



USER MANUAL

OMEGA application

Online Monitoring Expert Guard Application



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Introduction

OMEGA is created especially for factory control rooms where people monitor machinery pressures, temperatures and other process parameters. Along with these parameters you can display info about mechanical condition of your machines.

More and more factories are turning to online condition monitoring system due to lack of vibrations analysts or experienced people in this field.

At the beginning of Omega developing, we were inspired by our successful FASIT expert system. But we did not copy its algorithm. We started from the scratch and created much more sophisticated OMEGA system.

OMEGA displays machinery faults severities and makes predictive maintenance accessible to everyone with no expertise required.

Omega has a simple interface with route tree of your machines with meas. points and you can see real-time machine condition + historical data. You can see machine faults like unbalance, mechanical looseness, misalignment, bearing and other factors which can cause issues to the machines.



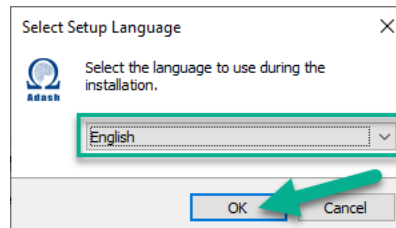
OMEGA engine itself exposes fault severity data (machine condition, unbalance, etc.) on OPC server. From OPC you can read the data by third party software and display them in the software which you already have.

Application installation

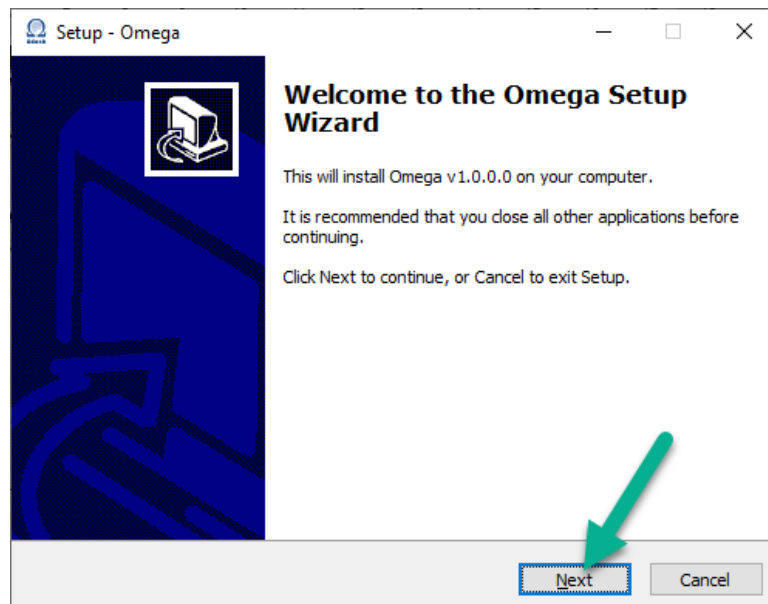
Application is installed with file **Omega_v1.0.0.0.exe** (it will differ with new versions of the application). Installation file can be downloaded from www.adash.com.

Note! Please keep in mind that **before installation** itself you need to upgrade the firmware of your online unit to **version 2.82 or higher**. The latest firmware is available on Adash website: www.adash.com.

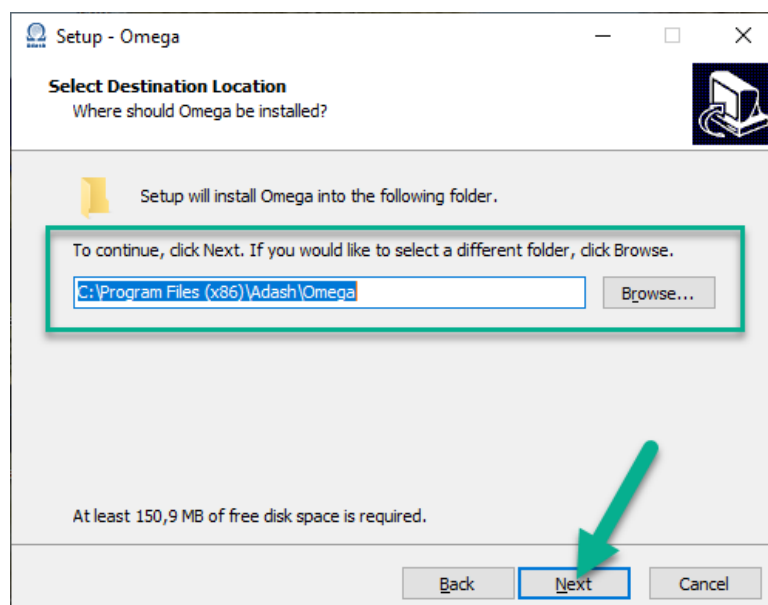
To proceed with the installation please see following steps. First of all, choose setup **language**. Confirm your option with '**OK**' button.



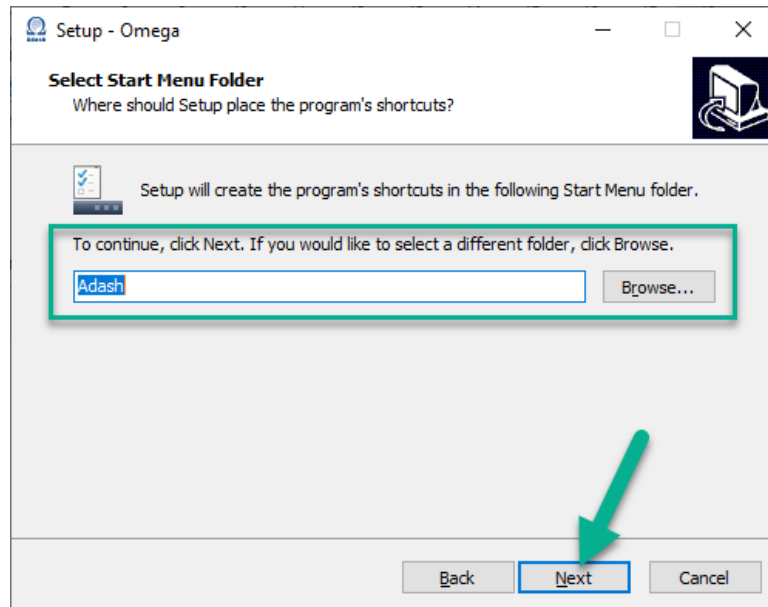
Next window is '**Setup**' window. Click through it and read the information included.



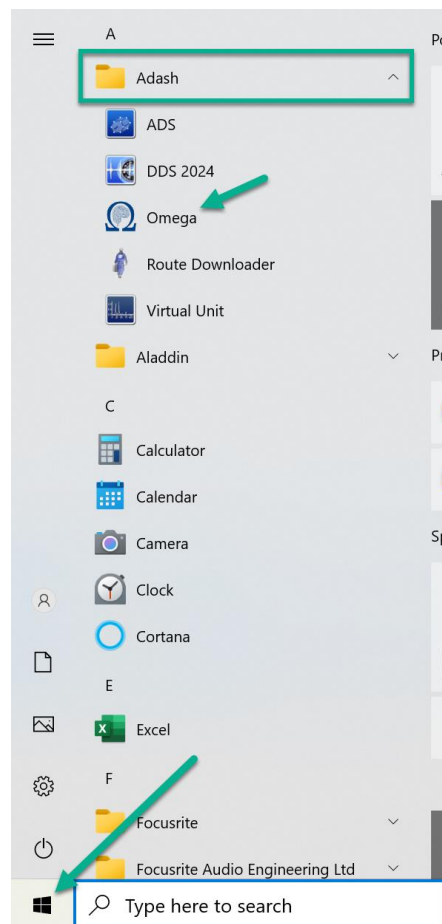
Choose folder where you install Omega. You can use predefined destination. Or you can choose the one you prefer with '**Browse**' button.



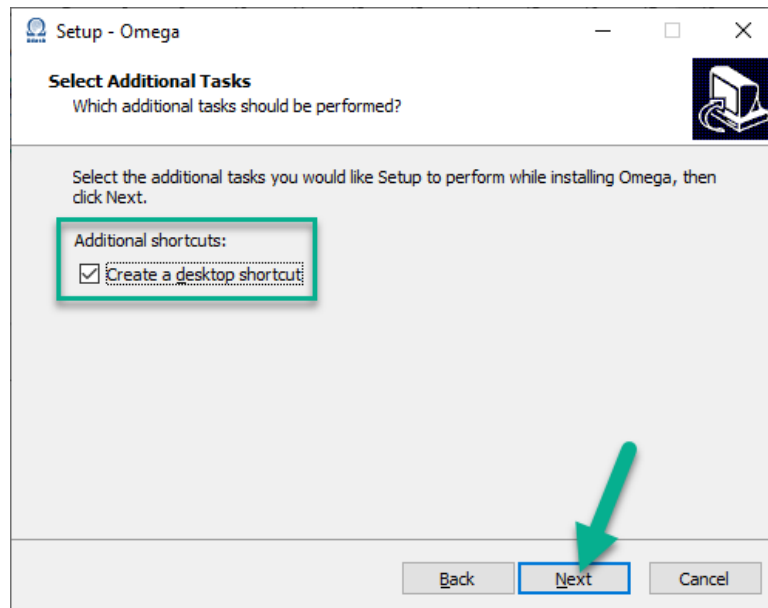
Next window is to set **start menu folder**. You can also keep the default option here or choose different one.



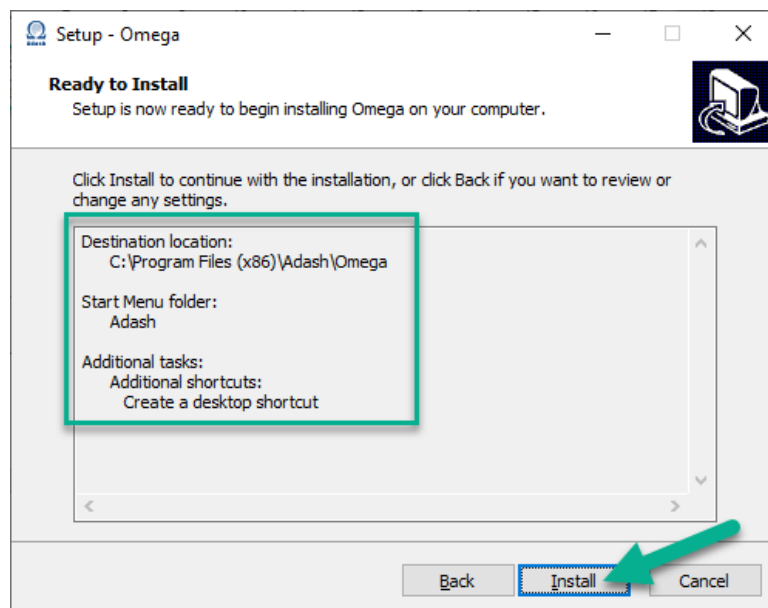
Note! Basically, this step is taken to create program's shortcut in Windows start menu. See the following screenshot. You can see Adash folder in Windows start. Omega shortcut is created under it (same as DDS, Virtual Unit, etc.).



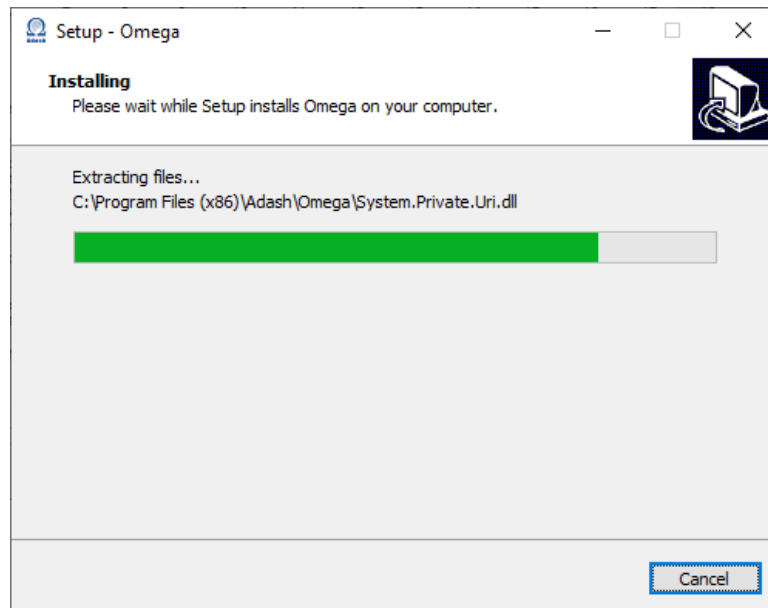
You can create also desktop shortcut for Omega application if you want to. If not, just unmark the checkbox.



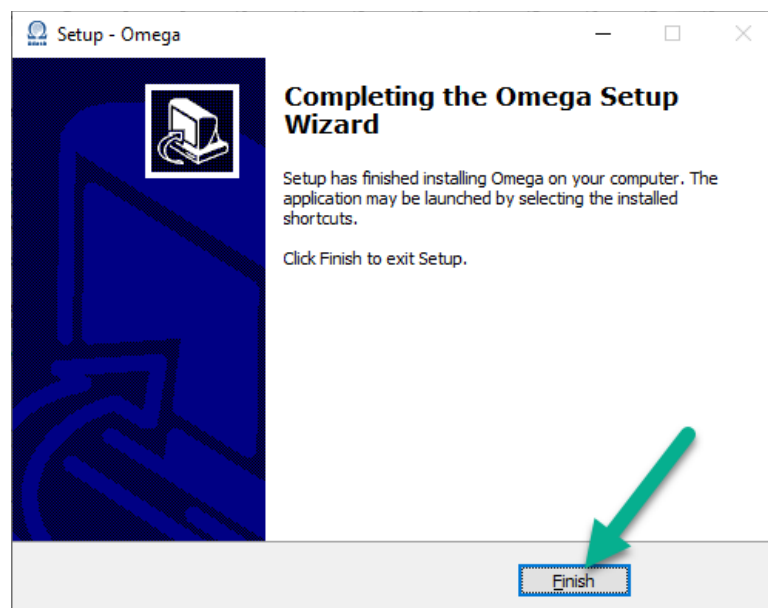
You can see the summary of your choices in the last window before you press 'Install' button.



Now the installation starts.



It is done! Click on '**Finish**' button to close the installation setup.

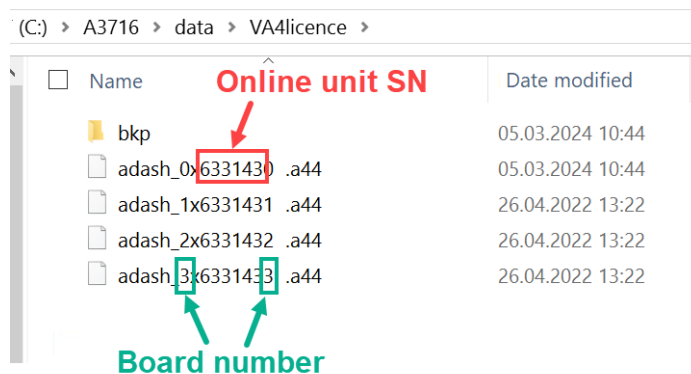


You have Omega installed in your computer now.

Licenses

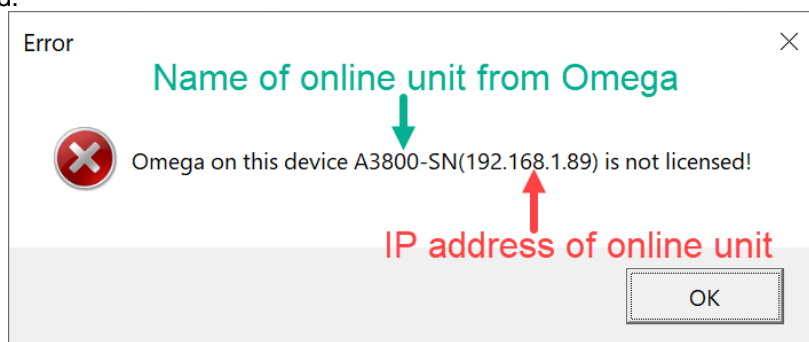
You need a license file to make Omega application work. The license itself is not related to any dongle key (as it is in case of DDS software).

You only need the license file from Adash to make Omega work properly. The license file needs to be saved to online unit. This file is named e.g. **adash_0x6331430.a44** (0 is the board number – 0 stands for the first board. Each unit's board has its own license file for Omega.).



It is important to save license file to online unit folder in following location: **c:\A3716\data\VA4licence**.

Note! Omega application will be working without license file. **But** no data will be shown in Omega graphs! You get following error message when you send the project to online unit without license. You can see on which unit omega is not licensed.



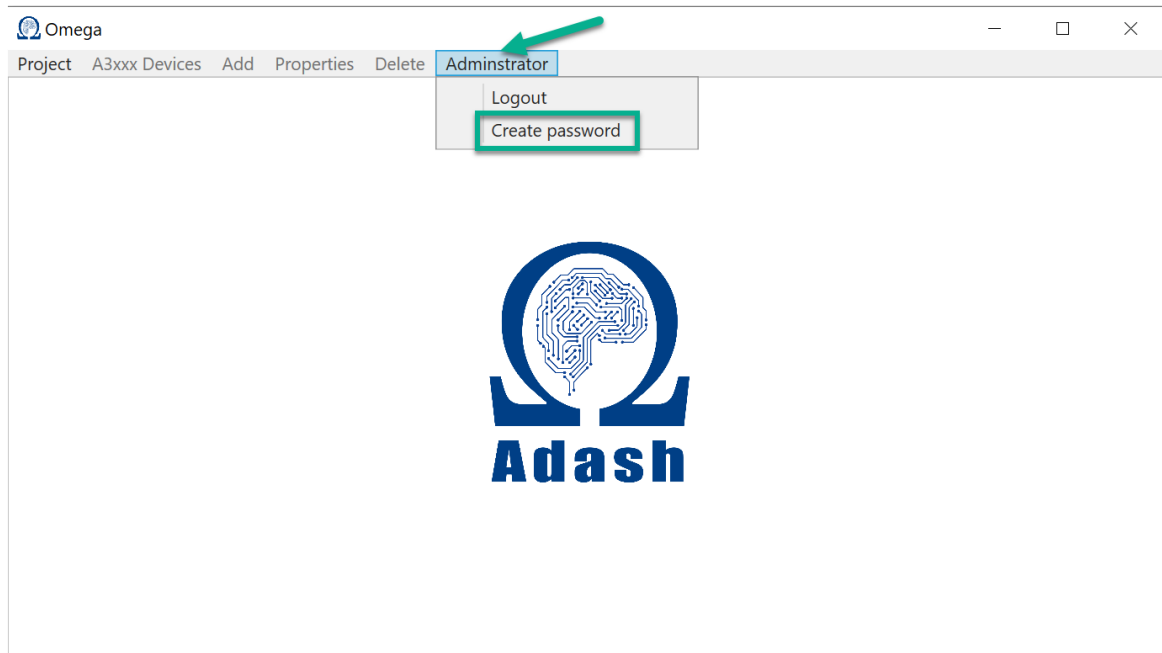
Login

You need to be logged into the application to edit the projects or to create new ones.

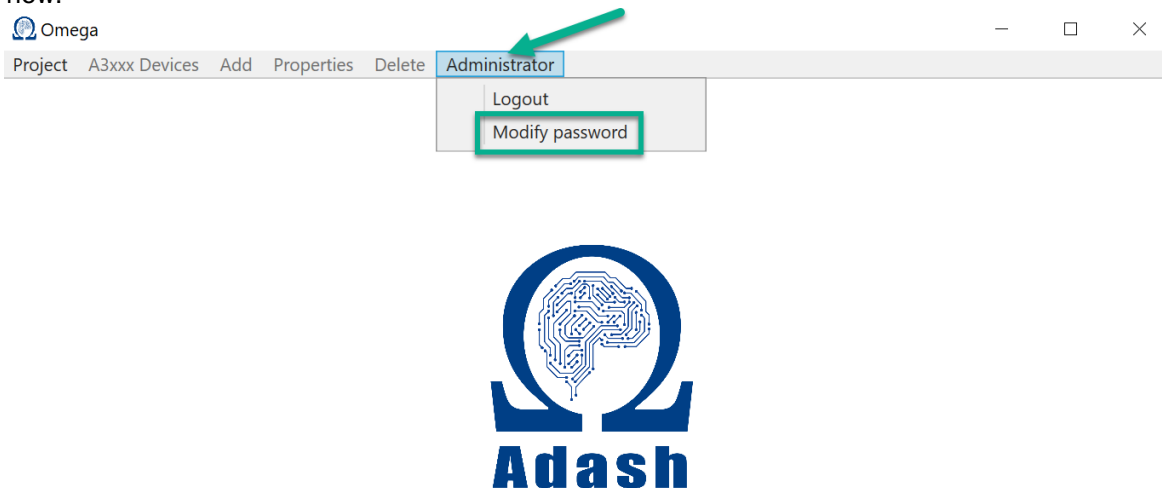
By default, there is no password set to Omega. You are automatically logged in as Administrator every time you open it. If the password is created, you need to login when you decide to modify the projects.

Note! Projects with graphs can be opened without login into Omega. Login is essential only to make project changes.

Password can be created under tab '**Administrator**'. Choose '**Create password**'.

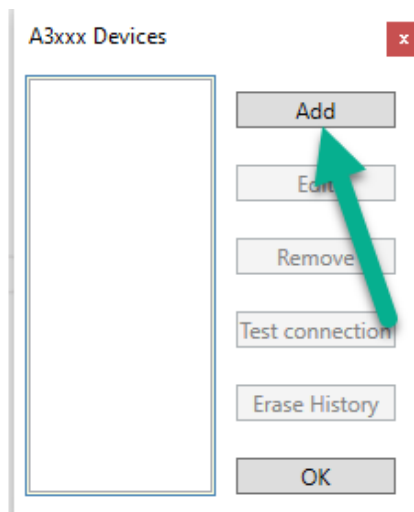


Once the password is set, you can see there is no button 'Create password'. You can see here '**Modify password**' button now.



A3xxx devices

This tab is used for working with online units. You can add online units (A3716 and A3800) here. Just click on '**A3xxx Devices**' and you can see following window.



This window is blank (without any online unit added) when you start to use Omega application. You need to add your online unit with '**Add**' button. Fill in units name and its IP address. You can set used sensors here. Or you can also use sensor settings from DDS – '**Read DDS sensor settings from the device**'. Confirm with '**OK**' button.

Add A3xxx Device

Name: A3800-SN

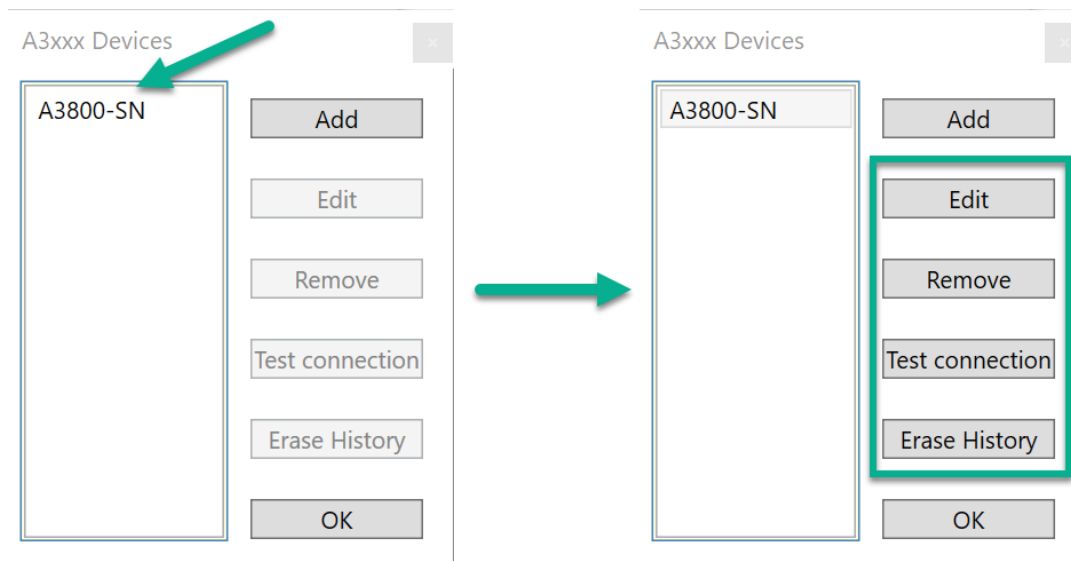
IP Address: 192.168.1.xxx

Channel	Unit	Sensitivity mV/unit	ICP Powering
1	g	100	<input checked="" type="checkbox"/>
2	g	100	<input checked="" type="checkbox"/>
3	g	100	<input checked="" type="checkbox"/>
4	g	100	<input checked="" type="checkbox"/>
5	g	100	<input checked="" type="checkbox"/>
6	g	100	<input checked="" type="checkbox"/>
7	g	100	<input checked="" type="checkbox"/>
8	g	100	<input checked="" type="checkbox"/>
9	g	100	<input checked="" type="checkbox"/>
10	g	100	<input checked="" type="checkbox"/>
11	g	100	<input checked="" type="checkbox"/>
12	g	100	<input checked="" type="checkbox"/>
13	g	100	<input checked="" type="checkbox"/>
14	g	100	<input checked="" type="checkbox"/>
15	g	100	<input checked="" type="checkbox"/>
16	g	100	<input checked="" type="checkbox"/>

Read DDS sensor settings from the device

OK Cancel

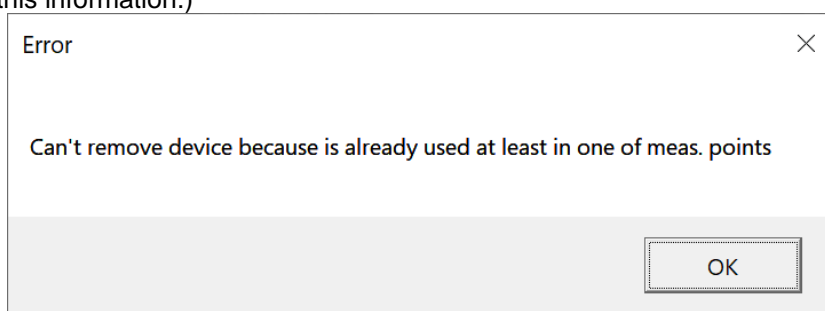
Once online unit is added, you can see it in the list.



Once you choose online unit in this list (click on it), all options will be ready to use. It means that options like Edit, Remove, Test connection and Erase History will be available.

Edit – Properties window for online unit is opened with this button. You can edit parameters of online unit – name, IP address, sensors.

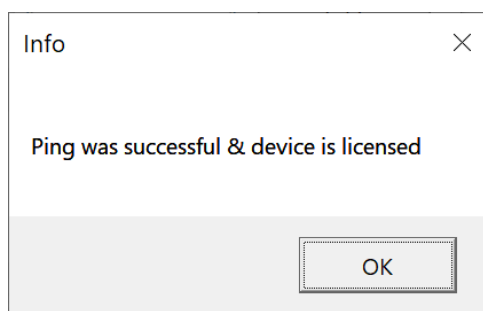
Remove – Remove the online unit from the list. (If online unit is used in some measurement point, you get the error message with this information.)



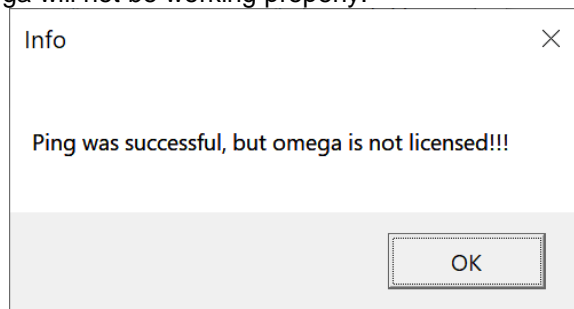
Test connection – Connection test between Omega and online unit.

Erase history – You can erase data history from online unit. In the end you get information if it was successful.

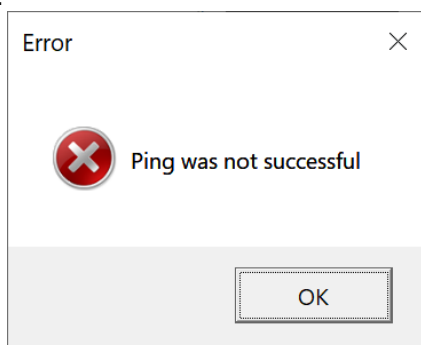
Note! You can always check if the online unit is connected to Omega application. Click on 'Test connection' button and ping test will be performed. If everything is working fine you get message '**Ping was successful and device is licensed**' (see below).



If connection is working well but online unit doesn't have Omega license, you get '**Ping was successful, but omega is not licensed!!!**'. Omega will not be working properly.



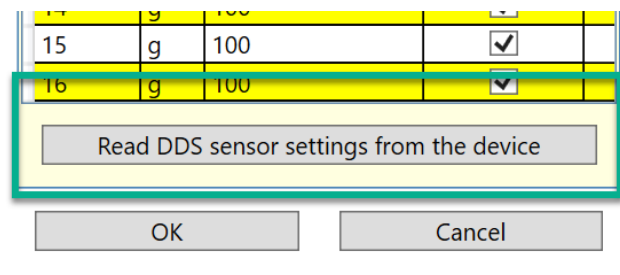
The last result you can get with ping test is '**Ping was not successful**'. In this case the connection between Omega and online unit is not working.



Sensors

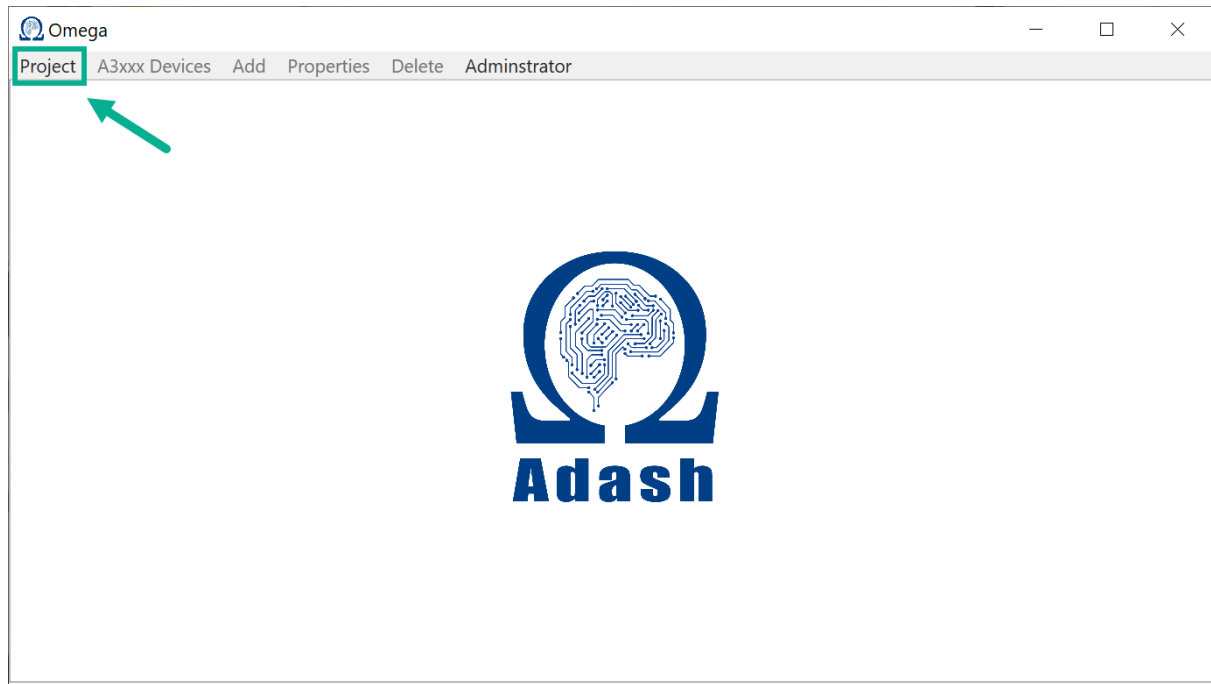
Sensor settings are done when you add the online unit (it is mentioned above). You can also edit it later here (tab A3xxx Devices – click on the device – Edit). For each channel you can define the sensor parameters – **unit**, **sensitivity** in mV/unit and **ICP powering**.

There is also the button 'Read DDS sensor settings from the device'. Basically, this button changes the sensors settings according to online unit. These sensors settings were sent to online unit from DDS software.



Projects

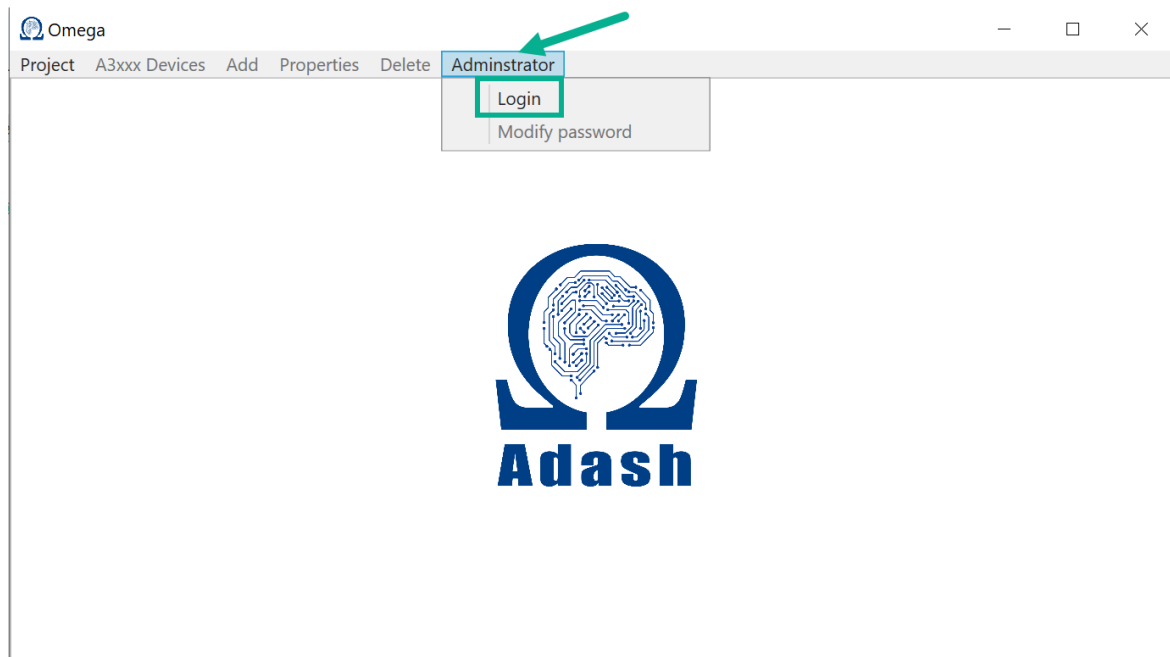
We described how to work with '**Project**' tab in this chapter.



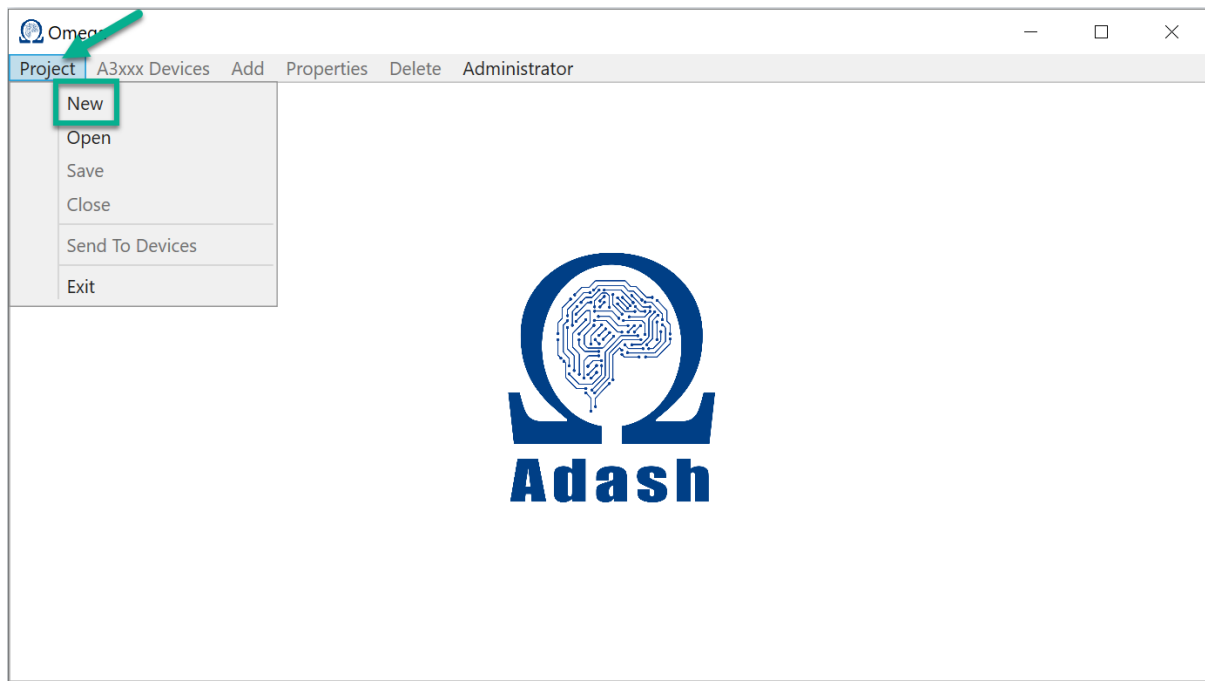
Creation of new project

You need to be logged in to create new project. If no password for Omega is set, you are automatically logged in as administrator (every time you open Omega). If password is set, you need to login as below to create new project.

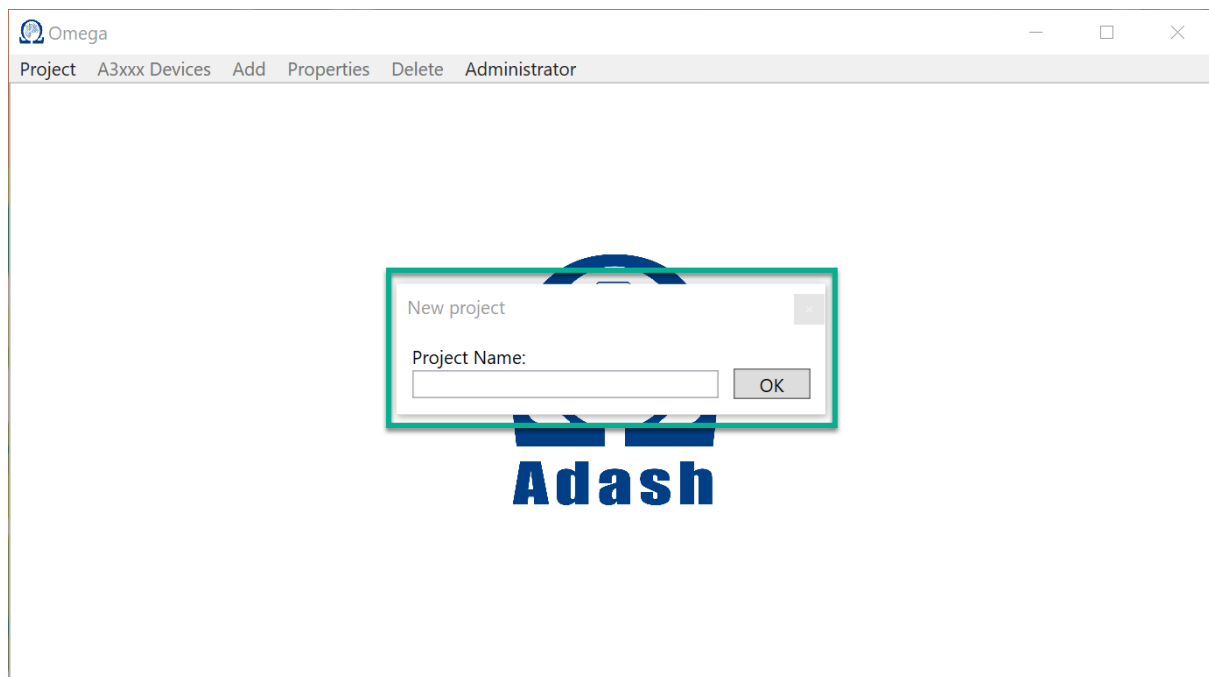
So, click on '**Administrator**' tab. Choose '**Login**'.



After that, new project can be created. Click on '**Project**' tab and choose '**New**'.



You get the window for project name. Fill in the name and confirm with **OK**.

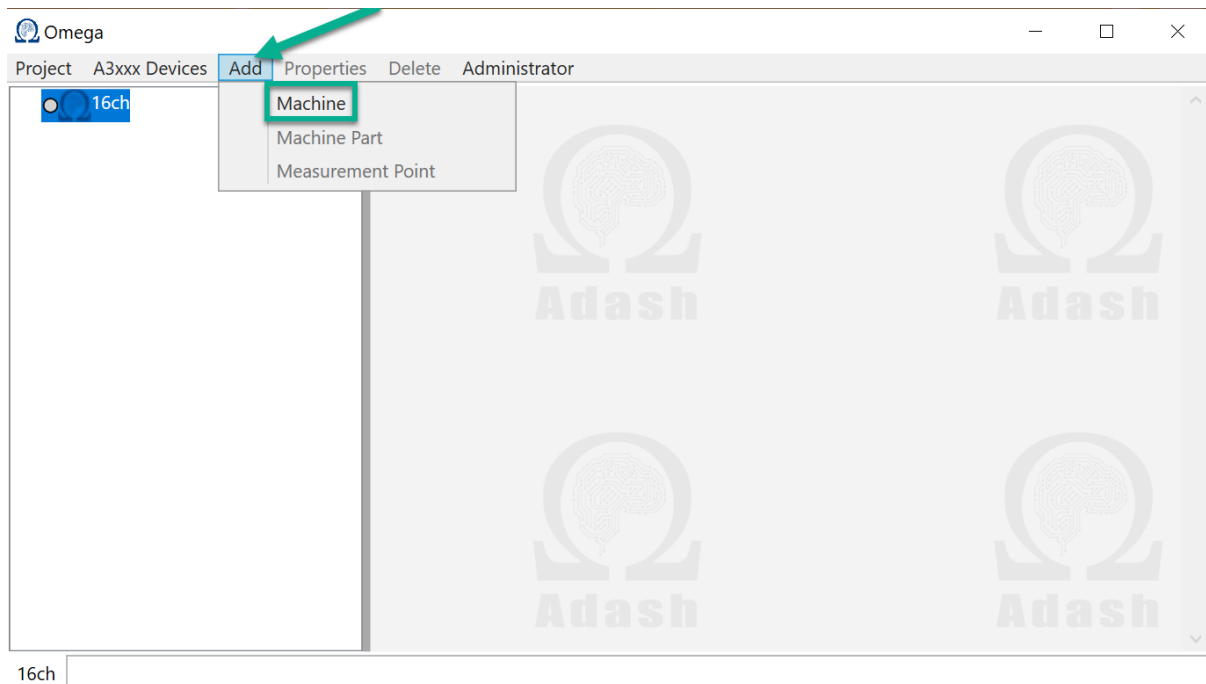


New project is created.

Project structure

Once the project is created you need to create its structure. It is very similar like tree structure in DDS. You add machines, machine parts and measurement points here.

Use 'Add' tab to add machine to project. Machine is the first level item of the structure.



Name the machine and set its parameters.

Add Machine

Name	Machine				
Speed	Tacho				
	Board	A			
	Required	Min	None	Max	None
					RPM
Limits	ISO				
	Iso Part	3			
	Iso Group	1 Large Rigid			
	Values (mm/s)	Warn.	4,5	Danger	7,1
Mach. Type	Electric motor				
Machine threshold	0,3 mm/s				

OK Cancel

Parameters description:

Name Fill in the name of your machine.

Speed Set the machine speed settings. You can choose **RPM**, **Interval**, **Tacho**. Each option has more settings included. It is shown below Speed row. In this example, there is set 'Speed: Tacho'. Additional settings for tacho is **Board** and **Required Min/Max RPM** (you can see it below speed row).

Board For tacho you can choose the board A-D.

Limits Limits can be set based on ISO limits for machines (ISO 20816) or you can choose option 'User'. With option 'User' you need to define the limits on your own. In case of 'User' setting of limits the '**Iso Part**' and the '**Iso Group**' will be greyed out. On the other hand, the option for manual values will be available. See picture below.

Required Min Max RPM

Limits User

Iso Part 3

Iso Group 1 Large Rigid ?

Values (mm/s) Warn. 4,5 Danger 7,1

Mach. Type Choose type of your machine. There are options: **Electric motor, Fan, Pump** and **Other**.
Machine Thold Choose threshold value for the machine.

Note! Threshold is also used for evaluation of the machine status: running/not running. This evaluation is done on machine level (not point level!). It means: if all measurements on the machine are below the threshold – the machine is not running. If at least one measurement is above the threshold value – the machine is running.

You can also add particular machine parts. It can be gearbox, motor, etc. Machine parts are added with the same 'Add' tab as machine. Option '**Machine part**' is available when you added '**Machine**' earlier. Otherwise, this option is greyed out and cannot be added (machine part without machine defined does not make sense).

Omega

Project A3xxx Devices Add Properties Delete Administrator

16ch

Machine

Machine Part

Measurement Point

Add Machine Part

Name

Speed Inherited/Ratio

x 1

Required Min Max RPM

Limits ☒ Inherited ISO

Iso Part 3

Iso Group 1 Large Flexible ?

Values (mm/s) Warn. 7,1 Danger 11

Mach. Type Electric motor

OK Cancel

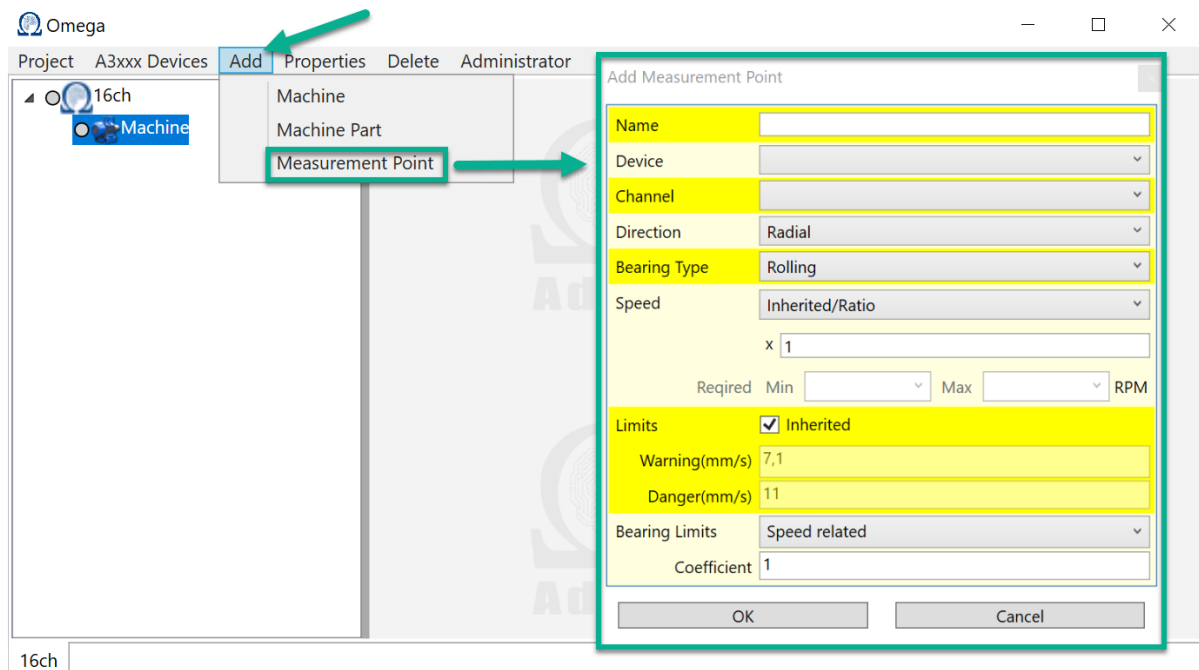
16ch

Parameters description:

Name Fill in the name of the machine part.
Speed Set the machine speed settings. You can choose **Inherited/Ratio, RPM, Interval, Tacho**.
Limits It can be inherited from the machine level (checkbox marked ☒). Or you can set it based on ISO or user requirements (detailed description is above in Machine section).
Mach. Type Choose type of your machine. There are options: **Electric motor, Fan, Pump** and **Other**.

Now you need to add measurement point to this machine/machine part. Do it the same way by using the same 'Add' button as for machine/machine part creation.

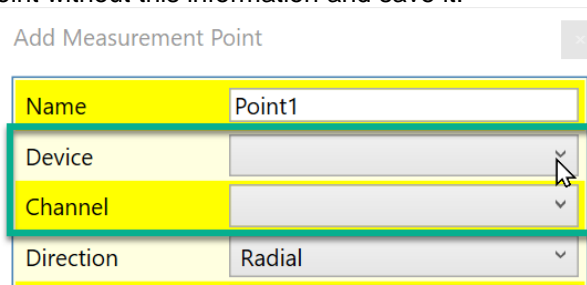
Note! Measurement point can be added directly to machine. Machine part is not mandatory item in the project structure. It actually depends on you, if you will use it or not.



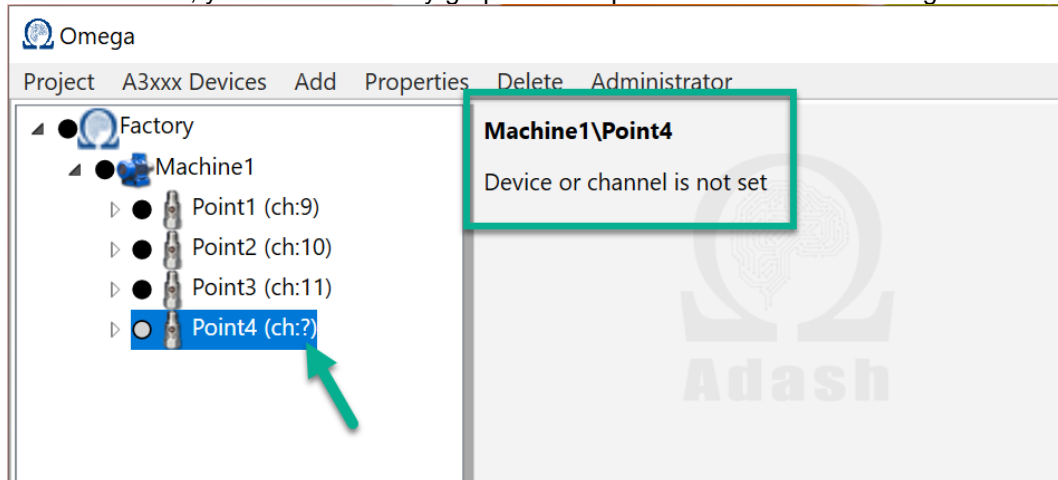
Parameters description:

- Name** Fill in the name of the point.
- Device** Choose online unit from the list.
- Channel** Choose the channel for this point measurement.
- Direction** Choose one from the options **Radial/Axial/Other**.
- Bearing Type** Choose type of the bearing **Rolling/Journal**.
- Speed** Set the machine speed settings. You can choose **Inherited/Ratio, RPM, Interval, Tacho**.
- Limits** It can be inherited from the machine level (checkbox marked ☒). Or set your own.
- Bearing limits** Two options are available: **Speed related/Absolute values**.
 - Speed related:** These limits are based on the Adash limits. Basically, when speed is increasing, the limits are set to higher values (there is linear relation between speed and the limit values).
 - Absolute values:** You can set the limits for warning and danger as you want in g unit. In this case, speed is not required for bearing evaluation.

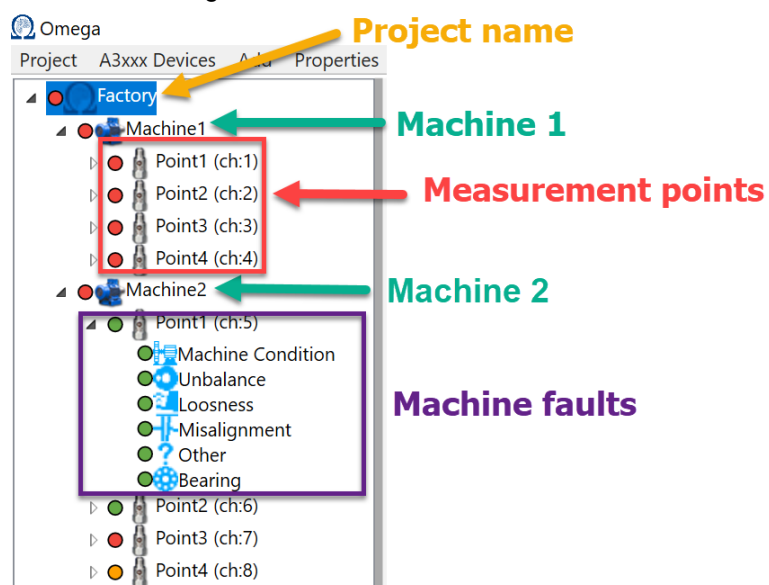
Note! Keep in mind that it is really important to fill in online unit and channel for the particular points when you create them. You can create point without this information and save it.



If device/channel is not set, you will not see any graph for that point. You see the following information:



The final structure looks like this in Omega.



Machine faults

Machine faults with their icons are described below.

Machine Condition



Machine condition is evaluated based on ISO standards (**ISO 20816**).

Unbalance



Unbalance is the most common source of machine vibration. You can remove this fault by balancing.

Looseness



In case that looseness appears, you can see the trend changing in this graph.

Misalignment



Misalignment is the most common fault on machines (same as unbalance). Basically, what happens is that the axis of rotation of the two machines is not in the same line.

Other



Vibration values measured on different frequencies than the typical frequencies for other faults (like unbalance, bearings, etc.) are shown in this graph.

Bearing

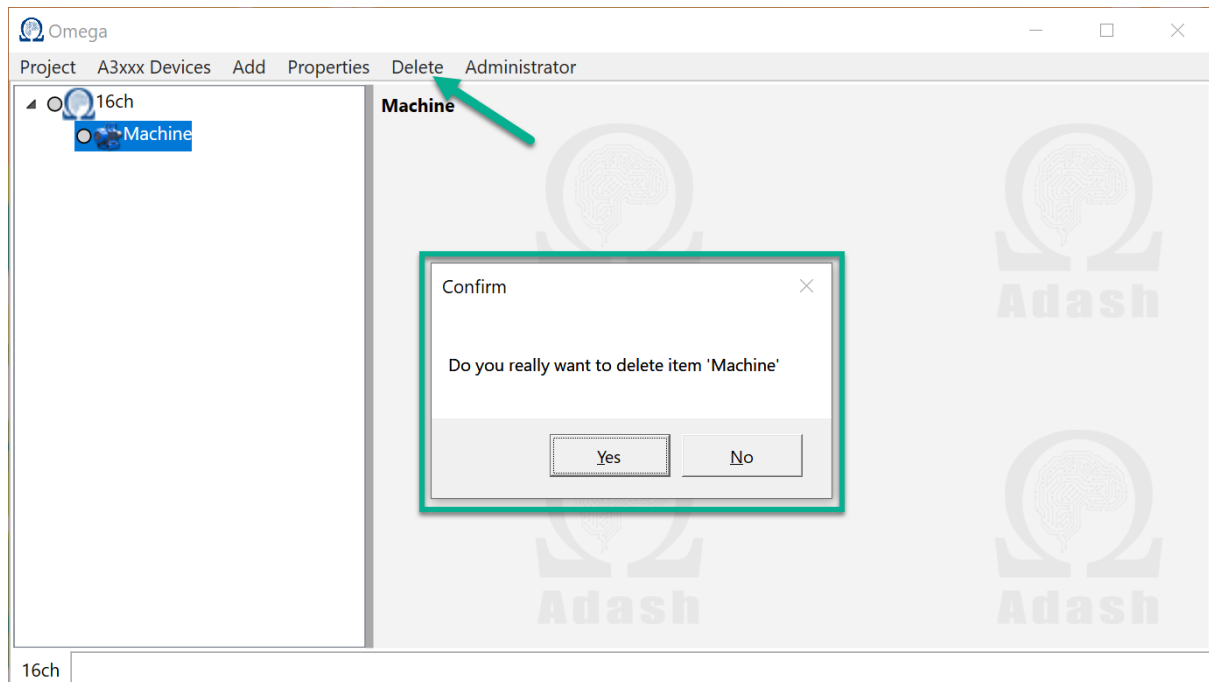


Graph of values characteristic for bearing faults (typically appearing at high frequencies).

Delete

If you want to delete any part of the structure you have two options. First one is to use '**Delete**' in main menu.

You need to click on the part of the project you want to remove. Then click on '**Delete**' tab. You get window where you confirm deleting of the item.



Second one is to delete the item with key 'Delete' on the keyboard. Just click on the item in the structure (point, machine, etc.) and press 'Delete'. You get the same window for confirmation as with 'Delete' button in Omega.

Note! It works the same way for any level of the structure. It means that the same way you delete machine, machine part and also measurement point.

Properties

You can modify the properties of particular items in Omega application. You can see '**Properties**' button in the main menu for it.



'Properties' tab works on every item in the project structure. You can click on the measurement point and then click on 'Properties' tab. Now you can modify the properties of this measurement point.

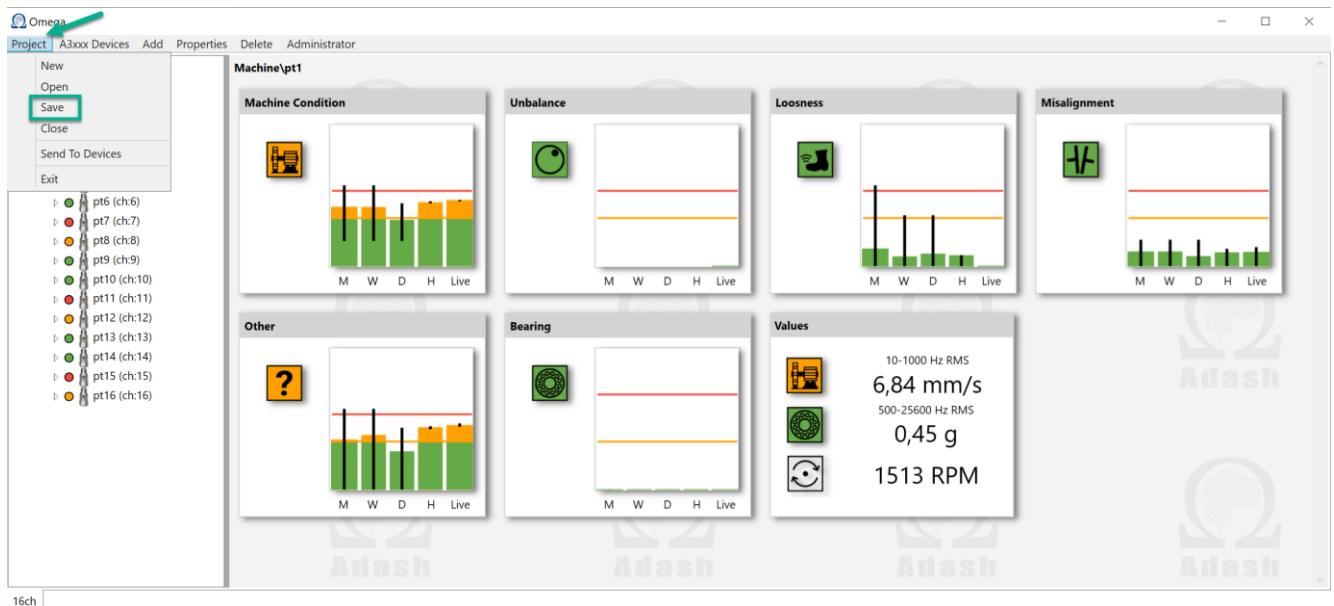


You can change properties with this tab also for machine and machine part.

Note! It is also possible to click on the tree item directly (machine, point) with right mouse button. You get the same properties window immediately for that item.

Project saving – SAVE

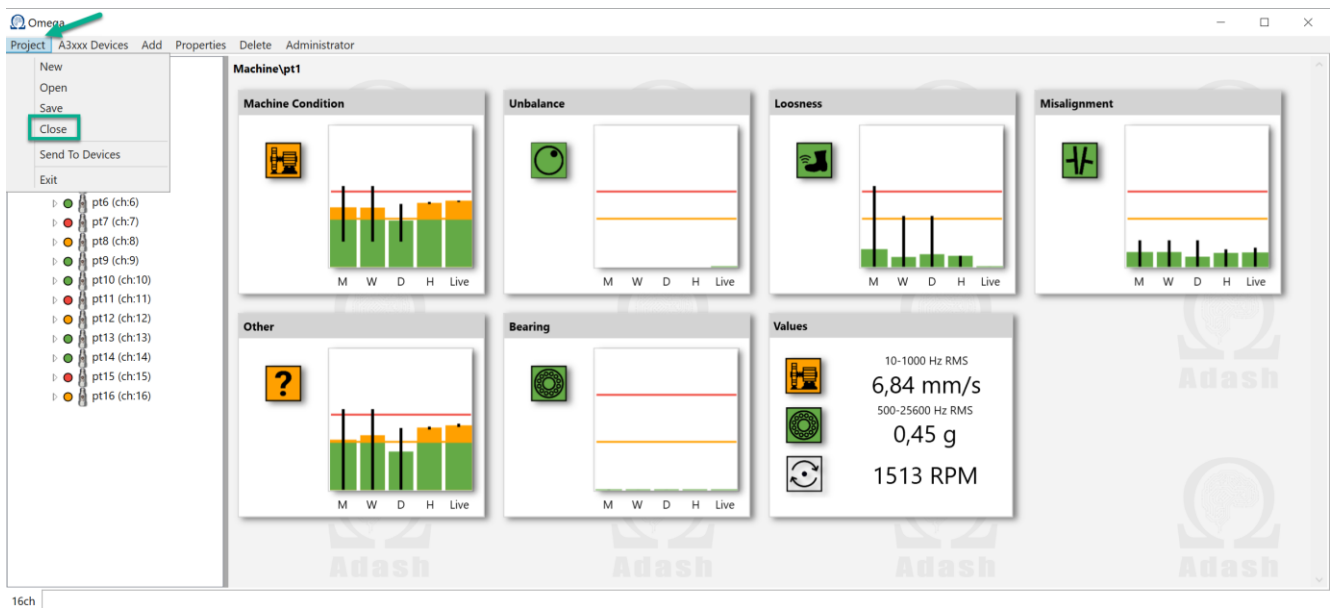
Once your project is created, you can of course save it. Go to tab 'Project'. Choose 'Save'.



Note! It's up to you where you want to save Omega projects. Once you press 'Save' you get window to choose location for saving. Confirm it with 'OK' button.

Project closure – CLOSE

Project can be closed also with the same tab 'Project'. Choose 'Close'.

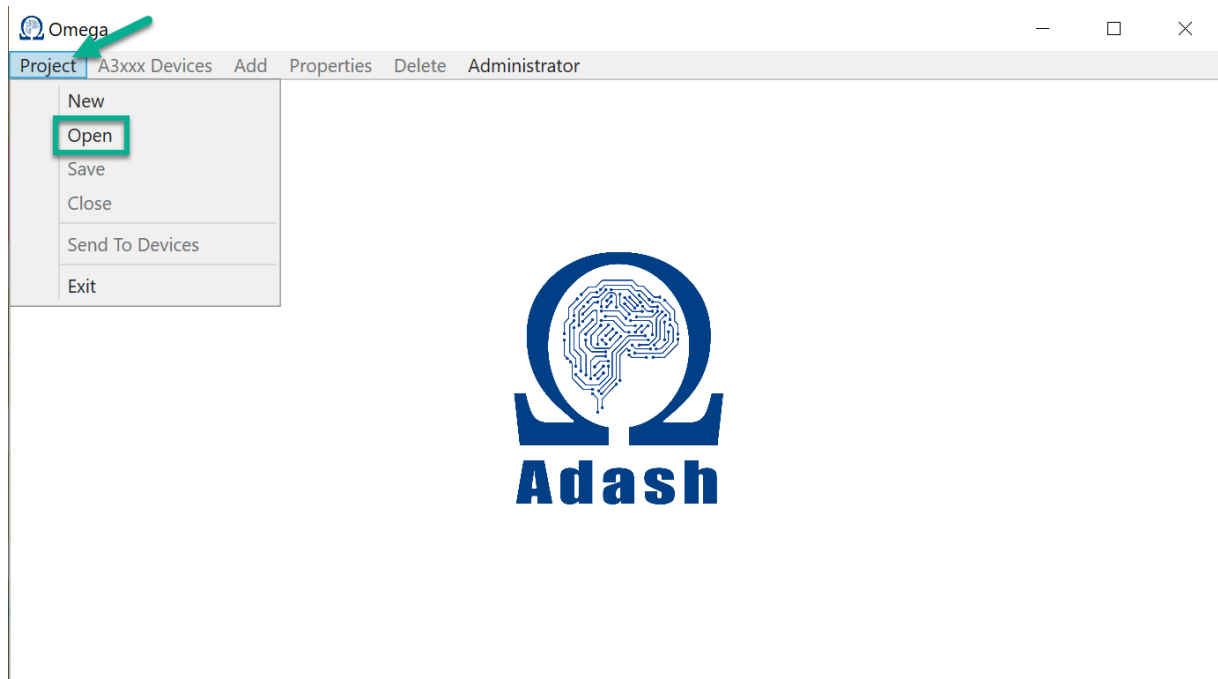


Project will be closed.

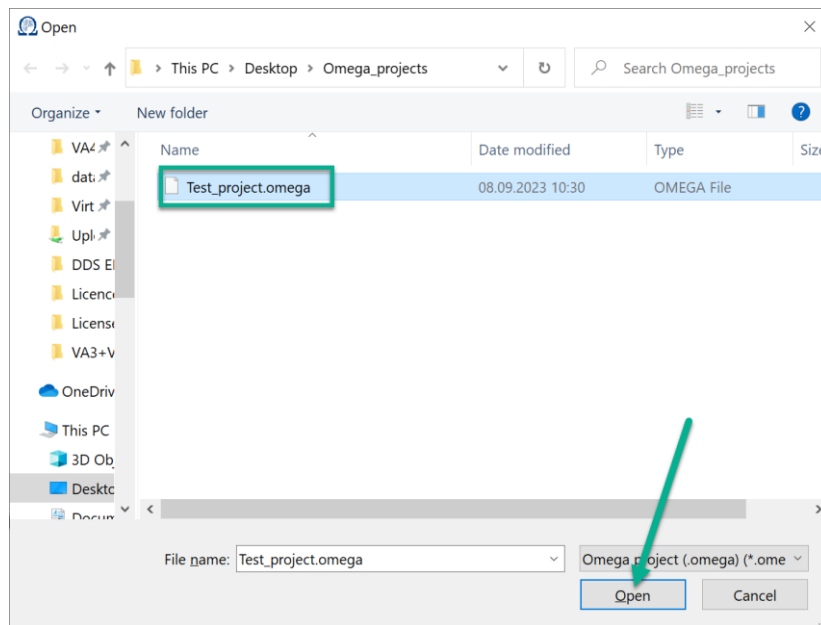
Project opening – OPEN

You don't need to be logged in for the project opening. **But, keep in mind that you cannot do any changes. Only see the graphs.**

Project can be opened with 'Project' tab. Choose option 'Open'.



You get window to find where the project is located in your PC. Find the path where it is stored. Click on project which you want to open and confirm with '**Open**' button.



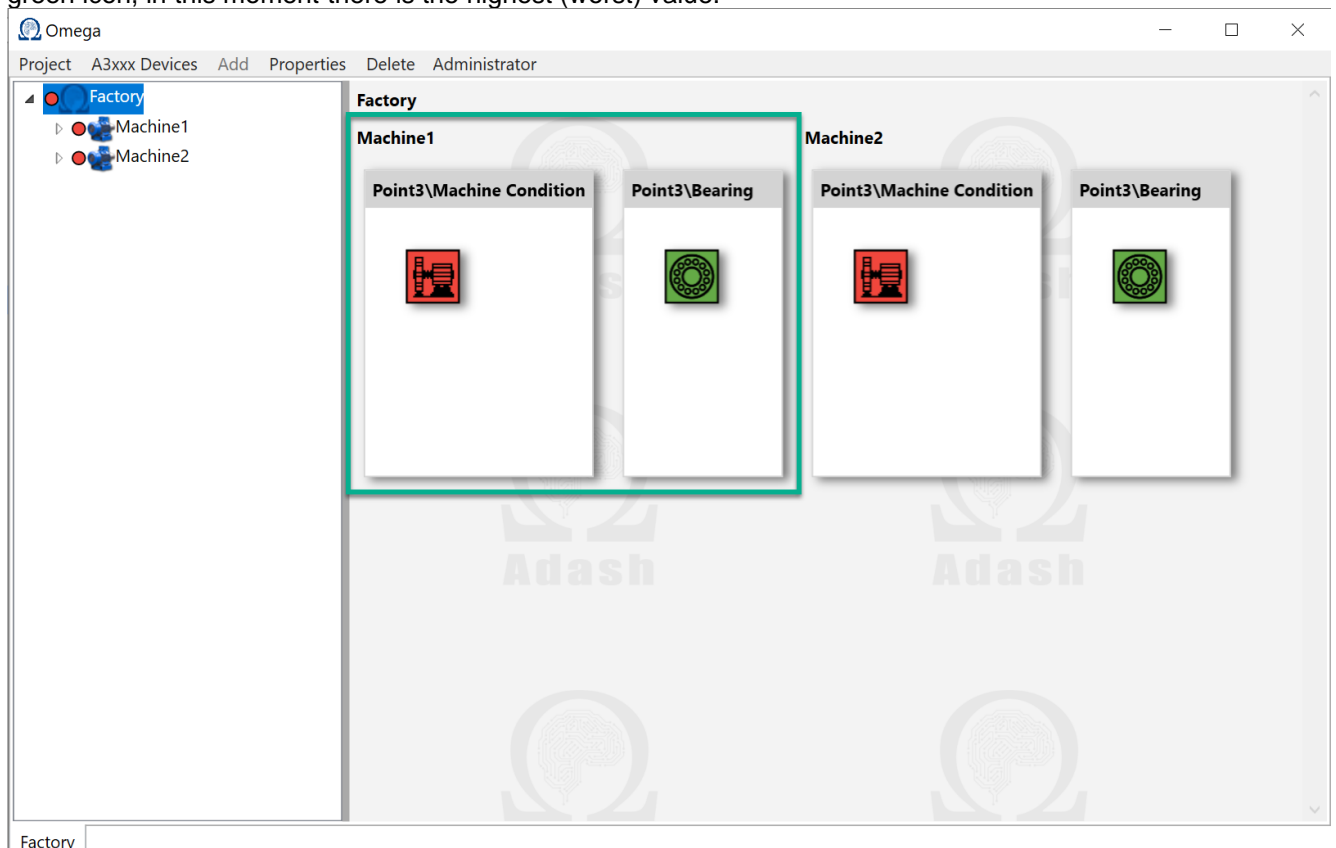
The chosen project is opened.

Note! Once you open the project with some data measured, you can always see the item with worst condition (fault with the worst values). Any time you click on the project name in the structure you also see the item with the worst condition. See the picture below.

Machine1 in the green frame:

You can see that the worst **machine condition** is on Point3.

The worst **bearing condition** is on Point3. Green icon is shown because there is no bearing point with worse color. All bearings are in this moment with green icon. The highest bearing values are on Point3 – even if it is green icon, in this moment there is the highest (worst) value.



How to make projects work?

When you have project structure created, you need to send it to device. Firstly, you can see this screen (when you click on the measurement point in the project structure).



You can see that there are graphs showing information about overall machine condition, unbalance, looseness, misalignment, other and bearing values. But no bar will be shown in graphs at this moment. Why?

The project has been created BUT it was not sent to device. See following steps how to send Omega project to online unit.

Go to 'Project' tab. Choose 'Send To Devices' option.



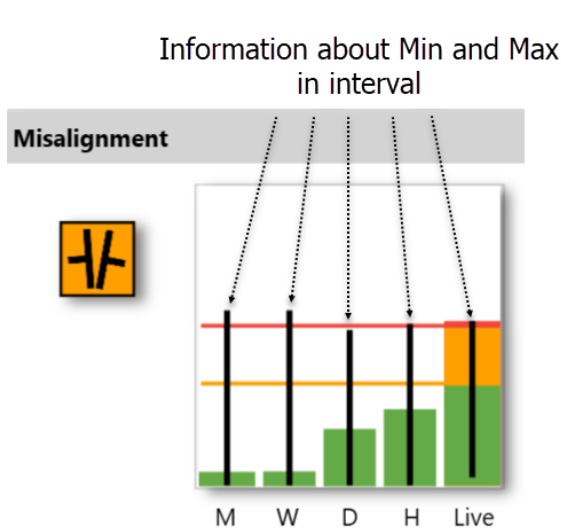
Graph description

You can finally see how the Omega graphs look like in this chapter. Omega graph includes trend of measured values which shows faults development in the last month. Every measurement point has its own graphs for particular faults. It means that every measurement point includes six graphs – every fault has its own graph.

But what exactly means letters **M**, **W**, **D** and **H** below the graph? And what you can see in column 'Live'? It will be explained in this part of manual.

Misalignment graph has been chosen for explanation. Imagine this situation. **It is Friday, 15:30**. What values are in particular columns?

Note! We work with whole hours in Omega project.



Live ... Last measured value is shown. It is refreshed **every 1s**. What about the line in the column? It shows Min and Max for values measured in the current 'open' hour. **Min and Max** are minimum and maximum value in interval **15:00 to 15:30**.

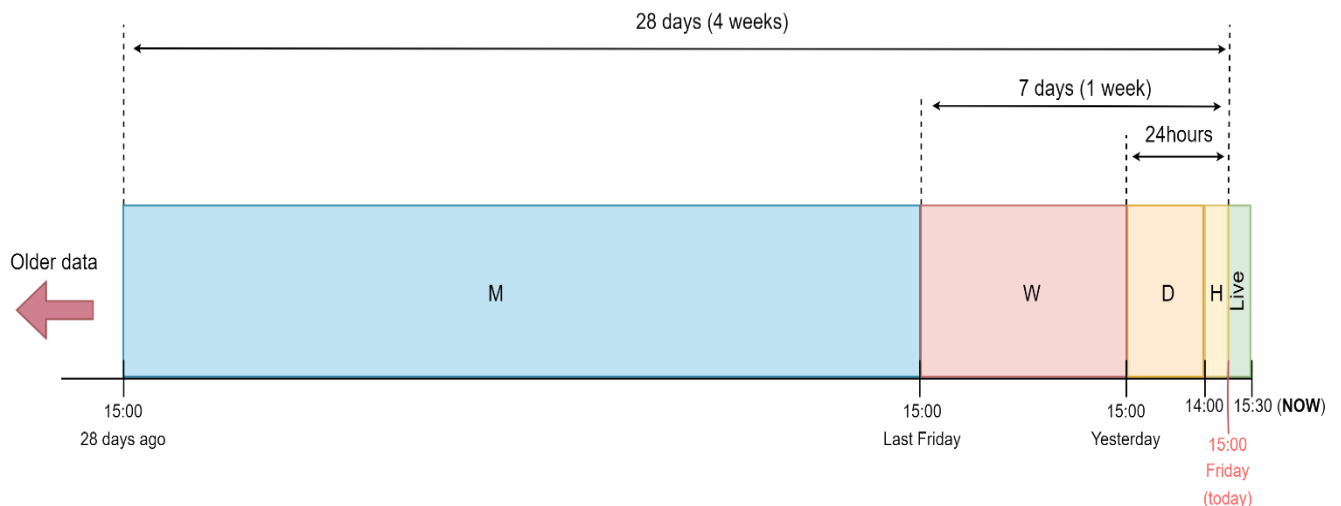
H ... **H** is for the last 'closed' **Hour** of the measurement. It shows averaged value from the last 'closed' hour. In this case it is average from measured values between **14:00 to 15:00**. It is the **same time interval for Min and Max** values.

D ... **D** is for the last **Day** of measurement. **D + H = 24hours**. It shows averaged value from the last measured day BUT without the last 'closed' hour (it is shown in H column). In our case it is average from measured values between **yesterday 15:00 to today 14:00**. It is the **same time interval for Min and Max** values.

W ... **W** is for the last **Week** of measurement. **W + D + H = week**. It shows averaged value from the last week BUT without the last day + hour (it is shown in different columns). In our case it is average from values between **last Friday 15:00 to yesterday 15:00**. It is the **same time interval for Min and Max** values.

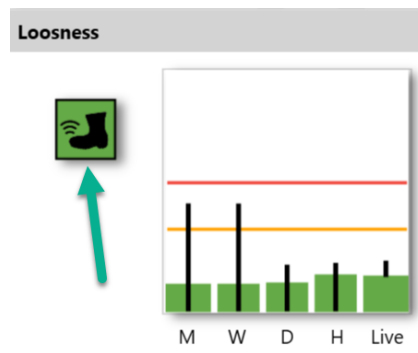
M ... **M** is for the last **Month** of the measurement. **M + W + D + H = month**. It shows averaged value from the last month BUT without week + day + hour (it is shown in different columns). In our case it is average from values between **15:00 28 days ago to last Friday 15:00**. It is the **same time interval for Min and Max** values.

For better understanding see the following time line of our example.

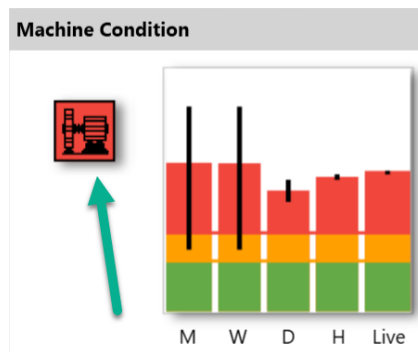


The column and icon of every machine fault is shown with color. The icon (and also the columns) has its color based on average values which are included in the columns (see graph description above). These values are evaluated based on ISO 20816 standards. According to these standards, the color is assigned to values based on the severity (green is the color without the faults, orange is medium fault, red is dangerous fault).

You can see that fault icons are filled with color. It means, if value is good, the icon is green like in the picture below.



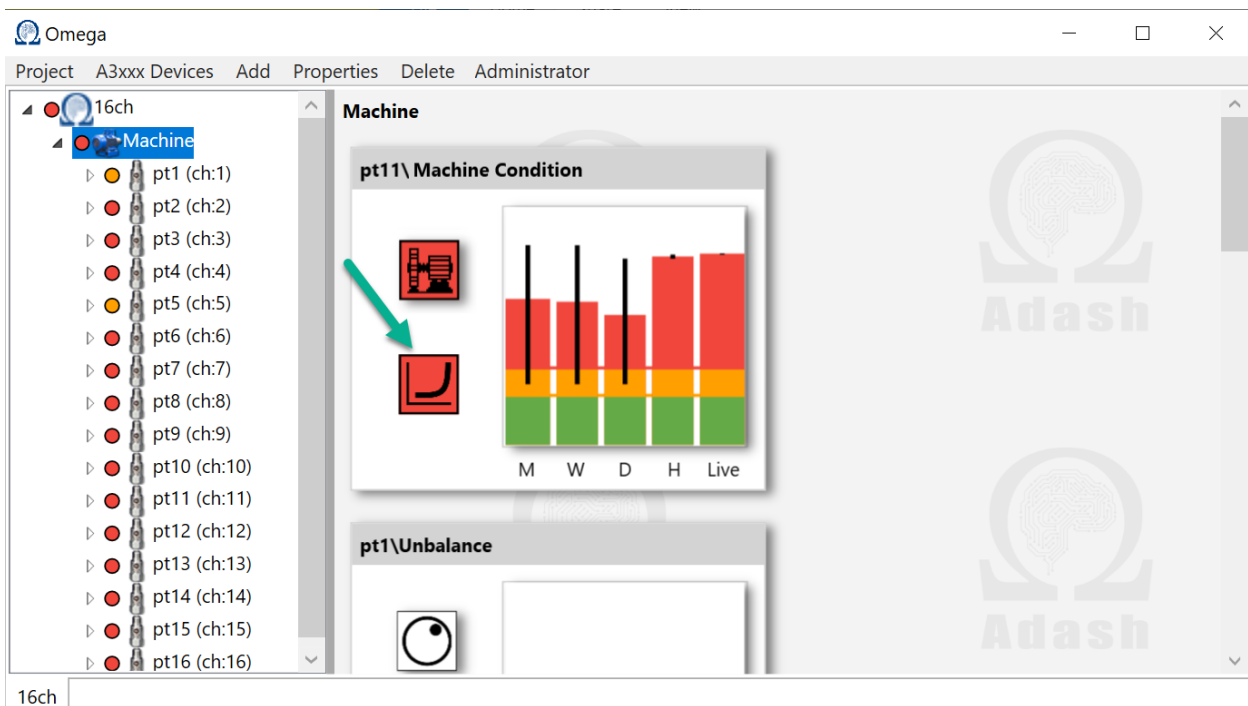
If the measured value is above the limit, you can see that icon is red. It is dangerous fault on the machine.



Note! Icon is changing color based on the last column value – it means, the color depends on the column 'Live' value.

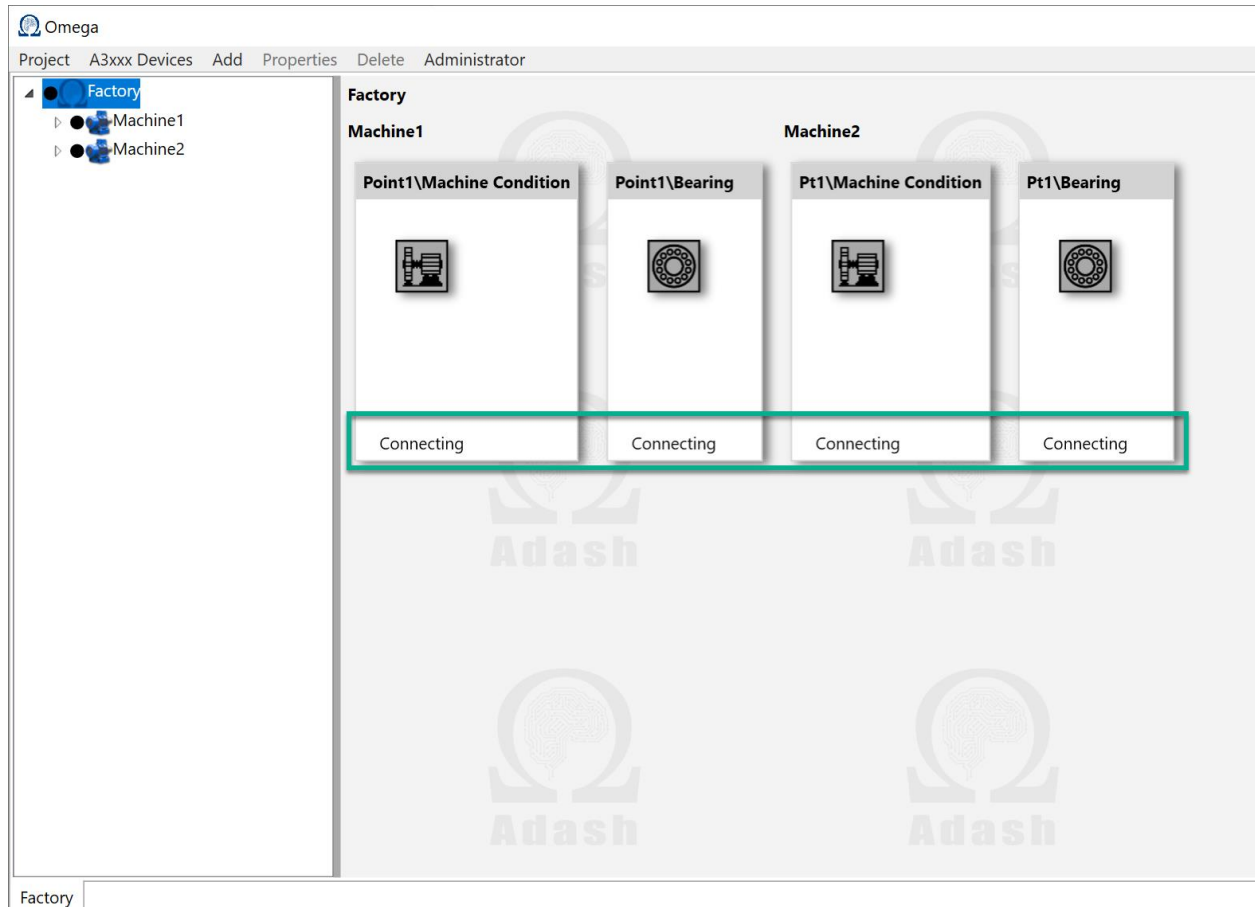
FASTCHANGE

It indicates that live value is changing fast and it may need your attention.



Statuses

Under the graphs may also appear additional statuses. See the list of them below the picture.



List of these statuses is:

Connecting – Omega is connecting to an OPC server and tries to find the values.

Project? – This project value was not found on OPC server, on A3xxx device is running a different project.

Not available – OPC server is starting and required values are not on OPC server yet.

ICP error – Sensor error probably sensor was disconnected or cable is cut.

Overload – Signal overload appeared on this channel.

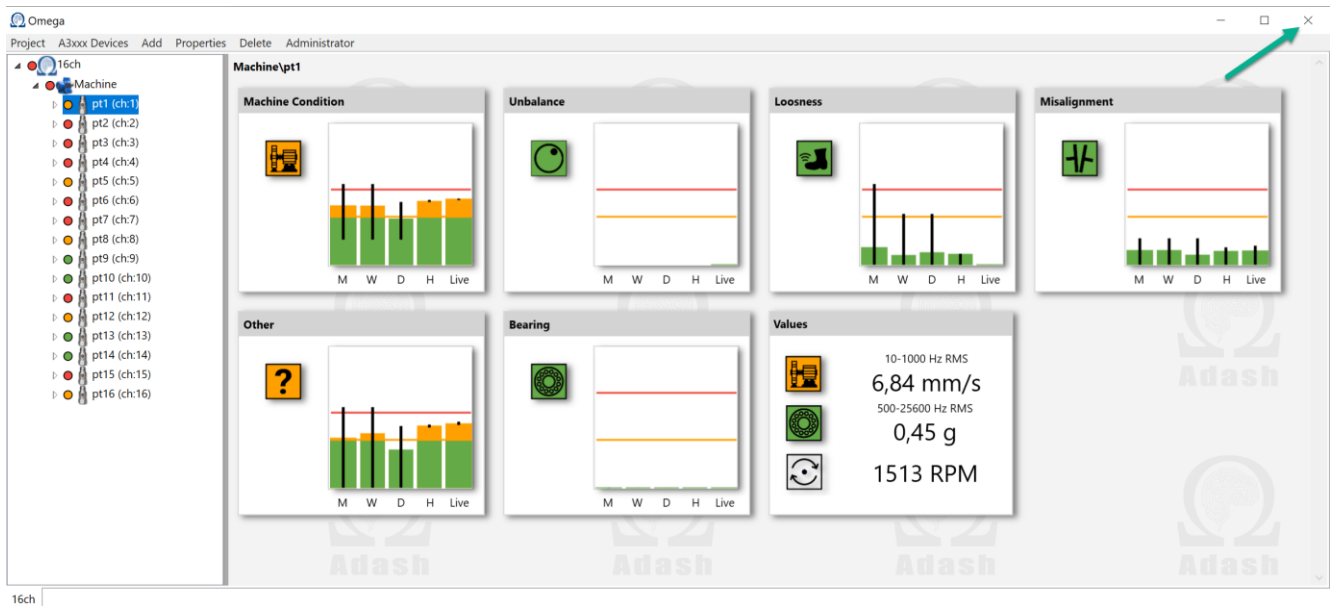
Condition not met – Speed is not in a valid interval. This may appear if speed is set from “Tacho” and measured speed is not within a defined interval.

Not running – Overall values are below “Mach Thold.” or “Bearing Thold.” set in a machine.

No speed – Speed is required for this measurement but was not detected/measured.

Application closure

You have two ways how to close the application. First one is the standard way – click on the **'Close'** button in the right upper corner.



Second way is to choose **'Exit'** button in Omega. Go to 'Project' and choose 'Exit'.



Note! Keep in mind that button **'Close'** under **'Project'** tab is used only for project closure. Not to close whole Omega window.

OPC interface

OPC UA Interface

OPC UA is a standardized communication protocol. It allows exchanging of data from devices to applications. Each A3xxx device provides OPC UA server. Measured values can be downloaded to company control system (e.g. SCADA). Omega application is basically just visualizing these values.

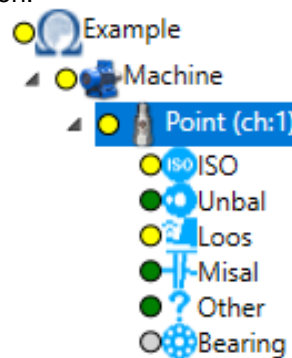
Connection

Server is running on „opc.tcp://**a3xxx device ip address**:37162” (so this endpoint URL may look like this: **opc.tcp://192.168.1.143:37162**). User is “Anonymous” and no encryption is needed. You can use any OPC client.

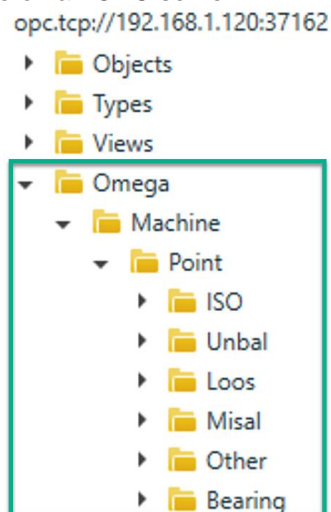
Structure

There is available an object node “Omega” on OPC server. This node contains basically a same tree as you created in a project.

Example of the project in Omega application:



Such project will create following structure on an OPC server:



In every object node with the fault name are available following variables.

List of node variables under each fault:

Reference – reference value for percent evaluation (e.g. ISO 20816/3/A – 7,1 mm/s) [mm/s]

Warning – warning level in percent (e.g. ISO 20816/3/A – 4,5 mm/s = 63,3% of Reference)

Danger – danger level in percent (7,1 mm/s = 100% of Reference)

Semaphore – **0** = OK, **1** = Warning, **2** = Danger

FastChange = the detection of fast change of machine fault

FastChange-warning = warning level

FastChange-danger = danger level

FastChange-semaphore = same as “semaphore” above

Live = actual value [%]

Live-min = minimum from actual hour [%]

Live-max = maximum from actual hour [%]

H = average from the previous Hour values [%]

H-min = minimum in the previous hour [%]

H-max = maximum in the previous hour [%]

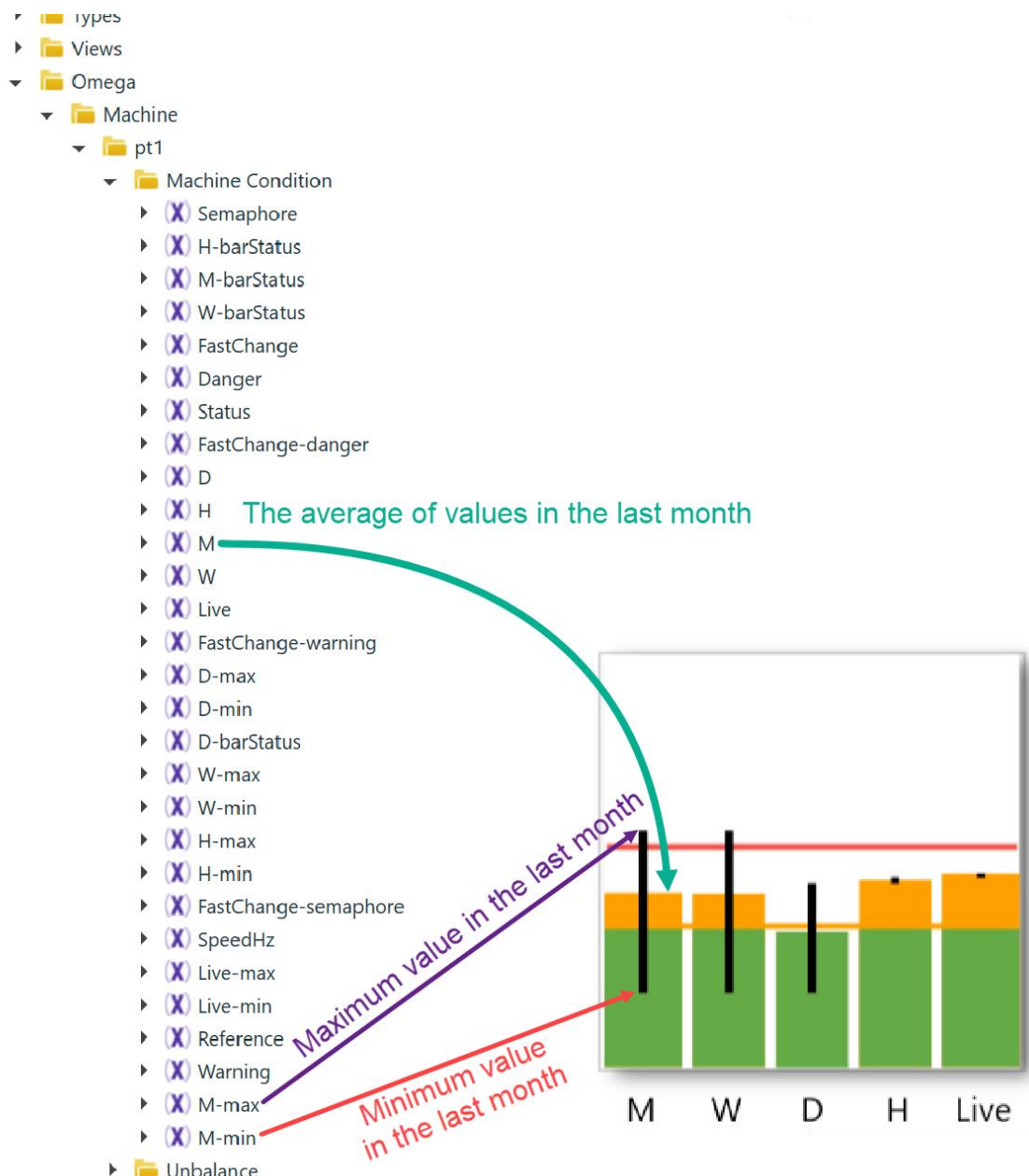
H-barStatus = state of H bar; **0** = no value, **1** = grey bar (measurement in this bar is not finished), **2** = green bar (measurement completed, OK)

D = average from the last Day values (without previous hour – H) [%]

D-min = minimum from the last day (without previous hour – H) [%]

D-max = maximum from the last day (without previous hour – H) [%]

D-barStatus = state of D bar; **0** = no value, **1** = grey bar (measurement in this bar is not finished), **2** = green bar (measurement completed, OK)

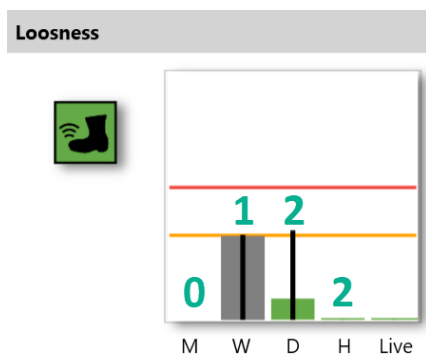


W = average from the last Week values (without actual day – D) [%]

W-min = minimum from the last week (without the last day – D) [%]

W-max = maximum from the last week (without the last day – D) [%]

W-barStatus = state of W bar; **0** = no value, **1** = grey bar (measurement in this bar is not finished), **2** = green bar (measurement completed, OK)



H/D/W/M-barStatus on OPC

Configuration Browse		Data Access X				
State	Display Name	Node Id		Data Type	Value	Server Timestamp
	...-barStatus	ns=1;s=1000002_omegapoint_ch:1-Loosness-M-barStatus	M-barStatus	UInt32	0	11:26:39.222
	...-barStatus	ns=1;s=1000002_omegapoint_ch:1-Loosness-W-barStatus	W-barStatus	UInt32	1	11:26:40.206
	...-barStatus	ns=1;s=1000002_omegapoint_ch:1-Loosness-D-barStatus	D-barStatus	UInt32	2	11:26:42.722
	...-barStatus	ns=1;s=1000002_omegapoint_ch:1-Loosness-H-barStatus	H-barStatus	UInt32	2	11:26:44.222

M = average from the last Month values (without actual week – W) [%]

M-min = minimum from the last month (without week – W) [%]

M-max = maximum from the last month (without week – W) [%]

M-barStatus = state of M bar; **0** = no value, **1** = grey bar (measurement in this bar is not finished), **2** = green bar (measurement completed, OK)

SpeedHz = speed in Hz

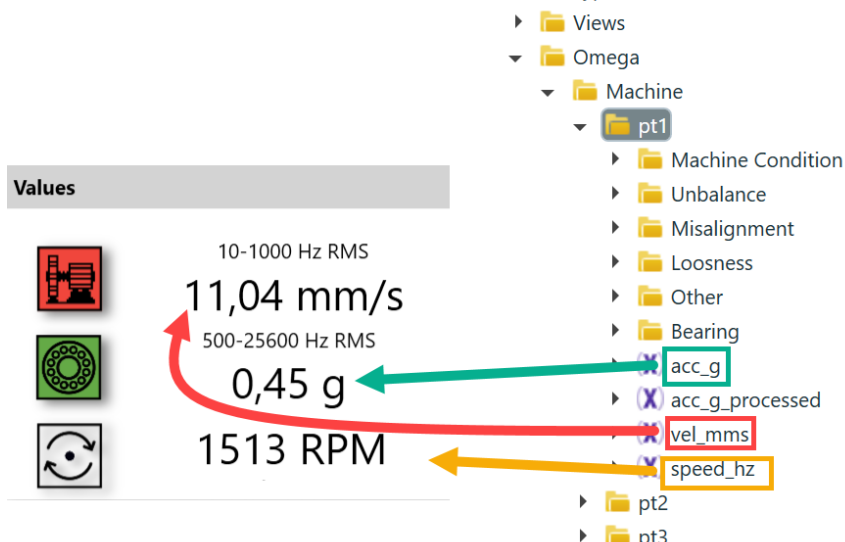
acc_g = this is the value shown in 'Values' window to see the bearing condition

vel_mms = this is the value shown in 'Values' window to see the machine condition

speed_Hz = this is the value shown in 'Values' window to see the speed

You can see the 'Values' window on the left – window from Omega. You can see OPC rows on the right.

Note! These OPC rows are located under each point (not under every fault on this point!).



Status = binary indication of system state on this channel, following options can be shown in status row (you will always see these combinations of numbers or zero, not the text):

- 0 = OK
- 0x000001 = Sensor Overload
- 0x000004 = Sensor ICP Error
- 0x004000 = Measurement initialization
- 0x020000 = Machine Not Running (Value below threshold)
- 0x040000 = Measurement condition not met (Speed is out of defined range)

- ▶ ☒ H-min
- ▶ ☒ FastChange
- ▶ ☒ semaphore
- ▶ ☒ Live
- ▶ ☒ status
- ▶ ☒ D
- ▶ ☒ H
- ▶ ☒ M
- ▶ ☒ W
- ▶ ☒ percent ref

Value		
Name	Value	Type
status	0	UInt32
Value	0	UInt32
▶ StatusCode	Good	StatusCode
SourceTimestamp	20.05.2024 10:32	DateTime
ServerTimestamp	20.05.2024 10:32	DateTime

Possible UA statuses are (it can be found as StatusCode):

- Good** – Data are valid
- GoodNoData** – Data are unavailable or not complete

- ▶ ☒ M-min
- ▶ ☒ Live-max
- ▶ ☒ Live-min
- ▶ ☒ Unbalance
- ▶ ☒ percent_danger
- ▶ ☒ FastChange-semaphore
- ▶ ☒ percent_warning
- ▶ ☒ Live-max
- ▶ ☒ Live-min
- ▶ ☒ percent
- ▶ ☒ D-cnt

Value		
Name	Value	Type
FastChange-semaphore	0	UInt32
Value	0	UInt32
▶ StatusCode	GoodNoData	StatusCode
SourceTimestamp	20.05.2024 9:37:4	DateTime
ServerTimestamp	20.05.2024 9:37:4	DateTime