USER MANUAL

Software User Manual

A. Login Procedure

B. Sensor Dashboard (software version 1.9.x)

USER MANUAL

USER MANUAL

USER MANUAL

USER MANUAL

A. Login procedure iQunet sensor network

The procedure below describes how to connect to the iQunet sensor network via WebRTC. Check section 10 for other connection possibilities.

1. Install a browser which is supporting WebRTC

iQunet strongly advises to use the Google Chrome browser.

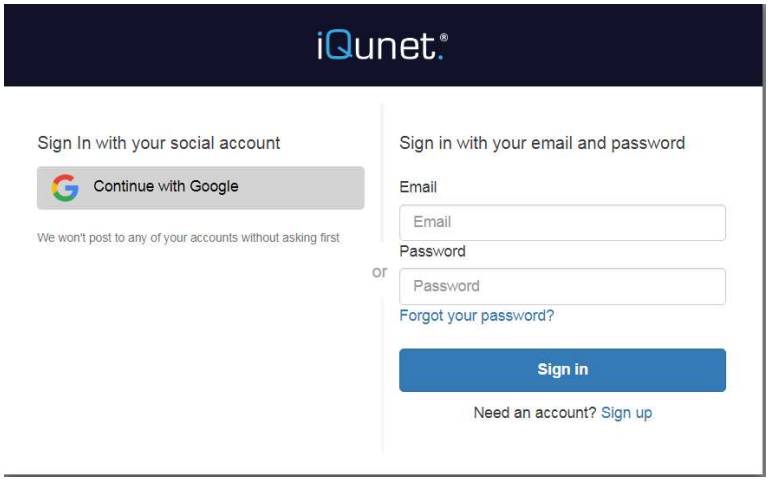
Note: Microsoft will not develop WebRTC for Internet Explorer. Microsoft Edge is WebRTC compatible since it is re-based on Chromium (released January 2020).

WebRTC is an open framework for the web that enables Real Time Communication in the browser. It includes the fundamental building blocks for high quality communications on the web, such as network, audio and video components used in voice and video chat applications. The WebRTC effort is being standardized on an API level at the W3C and at the protocol level at the IETF.

2. Surf to: connect.iqunet.com

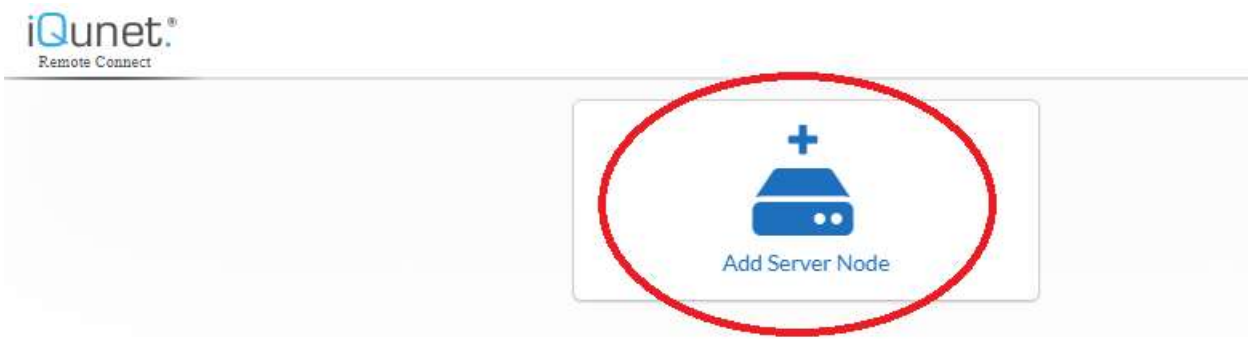
3. Log in with your Google account or create a new account using your email address.

This identification is to verify you are not a web robot. Once logged in, you will not be prompted anymore.

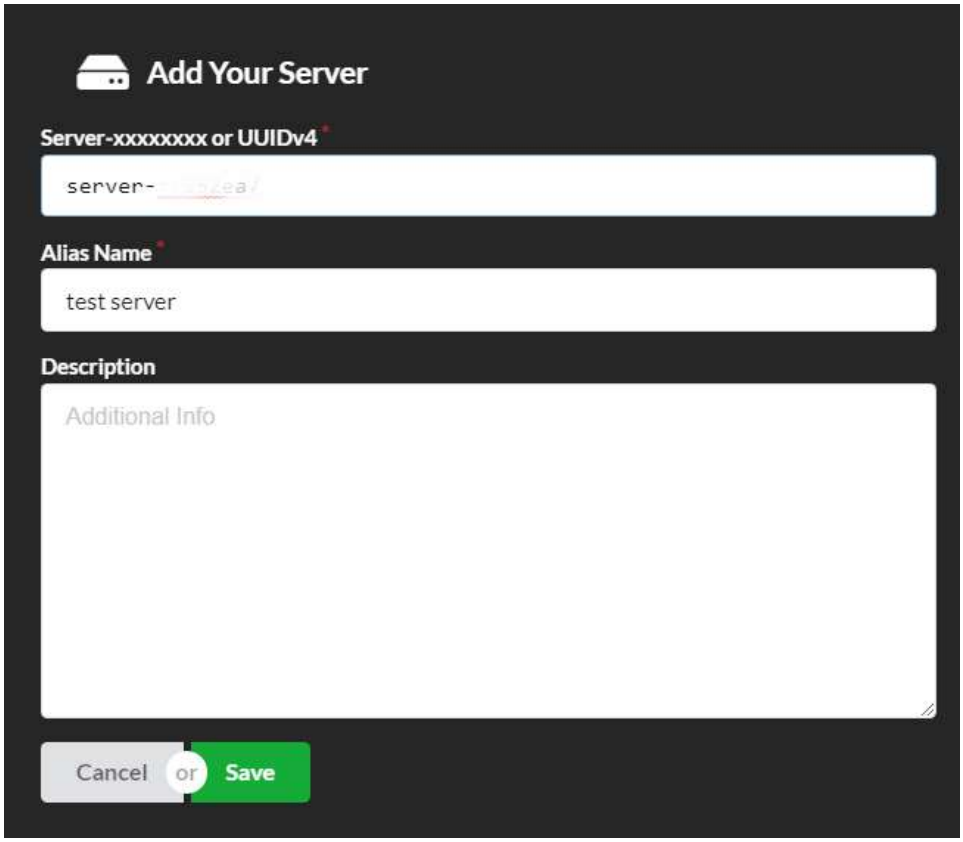


USER MANUAL

4. Click on "Add Server Node".

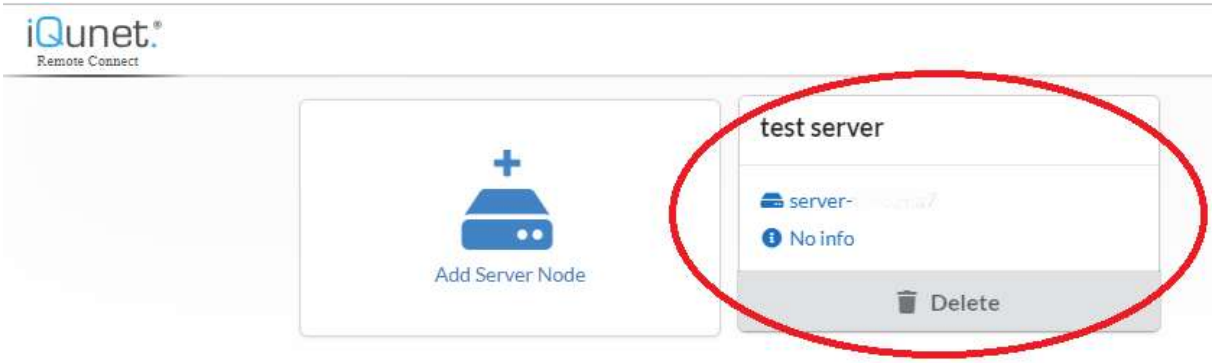


5. Enter the Sensor Proxy ID (server-xxxxxxxx) and provide an alias name for the Server. Click "Save". The Sensor Proxy ID is provided by iQunet.

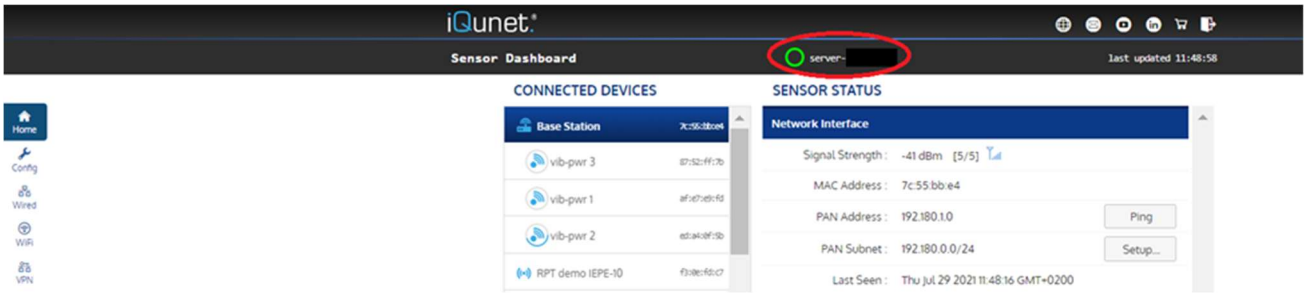


USER MANUAL

6. Click on the created server node to open the iQunet Sensor Dashboard.



7. You are now connected to the iQunet Sensor Dashboard.



USER MANUAL

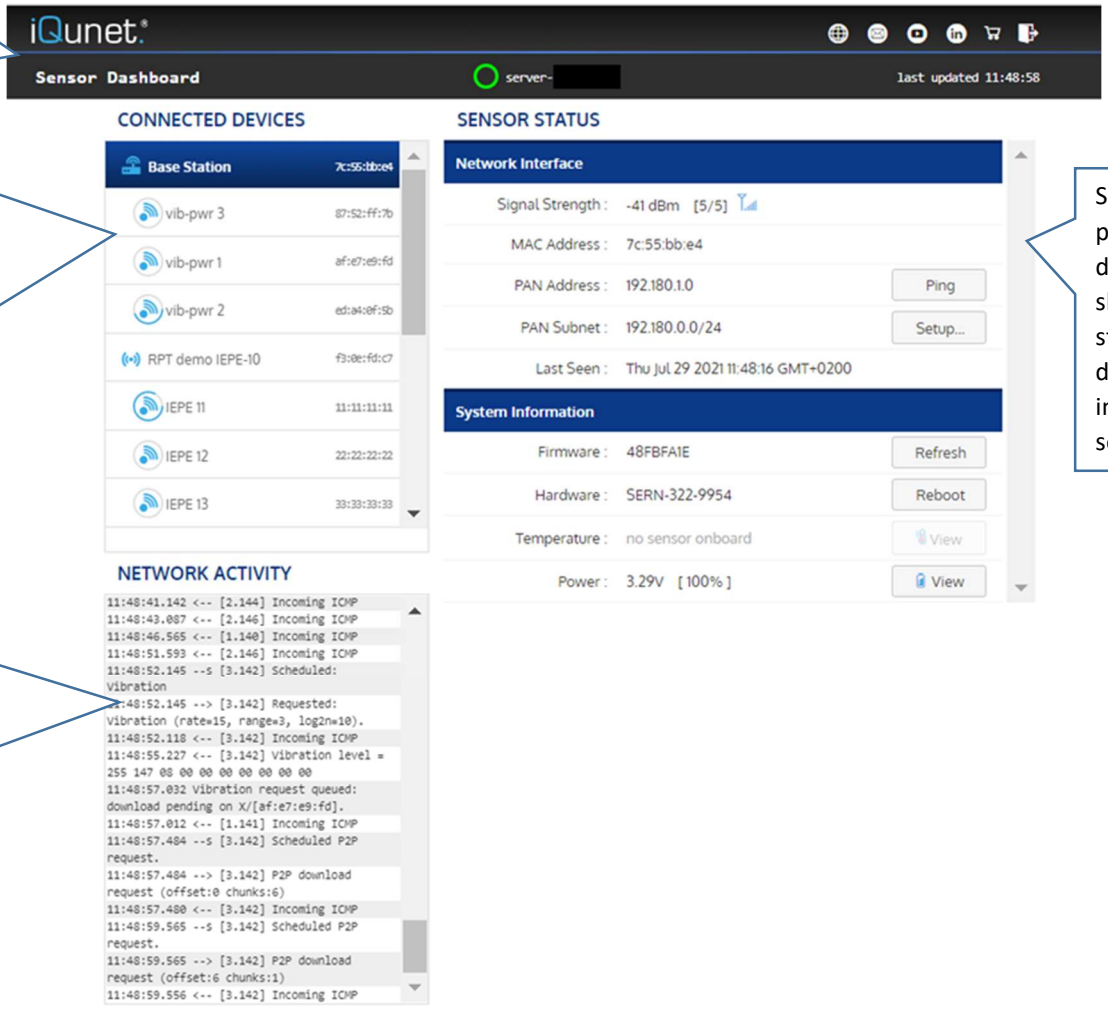
B. iQunet Web GUI: Quick Start Guide

1. General

General information pane

Device pane: list of devices connected to the Base Station. Connected devices can be scheduled for periodic measurements or for a single manually triggered measurement.

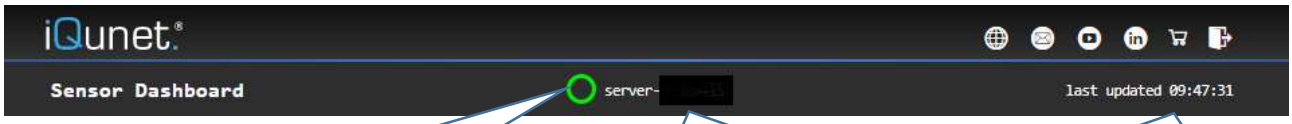
Network activity pane: this pane shows scrolling logs of sensor activity messages (sent and received messages per sensor).



Sensor status pane: this dynamic pane shows sensor status and device depending information and settings.

USER MANUAL

1.1. General information pane



Connection status to the iQunet Server from sensor network.

Green: connected

Red: connection lost

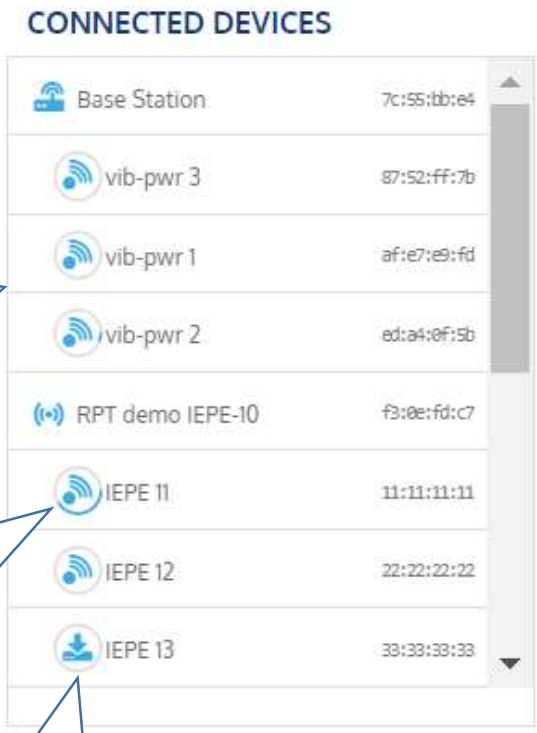
Grey: connecting

Connected Server

Time stamp of last screen refresh

1.2. Device pane

Devices connected to the Base Station. Once seen by the Base Station, the list remains intact until the device is deleted. Devices losing contact with the Base Station will show no updated network status (see Sensor Status pane) but remain linked with the Base Station (and remain in the list).



The circles around the sensor icons represent a countdown to the next scheduled measurement. When the blue circle becomes completely gray, a new measurement will be started.
These circles only appear for devices currently activated for measuring and sending data on preset time intervals.

When this icon appears, the measurement is being downloaded from the sensor and sent to OPC.

USER MANUAL

1.2.1. Device pane icons

The icons in front of the sensor name provide you with more information regarding the sensor status.

Icon	Explanation
	The sensor is active (normal sensor operation).
	The sensor is active, and a sensor measurement is requested.
	The measurement is being downloaded from the sensor device and sent to OPC.
	The sensor is last seen more than 10 minutes ago by the iQunet Server.
pending	The connection of the sensor to the iQunet Server is pending. The sensor has been seen by the Base Station/Repeater connected to the Server but has not been assigned yet. By (re)naming the sensor (see section 2.1 for instructions), the sensor will become connected to the Base Station/Repeater. If the sensor connection is still pending after 10 minutes, the sensor will be rebooted so it can reconnect itself to its original Base Station/Repeater and corresponding Server where it received a name previously.
pending	The connection of the sensor to the iQunet Server is pending. The sensor has been seen by the Base Station/Repeater connected to the Server but the sensor itself is not active anymore (last seen more than 10 minutes ago). The sensor can be deleted from the "Connected Devices" list if it is not relevant anymore (see section 2.2).
	The subnet of the Base Station has been changed (see section 3.2) and therefore the sensor is now registered in another subnet.

Remark: it can be necessary to refresh the Sensor Dashboard to see the latest sensor status (blue, grey…).

1.2.2. Device pane sensor ordering

The sensors are listed in the following order in the device pane (inside the different groups the sensors are sorted according to sensor mac ID number (00:00:00:00 to ff:ff:ff:ff)):

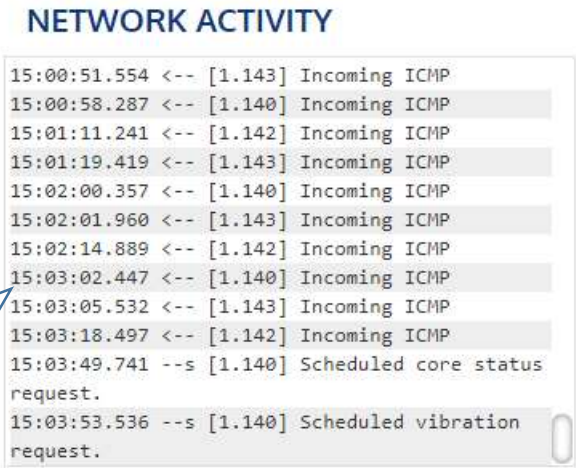
USER MANUAL

1.3. Network activity pane

This pane shows scrolling logs of sensor network messages.

"<- -": incoming messages from connected sensor devices (seen sensors)

"- ->": outgoing messages to the sensor devices (will be received as soon as sensor is awake)



2. General functionality

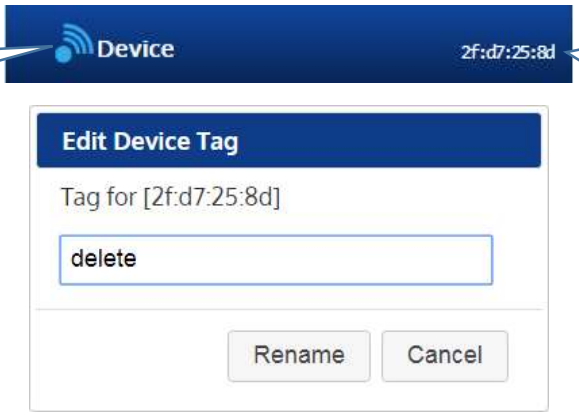
2.1. Renaming a device

By pressing the icon, a popup appears. The device can be renamed.

The device's MAC address cannot be altered and remains unique.

2.2. Deleting a device

By pressing the icon, a popup appears. The device can be deleted by renaming it to "delete".



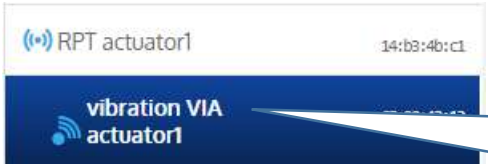
When deleted, the device will be removed from the sensor list. As soon as the battery is activated in the device, the device pops up again in the list and is automatically connected to the closest Base Station in the field when in reach.

USER MANUAL

2.3. Relaying a device via a Repeater or an Actuator

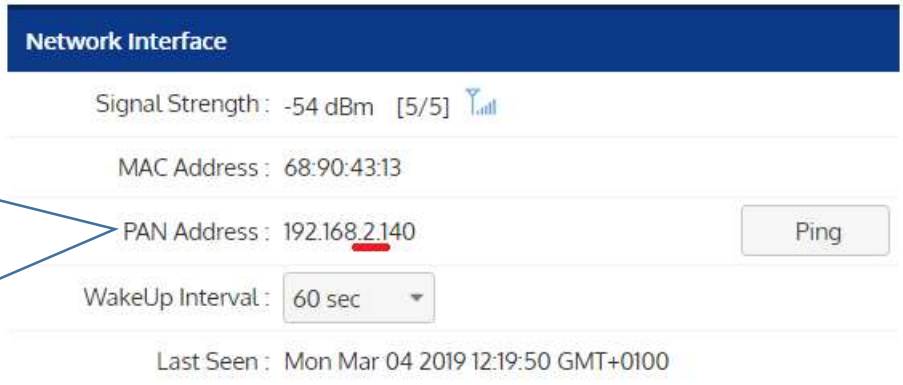
Remark: iQunet recommends **not to use** the relaying with the VIA keyword but rather let the sensors decide automatically for themselves to which Base Station or Repeater they want to connect in function of the signal strength.

To relay sensors via a Repeater or Actuator, simply rename the Repeater or Actuator and start the name with "RPT". The name of the Repeater or Actuator may NOT contain spaces.



To force the relay of a sensor device via a Repeater or Actuator, type "VIA" after the device name followed by the Repeater or Actuator name.

In the device pane select each device involved in the relaying (Repeater, Actuator and sensors), and press "Reboot" for each of them.



By clicking on each device, check if each Repeater or Actuator has received a new subnet like "192.168.2.xxx", "192.168.3.xxx", etc. In this example, sensor 68:90:43:13 is fixed relayed via Actuator "RPT actuator1" under the subnet "192.168.2".

USER MANUAL

3. Sensor status pane

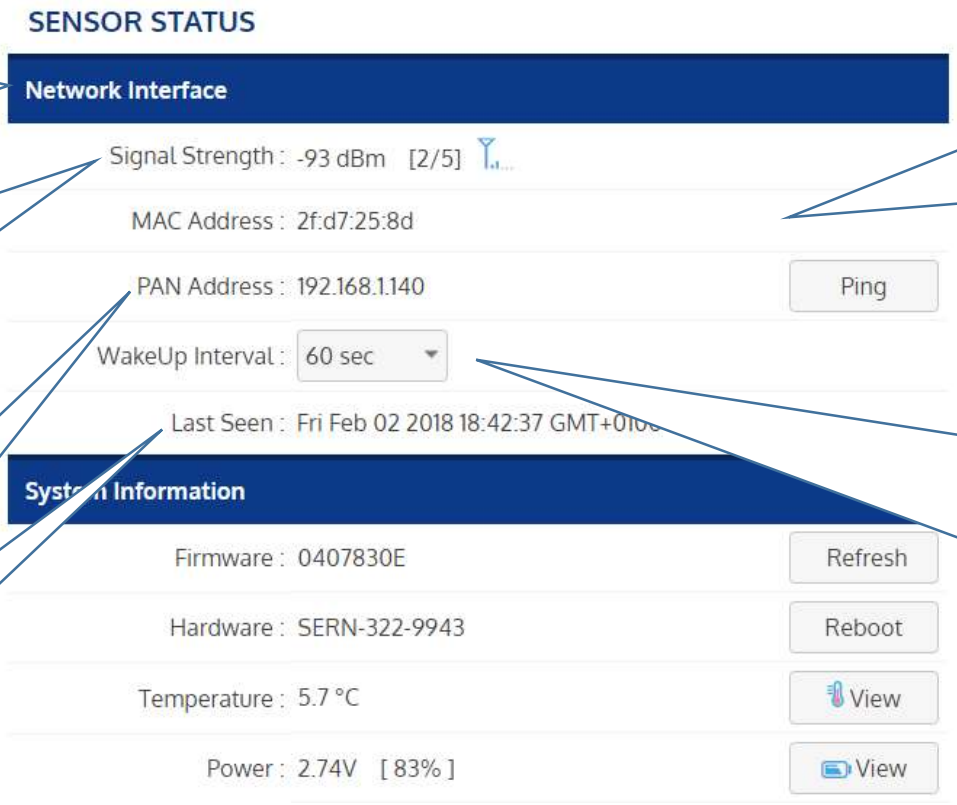
3.1. Network interface pane sensors

Network Interface pane is showing current interface settings from selected device.

Signal strength: current wireless signal strength between device and Base Station (or Repeater). Value is updated automatically every 15 minutes.

When connected, the device receives a unique PAN address. This address is used in the network activity log. Ping to check network activity.

Sensors last network contact

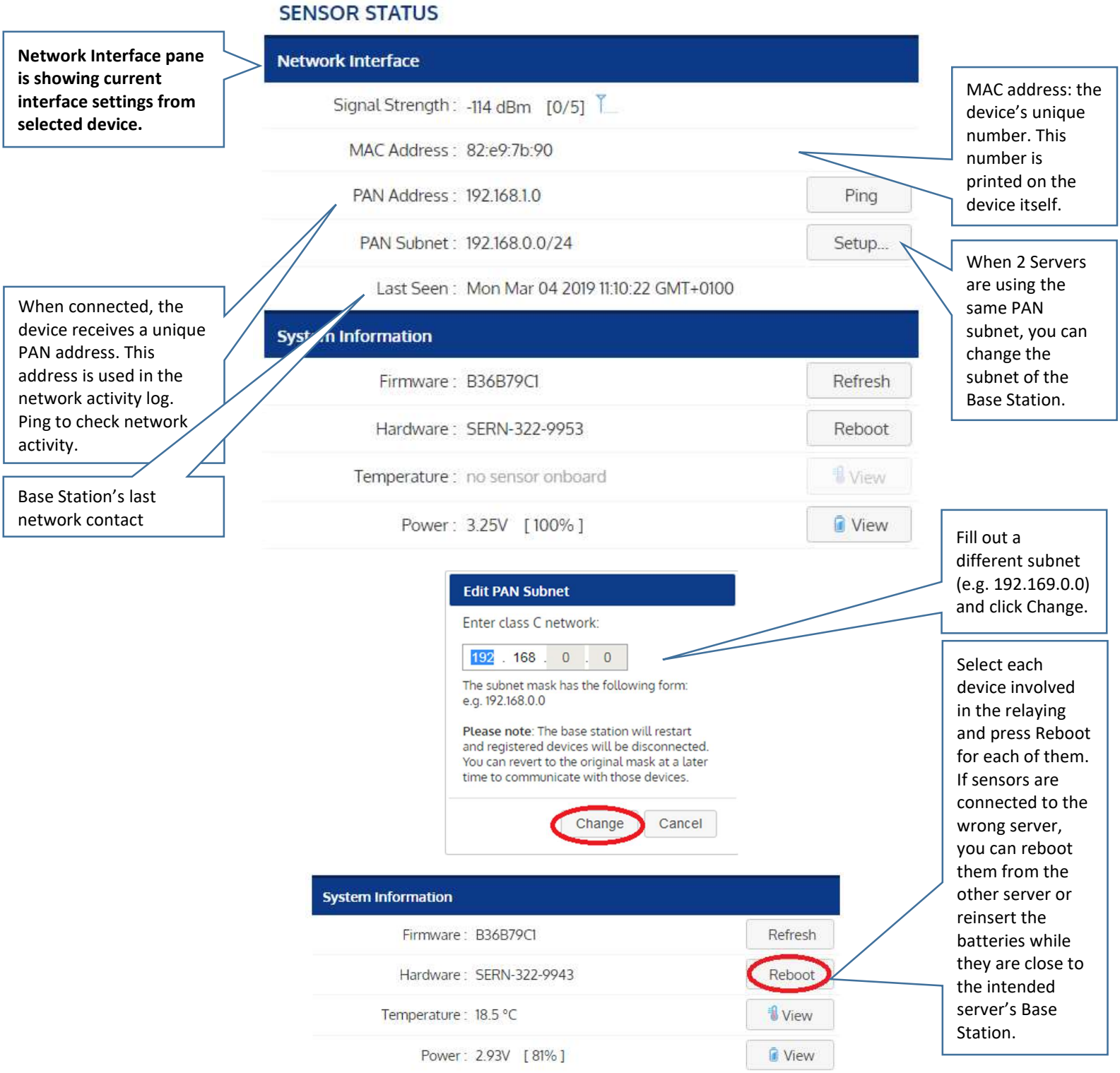


MAC address: the device's unique number. This number is printed on the device itself.

Device wakeup interval: the device will be in iQunet sleep mode for the set time. It will become active at the end of the set time interval. Change interval by changing the number.

USER MANUAL

3.2. Network interface pane Base Station



Remark: a sensor can become "blacklisted" (see the Network Activity pane (section 1.3)) if the sensor continuously jumps back and forth between two Base Stations (2 Base Stations have the same subnet). In this case it is recommended to change the subnet of one of the Base Stations.

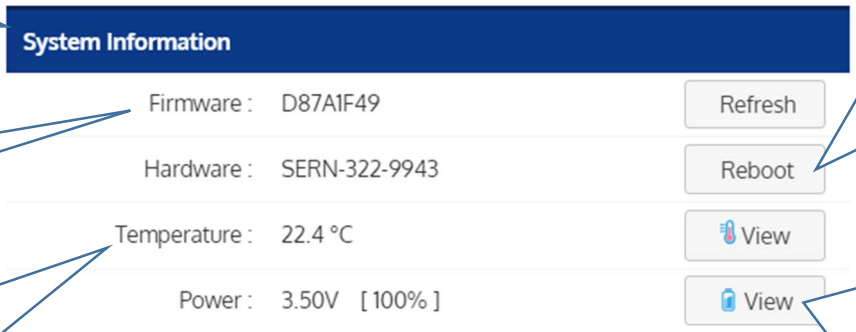
USER MANUAL

3.3. System information pane battery-powered sensors

System Information pane is showing the current connected device information.

Firmware: current firmware version running on selected sensor device.

Board temperature of the sensor device (when available). Pressing "View" will generate a graph over time. Data points correspond to each System Information inquiry by clicking on the device in the device pane on the left.



Current hardware version of the selected sensor device. Pressing "Reboot" resets the hardware. This is equivalent to removing and re-installing batteries.

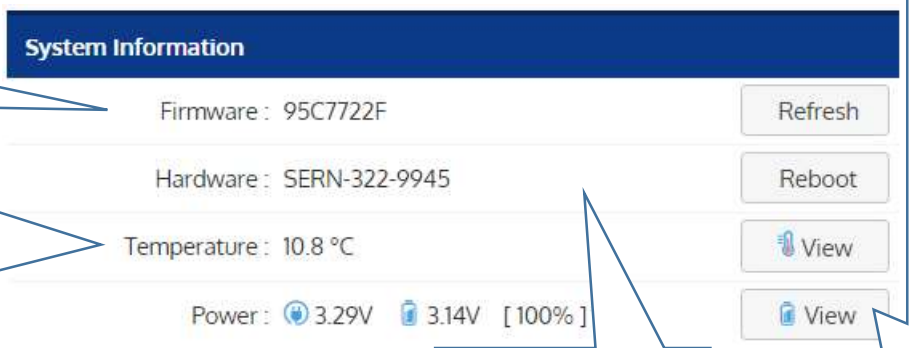
Status of the batteries, with indication of remaining charge of the batteries. Pressing "View" will generate a graph over time. Data points correspond to each System Information inquiry by clicking on the device in the device pane on the left.

3.4. System information pane 24V Powered Vibration Sensor

The iQunet wireless 24V Powered Vibration Sensor is powered with a 24V power supply (6VDC-60VDC). The sensor also has 1 standard coin cell on board acting as a backup during short power interruptions.

Firmware: current firmware version running on selected sensor device.

Board temperature of the sensor device (when available). Pressing "View" will generate a graph over time. Data points correspond to each System Information inquiry by clicking on the device in the device pane on the left.



Current hardware version of the selected sensor device. Pressing "Reboot" resets the hardware.

Power status, with indication of remaining charge of the back-up batterie. Pressing "View" will generate a graph over time of the battery voltage level and the external power supply level (chip only measures up to 3.3V). Data points correspond to each System Information inquiry by clicking on the device in the device pane on the left.

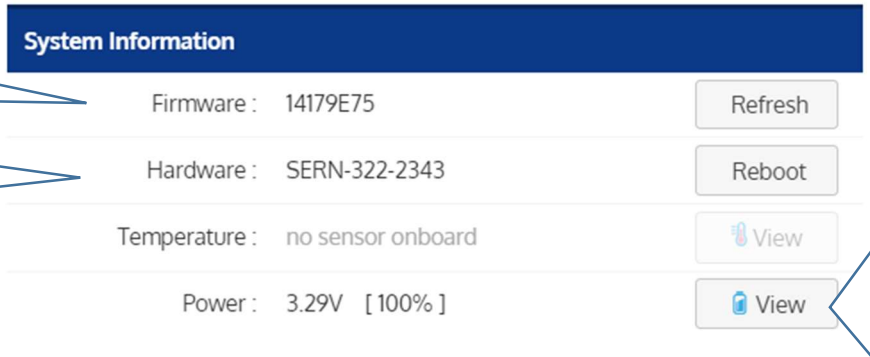
USER MANUAL

3.5. System information pane Current Clamp and IEPE Piezoelectric Accelerometer

For both the iQunet Current Clamps and the Piezoelectric Accelerometers, the signal cable is also providing the power voltage (coming from the iQunet Wireless Bridge).

Firmware: current firmware version running on selected sensor device.

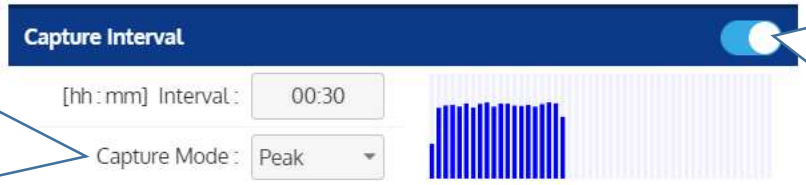
Current hardware version of the selected sensor device. Pressing "Reboot" resets the hardware.



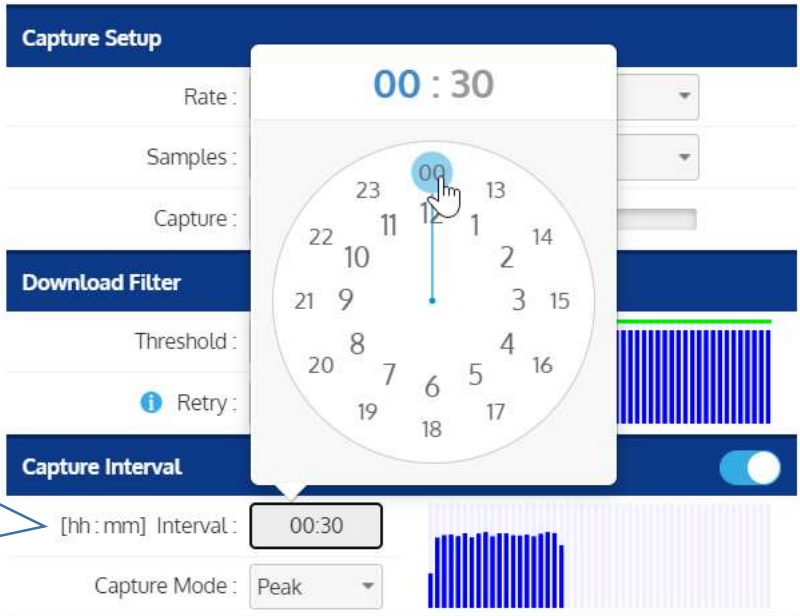
Power status, with indication of the externally applied voltage level. Pressing "View" will generate a graph over time of the external power supply level (chip only measures up to 3.3V). Data points correspond to each System Information inquiry by clicking on the device in the device pane on the left.

3.6. Capture interval pane (automatic measurements)

For the event-based sensors (the 24V Powered Vibration Sensor, the Current Clamp and the IEPE Accelerometer), it is possible to change the capture mode from "Peak" (measurement with the highest peak power during the set time interval is saved) to "Instant" (measurement is taken at the end of the set measurement interval).



A sensor device which is enabled for Auto Capture will show this extra pane. To start the periodic sensor measurements, slide the button to blue. The queue interval can now be set.



Select the queue interval in the dial pane. First select the hours by dragging the clock pointer over the desired number. Then repeat this action for selecting the minutes. The device will now become active after the set interval.

USER MANUAL

Devices activated for automatic measurements will now show a countdown circle around the sensor icon.

Remark: for the event-based sensors (the wireless 24V Powered Vibration Sensor, the Current Clamp, the IEPE Accelerometer and the MAD Vibration Sensor) the set auto measurement queue interval is also the measurement interval since these sensors will capture vibration or current signals from the moment a measurement is started until a new measurement is started (when used in the "Peak" capture mode).

The capture interval pane now also shows an overview of the number of captures per day.

3.7. Sensor control pane

3.7.1. Hall Sensor control (Proximity Sensor)

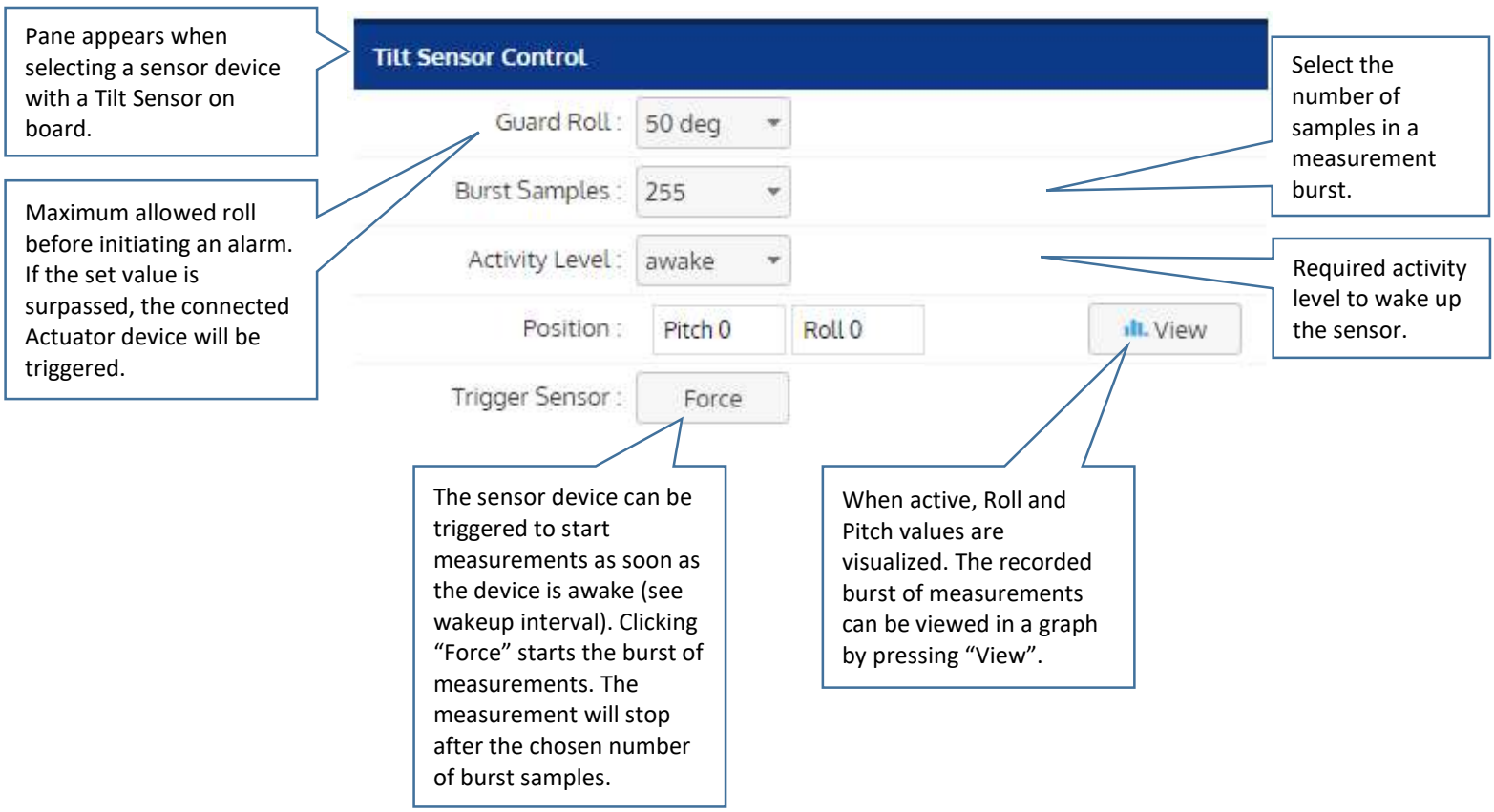
Pane appears when selecting a sensor device with a Hall Sensor on board.

The sensor device can be triggered to start measurements as soon as the device is awake (see wakeup interval). Clicking "Force" starts the burst of measurements. "Stop" will interrupt the measurements triggered earlier.

Field values are combined with the measuring voltage at that time (for calibration purposes). The burst of measurements can be viewed in a graph by pressing "View".

USER MANUAL

3.7.2. Tilt Sensor control (Inclination Sensor)



3.7.2.1. Activation of the roll guard

The guard of the inclination roll parameter works instantaneously in combination with the Actuator. For the Actuator to enter the standby mode for the roll guard, the Inclination Sensor needs to make a measurement first (click "Force"). This is the same whether the Actuator works as a repeater or not.

To check this functionality, you can perform the following test (if possible, perform the test on a table first).

Remark: make sure to perform this test only when the Actuator is connected to the mains otherwise the UPS function will start working and the batteries will drain.

- Connect the Actuator to the mains with the USB charger. It is not necessary to insert the batteries.
- Place your multimeter in the outside front contact of the Actuator and measure the resistance. You will detect a normal closed contact when the Actuator is on.
- Insert the batteries into the Inclination Sensor. The sensor will wake up (check the messages in the network activity pane). The "device" will appear in the device list. Keep the sensor values as set initially.
- Click "Force". The Inclination Sensor will start measuring within 60 seconds (the wake-up interval as set in the sensor information pane on the top). You can lower the wake-up interval setting but this is not necessary since it will take some time before the sensor learns to wake up every 3 seconds effectively for example.

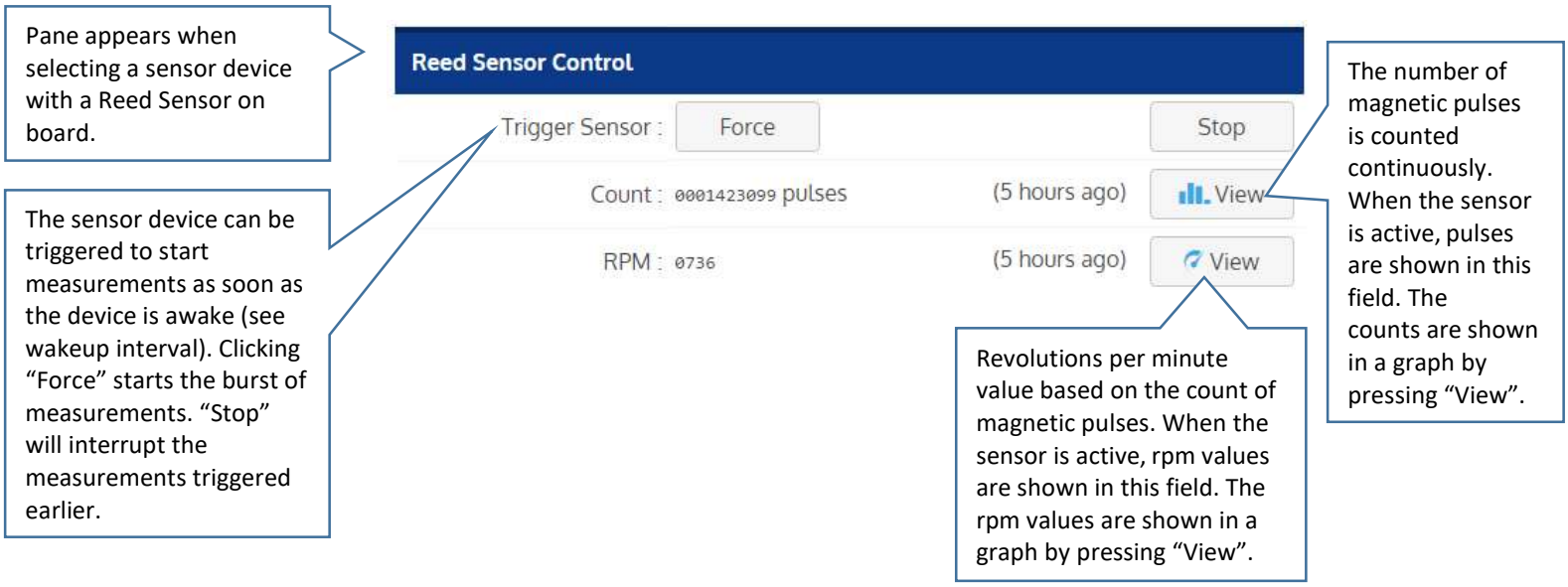
USER MANUAL

- Make some roll and pitch movements with the Inclination Sensor. The sensor will show changing values in the two “position” fields in the Sensor Dashboard. After measuring the set number of samples (e.g., 32), the sensor has proven to be active and is now armed to guard the roll of the sensor.
- Roll the sensor over the set guard roll angle (positive or negative). The message “actuator message 01” will appear in the network activity pane. The Actuator is then switching the contact to open (see the readings on your multimeter).
- Return the sensor to a safe position after 10 to 30 seconds. The sensor will send the “actuator message 00” to inform the Actuator that everything is safe again. The Actuator contact will be closed again.

The guard of the roll angle is always on, even if the Inclination Sensor looks asleep. There is no need to trigger the sensor again. In this way there will be little use of the batteries.

Note that the Inclination Sensor is optimized to be mounted on vibration machinery. A minimum vibration level is needed to keep the sensor awake internally. If the sensor doesn’t detect any vibration, the machinery is assumed to be not active, and the sensor will go in ultra-deep sleep mode. As soon as there is a minimum activity (see the set activity level), the sensor will switch on. Setting the activity level to none will prevent the sensor from going to deep sleep mode. The sensor will then always be active, even at night or when not in use. This will use unnecessary battery lifetime. The sensor batteries will drain quickly in this case.

3.7.3. Reed Sensor control (Proximity Switch Sensor)



USER MANUAL

3.7.4. Vibration Sensor control

Pane appears when selecting a sensor device with an Acceleration Sensor on board.

Select 1, 2, or 3 measurement axes in the dropdown menu.

Select the sampling rate.

Select the number of samples.

By pressing "REC", the vibration measurement is triggered with the set parameters.

Check if vibration level is high enough for download (see section 3.7.4.3).

Select the desired dynamic range of the sensor in the dropdown menu. Check the RMS values of the last month in the Statistics pane (see section 3.7.4.2) to find out which range is best suited. Keep the range as low as possible for optimal accuracy.

Select a threshold level. If the calculated peak power bar level is below threshold, the sensor download is aborted, and a new capture attempt will be started after the set period (see 3.7.4.3).

Number of extra capture attempts after the set interval (if the threshold level is not exceeded).

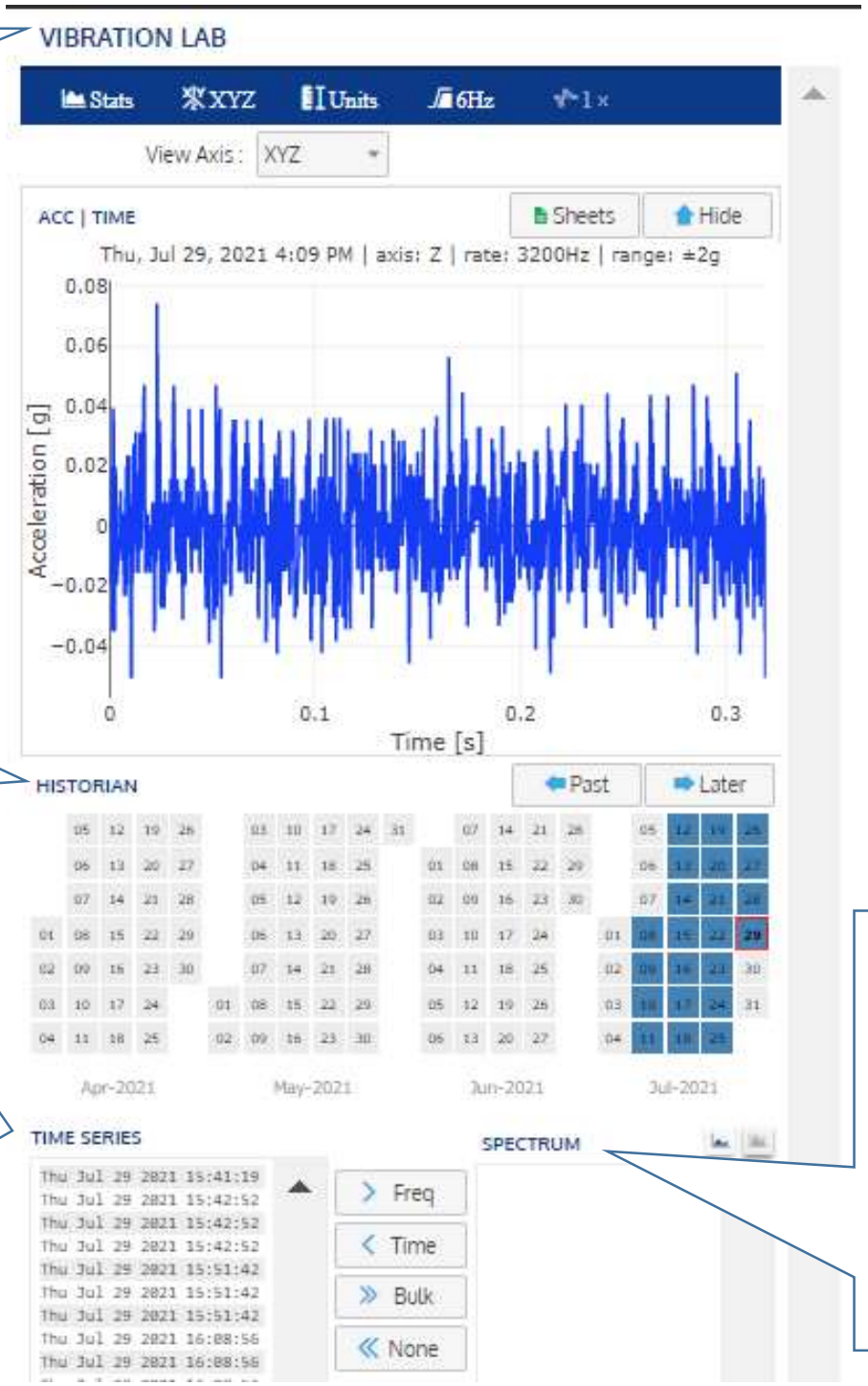
A full measurement is downloaded when the level of the measurements' bar is above threshold. See section 3.7.4.3.

If the full measurement is downloaded on to the Server, a green line appears on top of the graph. See section 3.7.4.3 for more information.

USER MANUAL

3.7.4.1. Vibration Lab

Vibration Lab pane shows basic analysis of measured vibration signals.

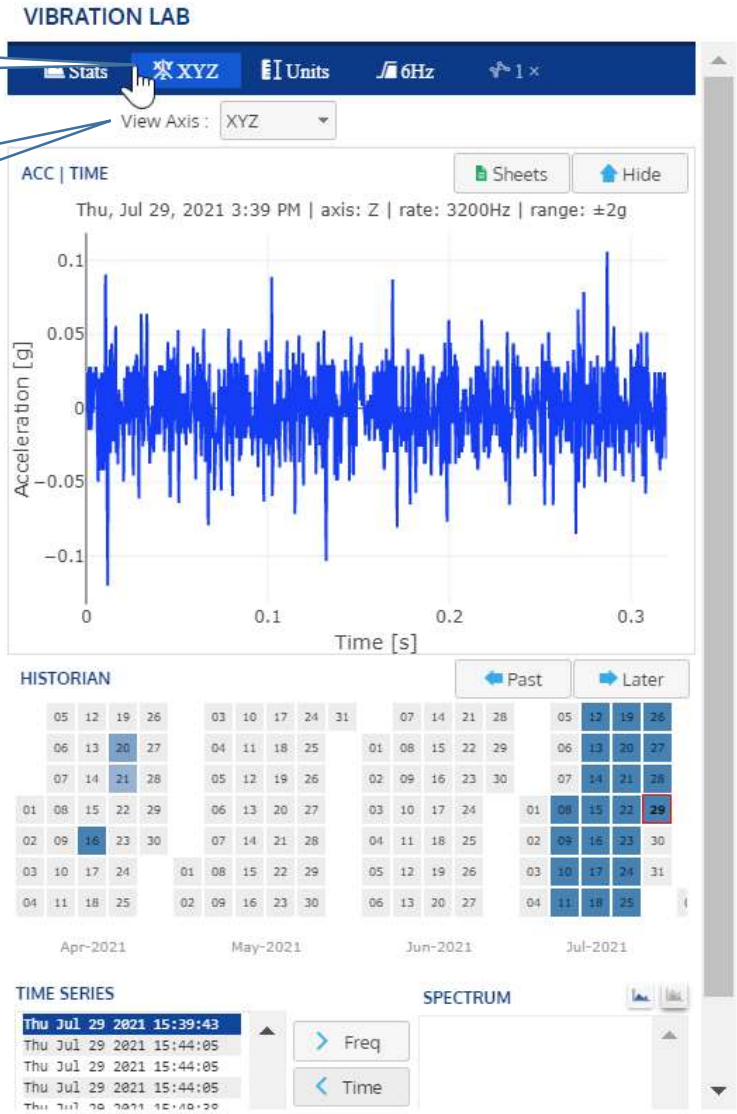


Measurements saved in the iQunet OPC historian. Click on the date to see the available measurements.

Time Series box: selecting 1 measurement in this box will show the respective time series graph. Select multiple time signals by dragging the mouse pointer. Click “Freq” to add the selected measurements to the box on the right. When only 1 measurement is selected, clicking “Freq” will automatically show the spectrum plot. Click “Bulk” to add all measurements to the box on the right.

Spectrum box: select 1 measurement to show the spectrum of this measurement. Drag over the list to select multiple items for removing them back to the left box (click “Time”). Click “None” to remove all measurements in this box.

USER MANUAL



"XYZ" view axis filter tab

Select the measurement axis of which you want to see the measurements.

Selecting "XYZ" as the view axis will show all measurements of the selected day. Selecting "X" will only show the X axis measurements and similarly for selecting "Y" or "Z".

"Units" tab

Select graph units: g or mm/s.

Select predefined viewport settings to alter graph format.

USER MANUAL

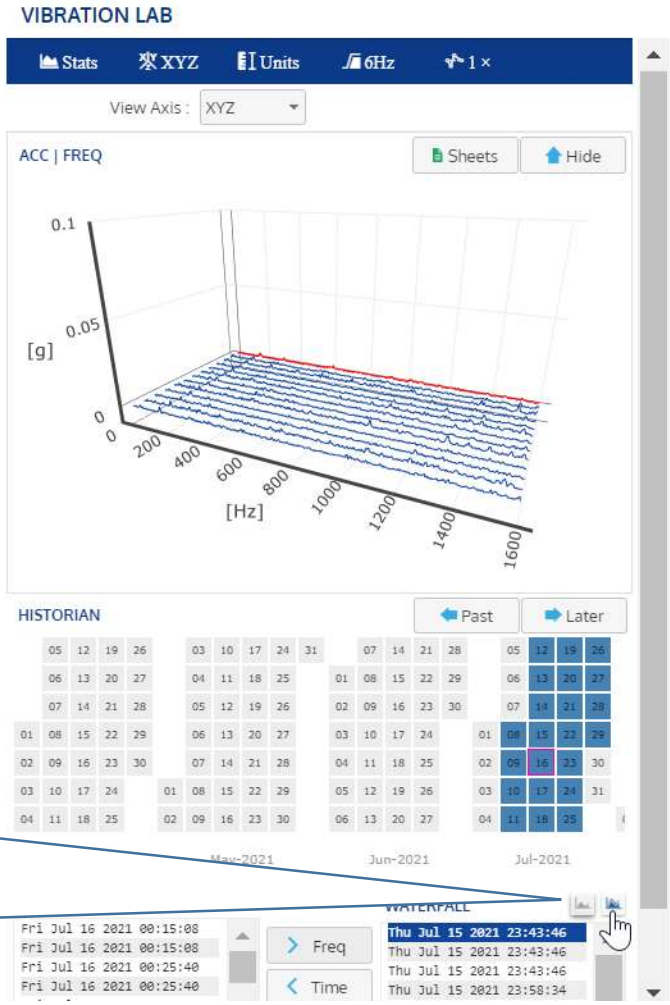
"6Hz" High Pass Filter tab

Select the high pass cut off frequency to remove the DC component and the low frequency noise from the plotted graphs and the calculated statistics values. See section 3.7.4.4 for more information.

Enable/disable 1/f flicker noise detrending (only for velocity spectra).

"1X" averaging tab

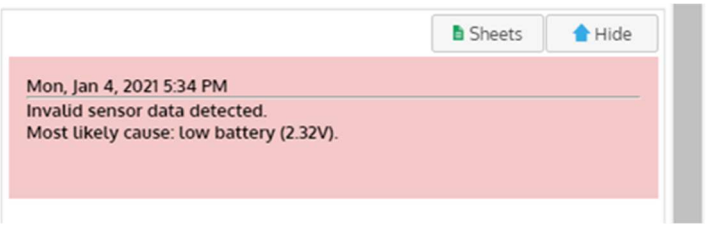
Enable/disable DFT averaging and select the number of averages. DFT averaging will decrease the noise level at the cost of a loss in resolution.



Clicking on the "Waterfall" icon changes the graph view from 2D to 3D. The graph now shows the combined spectra of all measurements from the spectrum box in a trending waterfall graph. Clicking on the "Spectrum" icon changes the view back to 2D mode.

3.7.4.1.1. Invalid data detection

The Sensor Dashboard will provide a warning on an overlay area on top of the Vibration Lab graph if the measurement you selected for plotting is not valid. The warning will disappear after a few seconds. This warning will not be shown on top of the frequency domain or waterfall plots. The most likely cause of this invalid data is a low battery level.



3.7.4.2. Statistics pane

USER MANUAL

STATISTICS shows the recorded RMS, Kurtosis and MAD values during a selected time interval.

"Units" tab

Select the desired units: g or mm/s (acceleration/velocity).

Select the RMS, Kurtosis or MAD statistic.
Remark: the MAD statistic is only available for the MAD Vibration Sensor.

Select or unselect an axis by clicking on the colored square.

Select a start and end date in the proposed lists to create a graph. Click on a date in the historian to select a specific start or end date. Click on "Update" to update the graph. Click "Full" to select all available data. Click "Month" to select the data of the past month. Click "Week" to select the data of the past 7 days.

"6Hz" High Pass Filter tab

Select the high pass cut off frequency to remove the DC component and the low frequency noise from the plotted graphs and the calculated statistics values. See section 3.7.4.4 for more information.

USER MANUAL

3.7.4.3. Auto capture and threshold explained

Below is the explanation of the automatic vibration (or current) measurements and the correct use of the threshold and retry settings. Automatic measurements must be enabled, as shown above in section 3.6.

NOTE: the set threshold level does <u>not</u> apply for manually recorded measurements with the REC button.

Table 1: number of measurement axes per sensor type

Sensor type	Number of measurement axes
Battery-powered Vibration Sensor	1 to 3 (X, Y and/or Z)
24V Powered Vibration Sensor	1 to 3 (X, Y and/or Z)
Current Clamp	1 (X, Y or Z)
Piezoelectric Accelerometer	1 (X, Y or Z)

Remark: if the sensor acquires data on multiple measurement axes, each measurement on a measurement axis will be considered as a separate complete measurement for the threshold functionality. In this section (section 3.7.4.3), the notation “a complete measurement” thus refers to a full measurement on 1 axis. See Table 1 for the number of measurement axes per sensor type.

Figure 1: Download Filter settings

Every time when the sensor acquires a measurement, the complete measurement (1 measurement axis) will be stored in sensor memory and the peak power level of this measurement will be calculated. The peak power level value will be transferred wirelessly and saved on to the iQunet Server. The transfer of this peak power level can be seen in the network activity pane (see Figure 2). There will thus be one value transfer per measurement axis.

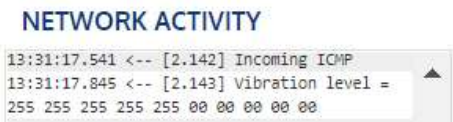


Figure 2: transfer of the peak power level in the network activity pane

The histogram graph (see Figure 1) shows the peak power measured in the sensor over time. The graph shows the peak power levels of the latest 50 measurements as a blue bar on a logarithmic scale with the bar of the newest measurement on the left and the bar of the oldest on the right.

In short, each blue bar represents a reduced but complete pre-download of a historical sensor measurement (previous data capture) whereby reduced refers to the fact that only the peak power level is sent to the iQunet Server and not the full measurement, and complete to the fact that the peak power level is calculated over the full measurement period. This contrasts with the old threshold version where only the first “prefetch” measuring samples were downloaded for the calculation of a rough RMS value

USER MANUAL

that was then compared to the set threshold level (in “g” units). By using this limited number of samples, impacts recorded later in the time series could be missed.

Threshold:

The red line in the histogram graph represents the set threshold level. If the blue bar level is above the threshold level, the complete measurement (1 measurement axis) will be downloaded from the sensor memory and sent wirelessly to the iQunet Server. A green indication will be shown at the top of the graph in this case. If the blue bar level is below the threshold level, the complete measurement will not be downloaded and will be discarded from sensor memory. In this case, there will be no indication at the top of the graph.

The timestamps of the blue bars (see Figure 3) refer to the timestamps of the measurements of which the peak power levels were calculated (i.e., the moment when these measurements were acquired by the sensor and stored into sensor memory). When the measurement (1 measurement axis) is above threshold level and is downloaded, the corresponding measurement timestamp will pop up in the “Time Series” box in the vibration lab (see Figure 4). In the case of multiple measurement axes, there will be a timestamp for each axis in the peak power histogram.

Figure 3: timestamp of the peak power level value

Figure 4: timestamp of the downloaded measurement

Note that it is important to set the threshold level correctly to prevent full downloads when the DUT (Device Under Test) is not active to conserve battery power. The result is that the battery lifetime may be extended since less data must be transmitted.

- Setting the threshold to “none” (default setting): the complete measurement will always be downloaded, even if the equipment is idle (the graph will show a full green line at the top).

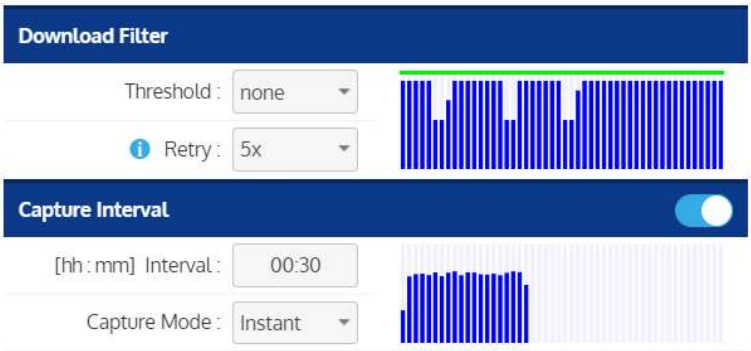


Figure 5: Threshold set to "none"

USER MANUAL

- Setting the threshold to “30%” shows that in this example the last 50 measurements and all future measurements will still be downloaded completely (the graph will show a full green line at the top).

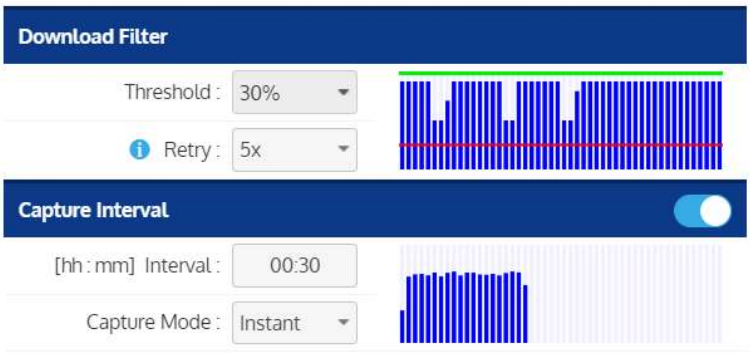


Figure 6: Threshold set to "30%"

- Setting the threshold to “60%” shows which of the last 50 measurements would have been downloaded for this example case (the graph will show green dots at the top for the downloaded measurements). The threshold level is now set accurately for future measurements.

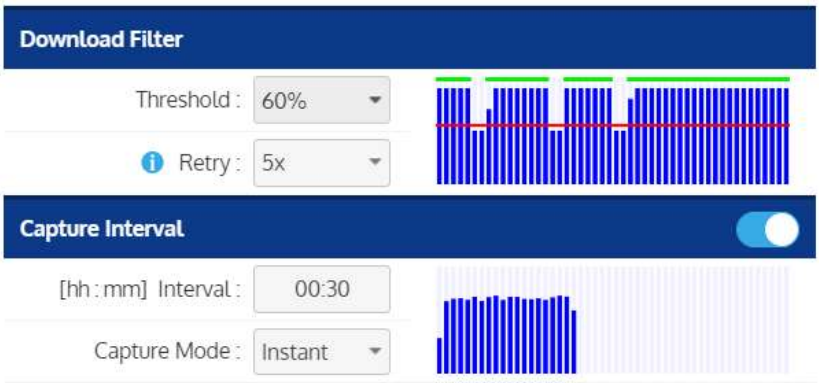


Figure 7: Threshold set to "60%"

- As from software version 1.9.6 on, the threshold can be set to “auto” meaning that the threshold level will be automatically calculated based on the last 50 measurements. The graph below shows which of the last 50 measurements would have been downloaded for this example case (the graph will show green dots at the top for the downloaded measurements).

  Remark: iQunet advises NOT to use the “auto” setting when the machine is running continuously at a fixed speed since the automatic threshold is calculated by adding 10% of the peak-to-peak values to the lowest RMS value of the last 50 measurements. In the case of a continuously running machine, the latest 50 measurements will be similar to all previous and future measurements. If we set the threshold to be 10% higher than this normal operation, no measurement will ever be downloaded. In this case it is recommended to use the “none” threshold.

USER MANUAL

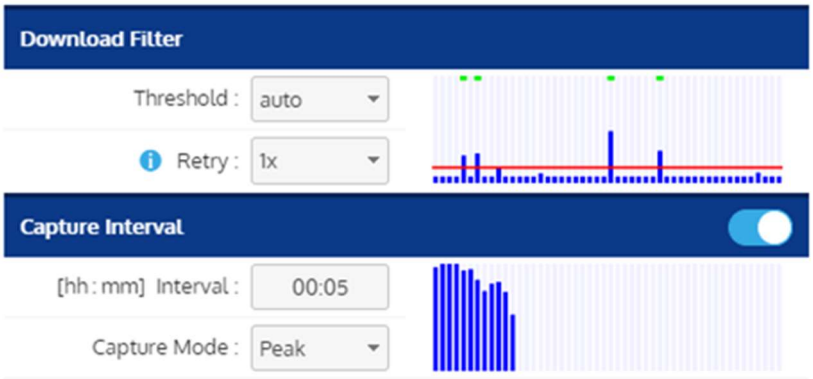


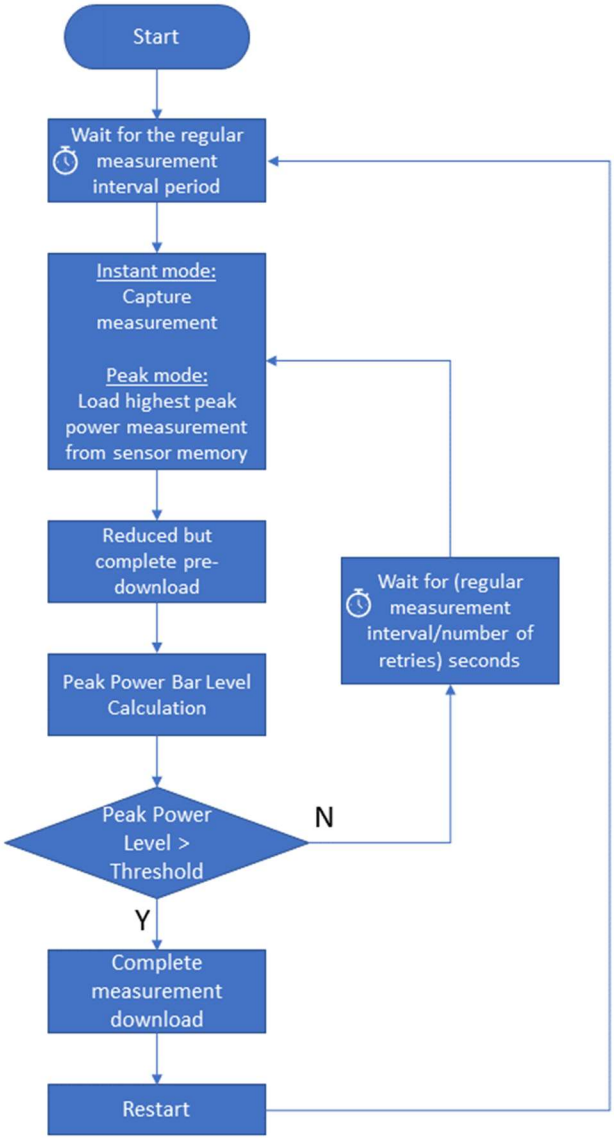
Figure 8: Threshold set to "auto"

Remark: if there are no measurements available yet, it is difficult to set the correct threshold level. In this case, it is recommended to enable the automatic measurements, to set the desired capture interval and to leave the threshold set to “none”. Wait for enough measurements to be downloaded and fill the histogram graph before setting the threshold level.

USER MANUAL

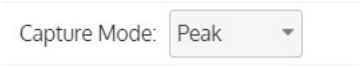
Number of retries:

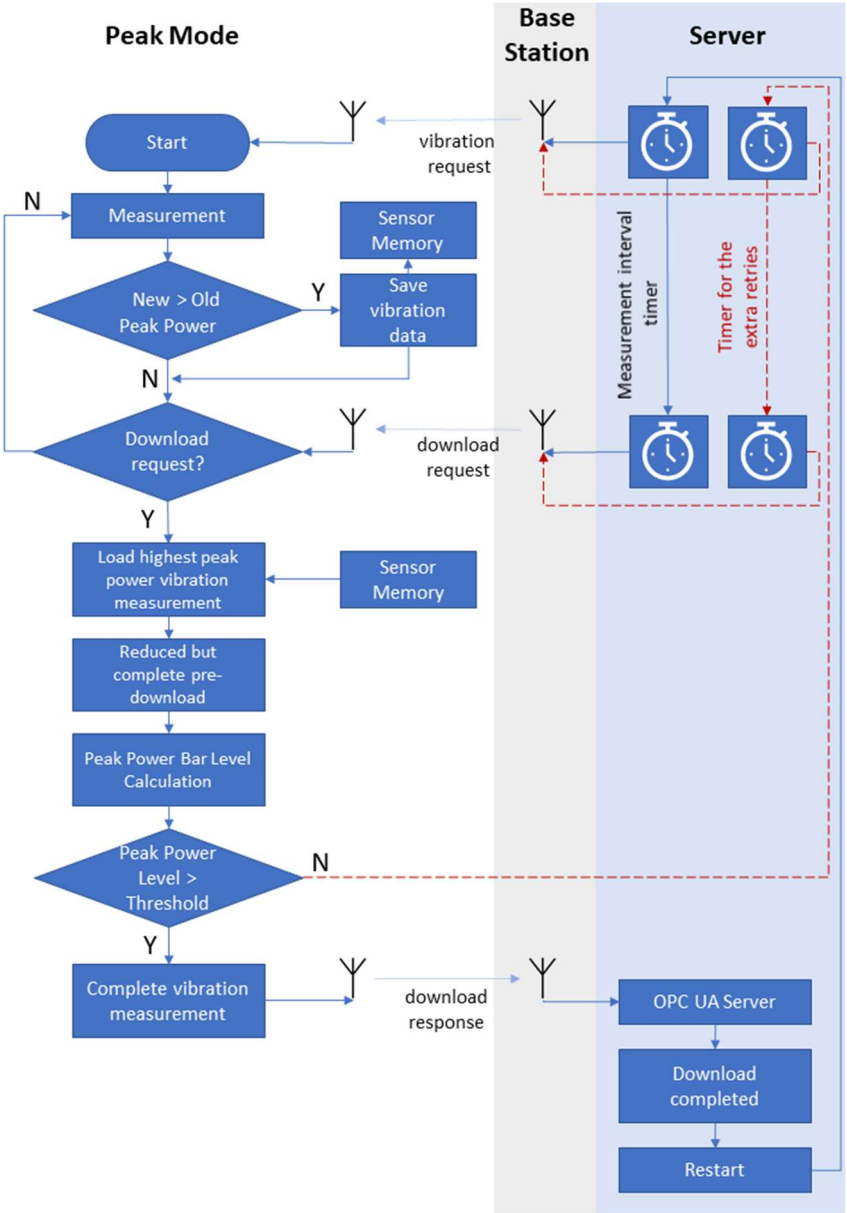
The "Retry" setting in the "Download Filter" section (see Figure 1) represents the number of extra capture attempts after the set measurement interval (if the threshold level is not exceeded yet). For example, if the measurement interval is set to 30 minutes and the number of retries to "5x", a first measurement will be acquired after the set 30 minutes. If the peak power bar level of that acquired measurement is below the threshold level, extra capture attempts will be performed every 6 minutes (5 within each measurement interval period) until one of the measurements has a peak power level above the set threshold level. That complete measurement will then be downloaded. After the complete download, a new capture attempt will only be performed after the set measurement interval of 30 minutes has elapsed.



USER MANUAL

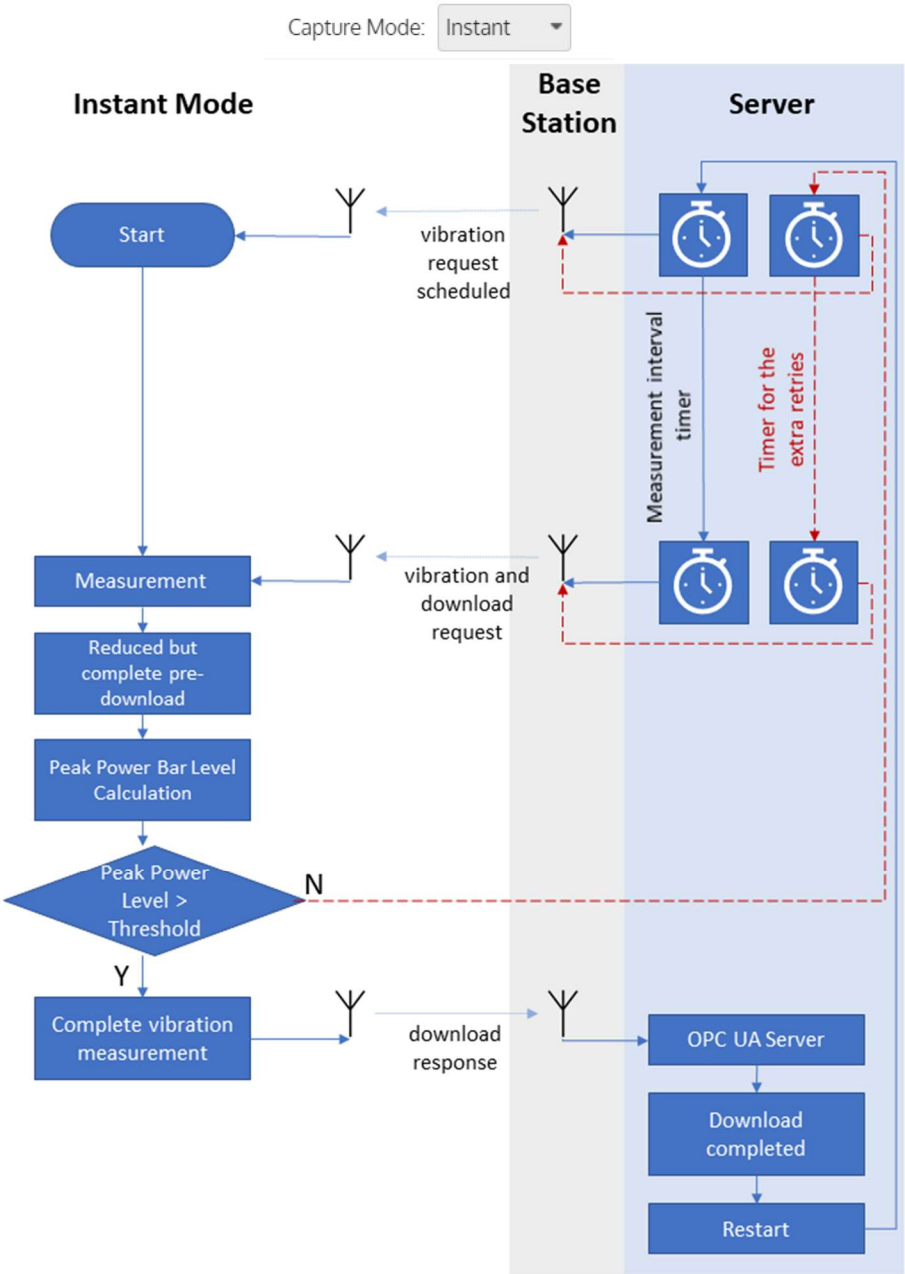
i. If the capture mode is set to “Peak”, the measurement will always be downloaded at the end of the set measurement interval (if above threshold level). The sensor is measuring continuously but only saves the measurement with the highest recorded peak power during the set time interval (for example a time series triggered by an impact). This saved measurement will then be downloaded at the end of the measurement interval. You thus receive the “smart” event-triggered sensor data. Setting the number of retries higher than “1x” will only have value in some rare cases in this capture mode like for example in the case of a bad wireless connection.





USER MANUAL

ii. If the capture mode is set to “Instant”, the measurement is acquired and downloaded at the end of the set measurement interval (if above threshold level). You thus receive the “unsmart” purely time-based sensor data. If the number of retries is set to more than “1x”, the sensor will extend the measurement interval period with several retries (if the threshold level has not been exceeded yet) for acquiring for example a non-idle equipment measurement right after the interval period. If all retries are below the threshold level, the measurement interval period will be extended with more retries. If one of the retries is above the threshold level, that complete measurement will be downloaded. After the succeeded download, the next measurement attempt will only be started after the set measurement interval period has elapsed. The measurement scheduler thus uses the latest download as a reference point. The retry function allows us to acquire more non-idle measurements in case a machine is working intermittently.



USER MANUAL

Remark: "Peak" mode is only available for the cable powered sensors and not for the battery-powered sensors. For battery-powered sensors "Instant" is the default capture mode and therefore the capture mode selection box is not shown in the Sensor Dashboard.

Remark: when using battery-powered vibration sensors, using the retry function will off course consume more battery power than only taking 1 measurement per measurement interval, but battery consumption will be less than in the case of a short measurement interval where the measurements will always be downloaded idle or not.

3.7.4.4. High pass filter setting explained

The high pass filter setting can be found and edited on 2 different places as shown in Figure 9 and Figure 10.

Figure 9: high pass filter setting in statistics lab pane

Figure 10: high pass filter setting in vibration lab

This high pass filter removes the DC offset (gravity) and the low frequency noise from the measured signals (as shown in Figure 11 and Figure 12) to improve the interpretation and analysis of the DFT graphs. The images below (Figure 11 and Figure 13) are taken with none or little vibrations, just gravity and the sensor noise floor are seen.

Remark: The HPF cut-off frequency setting can be changed at any time (DFT graphs are always recalculated after each setting change). The HPF setting however has no influence on the data stored on the iQunet Server.

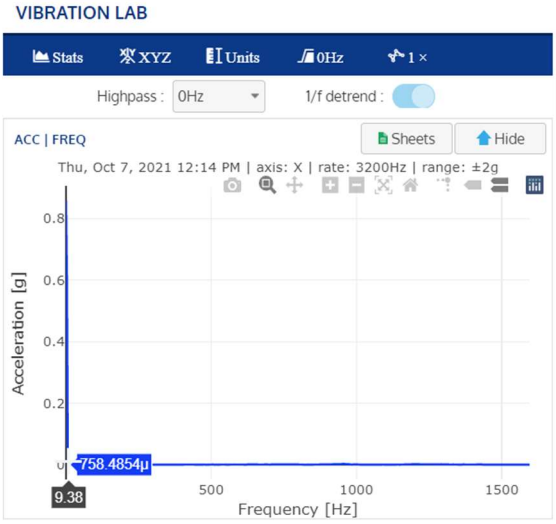


Figure 11: spectrum plot before applying the high pass filtering

USER MANUAL

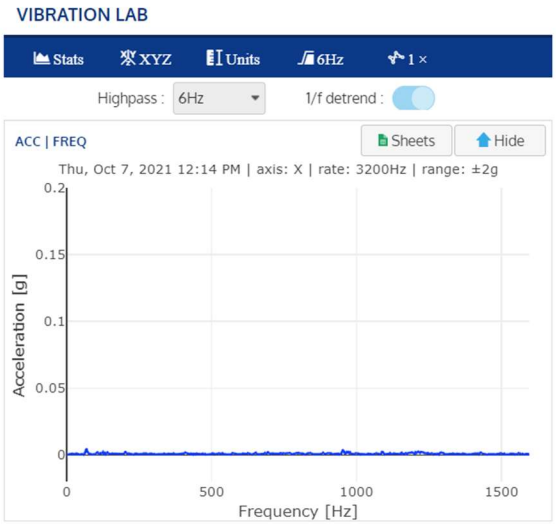


Figure 12: spectrum plot after applying the high pass filtering

Remark: when taking measurements with very few measurement samples (for example 128 samples), part of the DC offset and low frequency noise (plus the startup transient of the compression algorithm) may leak into the higher frequency bins, due to the coarse resolution of the DFT. This can be seen below in Figure 13, for a measurement of 128 samples. It can be seen here that a HPF value of at least 50Hz is necessary to remove the DC offset and noise.

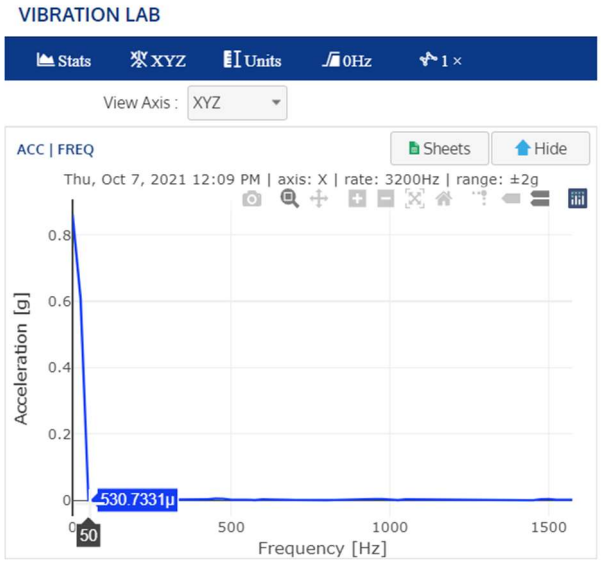


Figure 13: leakage into the higher frequency bins when using 128 measurement samples

When setting the high pass filter setting to a value higher than 0Hz, the statistics (RMS, kurtosis, or MAD) are calculated based on the frequency bins above the HPF cut-off frequency. The RMS value for example is the power in all frequency bins above the HPF cut-off frequency.

USER MANUAL

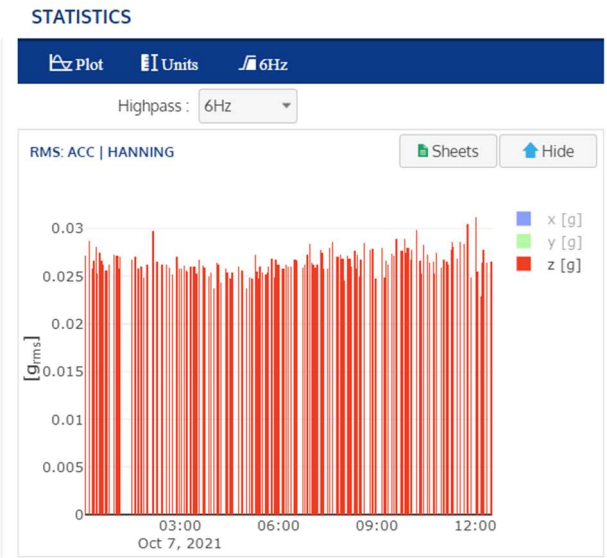
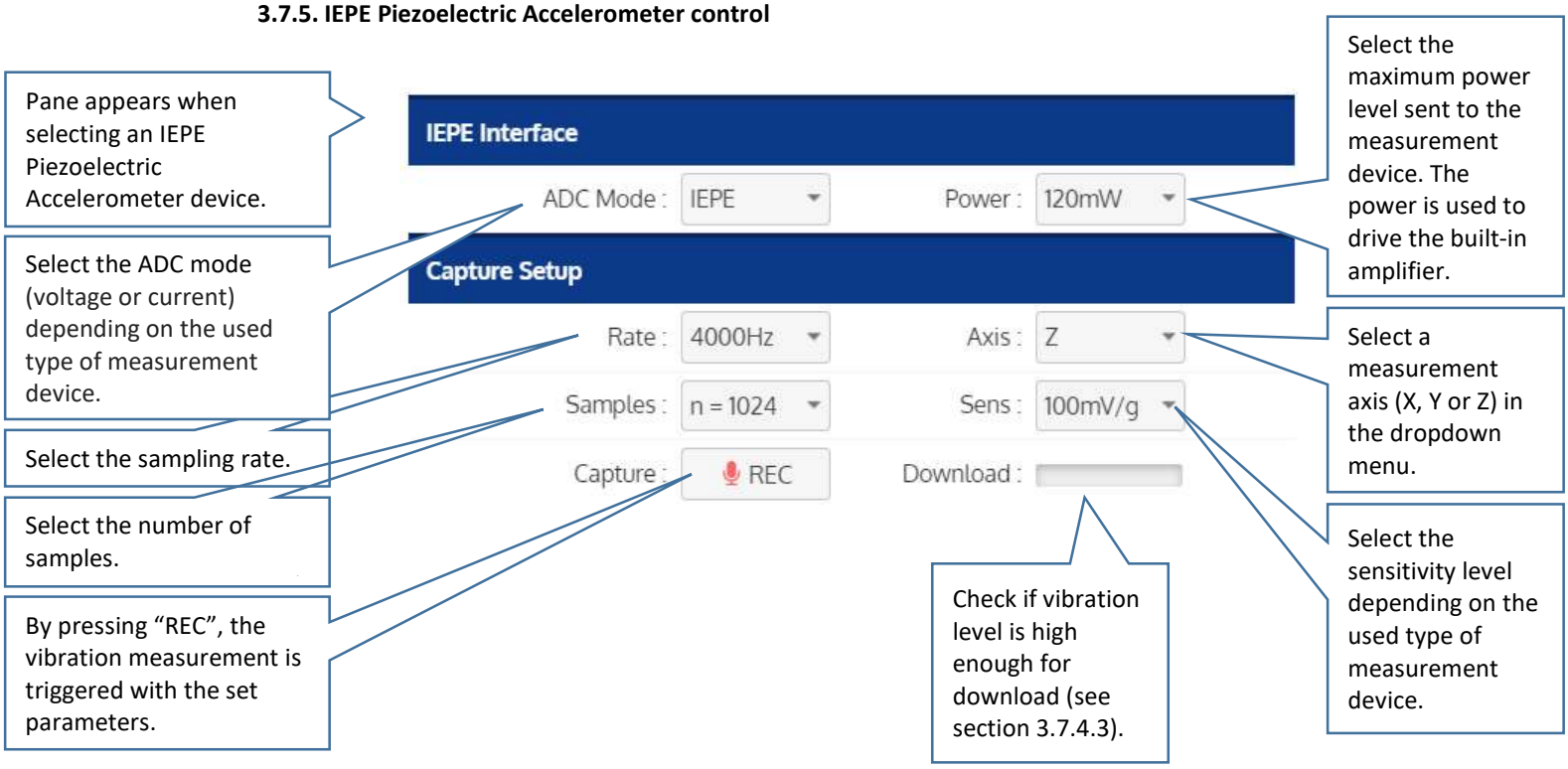


Figure 14: high pass filter setting in the statistics lab

3.7.5. IEPE Piezoelectric Accelerometer control



USER MANUAL

Select a threshold level. If the calculated peak power bar level is below threshold, the sensor download is aborted, and a new capture attempt will be started after the set period (see 3.7.4.3).

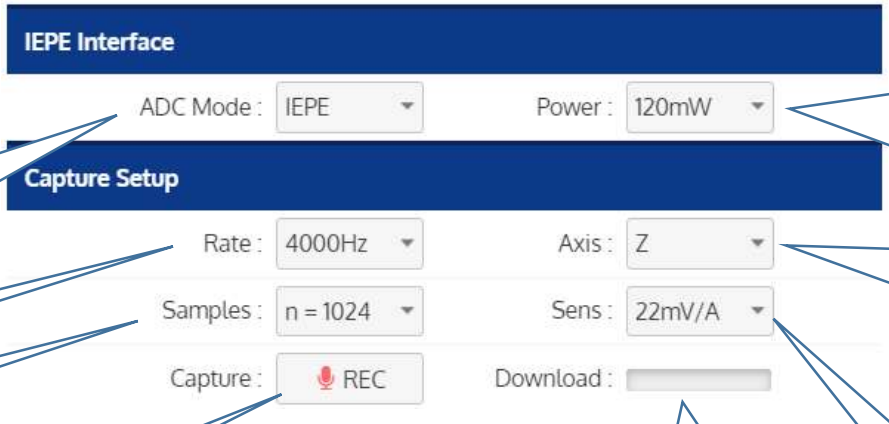
Number of extra capture attempts after the set interval (if the threshold level is not exceeded).

A full measurement is downloaded when the level of the measurements' bar is above threshold. See section 3.7.4.3.

If the full measurement is downloaded on to the Server, a green line appears on top of the graph. See section 3.7.4.3 for more information.

The Vibration Lab, Statistics pane, threshold calculation and high pass filter setting function in the same way as described in sections 3.7.4.1 to 3.7.4.4 for the regular Vibration Sensor.

3.7.6. Current Clamp control



Pane appears when selecting a Current Clamp device.

Select the ADC mode (voltage or current) depending on the used type of measurement device.

Select the sampling rate.

Select the number of samples.

By pressing "REC", the current measurement is triggered with the set parameters.

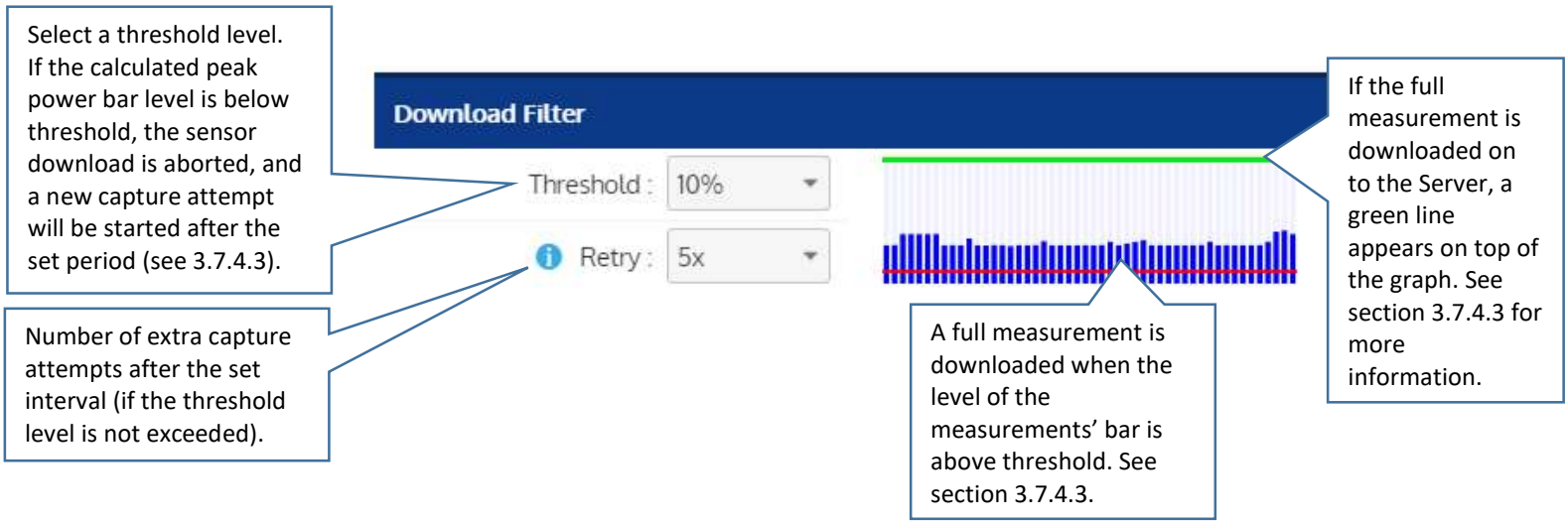
Check if current level is high enough for download (see section 3.7.4.3).

Select the maximum power level sent to the measurement device. The power is used to drive the built-in amplifier.

Select a measurement axis (X, Y or Z) in the dropdown menu.

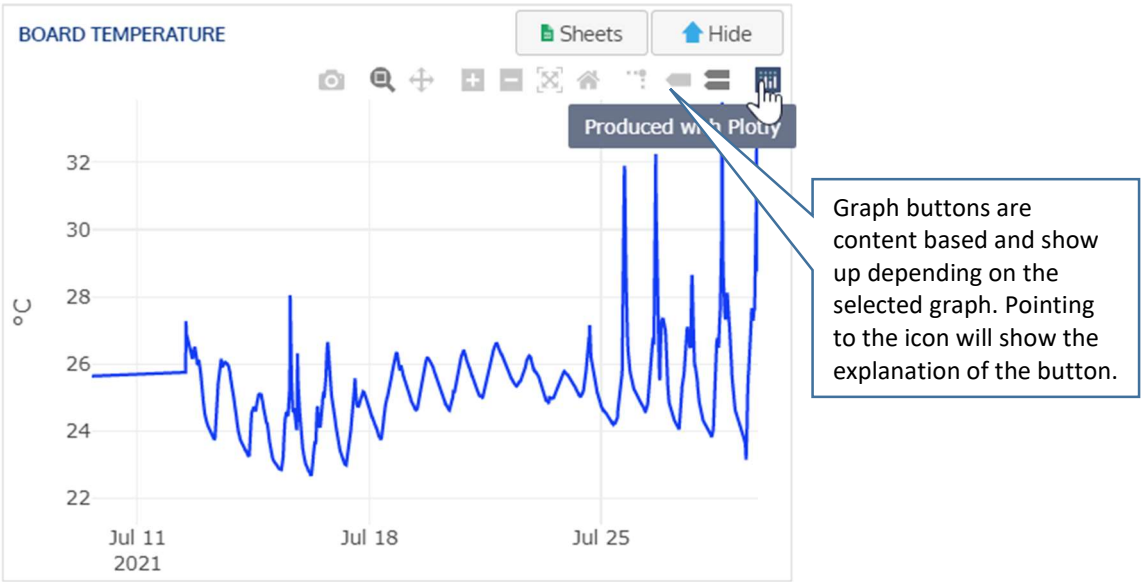
Select the sensitivity level depending on the used type of measurement device.

USER MANUAL



The Vibration Lab, Statistics pane, threshold calculation and high pass filter setting function in the same way as described in sections 3.7.4.1 to 3.7.4.4 for the regular Vibration Sensor. The only difference is that the Vibration Lab is renamed to Current Monitor and that the used units are current (A) and charge (A.s) instead of acceleration (g) and velocity (mm/s).

3.8. Content based graph settings



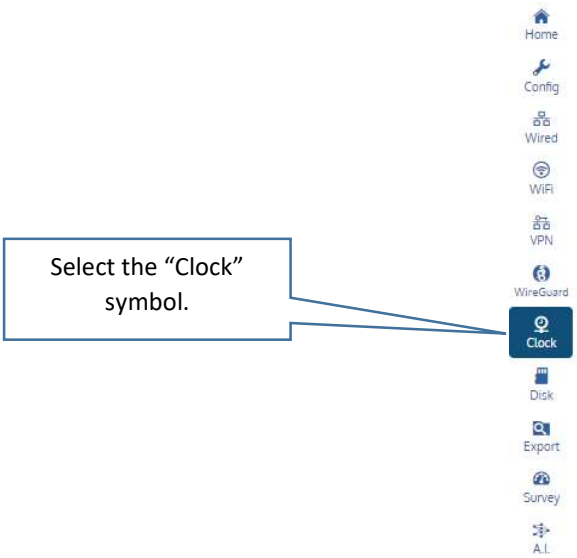
USER MANUAL

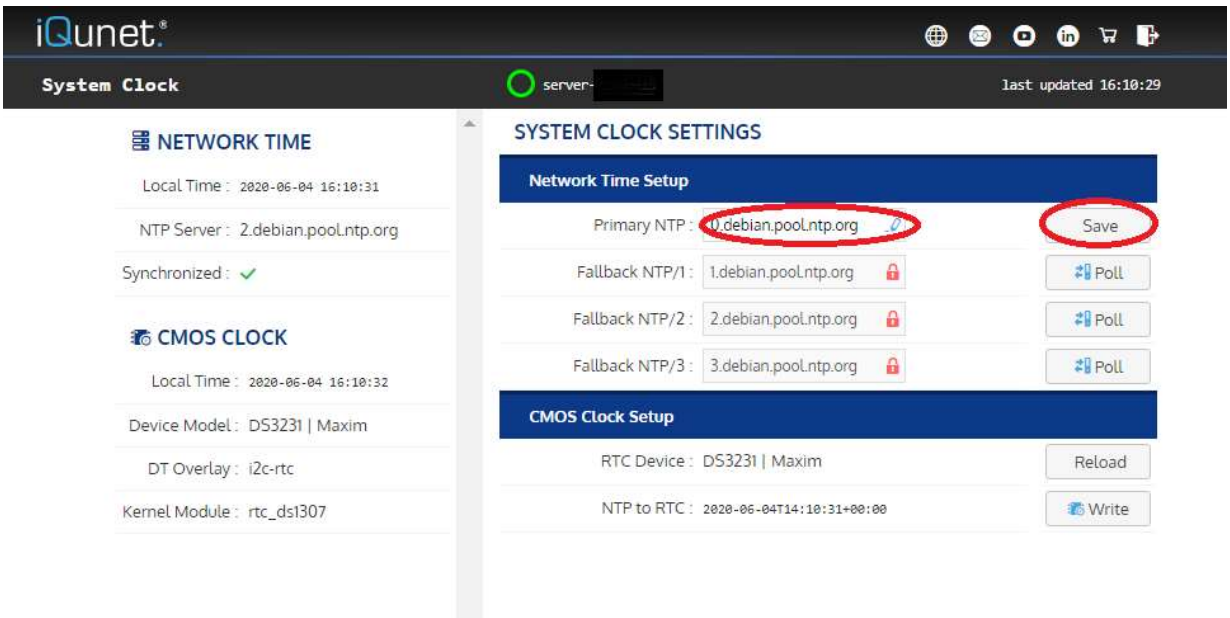
4. System clock panel

In the “System Clock” section you can set up your own Network Time Protocol (NTP) server to synchronize the hardware clock with. Normally the default NTP server is used (0.debian.pool.ntp.org). The iQunet system considers the drift and offset between the Real Time Clock (RTC) and the NTP clock so in most cases this default NTP server will work fine.

If you need to use your own NTP server for example when the default NTP server is blocked by the firewall, you can change the Primary NTP server.

Open the “System Clock” panel by clicking on the “Clock” symbol on the left-hand side in the iQunet Sensor Dashboard. Edit the Primary NTP (to for example time.google.com) and press “Save”.

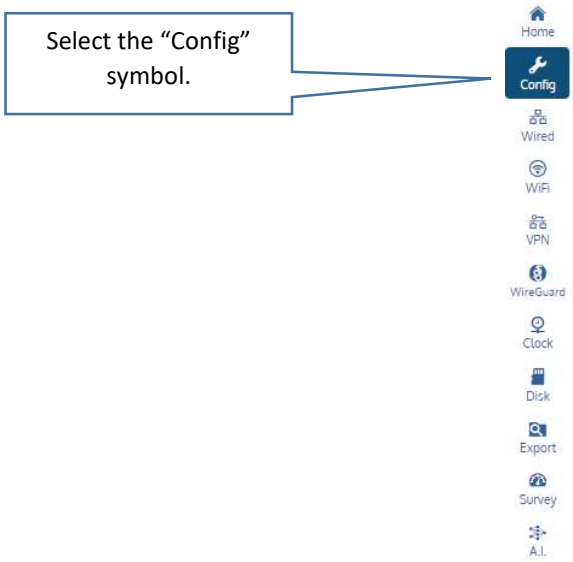




USER MANUAL

5. System settings panel

Open the “System Settings” panel by clicking on the “Config” symbol on the left-hand side in the iQunet Sensor Dashboard.

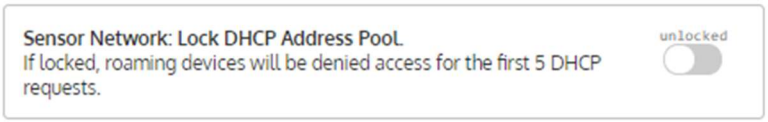


5.1. Suspend measurements

If the slider is set to active, all measurements on the complete connected devices list will be paused. Inactivating the slider will activate the measurements on all sensors.

Remark: the slider will be reset to active after a system reboot.

5.2. Lock DHCP Address Pool



If the slider is set to locked, roaming sensor devices will be denied access to this iQunet Server for the first 5 DHCP requests. The sensor will still be allowed access but with a delay of approximately 15 seconds. In this way an accidental sensor reboot within the wireless sensor network of this Server will not be picked up.

After the 15 seconds delay the sensor will be accepted by the Server and listed as pending (blue color) in the “Connected Devices” list. After 10 minutes the sensor will be rebooted so it can reconnect itself to its original Base Station/Repeater and corresponding Server where it received a name previously. If it was the intention to connect the sensor to this Server, you must (re)name the sensor (see section 2.1). Giving a name to the sensor “locks” the sensor to the Server.

Remark: it is recommended to leave the switch in the **unlocked** status in normal operation.

USER MANUAL

Remark: **locked** status can be used for setting up the sensor network during installation. This setting prevents sensors from "jumping" to other Servers in the same subnetwork before the sensors have been named. **Locked** status can also be used if it is not the intention to connect the sensor to the "nearest" Base Station with the strongest wireless signal. This setting will then give priority to the other Base Station in the neighborhood.

Remark: a sensor will always look for a Base Station or Repeater within its wireless range. In this way sensors cannot get "lost". If a sensor in blue "pending" status is not able to connect to a second Base Station or Repeater (with better connectivity and/or previously named there), it will remain connected to the Base Station or Repeater with the best connectivity (see section 1.2.1).

5.3. Reduce MTU size

Reducing the MTU (Maximum Transmission Unit) size can improve the latency on some networks with packet fragmentation. The MTU size defines the largest packet size that can be transmitted as a single entity over the network connection (without fragmentation). If an IP packet is larger than the MTU size of the connection, the packet will be fragmented into smaller packets so that it fits within the network constraints. The MTU is usually limited by the underlying network capabilities. If the MTU is larger than the network can support, data will get lost.

A larger MTU value allows more data to be transferred at once and therefore reduces the overhead. On the other hand, smaller packets (smaller MTU sizes) can be transferred faster and reduce the network delay. Therefore, the MTU size should be adjusted to optimize both requirements for the specific network connection.

5.4. CSV export history size

The CSV export size of the "Data Explorer" export function (see section 9.3) can be set according to your needs. In the default case, the newest 1024 samples will be extracted as a .csv file. In this way, the size of the exported .csv files can be limited.

5.5. iQunet-CloudLink real-time synchronization

Real-time synchronization can be enabled for iQunet-CloudLink. If enabled, new measurements are published in real-time to the iQunet-CloudLink service (see section 8 for more information on the iQunet-CloudLink service).

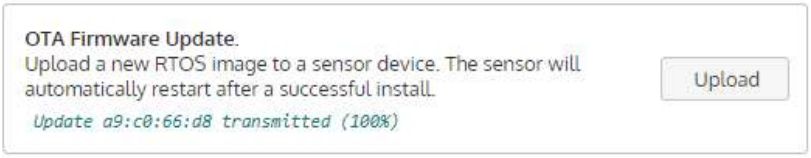
The synchronization status of the service is shown at the bottom.

USER MANUAL

5.6. OTA firmware update (as from software version 1.9.7 and for OTA-update enabled devices)

The OTA firmware update section allows iQunet to perform remote over-the-air (OTA) sensor firmware updates at all times for defined devices. This makes it possible to easily update sensors in the field when new sensor features become available.

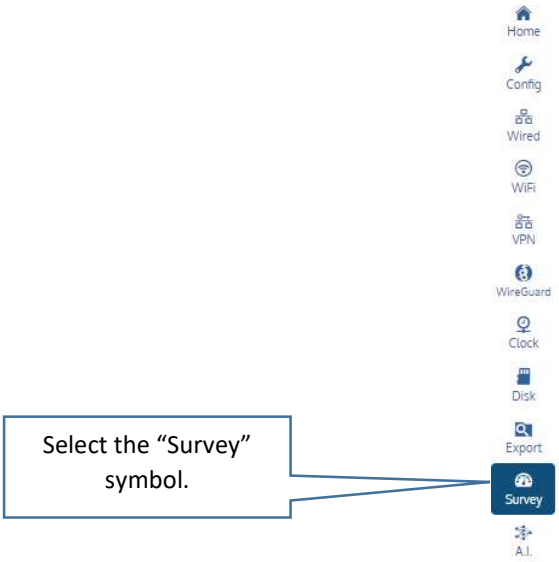
The update transmission status is shown at the bottom.



USER MANUAL

6. Sensor performance survey panel

Open the “Sensor Performance Survey” panel by clicking on the “Survey” symbol on the left-hand side in the iQunet Sensor Dashboard.

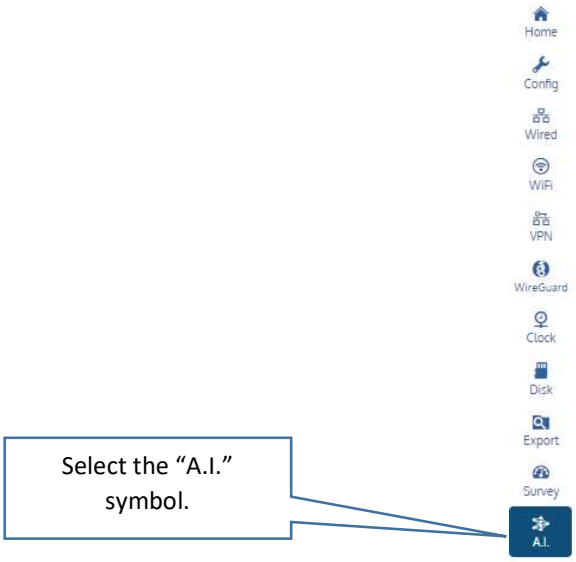


The Sensor Performance Survey pane can be used for quick troubleshooting of the sensors and the system or to calculate KPIs (like for example the ratio of the number of captures per day versus the number of downloads per day).

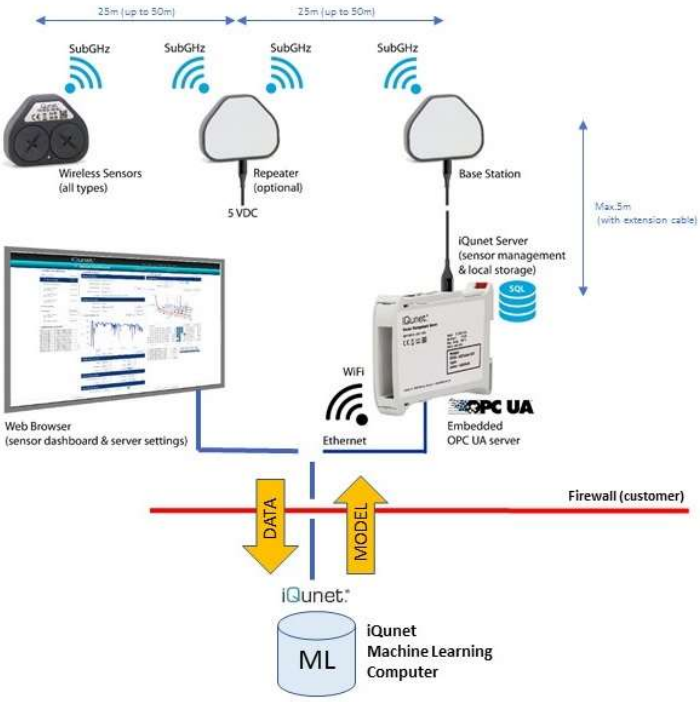
USER MANUAL

7. Anomaly monitoring panel

Open the “Anomaly Monitor” panel by clicking on the “A.I.” symbol on the left-hand side in the iQunet Sensor Dashboard.



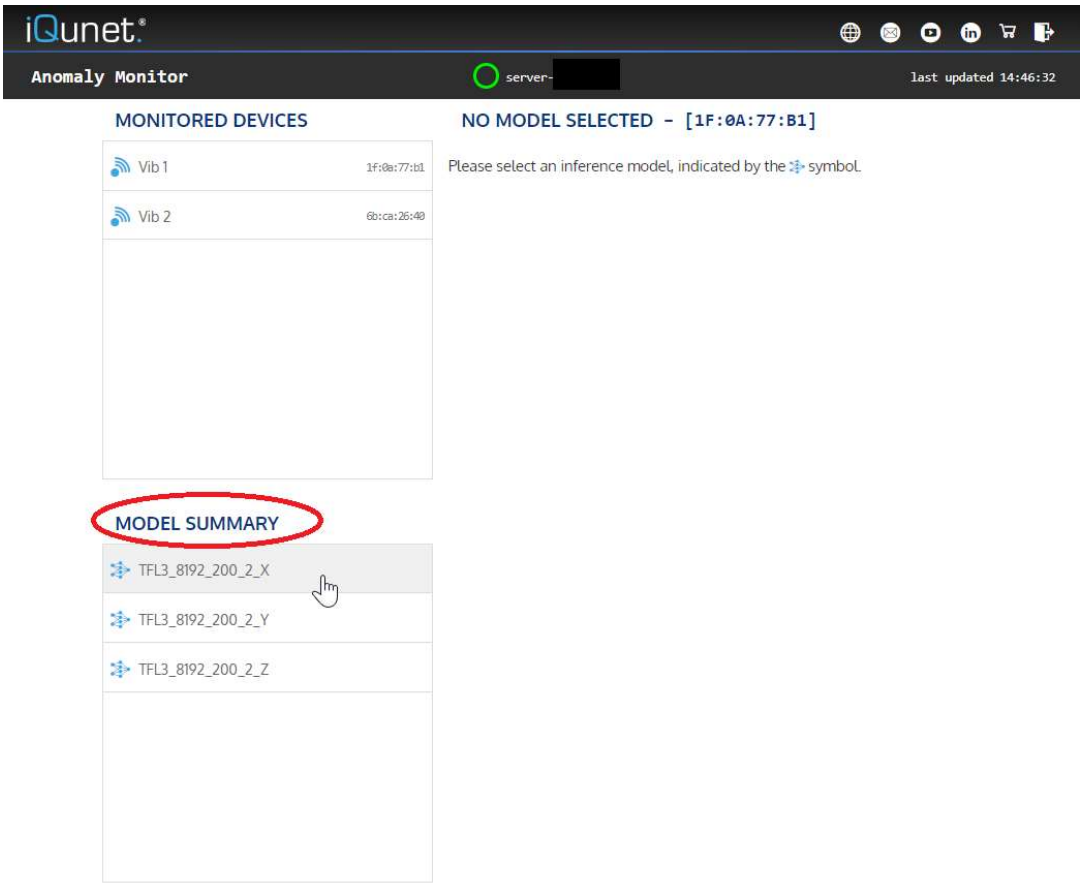
When you subscribe for the iQunet Anomaly Monitoring Service, a model will be created based on your acquired data set. All historical sensor data stored on your local iQunet Server for the specified training period will be automatically compressed and transferred once to the iQunet Machine Learning Servers (located in the iQunet premises) to calculate a machine learning data model. This model is then returned and saved on to your local iQunet Server for continuous local anomaly monitoring. New measurements that differ too much from the calculated data model are detected as anomalies and can be followed up and flagged (difference based on the Mean Squared Error).



USER MANUAL

To start monitoring anomalies, select an existing sensor model in the “Model Summary” section. The model’s name is composed of the sensor settings (for example TFL3_8192_200_2_X).

Remark: anomaly data is calculated from the start of the model’s training period. Data older than the timestamp of the start of the training period will not be displayed in the Anomaly Monitor in the iQunet Sensor Dashboard nor in OPC UA.

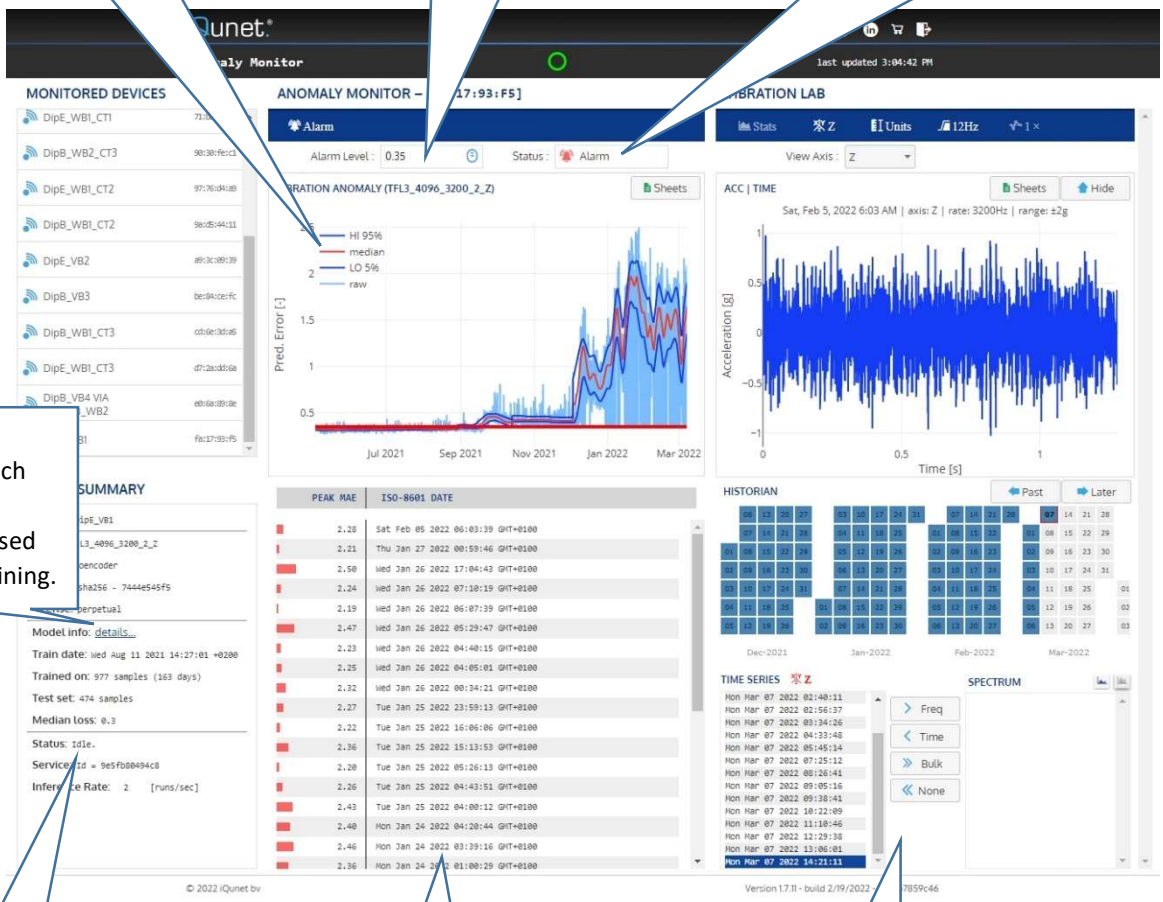


USER MANUAL

Select or unselect an expectile by clicking on the colored lines.

Set an alarm level for the median prediction error.

Status of the last new measurement: alarm (median error above alarm level) or idle (median error below alarm level).



Open the model details to see which and how many parameters are used for the model training.

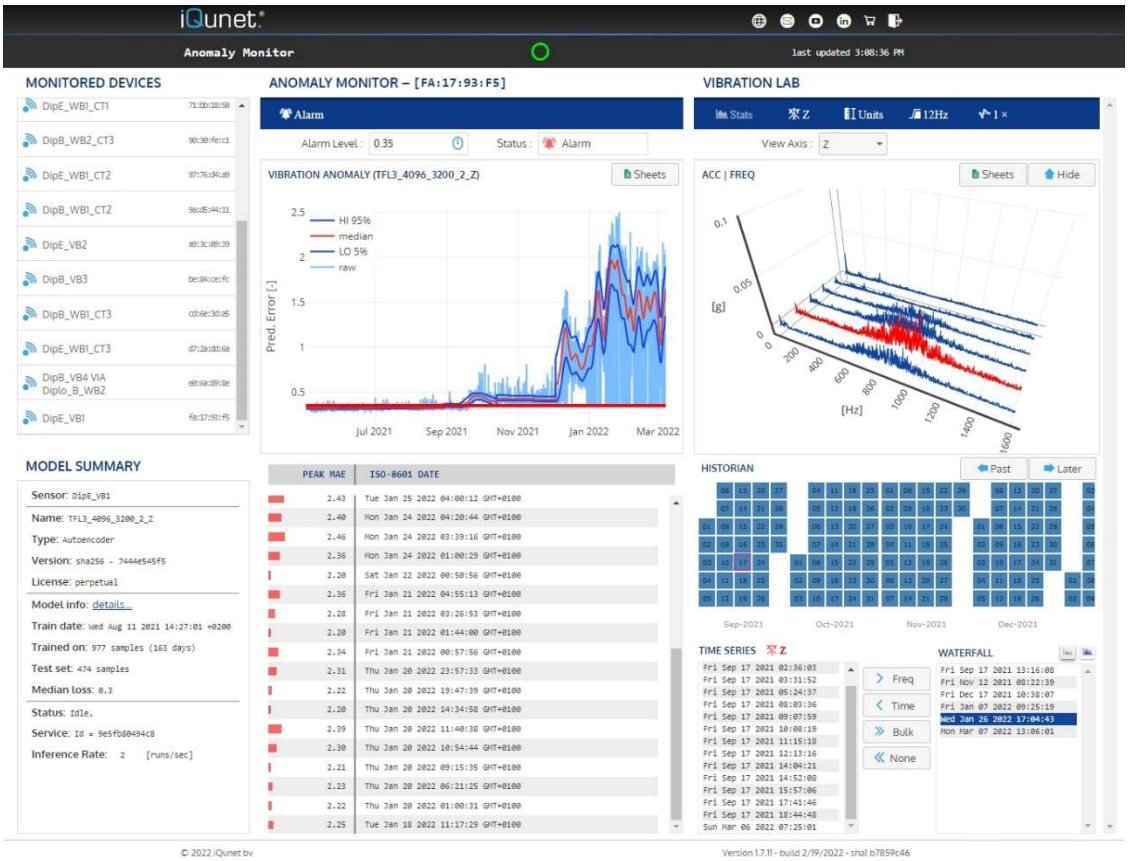
Status of the anomaly monitor: a new measurement is being processed if the status is not idle.

List of the highest prediction errors (peaks): BLUE colored items are raw anomalies below alarm level, RED colored items are above alarm level.

Clicking on 1 of these items shows where the anomaly is situated in the graph above and opens the time series in the vibration lab on the right-hand side.

You can compare the selected anomaly related measurement with measurements coming before and after that measurement. Check for 3D trends by adding them to the SPECTRUM box in the vibration lab (see figure below).

USER MANUAL



USER MANUAL

8. iQunet-CloudLink

iQunet-CloudLink is an optional database service (DBaaS) that synchronizes its mirror database with the database of your locally installed iQunet Edge Servers running condition monitoring. For each iQunet Server that is synchronized to iQunet-CloudLink, a yearly subscription is invoiced.

Once the service subscription is ordered, iQunet-CloudLink access is granted. Your iQunet Edge Server device(s) will now be able to connect automatically to iQunet-CloudLink.

Remark: iQunet-CloudLink is not a back-up service.

Real-time synchronization for iQunet-CloudLink can be enabled/disabled in the "System Settings" panel in the Sensor Dashboard of each Edge Server device (see Figure 15). If real-time synchronization is enabled, the newest data will always be available on iQunet-CloudLink. If disabled, data will be queried regularly by iQunet-CloudLink but the latest data might not be available immediately.
The iQunet-CloudLink connection status is also displayed in that panel.

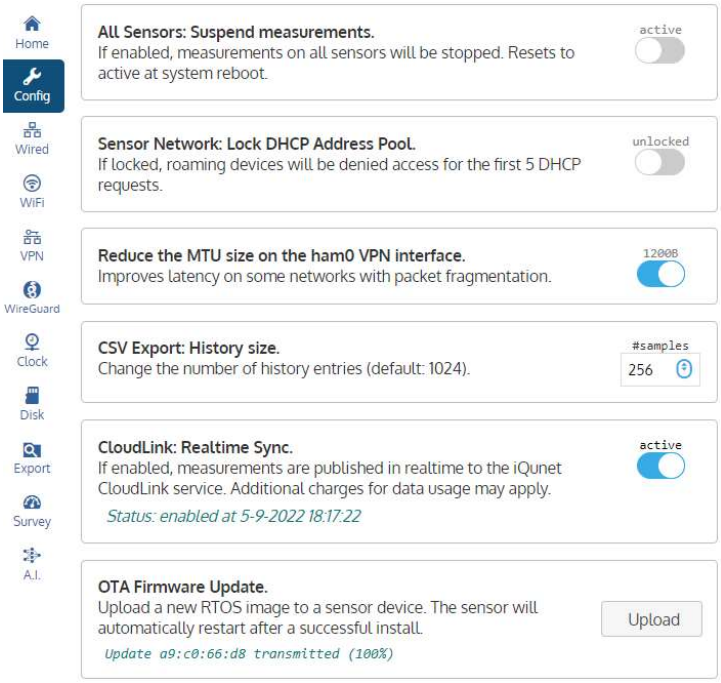


Figure 15: Activating real-time synchronization for iQunet-CloudLink in the Sensor Dashboard

iQunet-CloudLink provides a single access point to request data of multiple iQunet Edge Servers, making the service especially useful when running multiple Edge Server devices in for example different locations. iQunet-CloudLink data is also accessible when the iQunet Edge Servers are offline.

iQunet-CloudLink offers translation from OPC UA to MySQL, so that existing services such as Grafana can connect with minimal effort. Due to the additional frontends that become available (see Figure 16), iQunet-CloudLink drastically increases the interoperability of the iQunet condition monitoring solution.

USER MANUAL

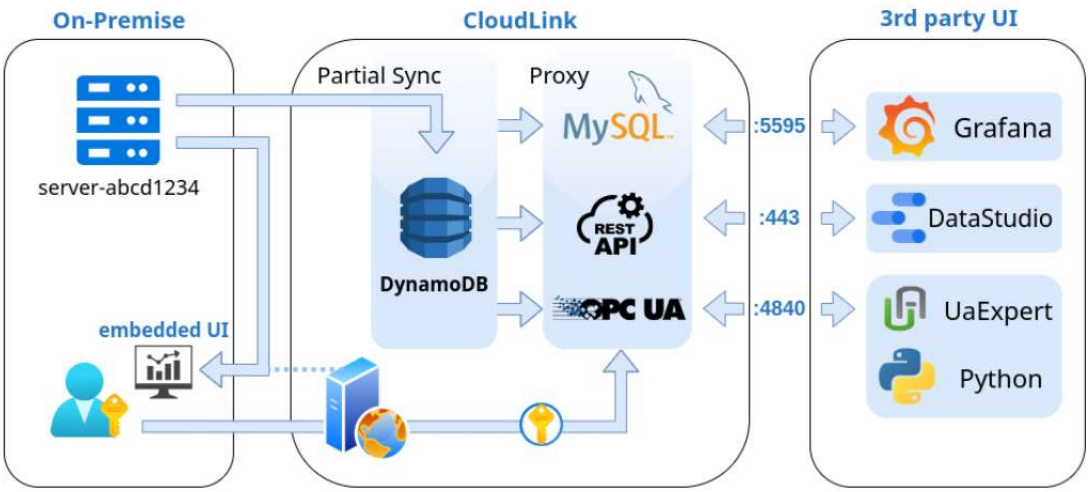


Figure 16: iQunet-CloudLink architecture

USER MANUAL

9. Export of data

9.1. Using OPC UA functionality

By connecting to the embedded OPC UA Server on the iQunet Server that is connected to the Base Station, you can read the data gathered by the iQunet sensors. Data is stored for a longer period, but the oldest data will be overwritten when the memory is full. It is strongly advised to install an OPC UA historian server to save the data permanently. Please contact your network administrator for more information on how to access the data. By connecting an OPC UA client to the running iQunet OPC UA Server, you can read the data as it is gathered by the sensors. The graphs in the iQunet Dashboard are using the same OPC UA data from the same source. Figure 17 and Figure 18 show the same temperature data on the iQunet Dashboard and in the OPC UA client.

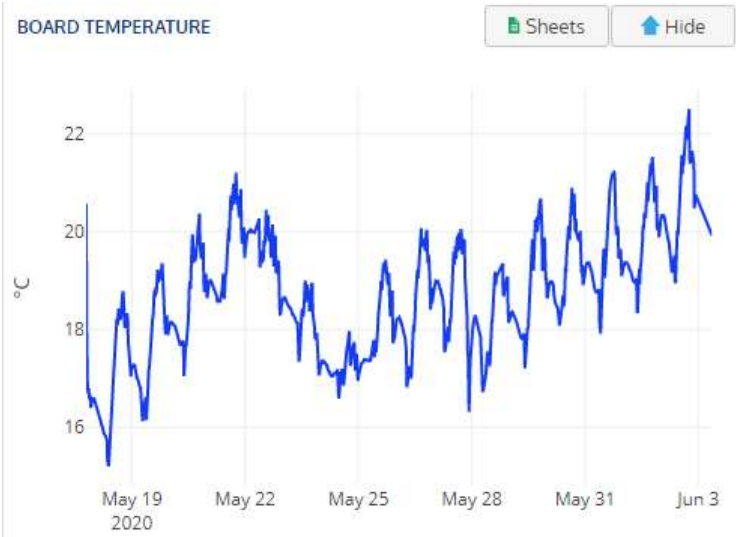


Figure 17: OPC UA data (board temperature) viewed in the iQunet Dashboard

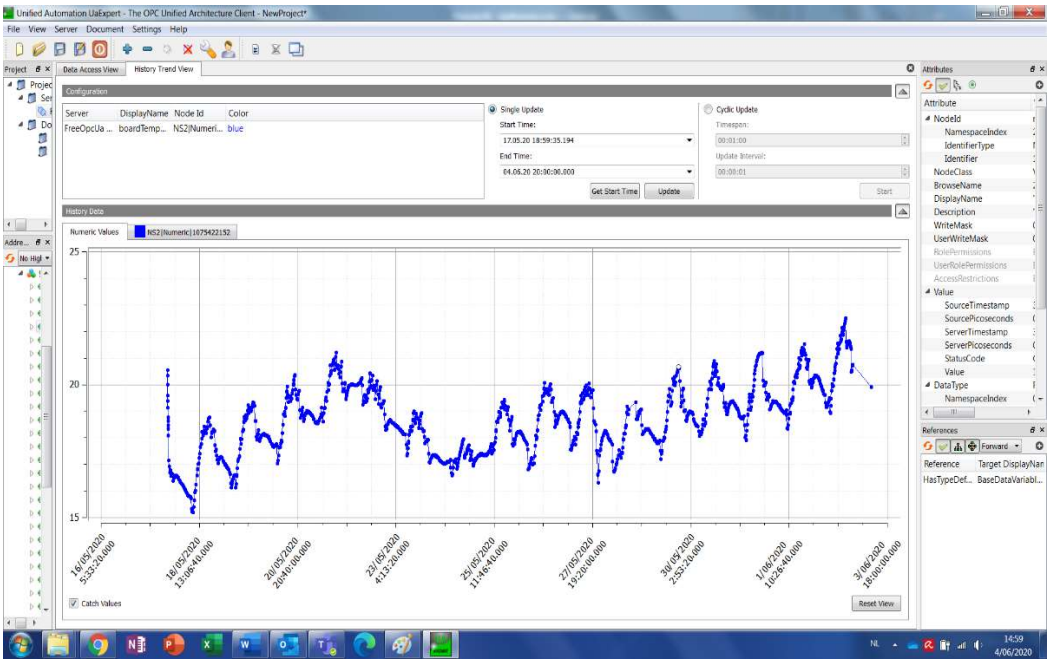


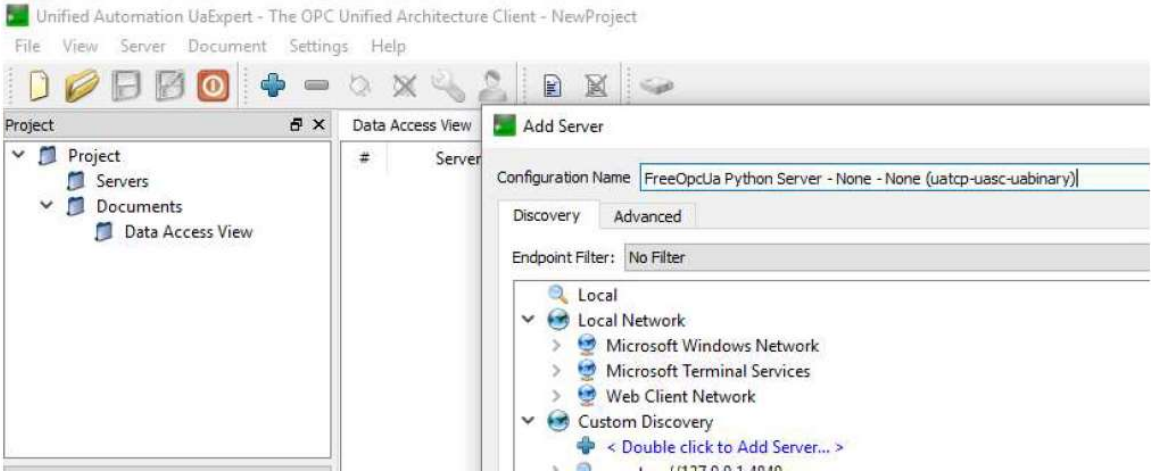
Figure 18: OPC UA data (board temperature) viewed in an OPC UA client

USER MANUAL

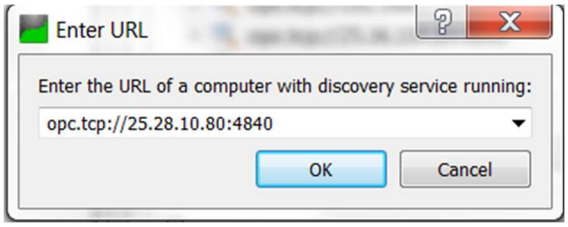
9.1.1. Setting up OPC UA client

For test purposes it is possible to set up an OPC UA client with free OPC UA client software.

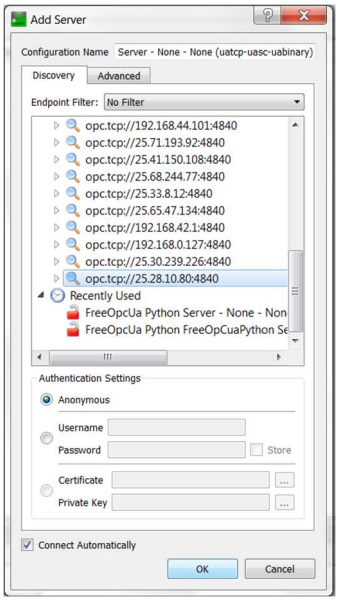
1. Download the free OPC UA client software and install it from the following link: https://www.unified-automation.com/products/development-tools/uaexpert.html.
2. Open the UA Expert software and add a new server by selecting "Add" in the Server tab. Double click on "Double click to Add Server".



3. Edit the URL to e.g. opc.tcp:// 25.28.10.80:4840 (see also section 10.2) and click OK.

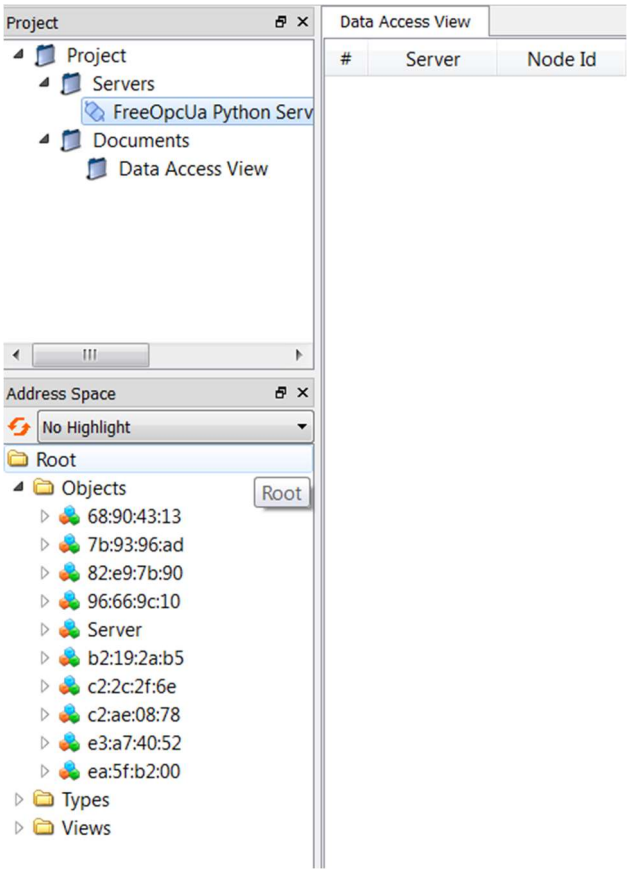


4. Select your added server in the list and click OK. If necessary, thrust the certificate of the iQunet Server.

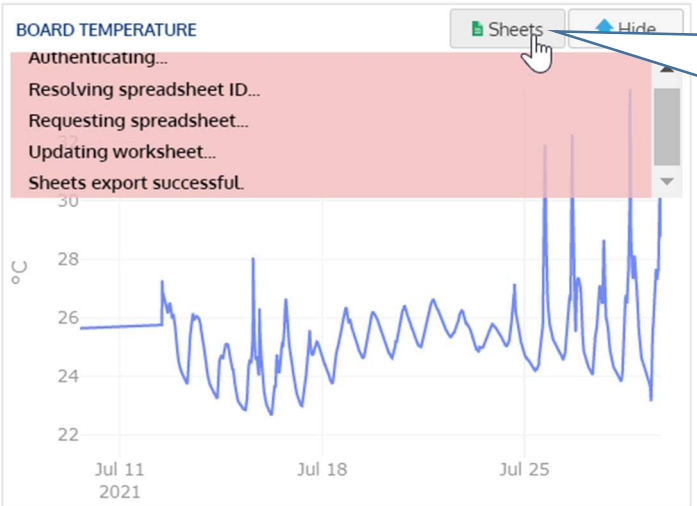


USER MANUAL

5. All connected iQunet sensors will appear in the object list.
6. Browse the attributes of the sensors by clicking on the tags.



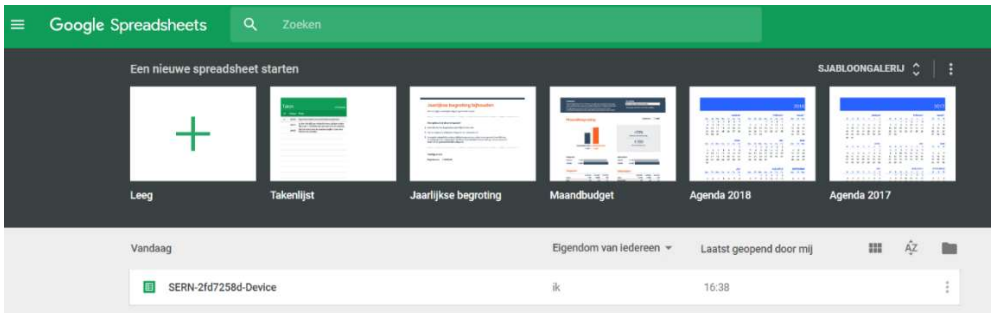
9.2. Using Google Sheets Export functionality



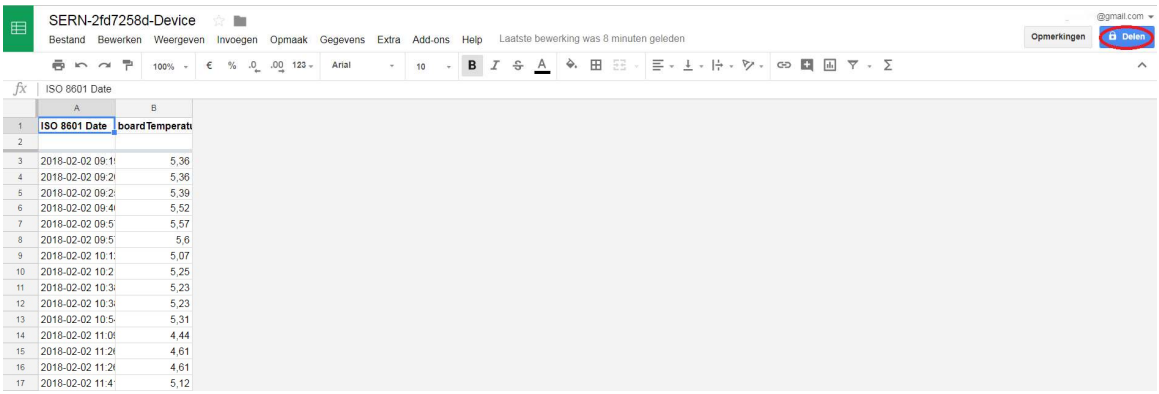
Pressing "Sheets" exports the OPC data to Google Sheets. By pressing the button again, the same sheet is updated with new values.

USER MANUAL

By clicking “Sheets”, a Google spreadsheet is created in the account you used to identify yourself at login.



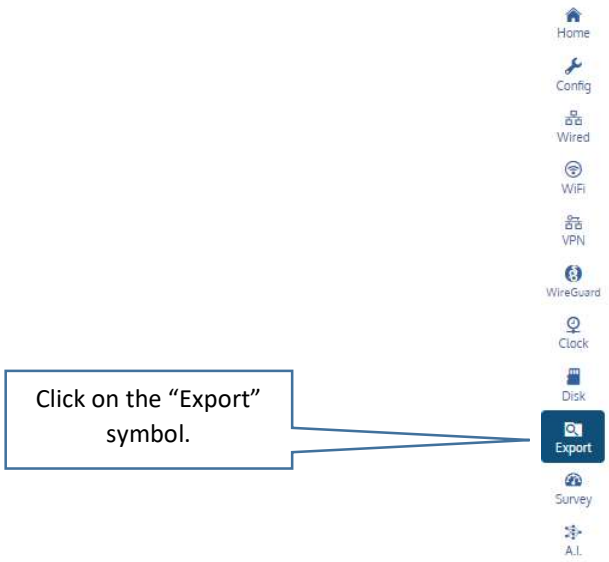
Go to Google Sheets, and you will see the file you created from this sensor by clicking the “Sheets” button. The data is updated every time you click the “Sheets” button in the same graph. Exporting new data parameters of the same sensor will create new tabs in the same file.



Open the file you created, and you can explore the data points or use plug-ins to analyze the data. Share the file with others by clicking the right upper blue button. Shared files will also be updated with new data once created. It is also possible to save the data in Microsoft Excel format.

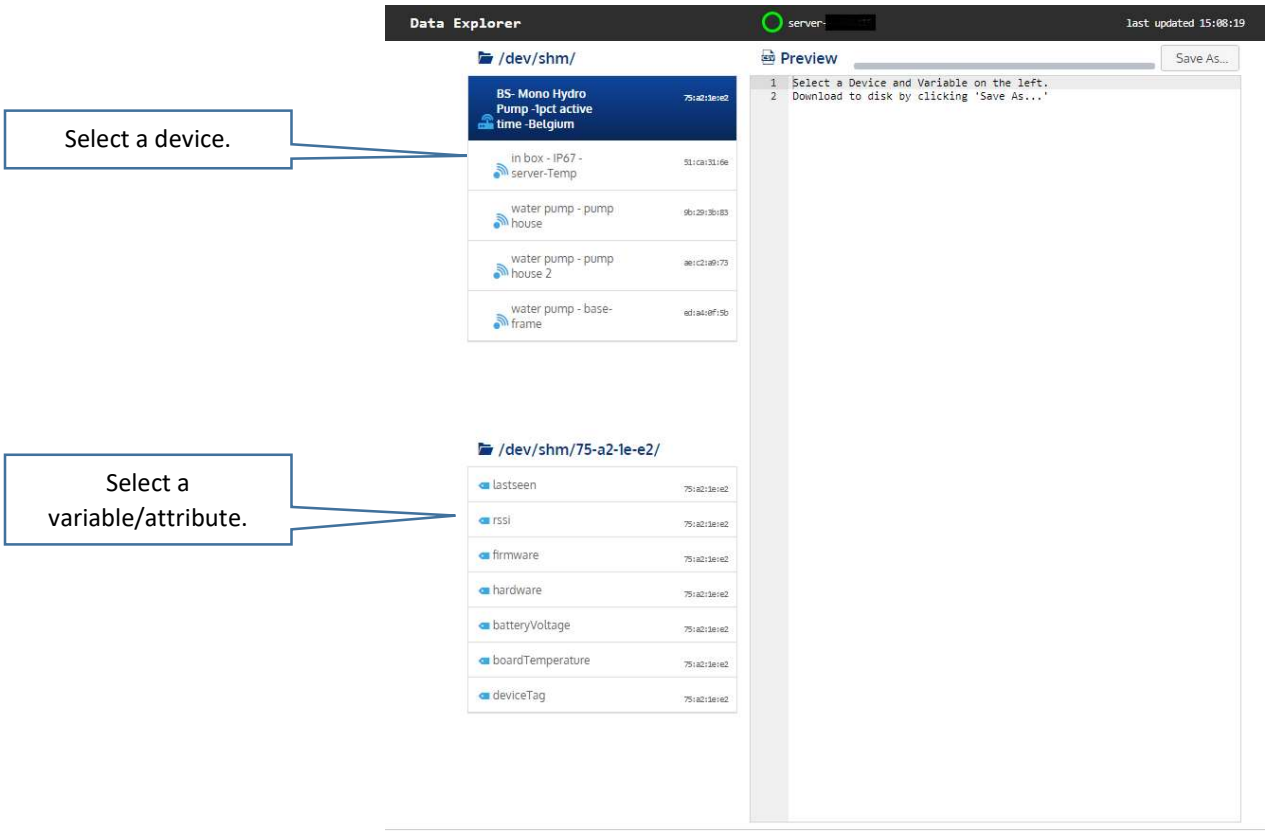
9.3. Using Data Explorer Export functionality

Open the “Data Explorer” functionality by clicking on the “Export” symbol on the left-hand side in the Dashboard.



USER MANUAL

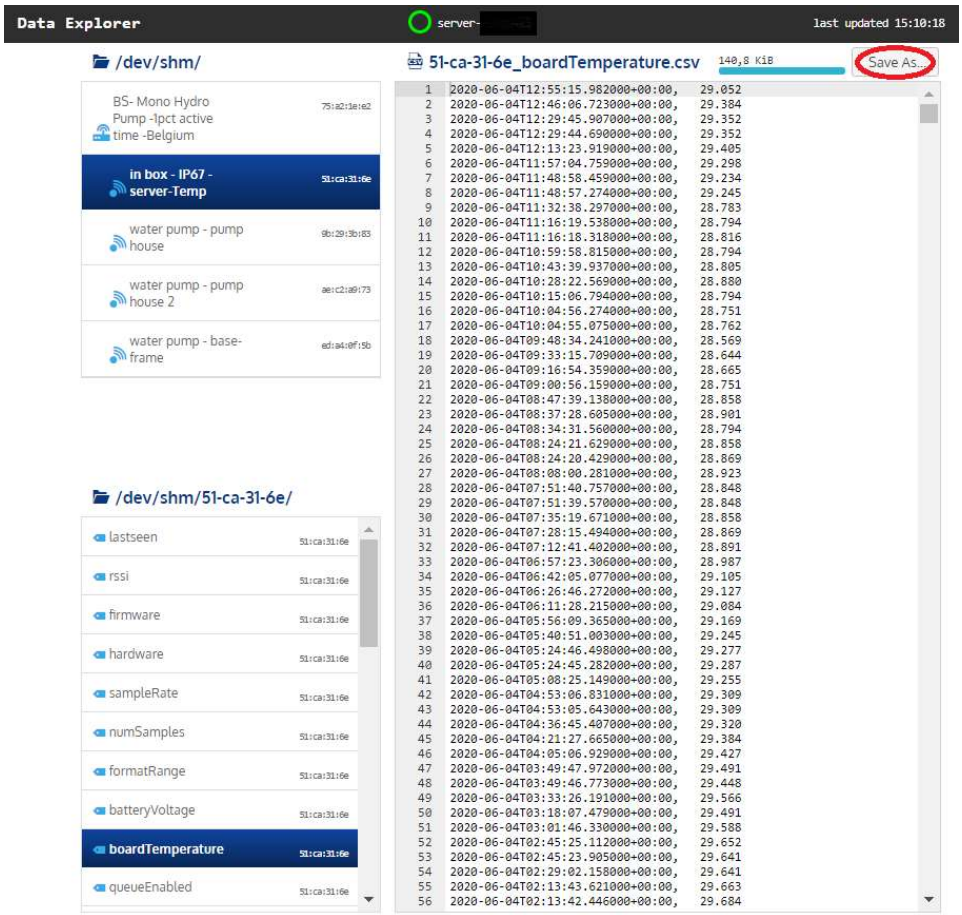
Select a device and according attribute on the left.



The data for this attribute will be loaded in the text box on the right in a csv format. Click on “Save As…” to download the data as a .csv file. For large amounts of data, the data loading might take a few minutes.

Remark: the downloaded amount of data can be limited in the “System settings” pane (see section 5.4). You can now for example chose to only download the newest 1024 data points.

USER MANUAL



9.4. Using APIs

9.4.1. General

GraphQL is a query language for APIs and a server-side runtime for executing queries by using a type system that is defined for the data. GraphQL is not tied to any specific database or storage engine and is instead backed by the existing code and data. GraphQL is typically served over HTTP via a single endpoint which expresses the full set of capabilities of this service. This contrasts with the REST APIs which expose a suite of URLs each of which exposes a single resource. Many different programming languages support GraphQL. A GraphQL spec was open sourced in 2015 and is now available in many environments and used by teams of all sizes. Some introductions can be found on http://graphql.org/.

Features:

- Syntax highlighting
- Intelligent type ahead of fields, arguments, types, and more
- Real-time error highlighting and reporting
- Automatic query completion
- Run and inspect query results

9.4.2. Starting with APIs

Before starting, we strongly recommend reading the “learn” section on the GraphQL website: http://graphql.org/learn/.

USER MANUAL

All APIs can be reached via http://xxx.xxx.xxx.xxx:8000/graphql where “xxx.xxx.xxx.xxx” refers to the current iQunet Server IP address (see section 10.3). Please note that all documentation is included and can be found in the Documentation Explorer on the right-hand side.

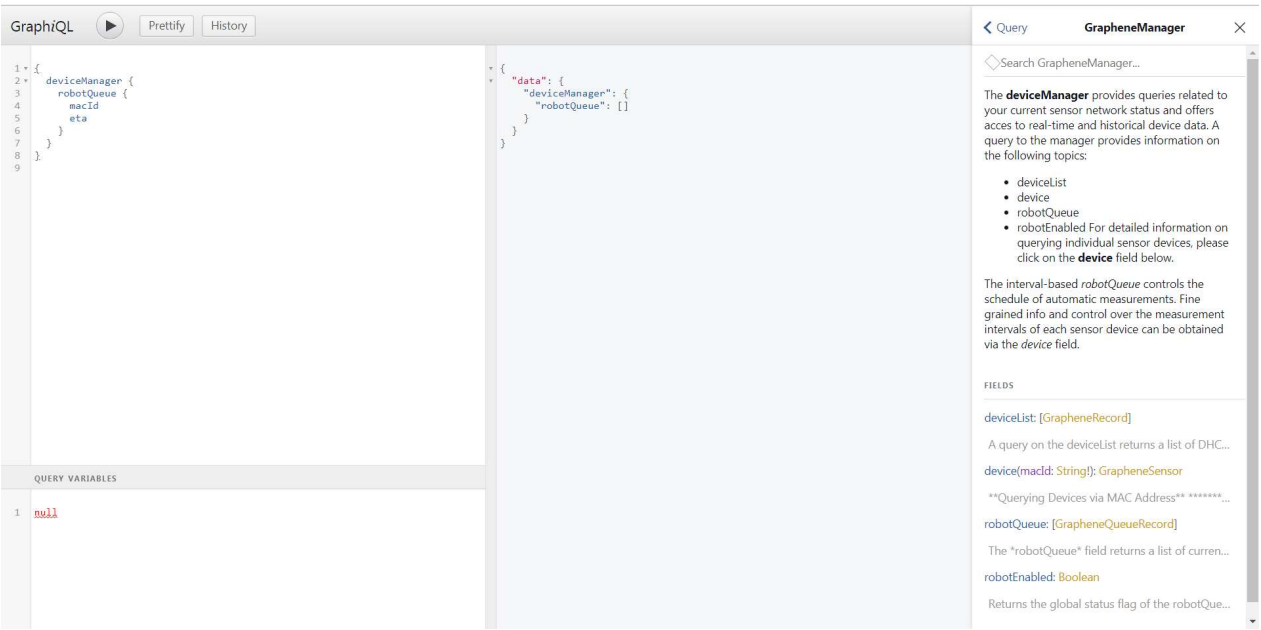


Figure 19: The iQunet graphical interactive in-browser GraphQL IDE (Integrated Development Environment)

Remark: it is also possible to use a client library to access the GraphQL Server. A list of all available GraphQL libraries can be found here: https://graphql.github.io/code/.

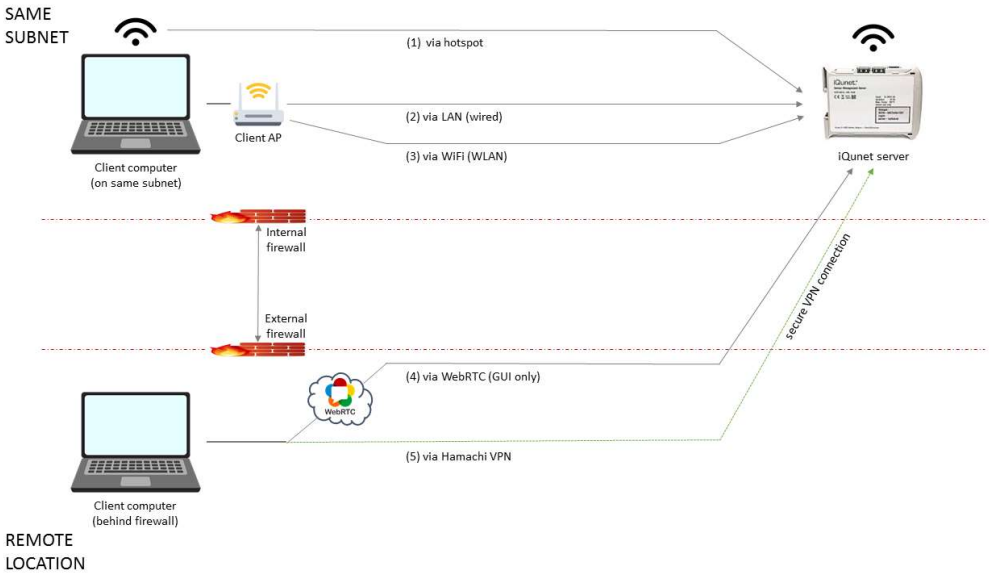
USER MANUAL

10. Connection to the iQunet Server

After connecting the iQunet Server to the 230V mains and if available to the network, there are several options to connect to the Server (see figure below):

1. Via WiFi hotspot (section 10.1). The IP address of the Server is always 192.168.42.1. An active network connection is optional.
2. Via local/direct access (LAN) where Server and client server are on the same subnet (section 10.2).
3. Via WiFi /WLAN (section 10.3). An active wireless network connection is required.
4. Via WebRTC (connect.iqunet.com). This only works for the Sensor Dashboard GUI. An active network connection is required. This procedure has already been described in section A.
5. Via Hamachi commercial VPN (section 10.4). An active Hamachi network is required.

Remark: section 10.5 describes which network connection (LAN, hotspot, or WiFi) takes precedence in connecting to the iQunet Server.



On all listening interfaces, the ports are fixed: 8000 for the Sensor Dashboard and GraphQL, 4840 for OPC UA, 9001 for the supervisor (pw: admin/admin) and port 22 for SSH.

10.1. Hotspot

10.1.1. Connect to hotspot

A WiFi hotspot is automatically created once the iQunet Server is connected to the 230V mains (even without connection to the network). A reboot of the server can be necessary if the hotspot does not become active immediately.

Remark: if the “Auto Off” option of the hotspot is enabled; the hotspot will only become active if there is no other active network connection available (wired or wireless). See section 10.1.2 for more info on the “Auto Off” mode.

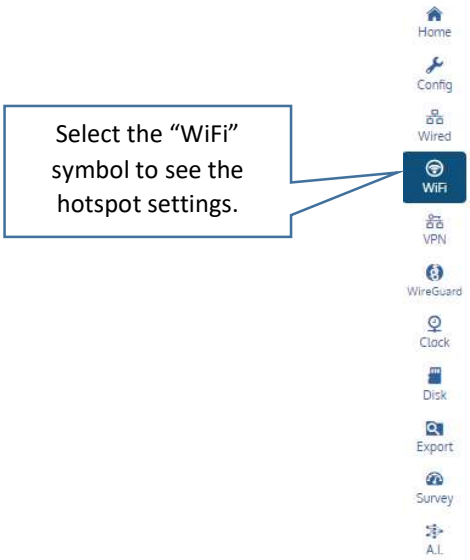
To use the hotspot’s WiFi network on your PC, select the hotspot in your network center (SERN-xxxxxxxxxxxx) and click Connect. The hotspot’s password is the Sensor Proxy ID (also used for the connection to WebRTC in section A). This ID is written on your iQunet Server (e.g., server-xxxxxxxx).

The IP address of the server is always 192.168.42.1. Once connected to the hotspot network, you can use this IP address to make a direct access connection to the server by browsing to http://192.168.42.1:8000/dashboard/app (see section 10.2 for more information). You can also use the server's IP address to set up an OPC UA client or to access the GraphQL APIs (see sections 9.1.1 and 9.4.2).

When the iQunet Server is connected to the network, you can also connect via WebRTC as explained in section A.

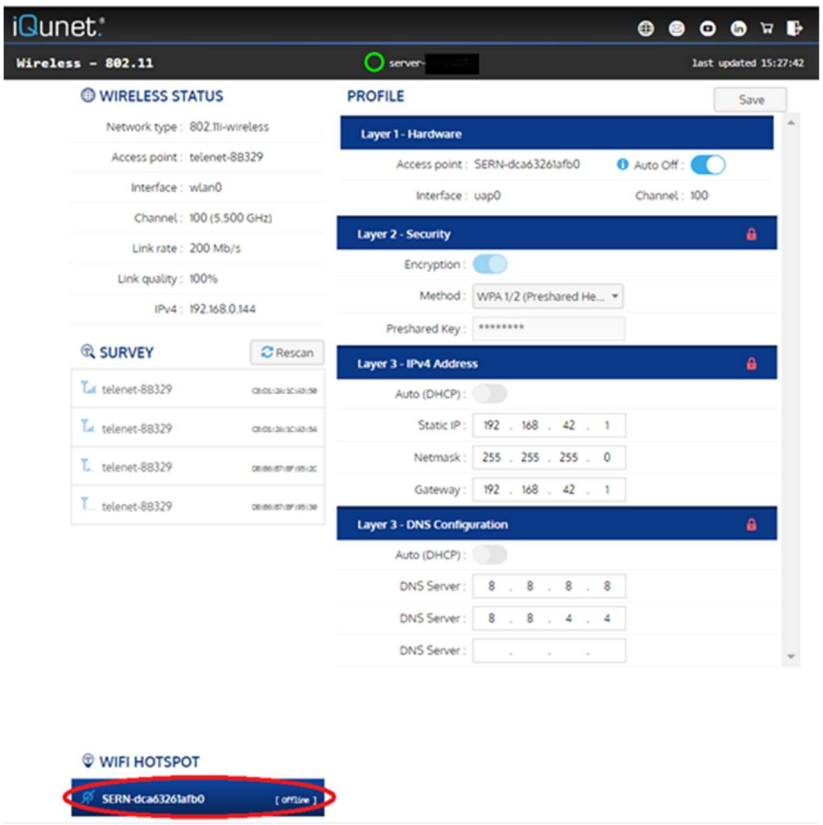
10.1.2. Turn off hotspot

Connect to the iQunet Sensor Dashboard via WebRTC (see section A) or via direct access (http://192.168.42.1:8000/dashboard/app). Open the "Wireless – 802.11" panel to see the hotspot settings by clicking on the "WiFi" symbol at the left-hand side on the Dashboard.



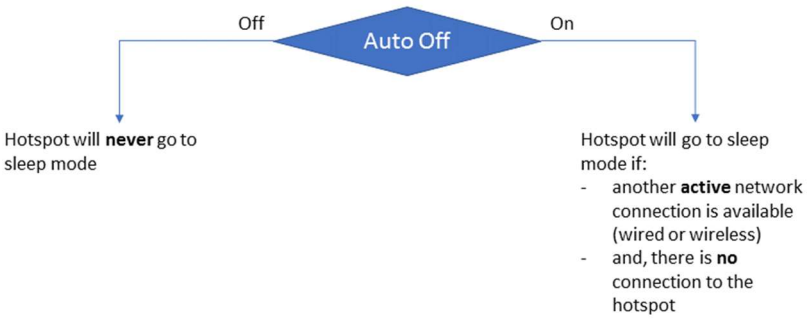
In the "WIFI HOTSPOT" section you can find the state of the hotspot (active/offline) and the hotspot's network name (SERN-xxxxxxxxxxxx). Click on the hotspot's name (SERN-xxxxxxxxxxxx) to see more details on the hotspot network.

USER MANUAL



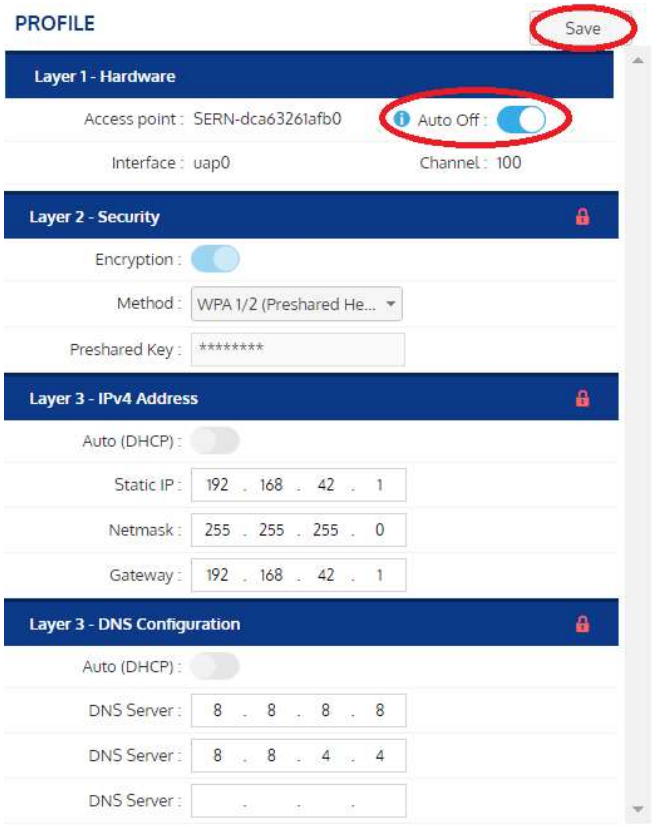
To turn off the hotspot, the user can activate the auto sleep mode of the hotspot by enabling “Auto Off” in the hardware layer. Slide the slider to the right and click the Save button in the upper right corner. When enabled, the hotspot will automatically turn off after maximum 10 minutes if another active wired or wireless network connection is available. If the other network connection drops down, the hotspot will become active again.

Important remark: the hotspot will not turn off when there is still someone connected to it.



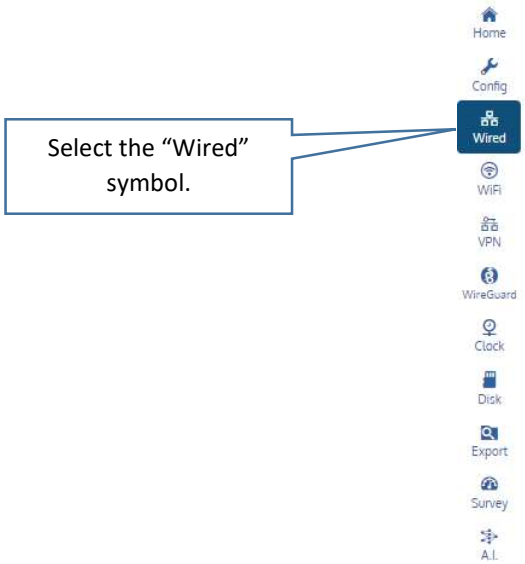
The other network settings shown below are not user adaptable.

USER MANUAL

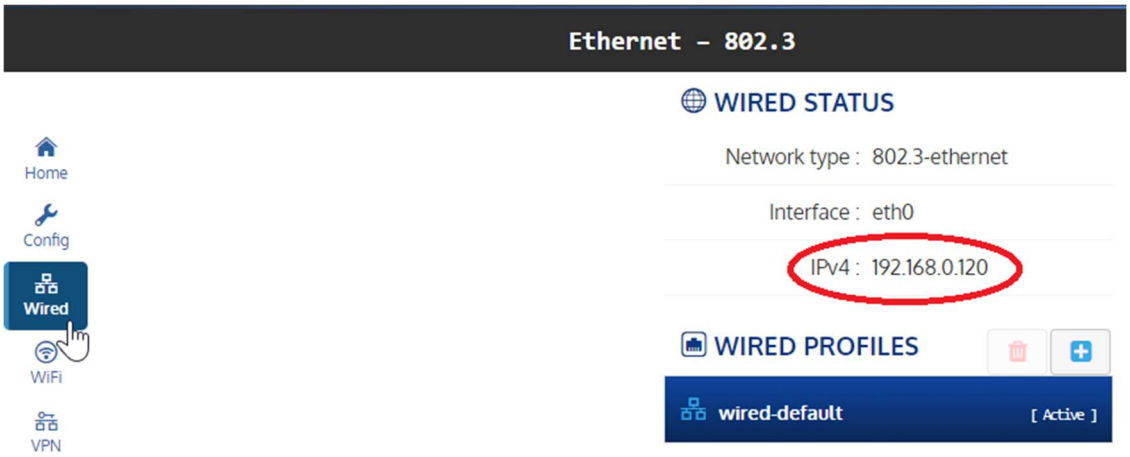


10.2. Direct Access setup (local access/intranet)

Open the “Ethernet – 802.3” panel by clicking on the “Wired” symbol on the left side.



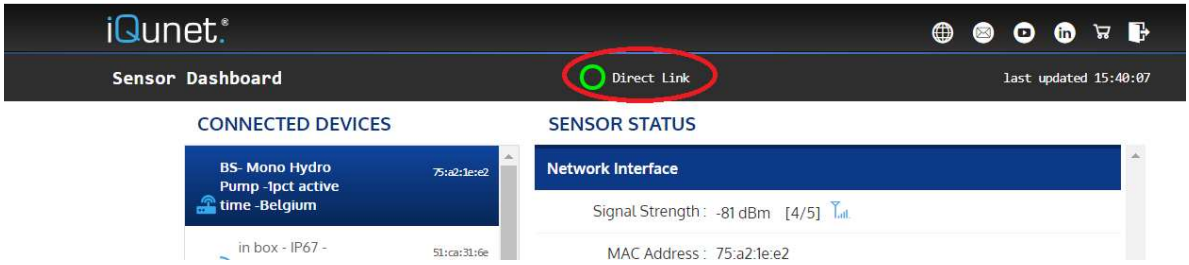
USER MANUAL



Copy the network IPv4 address of the running iQunet Server.

Copy the address into http://xxx.xxx.xxx.xxx:8000/dashboard/app and open it in your Chrome browser. From a computer in the SAME network and subnetwork you will now have direct access to the iQunet Server.

If the connection is established, "Direct Link" will appear next to the green circle instead of the server's name "server-xxxxxxxx".



10.3. WIFI setup

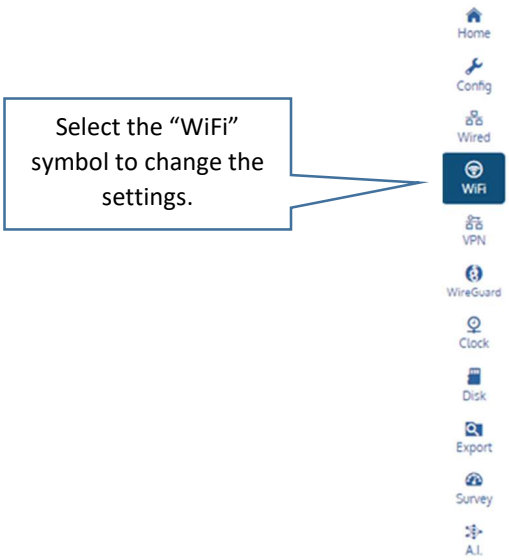
Important remark 1: you can either use the hotspot functionality (a wired internet connection is not required) or a wired connection to the internet (either via a network in the neighborhood, or via a wired mobile MiFi connection) to establish the wireless connection. The wired connection can be disconnected once the Wi-Fi connection is established.

Important remark 2: if you are using multiple simultaneous connections, the Ethernet interface will have precedence over the Wi-Fi interface. The Ethernet interface is the preferred connection. The Wi-Fi interface can be used if Ethernet is not available.

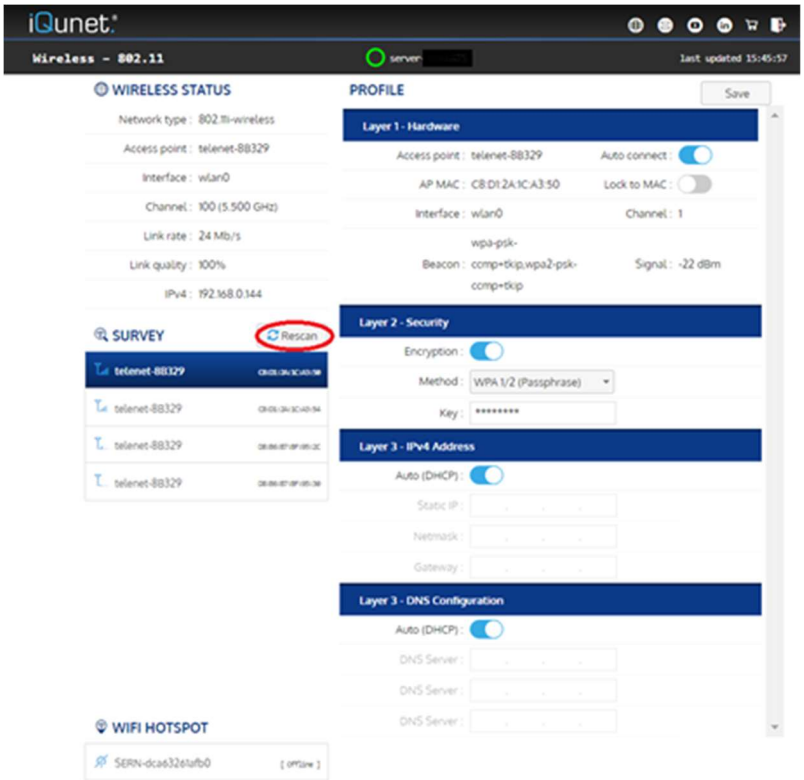
Browse to the iQunet Sensor Dashboard via WebRTC (see section A) or via direct access to the hotspot (http://192.168.42.1:8000/dashboard/app). For more information on the connection to the hotspot see section 10.1.1.

USER MANUAL

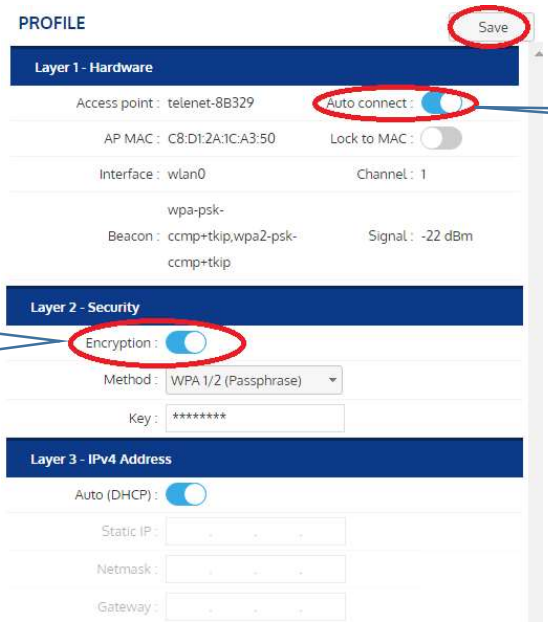
Open the “Wireless – 802.11” settings by clicking on the “WiFi” symbol on the left side.



Rescan for wireless networks in the “SURVEY” section. Select the wireless network you want to connect with. Enable the encryption.



USER MANUAL



Enable Auto connect.

Enable Encryption and select the used encryption method. Fill in the password key (and the identity) of the network.

Now press the “Save” button on top of the pane.

Enable the “Auto Off” option of the hotspot in the “Wireless – 802.11” control panel so the hotspot will be disabled immediately when a Wi-Fi connection is detected (see section 10.1.2 for more information on how to turn off the hotspot).

If you are using a wired connection, disconnect the Ethernet cable.

Put the iQunet Server with the connected Base Station on the desired spot in reach of the selected Wi-Fi network.

10.4. VPN

10.4.1. Hamachi VPN

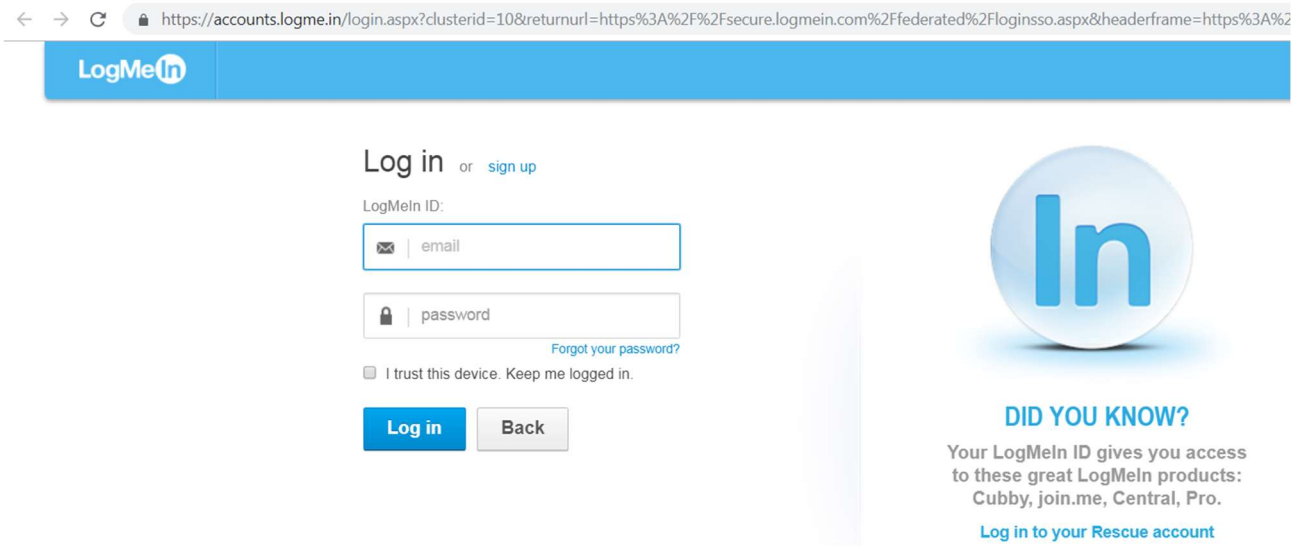
In the “Hamachi – VPN” section you can join an existing Hamachi VPN network.

Open the “Hamachi - VPN” panel by clicking on the “VPN” symbol on the left side.

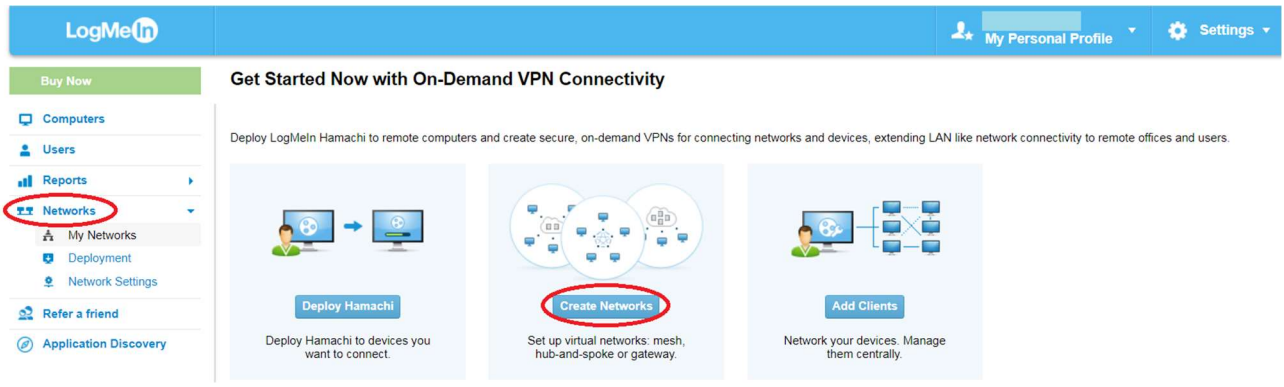
Select the “VPN” symbol.

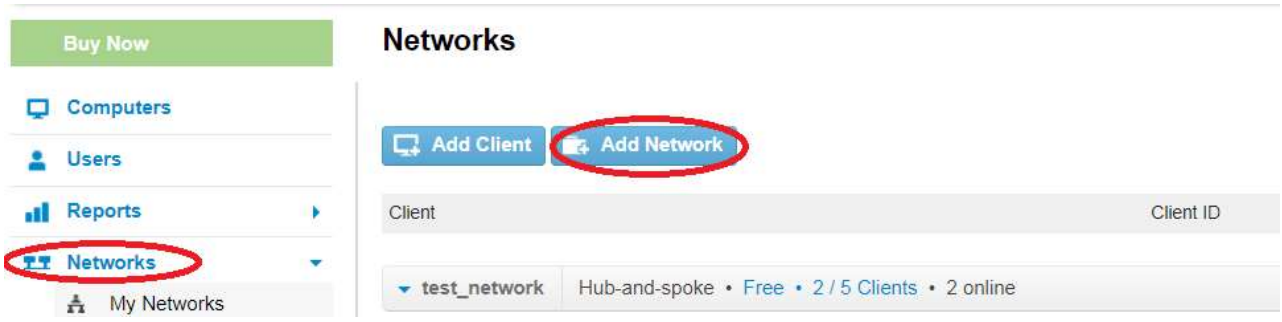
USER MANUAL

To create a Hamachi VPN network, browse to https://secure.logmein.com/central/Central.aspx and create an account or log in with your account credentials.



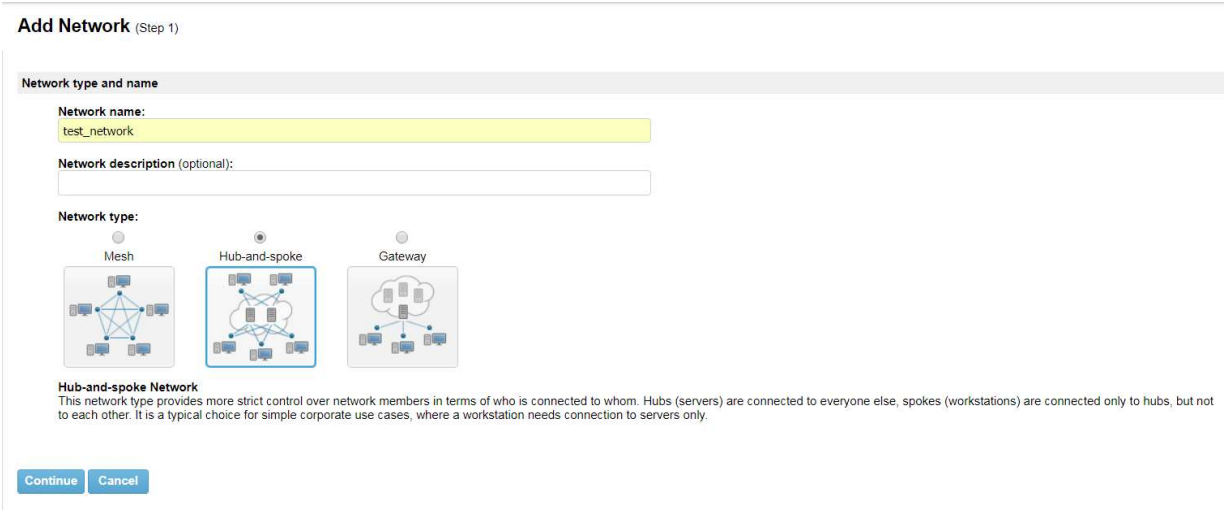
Go to the Networks section and click on “Create Networks” if this is the first network you create or “Add Network” for the following networks.



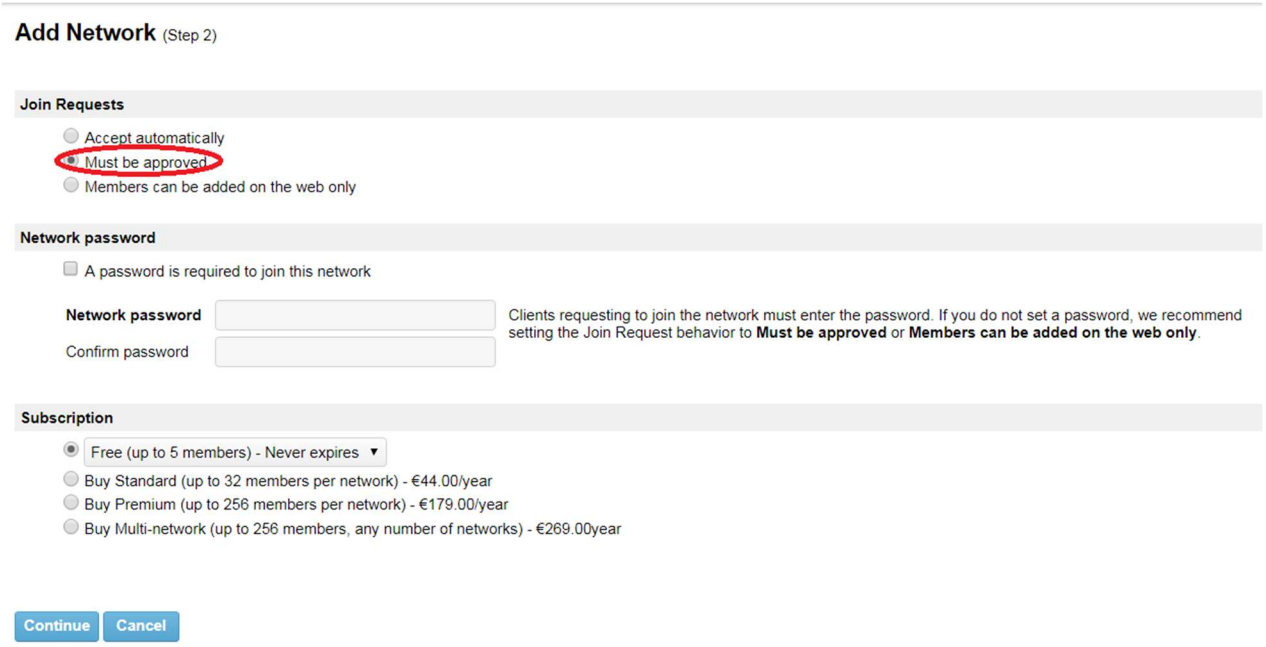


USER MANUAL

Fill out the network name. Select “Hub-and-spoke” as the network type and click Continue.

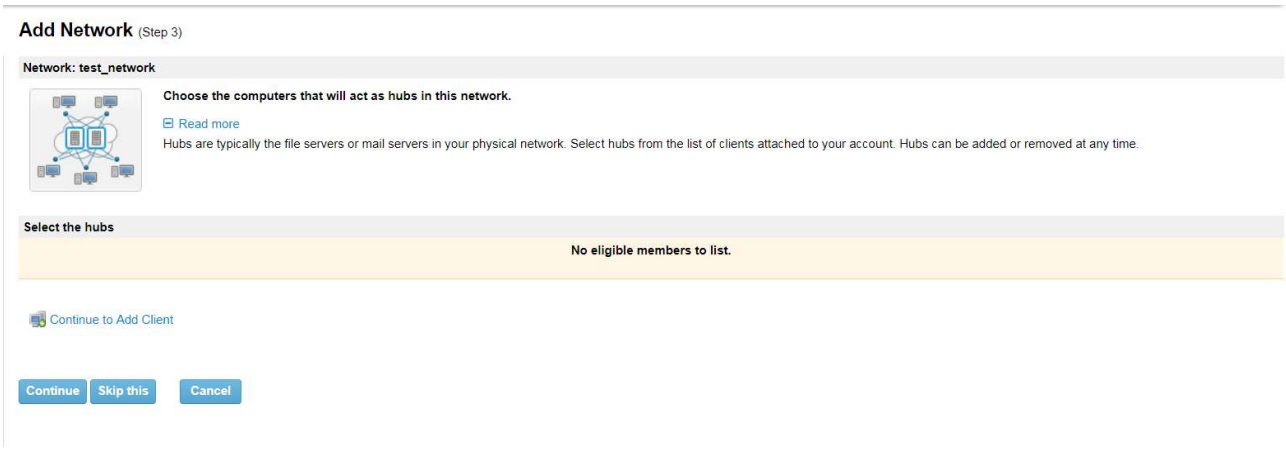


Check the “Must be approved” option in the “Join Requests” section and click Continue.

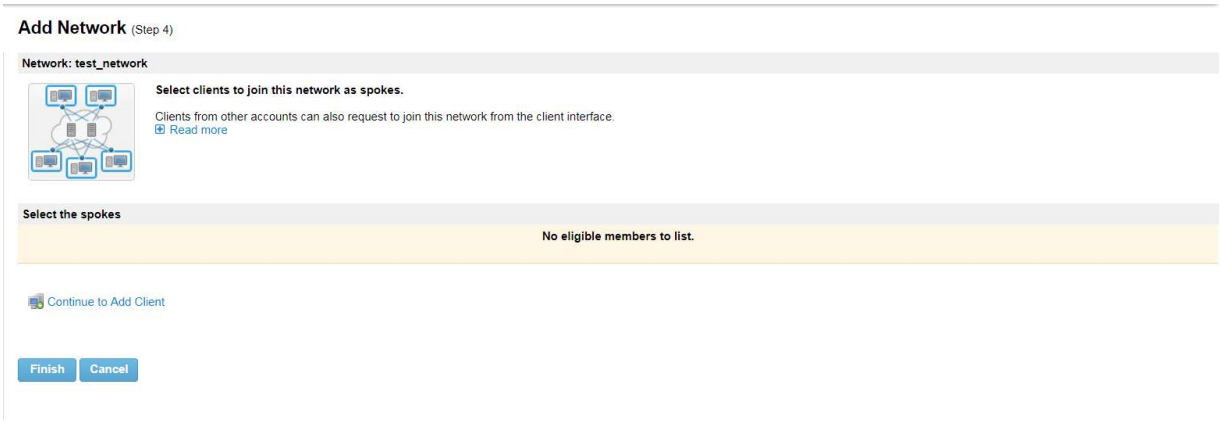


USER MANUAL

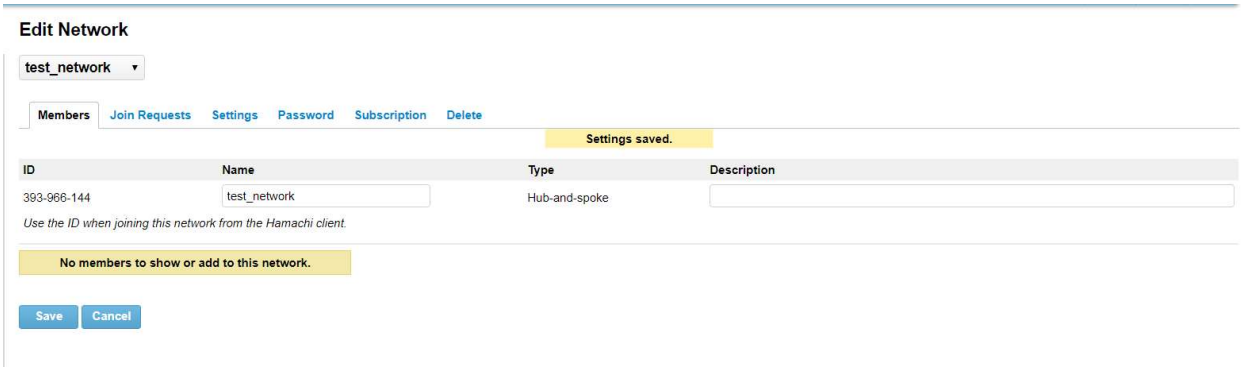
Click Continue.



Click Finish.

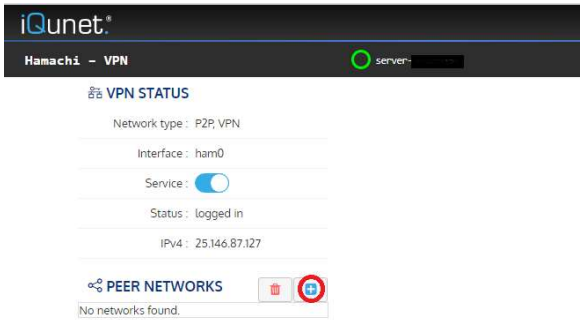


Your VPN network is now created. You can find the ID by editing the network.

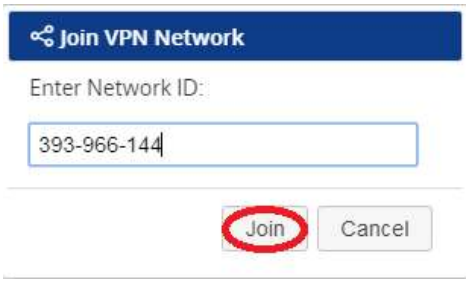


USER MANUAL

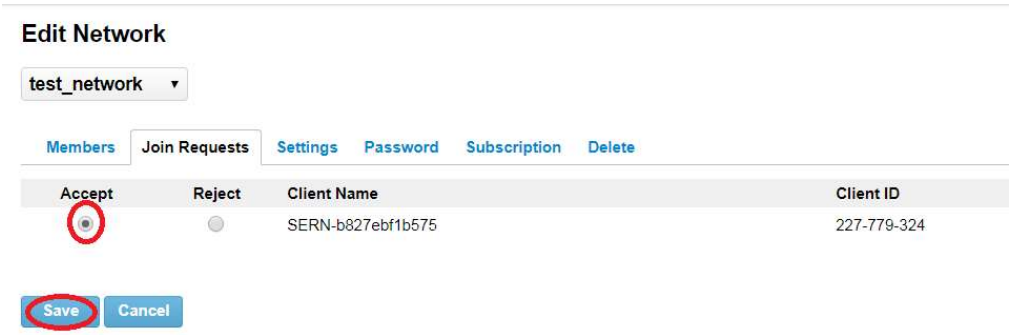
Add the VPN network in the iQunet Sensor Dashboard by clicking the plus sign in the “Hamachi – VPN” panel.



Enter the network ID and click the Join button.

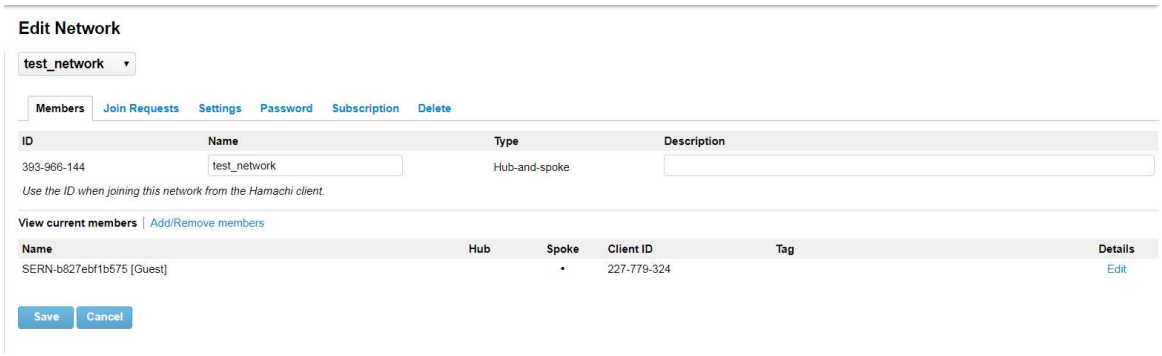


Go back to the Hamachi Logmein website and accept the iQunet Server as a client in the “Join Requests” section of the created network.



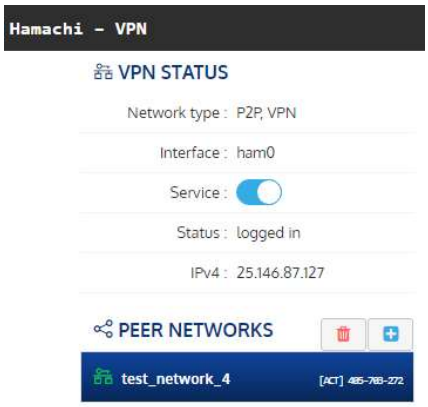
USER MANUAL

The iQunet Server will now appear in the Members section of the VPN network.

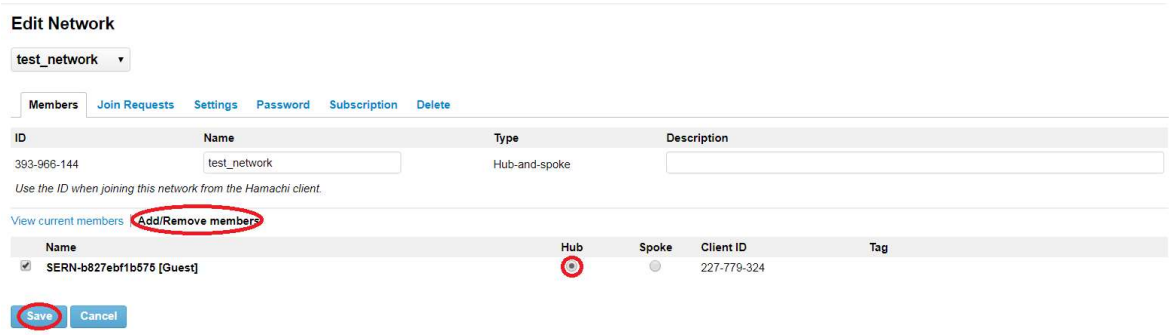


Reselect the "VPN" symbol on the left side in the iQunet Sensor Dashboard and the VPN network will appear in the list of peer networks.

Remark: the list of peer networks is not updated automatically since Hamachi doesn't provide any sign or warning when changes have been applied. For this reason, you need to reopen the "Hamachi -VPN" panel to update the list of peer networks.



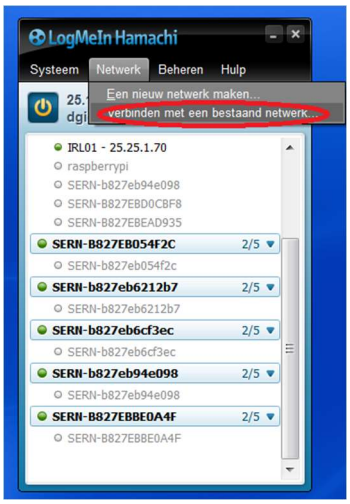
Set the SERN-xxxxxxxxxxxx to act as a hub on the Logmein web page by clicking on "Add/Remove members". Check the Hub box and press Save.



USER MANUAL

You now need to add your personal computer to this network. Download the Logmein Hamachi software from www.vpn.net.

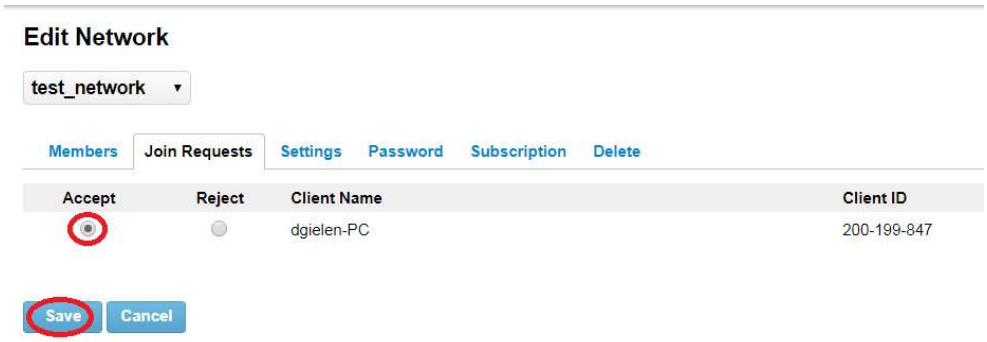
Open the software and click on the Network tab. Select “Join an existing network”.



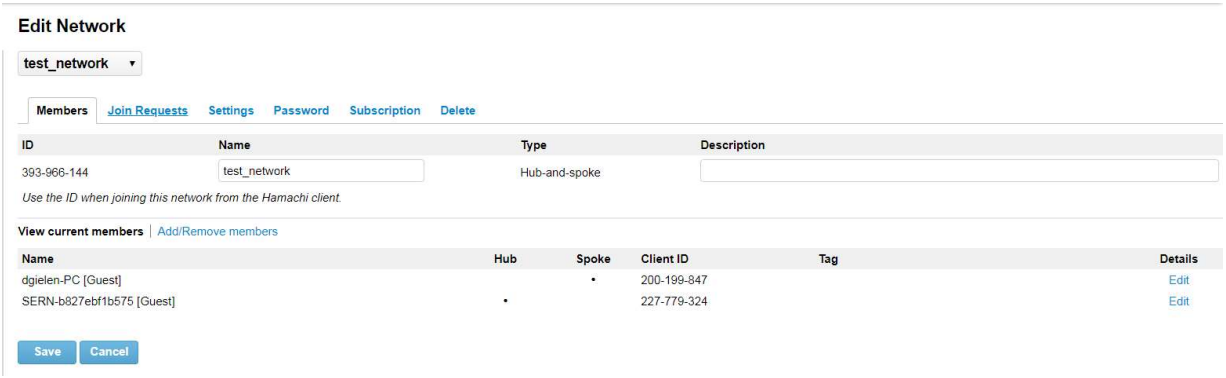
Fill out the network ID and click Connect. Confirm that you want to ask for membership.

USER MANUAL

Accept your PC as a client in the Join Requests section on the Logmein page and click Save.



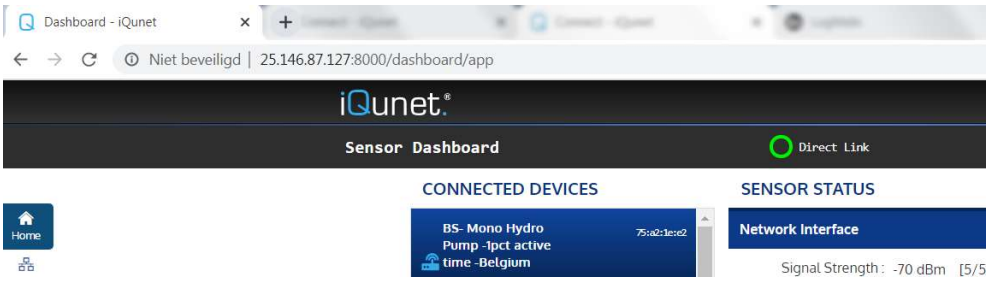
Now both your PC and the iQunet Server should be in the list of network members. Make sure that the iQunet Server is listed as a hub.



You can find the IP address of this VPN network in the “Hamachi – VPN” control panel. You can now use this IP address instead of the IP address listed at “Ethernet – 802.3” to for example make a direct access connection or connect with UA Expert.

USER MANUAL

Copy the IP address into http://xxx.xxx.xxx.xxx:8000/dashboard/app and open it in your browser. You will now get a direct link to the iQunet Server.



10.4.2. WireGuard VPN (as from software version 1.9.4)

WireGuard® is an extremely simple fast and modern Virtual Private Network (VPN) that utilizes state-of-the-art cryptography. WireGuard is designed as a general-purpose VPN for running on embedded interfaces and super computers alike, fit for many different circumstances. A WireGuard VPN connection is made simply by exchanging public keys – exactly like exchanging SSH keys – and all the rest is transparently handled by WireGuard (see https://www.wireguard.com/ for more information).

iQunet runs a WireGuard server (wg-server in Figure 20) for demo purposes.
Please contact your local IT department for setting up your own Wireguard VPN-Endpoint server (see https://github.com/linuxserver/docker-wireguard for all details).

To be able to communicate over the WireGuard VPN tunnel interface, both your iQunet Server and your PC need to be configured as a WireGuard VPN client (see Figure 20 for the WireGuard architecture). This configuration is done as shown in section 10.4.2.1 for the iQunet Server and section 10.4.2.2 for the PC.

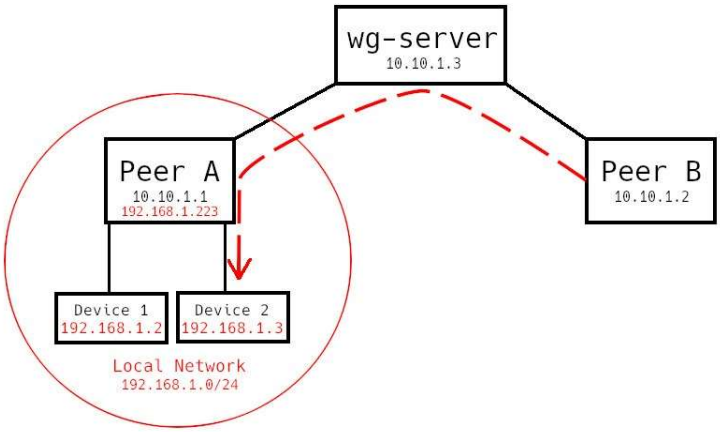
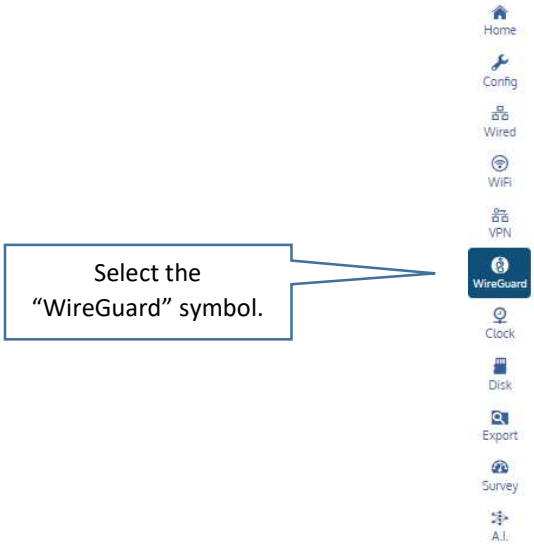


Figure 20: WireGuard VPN architecture

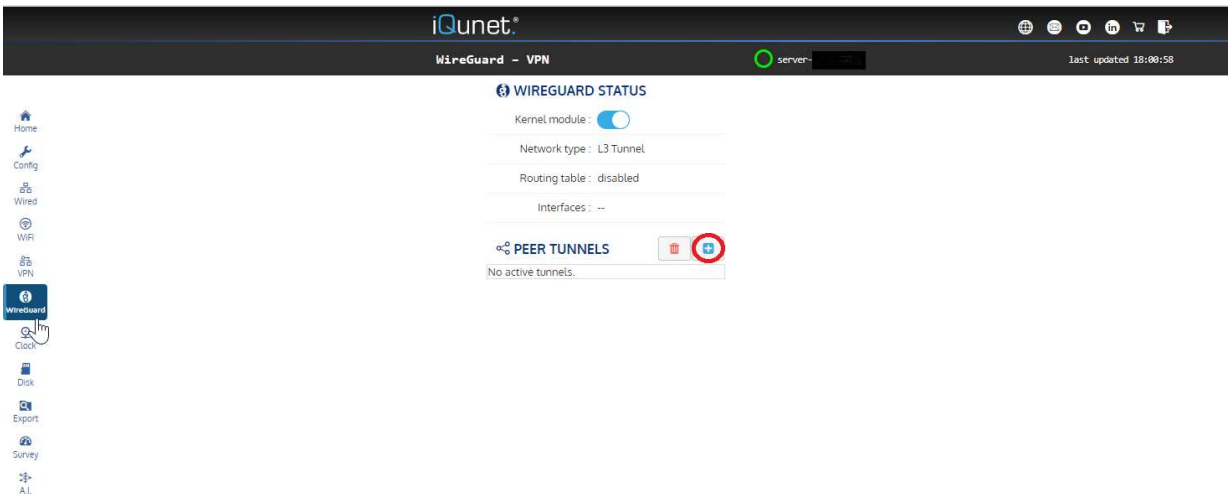
USER MANUAL

10.4.2.1. Configure your iQunet Server as a WireGuard peer

In the “WireGuard – VPN” section you can configure the iQunet Server to act as a peer (client). Open the “WireGuard - VPN” panel by clicking on the “WireGuard” symbol on the left side.



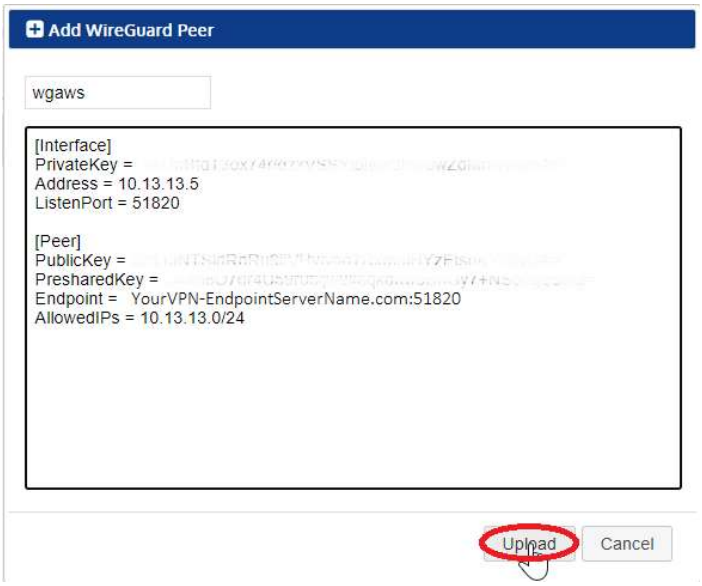
Click on the plus icon in the “Peer Tunnels” section.



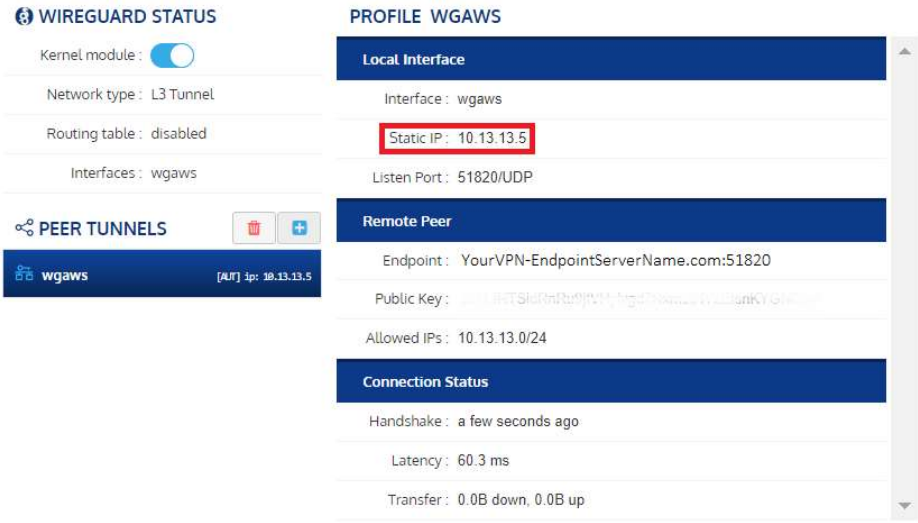
USER MANUAL

Set up your iQunet Server to act as a WireGuard peer by filling out the configuration details and clicking on “Upload”.

Remark: “YourVPN-EndpointServerName.com” is an example only. Remember to change this “YourVPN-EndpointServerName.com” name to the endpoint of your own VPN server and to fill out the public/private key pair generated by your VPN server.



You can now find the IP address and the other configuration details of the added iQunet Server peer in the “Profile” section at the right side.



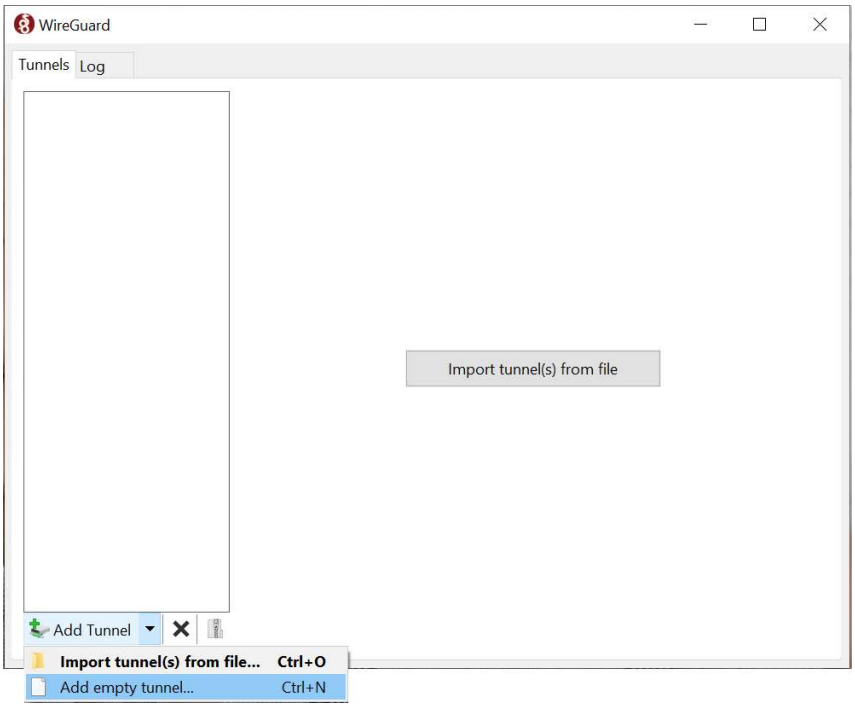
10.4.2.2. Configure your PC as a WireGuard peer

Install the WireGuard application from https://www.wireguard.com/install/.

Open the application.

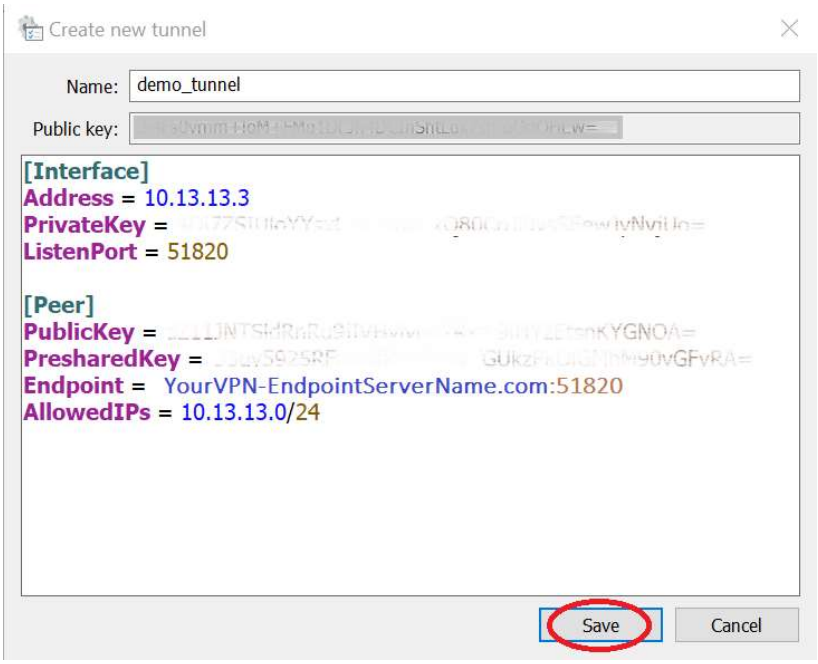
USER MANUAL

Click on “Add empty tunnel…”.



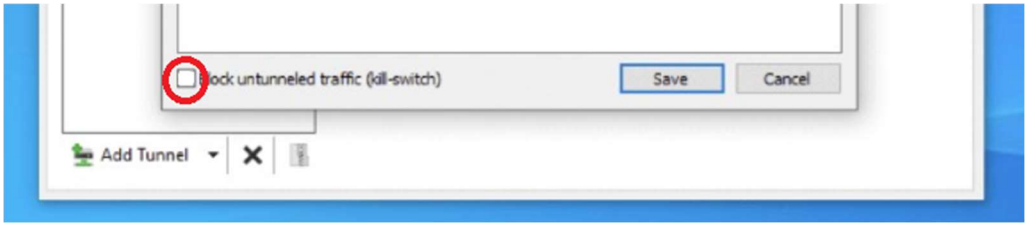
Fill out the configuration details.

Remark: “YourVPN-EndpointServerName.com” is an example only. Remember to change this “YourVPN-EndpointServerName.com” name to the endpoint of your own VPN server and to fill out the public/private key pair generated by your VPN server.

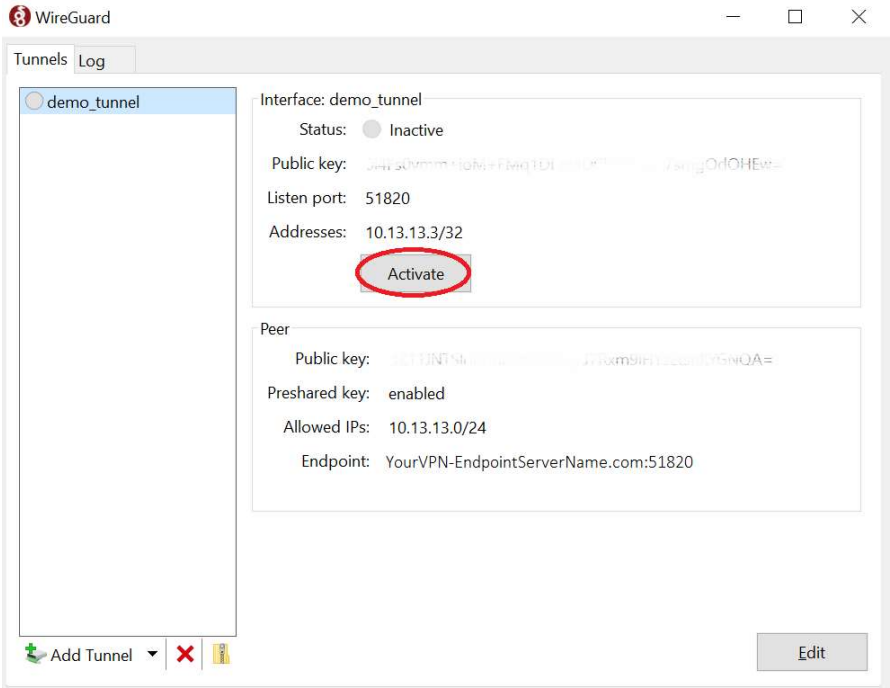


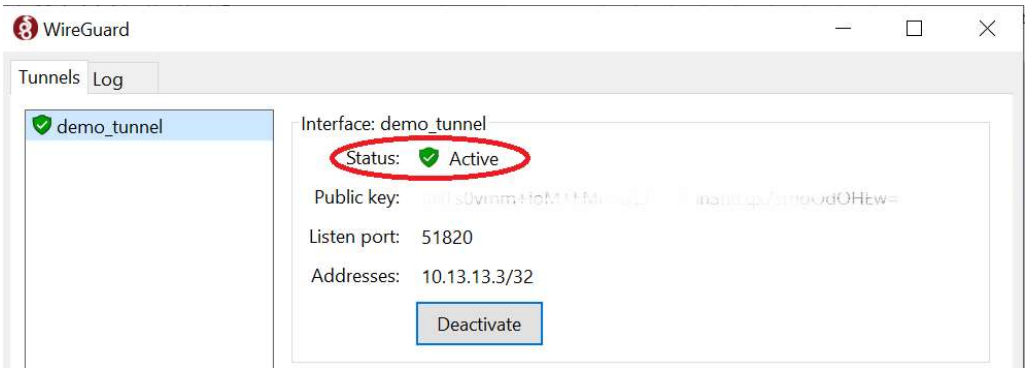
USER MANUAL

If the “Block untunneled traffic (kill-switch)” checkbox is available, make sure to leave this unchecked because the iQunet Server is only acting as a gateway for internet traffic to the 10.13.13.0/24 range and not for all internet traffic coming from the PC.



Click “Save”.
Click on “Activate” and check that the connection to the WireGuard VPN interface has been activated.

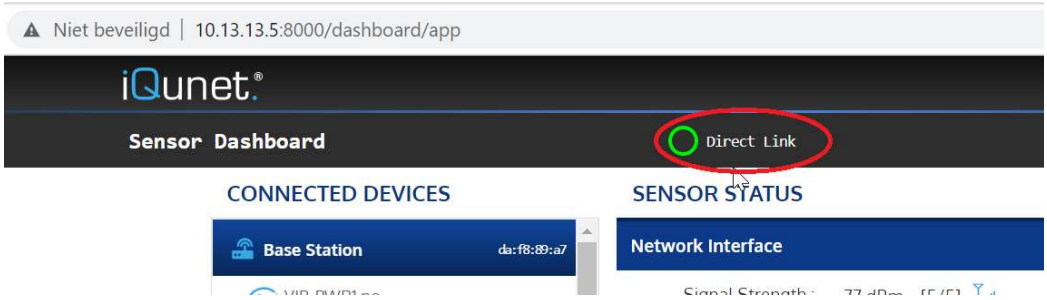




USER MANUAL

10.4.2.3. Test the WireGuard VPN interface

Copy the IP address from section 10.4.2.1 into http://xxx.xxx.xxx.xxx:8000/dashboard/app and open it in your browser. You will now get a direct link to the iQunet Server.



10.5. Preferred connections of the iQunet Server

The flowchart below shows which connection to the iQunet Server will take precedence if several connection types are used simultaneously.

a) If there is a cabled LAN connection available, the cabled LAN connection will take precedence. The Wi-Fi connection and the Wi-Fi hotspot connection will not become active.
Remark: the Wi-Fi connection can however co-exist next to the cabled LAN connection. The Wi-Fi connection will not become active, but you can scan for wireless networks in the Sensor Dashboard, fill out the Wi-Fi connection details and turn on the "Auto connect" slider while connected via LAN (see section 10.3 for more information on how to activate a Wi-Fi connection). In the "Wireless – 802.11" pane you can see that the Wi-Fi connection has an IPv4 address, but this IP address cannot be used since the Server is working via the preferred LAN connection.

b) If there is no LAN connection available (cable is unplugged), the Wi-Fi connection is the preferred connection. For the Wi-Fi connection to become active, an active Wi-Fi connection must be available and the "Auto connect" slider in the "Wireless – 802.11" pane needs to be set up to connect to one of the scanned Wi-Fi networks (see section 10.3 for more information on how to activate a Wi-Fi connection). The hotspot connection will not become active.
Remark: the LAN connection will show "unplugged" in the Sensor Dashboard in the "Ethernet - 802.3" pane instead of the IPv4 address.

c) If there is no LAN or Wi-Fi connection available and/or the Wi-Fi auto connect slider is turned off, the hotspot will wait for **60 seconds** for still another connection to pop up. If no other connection becomes active, the hotspot (SERN-xxxxxxxxx) will become active and will appear in your list of available Wi-Fi connections on your PC/phone. You can connect to the hotspot as described in section 10.1.

USER MANUAL

Remark: we strongly advice to turn the hotspot's "Auto Off" slider on (blue). When there is a LAN or Wi-Fi connection available, the hotspot will turn off and the Server will switch back to a LAN or Wi-Fi connection.