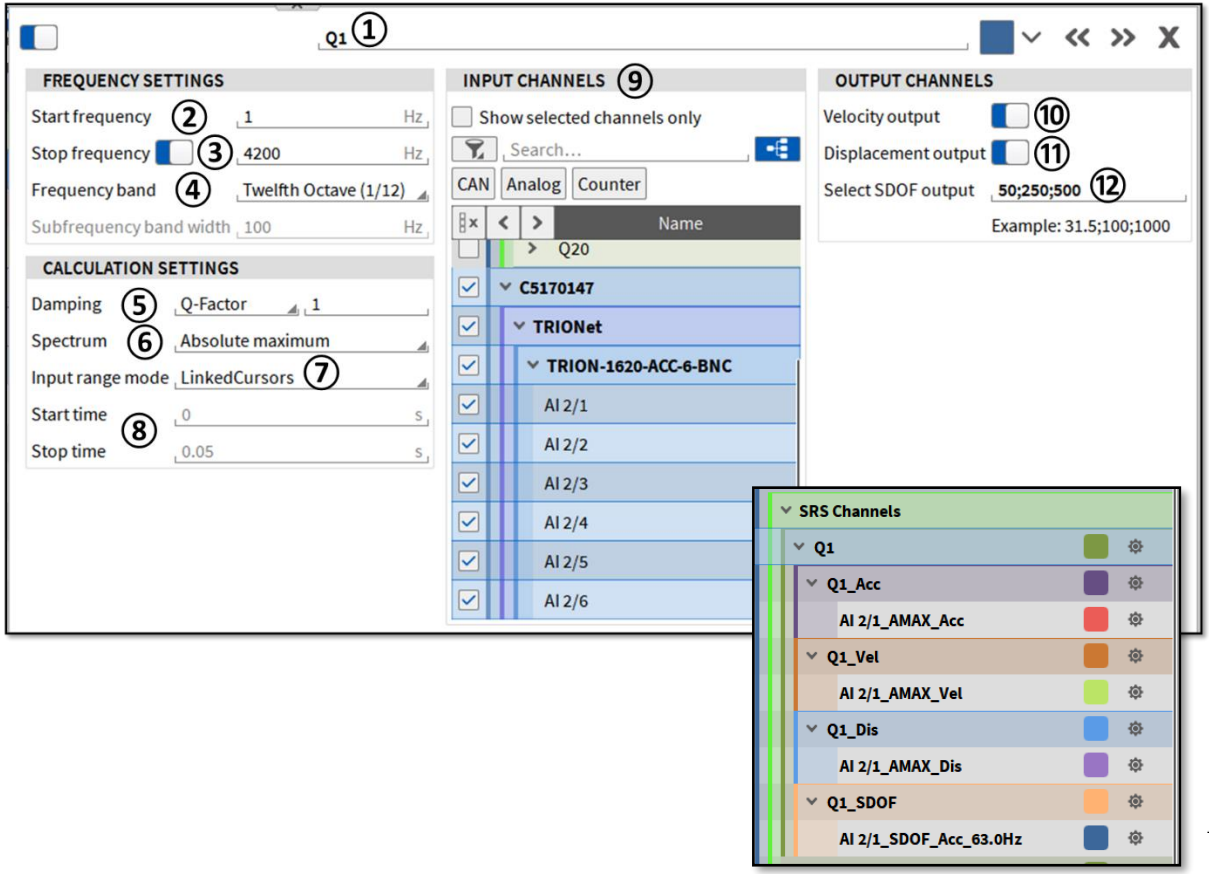
Creating a SRS calculation

①	Select one or more input channels for the shock signal.
②	Add add the SRS calculation from the optional calculation tab
③	Optional name the SRS calculation group. If no name is selected the group is named SRS_n with „n“ as increasing integer.



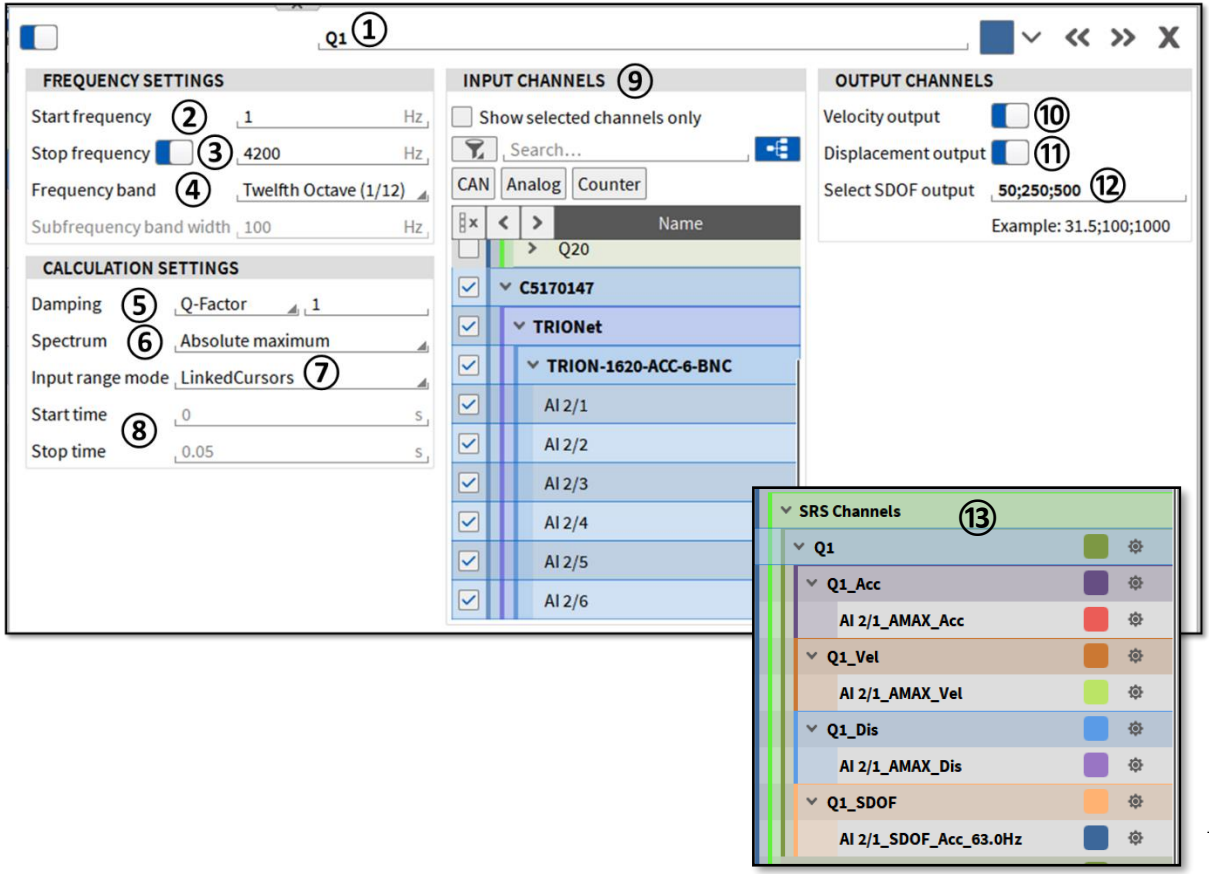
Configure the SRS calculation

①	Calculation group naming
②	Select the start frequency for the SRS calculation
③	Select the end frequency for the SRS calculation
④	Select the frequency division steps, which determine the SRS resolution. Either linear with static resolution or 1/3, 1/9, 1/12 octave resolution
⑤	Define the damping by Q-factor or damping ratio $\xi = 1/2Q$
⑥	Select the type of the SRS spectrum, either absolute maximum (maximax), maximum (positive) or minimum (negative) of the SDOF amplitude.
⑦	Select the timeframe for calculation either manual with start and stop time or via a linked cursor
⑧	Define the manual start and stop time for the SRS calculation



Configure the SRS calculation

⑨	Selected input channels for the SRS calculation
⑩	Toggle the integration of the acceleration SRS to enable the velocity SRS. (pseudo velocity)
⑪	Toggle the double integration of the acceleration SRS to enable the displacement SRS. (equivalent static acceleration)
⑫	Specify the frequencies for which the SDOF acceleration elements are to be added to the SRS group. If the input frequency is not the center frequency of the SDOF element, the closest element is selected.
⑬	Channel overview for one Input channel AI2/1. The channels are named by input channel, spectrum type and output type.



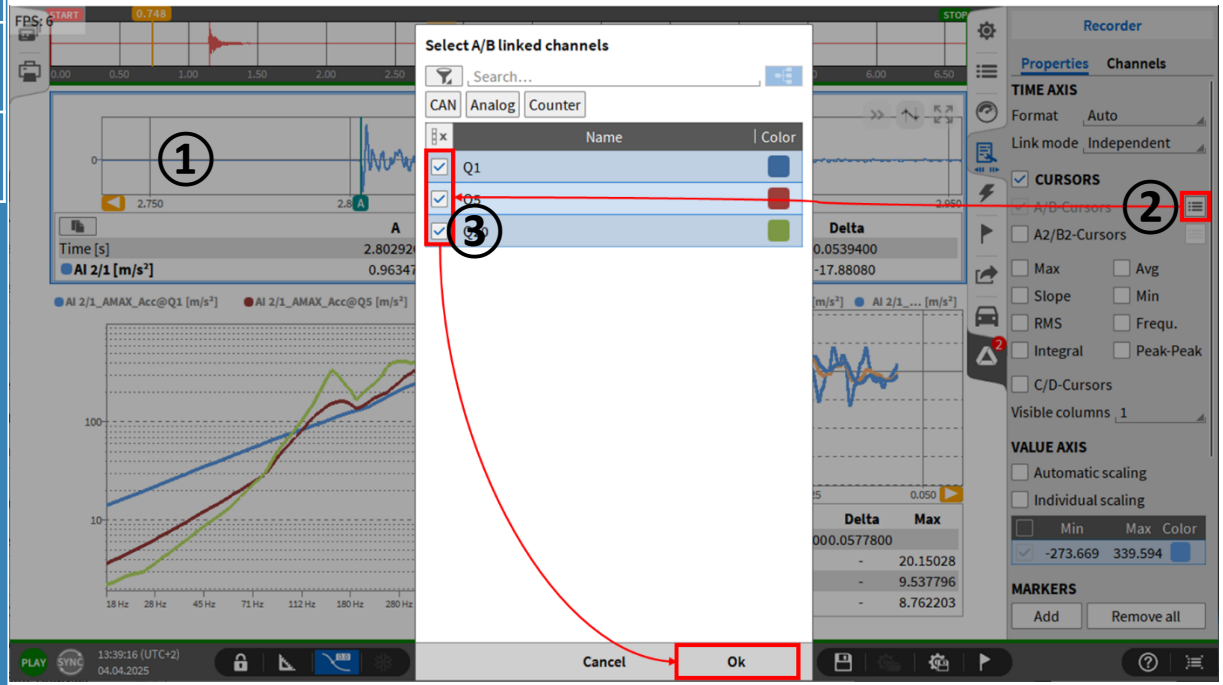
Assigning a cursor to the SRS calculation

①	Assign a channel into a Recorder
②	Activate the cursor and open the A/B cursor link window
③	Assign the desired SRS calculation groups to the recorder cursor

Note: Please mind, that the measurement file has to be in „edit“ mode for the A/B cursor selection to affect the calculation

Locked mode

Edit mode



Selecting calculation timeframe and displaying SRS

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①	Select the desired timeframe with the cursor
②	Drag and drop the SRS channels into an array chart, change to log, and interpolated line.
③	Drag and drop the SDOF channels into a Recorder