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# Simple Measurement Using Dewesoft DAQ Hardware



# How to Install the Dewesoft X Software?

First, we need to install <u>Dewesoft X</u> on the computer. You have to download Dewesoft X software from our <u>download page</u>. Download and run the Installer. <u>Dewesoft X</u> supports the operating system Windows, Version 7 (32-bit and 64-bit), and newer.

# Licensing

- The license for measuring with <u>Dewesoft X</u> is included in the device (usually PROF version). Once it is connected on the USB port, it acts as a dongle.
- The license for analysing is free! <u>Dewesoft X</u> can be installed on any computer and the stored data files can be opened, recalculated, and exported.
- Additional licenses can be required for plugins, these can then also be written into the Dewesoft® device. To test plugins, you can request a 30-days-Evaluation license.

More information about licensing can be found <u>here</u>. On the following link, you can also find the information about plug-in installation and registration.

# Which Equipment will be used for demonstration?

In this simple measurement lesson, we will show a simple measurement of various sensors using <u>Dewesoft SIRIUS</u> system. One sensor after the other will be connected and a basic measurement will be done. It makes sense to work this through from the start to the end, as with each measurement more details and different instruments and functions are shown. In the picture below, you can see the demo equipment that was used.



Image 1: In following tutorial the Dewesoft Sirius device will be coupled together with an acceleration sensor, tuning fork and encoder

The demo kit consists of the **SIRIUS** device, with its installation USB stick and the three sensors:

- Acceleration sensor
- Tuning fork
- Encoder

#### Dewesoft X Launcher

When we connect the *power and USB connector to the computer*, <u>Dewesoft X</u> will pop out from the auto-detect the screen and show the devices with their serial number, the status of power supply, and the status of the synchronization cables in case we have more than one unit connected. Pressing Run Dewesoft will close the popup and start <u>Dewesoft X</u> software.

	<b>▲ DEWE</b> Soft <sup>®</sup> X			
Device Name	Serial Number	Power	Sync	
SIRIUSi-CD	D00BFEDCAD (D017ED0BBA)	Ok	Ok	
Settings	Run D	ewesoft	Close	

Image 2: Dewesoft will auto-detect connected Dewesoft Hardware

# Manual setup of hardware

In case you need to manually set up the hardware, please start <u>Dewesoft X</u> and go to **Options - Settings**.

Under Devices, set the operation mode to Real measurement. Then scan for the hardware with the refresh SIRIUS will be found with the according to the serial number.

For more informations about Settings, visit the <u>How to set up the Dewesoft</u> tutorial.

When you confirm the Settings, you should get the Channel Setup screen in the Measure mode, showing the instrument with the built-in amplifiers.

Notice, the two buttons on the left upper corner Measure and Analyse. One mode is for *storing* the data, the other is for *reloading* data files and analyzing them.

#### How to connect the Acceleration sensor?

We connect an IEPE accelerometer on the first channel.



Image 3: Connected acceleration sensor to the Dewesoft SIRIUS device

First, think about the required sampling rate. What is the highest input frequency we expect? In the drop-down "Dynamic acquisition rate" the default value is usually 20 kS/s, which is fine for now.

If not already set, activate the channel by setting it to Used.

As the <u>SIRIUS-ACC</u> amplifier supports two input modes, in the row of the first amplifier please set the "Measurement" from Voltage to "IEPE", so the amplifier will supply the sensor. If the "Ampl. name" (and the LED ring on the instrument around the BNC connector) gets green after a few seconds, we know that the sensor impedance is OK.

Then enter the Channel setup window by pressing the "Setup" button.

O	E Save	Save as		M Analog in	010001 CAN	+÷ πΣ Math	More.	Remove							
Device p	preview			Dynamic ao	quisition	rate	Channe	l actions							
-		000	00	20000 (Hz)		Bandwidth: 7812 Hz		Balance amplifiers	Short on	Zero all Reset zer	o all				
Search		Q													
ID	Used	C. Nam	e	Ampl. name		Range		Measurement	Min	Values	Max	Physical quantity	Units	Zero 🔳	Setup
1	Unused	AI	1	SIRIUS-ACC	+	10 V		Voltage	-10.00	0.0001	10.00		V	Zero	Setup
2	Unused	AI :	2	SIRIUS-ACC	+	10 V		Voltage	-10.00	0.0001	10.00		V	Zero	Setup
3	Unused	AI 3	3	SIRIUS-CHO	G	10 V		Voltage	-10.00	0.0001	10.00		v	Zero	Setup
4	Used	Acc-Se	nsor	DSI-ACC		10000 mV		IEPE	-988.30	0.02	988.30	Acceleration	m/s2		Setup
5	Unused	AI :	5	SIRIUS-STG	6	50 V		Voltage	-50.00	0.001	50.00		V	Zero	Setup
6	Unused	AI 6	5	SIRIUS-STG	6	50 V		Voltage	-50.00	0.001	50.00		v	Zero	Setup
7	Unused	AI :	7	SIRIUS-MUL		10 V		Voltage	-10.00	0.0007	10.00		v	Zero	Setup
8	Unused	AI 8	3	SIRIUS-MUL	-	10 V		Voltage	-10.00	-0.0396	10.00		V	Zero	Setup

Image 4: Connected acceleration sensor is shown in a Channel setup under the 'Analog in' tab in the Measure mode of Dewesoft X

software

# Channel setup

The Channel setup window splits up into left (Amplifier settings) and right (Sensor settings) side. Furthermore, you can change the name

- Amplifier settings With the Dual core option set (if you own a Dual-core <u>SIRIUS</u>), we don't have to care about the input range. On the bottom you see a quick preview of the sensor signal, knock on the accelerometer for testing.
- Sensor settings In our case the accelerometer has built-in TEDS (transducer electronic data sheet), so automatically
  all the calibration factor and calibration data (by the way: out of date, see red warning) is read from it. In any other
  case Enter the Physical quantity (Acceleration) and the Unit (either g or m/sÂ<sup>2</sup>) and the calibration factor below, or
  put the sensor on a reference shaker and press the Calibrate button.



Image 5: Channel setup window

## Storing

Before starting the measurement, please go to the Storing ribbon, and *specify a file name*. The Storing type is set to always fast, here you can specify trigger conditions later.

Then click the red Store button to start storing the measurement.

O Store	Save	Save as	Storing	M Analog in	010001 CAN	+÷ πΣ Math		re	Remove
Folder									
Project da	ta files fold	ler	~	C:\De	wesoft\Data	١			
File name				Stop s	toring				
Acc_Meas	urement	.dxd		Sto	p storing aft	er	2000		MB
Create	a multifile			Ma	ke new file af	ter			
Storing opt	ions								
Storing typ	e			Static	acquisition ra	te			
always fa	st		~	Auto	~	sec	~		
Start st	oring autor	matically		Adjus	ted to 0.05 s	ec			

Image 6: In Storing tab set the file name and start storing

#### Recorder

<u>Dewesoft X</u> switches to Measure mode. For faster navigation on top, there are 2 screens - **Recorder**, and **Custom...** predefined. The screens contain instruments, and can be freely defined. The Recorder screen currently consists of one Recorder instrument.

Do a few hits on the accelerometer.



Image 7: Display preview in measurement mode

left "Autoscale" is enabled. On the right side is the channel list, showing the *channel currently assigned* to the Recorder instrument.

After you have done the measurement, please click Stop, then change to Analysis mode.

# Analysis

Let's take a look at the recorded data. You are now in "Analysis mode". The last recorded data file is automatically reloaded. Let's zoom into one of the peaks.

To zoom in, press the left mouse button, hold it down while moving to the right, then release. If you move the mouse between the two cursors, there is a small + attached to the mouse icon, and if you click between cursors, the area will be zoomed in.

To zoom out to the previous level again, simply click the right mouse button.



Image 8: Zoom in the area between cursors

You can zoom in until you see the sampling points (20 kHz).



Image 9: Zoom in until you see the sampling points

# Export

Only the selected region (in the overview instrument on top) will be exported!



Image 10: Export the zoomed region

Go to the Export section -> File Export, chose the file type and properties, enable or disable channels from the right, then click the Export button.

Anslyze Data files Setup Review Print Export													SIRIUS	− □ × Lock device ≡ Option
Heritic         Heritic <t< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>														
Export type	Channels					_			_	_	_			
Matlab (*.mat)	Search	۹ (												
Data presentation	Export order		Ch. no	Name			Data str 🔳					Export rate (Hz)		
Full speed data V Relative time V	1	Yes	AI 4	Acc_sensor	Synchronous	20000 Hz	Scalar	Integer	m/s2	-450.11	1084.65	Default	Disabled	
Settings														
Export setup to xml file														
Ignore gaps between triggers Export per channel														
Generate Matlab names from														
Channel name														
Channel index Up														
Channel type Down														
Trigger index format Export precision Standard  V Auto detect  V														
Matlab export file format														
MATLAB 5.0 MAT-file														
Special Export (needs installed Matlab)														
Special Export (needs installed Mattab)														
Export file name														
Acc_Measurement														
File directory Existing files														
Executivy Executive times														
🗁 Dewesoft														
Exports														
e cong														

Image 11: Export selected area

The FlexPro and MSExcel Active X ribbons on top will export into a template, which you can adapt, in order to directly export in your finished report.

To learn more about acceleration sensors and vibration measurement, visit <u>Vibration measurement</u> tutorial.

## How to measure with Tuning forks or a Strain Gage?

We connect a strain gage on one of the STG inputs of our SIRIUS.



Image 12: Tuning forks with strain gage coupled to the SIRIUS device

A "tuning fork" is normally used for tuning the instruments of an orchestra. It is *tuned to 440Hz*, which is the standard pitch (note 'a'). In our demo tool, a quarter bridge strain gage with either 120 or 350 ohms resistance (is marked on the connector) is mounted on the steel, therefore we can measure the strain of the vibrations.



Image 13: Strain gage and tuning forks specification

Open the Setup of the channel where the tuning fork is connected to.



Image 14: Tuning fork channel setup

In the left upper section, we find the amplifier settings. Set to "**Bridge**" and "**Quarter bridge 3-wire**", either 120 or 350 ohm (written on connector). You directly see the according circuitry, how to connect the quarter bridge on the 9pin DSUB connector.

Select an appropriate **range**, if you use the highest, you don't have to care about overload (input voltage exceeding amplifier range). We use a smaller range, e.g. 20mV/V. The higher ADC is now working in the 20mV/V input range, while the lower ADC input range is 5% of it, 1 mV/V simultaneously, so you get an amazing dynamic.

On the right side - Sensor settings, we select Physical quantity *Strain* or *Stress* and the unit. If you have a sensor with a TEDS chip, and all the settings are read from it automatically.

# Balance sensor

Before starting the measurement, we need to balance the strain gage. Click "Balance", the output will go to 0 um/m, and the offset will be shown next to the button.



Image 15: Click on the Balance button to balance sensors before the measurement

# Sampling rate

Because the natural frequency of the tuning fork is 440Hz, we have to think of *which* sample rate we want to digitize the signal. In theory, a factor of 2 (=880Hz, Nyquist criteria) would be sufficient, in praxis however it depends very much how the signal looks like. We suggest a factor of 10 or even 20 to get a good result.

So, the sample rate is still fine with 20 kHz.

Go again to "Storing", specify a filename, e.g. "tuning\_fork\_measurement". Then click "Store".

# Scope Widget

Now we switch to the Custom... display and add the Scope widget to it. Maximize it over the whole screen.







Image 17: Scope display can be randomly adjusted

Switch to the Scope screen. Hit the tuning fork, that we have an oscillating signal, then click the **y-axis label for min/max** scaling.

Set the trigger to *Auto*, in the properties of the left. Move the trigger level up- or downwards with the mouse, until you get a triggered image.

With the +/- buttons on the x-axis



, you can adjust the time window shown.

#### **Customizing Displays**

Now we want to add an FFT instrument, to measure the resonance frequency of the tuning fork. Usually the Custom... screens are always empty so you fill them with any widgets, but basically no matter what display is, every display can be adapted to your needs.

## Design mode

Go to the "Design mode", either by clicking the "Design" tab on the top or just starting adding the Widgets by clicking on "Widgets" tab.

O	Pause	Stop	* Freeze	<b>O</b> esign	+ Widgets	- Displays	Recorder	>_ Custom			
E					1			۹	Favorites All Manage favorites		
					Meters				Campbell plot	Combustion engine analysis	Acoustics
					26.3 Digi	tal meter			<u>ف</u> 3D graph	CEA p-v diagram	Cound intensity
					🙆 Ana	log meter			2D/3D table	CEA scope	
						izontal bar			Controls	Aerospace and automotive	
					Vert	tical bar			👆 Input control	🔊 GPS	
					ON Disc	rete display			Video	🊱 Мар	
					🔵 Indi	cator lamp			Video	3D model	
					Dve	erload indicat	or		Machinery diagnostics	Attitude indicator	
	$\searrow$				Tab	ular values d	lisplay		Orbit	Reporting	
	W				Line gra	phs			Frequency domain analysis	🖍 Image	
					🔶 Rec	order			FFT preview	Abc. Text box	
					🕴 Vert	tical recorder			Octave preview	Line	
					P Sco				Electrical measurements	Additional	
						ecorder			Vector scope	9 Polygon 3D	
						natrix grap	ohs		Harmonic FFT	Modal Circle	
					2D g	graph				intersection of the second sec	
					Overload	l indicator					

Image 18: Enable Design mode by clicking on a Design button or by adding widgets to the display

In the Widget search window type in FFT and add an FFT widget on a display.

Automatically the channel "AI 5" is assigned to the instrument as it is the only "Used" channel we had.

As you are in "Design mode" you can now freely adapt the size of the FFT and move it to your favorite location on the screen. After you fit the FFT diagram to your needs, exit the Design mode by clicking on a Design button.

#### FFT instrument

Following steps help to get your data displayed quickly with the FFT:

- Y scale type set on "Log".
- Adjust Y-axis according to the range you are measuring. In this case, it is set from 0.001 to 1000 um/m.
- Click on the measured peak when the tuning for is vibrating. The values of the peak will be displayed, showing the maximum of 439,5 Hz with the according to amplitude.



Image 19: FFT widget

# Analysis folder View

After stopping the measurement, click on the **Analysis button**, and go to the Data files tab. You will see the Analysis folder view, which is like an Explorer. On the bottom, you get information about the channels and data header, and with the powerful search fields, you easily find the data file you are looking for.

Measu Import Multifie	re Analyse	ewesoft bata files Setup Review se for measure Revert to orig	AVI compress Post	-svnc, video		Anc? De	elete Cop											SIRIUSI	Look device 🗮 O	X
Folders		Search	٩	.,				.,												
📙 Data		+	File name				Start store time			Sample rate		Cha	nnels		Store mode	Data heade	ter			_
		Acc Reservent d	70-				An 20 14:39:5	<del></del>		20000 Hz	- 41: 1				naya fast					
Settings Events General file inform	s Data header File	odking Preview	_	_	_		_	_			_	_	_	_	_	_				
Sample rate 20000 s/sec Reduced rate 0.05 sec Search	٩	Store date and time 03-Jun-20 14:39:53 Duration 00:00:03		1	of channels conditions s fast												asurement Data Properties			
+	Ch. no AI	Name	Color	Rate		Channe	l info		Sensor	Un	it So	cale	Offset	Min	Max					
	AI AI 5	Tuning_Fork		20000	SIRIUS-STG (Br	idge; 20 mV/V	(DualCore); Ex	xc 5 V;) S		um)	/m 200	00.00	0.00	-4,97	2.31					

Image 20: Measurement data properties

To learn more about strain gages and how to measure strain and stress, visit our Strain measurement tutorial.

#### How to connect the Encoder?

Now we connect the demo encoder to e.g. ACC+ or STG+ (with additional Lemo connector), or MULTI module.



Image 21: Encoder coupled with the SIRIUS device

Per default the Counter inputs are not visible in <u>Dewesoft X</u>, we have to add them with the "+ More" button.

Aore Remove	
cou	Add module New setup defaults
Counters	*
πż Math	
III FFT analysis	
💥 Fatigue analysis	*
NT SENT	

Image 22: Add Counters to the Dewesoft X software

Also, other software options can be added here, e.g. Power, Order tracking, Modal test... The Counters *will appear now as a ribbon on top*.

The buttons on top can be customized, click the "+" button again, go to "New setup defaults" and set the asterisk for the Counters. From now on they will appear as default each time when starting <u>Dewesoft X</u>.

	Q	Add module	New setup defaults	
General		👆 User inp	uts	*
Channels	*			
🔍 Storing	*			
📕 Data header	$\star$			
System monitor	*			
A NET	*			
M Analog in	*			
Function generator	$\star$			
CAN 010001	*			
Counters	*			
VIII Analog/digital out	$\star$			
👏 GPS	$\star$			
∭ Digital in	*			
πż Math	*			
((🌲)) Alarms	$\star$			
Video	$\star$			
Security	*			

Image 23: Add Counters module as favorite

There are two typical counter techniques:

- the gated measurement (high-frequency range typical > 100 Hz), and
- pulse width measurement (low-frequency range typical < 100 Hz).

Many applications need both, the counter information and the analog data. Traditional systems do not offer the counter information synchronized to the A/D converters because they get the counter information only either after the gate time or after the pulse time measured. In comparison to standard counting with software interpolation (value 1.5 shown on image 24), Dewesoft X real-time counting uses an additional counter on a 102 MHz time base to get the exact time of the rising edge of the signal. This unique feature allows the calculation of the exact counter value at the A/D sample point (value 1.87 on the image 24).



Image 24: Comparison of traditional counting and Dewesoft Counter, which bases on value interpolation

When you turn on the encoder, you should already see the Counter value increasing. Each counter (CNT x) consists of 3 digital inputs (IN0, IN1, and IN2). Set the channels to Used and enter the Setup.

+	Used	C.	Sample rate	Name	Description	Counter type	Min	Values	Max	Unit	Setup
4		_		CNT 1	Event counting mode						Setup
•	Used		20000	CNT 1	-	Events	0.00	169288	10000.00	Revs	
•	Used		20000	CNT 1/IN0	-	Digital	0.00	0	1.00	-	
•	Used		20000	CNT 1/IN1	-	Digital	0.00	1	1.00	-	
	Used		20000	CNT 1/IN2	-	Digital	0.00	0	1.00	-	
4				CNT 2	Event counting mode						Setup
	Unused		20000	CNT 2	-	Events	0.00	0	10000.00	-	
	Unused		20000	CNT 2/IN0	-	Digital	0.00	1	1.00	-	
	Unused		20000	CNT 2/IN1	-	Digital	0.00	1	1.00	-	
	Unused		20000	CNT 2/IN2	-	Digital	0.00	1	1.00	-	

Image 25: Set the counter on Used and open Setup

#### Counter setup

asic setting													
Basic applica Sensor (enc		CDM, tacho)	~	Reset Input filter	off		~			Encoder Encoder		24	
Sensor type	e									Encoder Freg. dro		tomatic	~s
Encoder-10	024	~		Lowest detecta	able frequ	iency				Encoder	_		
Frequency i	interpo	blation Linear	~	Lower frequen	cy limit 1		Hz				ic angle wrap	around	
				Appromignesci	requericy	limit: 4.8828 Hz (ir	ici eases wit	rsampling re	ate)				
Signal A	C	CNT_IN0	~ 🗌 inv	j-	1 in	ююн	∎ ĝ=						
Signal A Signal B		CNT_IN0 CNT_IN1	<ul><li>✓ □ inv</li><li>✓ □ inv</li></ul>	ţ	ι'n								
-	C	-		5									
Signal B Signal Z utput chann	( (	CNT_IN1 CNT_IN2	✓ □ inv	Į			1	1		Value	Max	Init	
Signal B Signal Z utput chann Used		CNT_IN1 CNT_IN2 Name	✓ □ inv	Description		Physical unit	Scale	Offset	Min	Values 0.343	Max	Unit	
Signal B Signal Z Utput chann Used Used	( (	CNT_IN1 CNT_IN2 Name CNT 1/Angle	✓ □ inv	Description -		Physical unit revs	Scale	Offset 0.00	-10000	0.343	10000.00	Revs	
Signal B Signal Z Uput chann Used Used Used	( (	CNT_IN1 CNT_IN2 Name CNT 1/Angle CNT 1/Frequency	✓ □ inv	Description - -		Physical unit	Scale 1.00 1.00	Offset 0.00 0.00	-10000 0.00	0.343	10000.00	Revs RPM	
Signal B Signal Z Used Used Used	C.	CNT_IN1 CNT_IN2 Name CNT 1/Angle CNT 1/Frequency CNT 1/Raw_Count	✓ □ inv	Description - -		Physical unit revs	Scale 1.00 1.00 1.00	Offset 0.00 0.00 0.00	-10000 0.00 0.00	0.343 827.4721 352	10000.00 1.00 1.00	Revs RPM -	
Signal B Signal Z Used Used Used Used Used	C.	CNT_IN1 CNT_IN2 Name CNT 1/Angle CNT 1/Frequency CNT 1/Raw_Count CNT 1/Raw_EdgeSep	✓ □ inv	Description - - -		Physical unit revs	Scale 1.00 1.00 1.00 1.00	Offset 0.00 0.00 0.00 0.00	-10000 0.00 0.00 0.00	0.343 827.4721 352 2144	10000.00 1.00 1.00 1.00	Revs RPM -	
Signal B Signal Z Used Used Used Used Used Used Used	C.	CNT_IN1 CNT_IN2 Name CNT 1/Angle CNT 1/Frequency CNT 1/Raw_Count CNT 1/Raw_EdgeSep CNT 1/IN0	✓ □ inv	Description - - - - -		Physical unit revs	Scale 1.00 1.00 1.00 1.00 1.00	Offset 0.00 0.00 0.00 0.00 0.00	-10000 0.00 0.00 0.00 0.00	0.343 827.4721 352 2144 1	10000.00 1.00 1.00 1.00 1.00	Revs RPM - -	
Signal B Signal Z Used Used Used Used Used	C.	CNT_IN1 CNT_IN2 Name CNT 1/Angle CNT 1/Frequency CNT 1/Raw_Count CNT 1/Raw_EdgeSep	✓ □ inv	Description - - -		Physical unit revs	Scale 1.00 1.00 1.00 1.00	Offset 0.00 0.00 0.00 0.00	-10000 0.00 0.00 0.00	0.343 827.4721 352 2144	10000.00 1.00 1.00 1.00	Revs RPM -	

Image 26: Counter setup

In our case, we have a 1024-pulses Encoder with A, B, and Z track. Set the basic application to Sensor (encoder... and the sensor type to "Encoder-1024". Enable the "Encoder zero", so the angle will be reset with the Z pulse once per revolution, also enable the Automatic angle wrap around.

The most important output channels below are Angle, Frequency, and Raw\_Count.

Go to the Design mode and add Analog meter, Digital meter, and Recorders. Set the properties on the left for each instrument (min, max values, and resolution). To assign/unassign a channel to an instrument, click on the instrument first, then select/deselect the channel from the channel list on the right.



#### Image 27: Assign channels

# Analog and Digital meter

Below you see some example properties for the analog and digital meter. This should help you for displaying your RPM signal.



Image 28: Properties for Analog and Digital meter

# Save the Setup

After you have done all the sensor settings and created your own screen, you can save this setup/display configuration to a setup file (\*.dxs). Therefore stop the measurement, or go back to Channel setup, then click the <u>Dewesoft X</u> icon button, and use "Save setup as...".



Image 30: Save the setup

The same way you can load any configurations.

To learn more about counters and angle sensors, visit our <u>Digital counters</u> training.

# What for is the Math module used?

In <u>Dewesoft X</u>, we have extended Math library and several software modules for special applications. Let's only look to one of them as an example, you will find more. We will use the *Power module to calculate active power* and *we will measure grid frequency*. First, we must add the **Power analysis module - under '+ More' button**.



Image 31: Add Power analysis

We have several settings and calculation options, but for basic measurement, we only need to assign the right channels. For U1, we select the *voltage channel* and for I1 we select the *current channel*.

Power 1 +						
Power system configuration Single phase 🗸	Line frequency 50 V Number of cycles 10 V	Output units W V Nominal voltage 230 V Line to earth	Calculation sample ra	Phase V U1 te	~	
U1 voltag	e v v	Power En	ergy Power quality	Vector scope		
		Harmonics ca				
	t ~ A	Halfbands	All / IEC6 1000 -4-7 5.6 / IEC6 1000 -4-7 5.5.1 smoothing filter	Automatic I	ohase angles P,Q mpedance nterharmonics sground harmonics editor	r
		Harmonic dist		Group FFT line		mmetrical components
N <b>1</b>		THD Max		200 Hz 2 -		Cycles symmetrical components Period symmetrical components
		Rapid voltage				
		Stead		lysteresis ).2	D(t) % 3.3	%
		Voltage flicke			Flicker emission	
		Voltage flic			Flicker emission	
				Calculate for Star V	Total short circuit powe	VA V
		Calculation ov	-	P filter Auto 🗸	Phase (deg) 0	

Image 32: Select the proper channels to the voltage and current

Go to measure screen, and you will have several predefined displays related to the power module displayed. You can also, of course, create your own display as a combination of power and other parameters.



Image 33: Predefined Power displays

After setting the input and math channels, we are prepared to perform a measurement. Let's store some data by pressing the **Store button**. Once the data is stored, we can press **Stop** to stop the recording.

By pressing Analyse, the file can be review for analysis. We can look on different screens and by pressing *Play*, we can replay the data.



Image 34: Widgets for Power analysis



Image 35: Analysis of power measurement data

For the analysis of data, <u>Dewesoft X</u> offers several possibilities. We can do *Offline math* inside the software, we can *export data* to other software packages or we can simply *print the display* which we would like to add to the report. Of course, all file operations like merging the files together, renaming, and deleting them are possible.

By selecting the print button, the selected display will be printed out.

		Q	Dewesoft	t			
	Measure	Analyse	Data files	Setup	Review	Print	Export
Ę							
Prir	nt						
Printer							
OneNote	e for Windows	10	$\sim$				
Paper							
Letter			$\sim$				
Orientatio	n						
Portrait			$\sim$				
Copies			_				
1							
Multipage	:		0				
Settings			$\odot$				
			_				
⊗ Heade	er						
Show hea	ader		0				
Header te	ext						

Image 36: Print the report

We can also export data in various formats (Excel, Matlab, Diadem, Flexpro, ...) by selecting Export function.

# How to apply an Offline Math?

If we want to perform additional analysis on data already stored, it is very easy to do Offline math inside <u>Dewesoft X</u>. Here we will calculate vibration velocity out of an acceleration signal. To do that we must select the Offline math button:



Image 37: Open Offline math in Analyse mode

#### Choose '+ Add math' button and select a Time integration, derivation for our case.

	Q Deweso	oft			
Measure Ar	nalyse Data file	es Setup Review	Print Export		
· <u>∼</u> ⊞ '	hath Power	More Remove			
X <sup>2</sup> +Y <sup>2</sup>	tering Statistics				
	۹	Add math Manage f	avorites		
ormula and scripting		Time domain analysi	s	Machinery diagnostics	Acoustics
++ C++script		-5 ms Delay channel		Angle sensor math	Acoustic weighting filters
+Y' Formula		Latch value math		Combustion noise	Control systems
ltering		Ն Scope math		Envelope detection	Ar PID control
FIR filter		∫(dt) Time integration, o	derivation	Tracking filter	Constants
FT Frequency domain filter	r	Time-to-vector tra	ansform	Strain, stress	e Vector, matrix constant
IIR filter		Frequency domain a	nalysis	🙏 Rosettes	Additional
tatistics		Cepstrum			a + bi Complex presentation
Array statistics		Correlation			
Basic statistics		HZ Exact frequency			Counting
Classification					Ounting
eference curves		∫(df) Frequency integra	ation, derivation		
Hz Frequency domain ref. curve		Full spectrum			
Time reference curve		Octave analysis			
Vector reference curve					
XY reference curve					

Image 38: Add Time integration, derivation math in offline mode

In the setup, we select the acceleration channel, on which we will perform integration. Please note that the system will already suggest the units of measurement to be mm/s and do automatic conversion. We can, of course, select an alternative unit, like 'ips'.



Image 39: Time integration of acceleration channel

After we have done this, we go back to Review, add one Recorder display on which we will put acceleration signal and created math signal vibration velocity. To calculate this math signal, we must click on the Recalculate button. Now we can see both signals.



Image 40: Preview the acceleration and vibration velocities signals

There are many things to do in <u>Dewesoft X</u> and we invite you to visit further sessions on different topics *How to measure* signals, *How to analyze the data*, and *How to use* <u>Dewesoft X</u>.

# Sine Wave on All Channels

# In case you have set the Operation mode in <u>Dewesoft X</u> to **Offline** mode, you will get a picture like below - **sine** waves with random amplitude and frequency on all channels.



Image 41: Sine waves with random amplitude and frequency on all channels as an output of Offline mode

When you switch back to Ch. Setup, the amplifiers will show "**Demo-...**". In this case, please review the upper page - Manual setup of hardware.

Dynamic acquisition rate Channel actions													
5000	~	Band 1953	width:	Balance amplifiers Sh	ort on Zero all Re	set zero all							
(Hz) v													
Search			Q										
ID	Used	C.	Name	Ampl. name 🔳	Range 🔳	Measurement	Min	Values	Max	Physical quantity	Units	Zero 🔳	Setup
1	Used		AI 1	DEMO-SIRIUS-ACC	10 V	Voltage	-10.00	-3.355 / 3.587	10.00		V	Zero	Setup
2	Used		AI 2	DEMO-SIRIUS-ACC+	10 V	Voltage	-20.00	-6.740 / 6.976	20.00		V	Zero	Setup
3	Used		AI 3	DEMO-SIRIUS-ACC+	10 V	Voltage	-20.00	-1.595 / 1.819	20.00		V	Zero	Setup
4	Used		AI 4	DEMO-SIRIUS-MUL	10 V	Voltage	-20.00	-1.595 / 1.850	20.00		V	Zero	Setup
5	Used		AI 5	DEMO-SIRIUS-MUL	10 V	Voltage	-50.00	-6.84 / 7.06	50.00		V	Zero	Setup
6	Used		AI 6	DEMO-SIRIUS-STG	50 V	Voltage	-50.00	-36.71 / 37.64	50.00		V	Zero	Setup
7	Used		AI 7	DEMO-SIRIUS-STG	50 V	Voltage	-50.00	-17.26 / 18.57	50.00		V	Zero	Setup
8	Used		AI 8	DEMO-SIRIUS-HV	1000 V	Voltage	-1000.00	-160.0 / 185.4	1000.00		v	Zero	Setup

Image 42: Demo- prefix is defined only for simulated channels