

VIBESIGHT

Vibe-Sight_{HS} High Speed User Manual



VS700HS01

8/1/23

Contents

1.0 Introduction	1
2.0 What's New with Vibe-Sight	2
3.0 Vibe-Sight Components	2
4.0 Getting Started	3
4.1 Sensor Installation	4
4.2 DXMR90 Gateway	5
5.0 Using the Screens	6
5.1 Main Screen	6
5.1.1 Real Time Monitoring	6
5.1.2 Vibration and Temp Display	6
5.1.3 Health Halo (Predictive Health Display)	7
5.1.4 Visualization of Data	7
5.1.5 System Date and Time	7
5.1.6 System Operation Information	8
5.1.7 Navigation Buttons	8
5.1.8 Calling Device Status Screens	9
5.2 Node / Device Status Screen	9
5.2.1 Alarm Display	10
5.2.2 Real Time Visualization	10
5.2.3 Device Configuration	11
5.2.4 Real Time Trend Charts	12
5.2.5 Node Number and Name	14
5.2.6 Navigation Buttons	14
5.3 Node / Device Configuration Screen	15
5.3.1 Node Setpoints	15
5.3.2 Vibration Class Setup	18
5.3.3 Auto Calc. Sample Time	19
5.3.4 Sensor Selection	19
5.3.5 Dynamic Tracking	19
5.3.6 Reset Tracking Data	20
5.3.7 Temp. In Health Calculation	20
5.3.8 Startup Delay	20
5.3.9 Return to Node / Device Status	20
5.4 Alarms Screen	21
5.5 System Configuration Screen	22
5.5.1 LAN Connection Display	22
5.5.2 Standard Vibration Setpoints	23
5.5.3 Global Defaults	23
5.5.4 Polling Time	25
5.5.5 Summary Main Screen	25
5.5.6 Startup Delay	25
5.5.7 Screen Saver Time	25
5.5.8 Go To Scheduling	25
5.5.9 Go to Driver Settings	26
5.5.10 Go To User Administration	26
5.5.11 Return to Main Screen	26

5.6	Scheduling Setup	26
5.6.1	Schedule Daily Health Calculation & Trending	27
5.6.2	Schedule Block Trending Monitoring & Alarms	27
5.6.3	Manual Blocking	27
5.6.4	Indication of Blocking	27
5.7	Driver Settings	28
5.8	User Administration	28
5.8.1	Current Login	28
5.8.2	Login	28
5.8.3	Logout	29
5.8.4	Add New Account	29
5.8.5	Delete Account	29
5.8.6	Set Privilege	29
5.8.7	Set Password	30
5.9	Summary Screen	30
5.10	System Validation Code	31
6.0	Adding in a Sensor	31
7.0	Determining Setpoints	32
8.0	Using Statistics for Auto Setpoints and Health	33
9.0	Dynamic Tracking	33
10.0	Remote Viewing of Vibe-Sight Screens	35
10.1	cMT Viewer	35
10.2	Built in WebView	36
11.0	Remote Connection to Vibe-Sight Via Tosibox	37
11.1	Default Connections	36
11.1.1	Connect Directly to the Lock-175's LAN	36
11.1.2	Tosibox WIFI as a Client to your Guest Account	37
11.1.3	Tosibox Lock-175 with Cellular Network	37
11.2	How Does Tosibox Work?	38
 ADDENDUMS		
1.0	Setting up the 2nd LAN Port on the cMT-FHD	41
1.1	Vibe-Sight to MES network	41
1.2	Configure LAN Ports	41
1.2.1	Via cMT	41
1.2.2	Via Easy Web	44
2.0	Introduction to Tosibox	45
2.1	Minimum Setup	45
2.2	Adding Additional Personnel (keys)	45
2.3	Adding additional sites (Locks)	45
2.4	What Happens if You Lose Your Master Key?	45
2.5	Types of Lock Connections	46
2.6	How does this work?	47
2.7	Excerpt from Tosibox's Security Paper	48
2.8	Simultaneous Connections	48
3.0	Setting Tosibox up as a WIFI Client	49
4.0	Vibe-Sight Edge Server	53
4.1	Connection Via Same LAN	53
4.2	Connection Via Tosibox VPN Tunnel	54

4.3 Parameters List	56
4.4 External Vibration / Temperature Data	56
5.0 EULA	57
4.0 Important Links	58



Vibe-Sight_{HS} User Manual

1. Introduction:

The Vibe-Sight_{HS} Predictive maintenance appliance gives you both **High-Speed, Real-Time Trouble Shooting** and **On-Board Predictive Maintenance**. All analytics, charts and reports are located on Vibe-Sight, not in the cloud.



The VS700HS is set up to monitor 6 different devices, whether they are motors, bearings, or machine assemblies. The High-Speed configuration uses the Banner DXMR90 Controller along with their hard-wired Modbus Sensors. These sensors are automatically set to scan every 3 seconds. Vibe-Sight_{HS} can be upgraded in groups of 6 up to a total of 18 Devices.

All Data gathering, displays and charts are preconfigured. Out of the box, all you have to do is connect the Vibe-Sight to power, place your Vibration sensors on their respective sensing points and connect them to their respective ports on the DXMR90 (more on this later). The Vibe-Sight unit is set to start monitoring up to 6 sensor nodes with Z axis and X axis vibration along with Temperature. Once the Vibration Nodes are mounted and connected you will need to set the Vibration Levels. **By default**, Vibe-Sight is set to **automatically calculate** this for you.

The Big difference between Vibe-Sight and other predictive maintenance systems, is that it combines both Real Time Monitoring and Alarming for Day-to-Day Maintenance, along with on board predictive analytics and provides you with **Device Health** for Maintenance planning. Additionally, Long term Trending and Regression lines help you to visually determine the condition of your systems. All this is done "In the Box" without additional programming or Integration. **Vibe-Sight does not require a cloud connection or cloud subscriptions or additional programming.**

Graphics:

All Vibe-Sights graphics are displayed on the HMI. Just tap the display to navigate the screens.



Remote Viewing:

Vibe-Sight also allows up to 4 simultaneous remote connections in conjunction to the HMI Screen. These remote connections are independent of each other and the main display.

Remote Connectivity and Edge Gateway:

While all you need to get going is contained in the Vibe-Sight_{HS} unit, you may wish to allow remote access to screens or pass data to Control or MES devices. Vibe-Sight has a Modbus Edge Gateway to directly pass pertinent data to these Devices. Using a Tosibox cybersecurity router, Vibe-Sight allows you to connect, either through direct connection to its internal Ethernet LAN, or Tosibox can act as a layer 3 router and connect to your Plant Network. Additionally, Vibe-Sight can act either as a Secure WIFI Access Point or Client and connect to your Plant Wireless system. (More on this later)

Modifications:

While you may never want to do any modification or programming to Vibe-Sight, you **are allowed** to do so. We chose to use of the Quad Core Maple Systems cMT3072XH HMI as its Data Analytics Engine instead of a custom programming environment. This gives you the ability to customize the Graphical interface and Data Flow to match your needs and easily pass data to PLC's and Management Systems. The cMT HMI's are programmed via Maples "Easy Builder Pro software."

2. What's New with Vibe-Sight_{HS}:

1. A Tosibox Lock-175 with Cellular Radio has replaced the old Lock-150. (Optional)
2. External connectors have been upgraded to Tripp-Lite IP66 rated connectors, with available (Optional) sealed interface cables for Ethernet connection and M12 D-Coded cables for device connection. M12 A-Coded connectors allow for DXM power connectivity.
3. Vibe-Sight's user Interface has been modified to allow external sensing devices to be monitored in addition to the Banner nodes and sensors normally used in Vibe-Sight.
4. True predictive analytics with a Device Health Indicator.
5. Automatic calculation of Alarm Condition and Run Condition Setpoints
6. Dynamic Tracking of Event Conditions allow more accurate tracking of Bearing Failure.
7. New Easier to Read Graphics in the GUI.
8. Critical Faults can be transmitted via Email

3. Vibe-Sight Components:

Fig 1
(External View)

- | | |
|-----------------------------|-----------------------------|
| 1. Ethernet Port | 4. M12 A-Code Serial / DC |
| 2. M12 D-Code Ethernet Port | 5. Vibe-Sight Engine / HMI |
| 3. 120 VAC Power Cord | 6. Banner DXMR90 Controller |

Internal Components:

1. Serial Breakout Board
2. Power Supply
3. Main Power Circuit Breaker
4. USB Memory for Data Logs

4. Getting Started:

Power: The Vibe-Sight_{HS} unit requires a 120VAC power source 3-amp minimum supply. A power cable is attached for your convenience.

Position your Sensors: and wire them back to the DXMR90 controller.

Plug in to the Ports: The port the sensor is plugged into on the DXMR90 predicates the device / node number on Vibe-Sight. Port 1 on the DXMR90 becomes port 1 on the Vibe-Sight screen. There is no need to pre-program the Sensor. Each Sensor will automatically be adjusted to a 3 second poll rate when it is plugged into the DXMR90. More on the DXMR90 latter.



Wire the DXMR90 to Vibe-Sight: The DXMR90 requires an M12 D-Coded ethernet cable and an M12 A-coded cable to be connected to Vibe-Sight. Plug the D-Code Ethernet cable into the D-Code receptacle on Vibe-Sight (Item 2 of figure 1). Plug the A-Code M12 Cable to either of the two serial ports on Vibe-Sight (Item 4 of figure 1).

Turn on the Circuit Breaker: Item 3, inside of Vibe-Sight.

4.1 Sensor Installation:

Step 1: Install the Sensor

Mounting and installing the vibration sensors on a motor are important for getting the most accurate readings. Sensors can be mounted using magnetic brackets, thermal transfer dual-sided tape, standard brackets epoxied directly to the motor, or standard brackets bolted directly to the motor.

The vibration sensors have an X and Z axis indication on the face of the sensor. The Z axis goes in a plane through the sensor while the X goes horizontally.

1. Install the sensor so that the X axis line is aligned with the motor shaft of the motor, or axially.
2. Install the sensor's Z axis into/through the motor. These can be swapped where the X axis is going into/through the motor and the Z axis is in line with the shaft of the motor if you are placing the sensing vertically for easier installation.
3. Install the sensor as close to the bearing of the motor as possible. Using a cover shroud or location far from the bearing may result in reduced accuracy or a reduced ability to detect certain vibration characteristics.

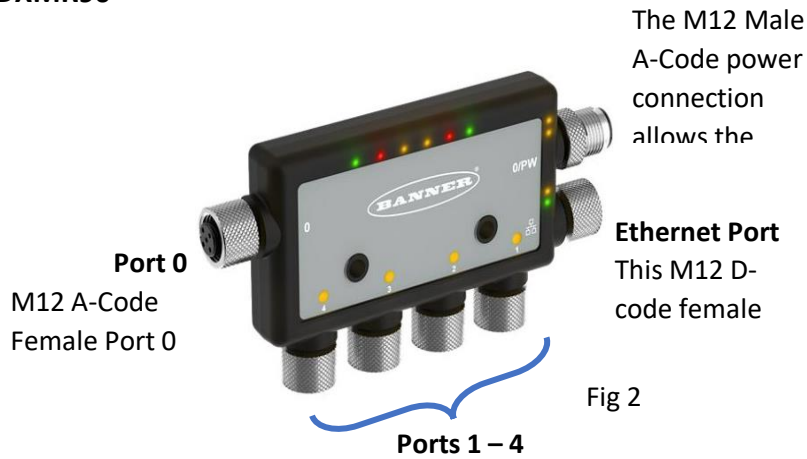


(Copied from Banner Engineering's Vibration Monitoring Solution Guide)

Mounting Brackets:

- Vibe-Sights Sensor Kits come with one QM30VT2 Sensor and a Magnetic mount Bracket. These can be ordered as a kit Vibe-Sight part number: VS105-1
- The Magnetic Mount bracket is a great way to mount the Sensor.
- If there is too much of a Radius and the bracket rocks back and forth or a more permanent solution is required, there is a Bracket that can be epoxied into place. This bracket is included in the QM30VT1 packaging.
- There is an additional magnetic bracket for curved surfaces this can be ordered optionally Banner Part Number BWA-BK-019. (Please see your Vibe-Sight Distributor, Integrator or VAR to order this product)
- Additionally, a stainless steel Sensor can be ordered. Part number: QM30VT2-SS and QM30VT2-SS-QP with a quick disconnect pig-tail. The bracket can be epoxied, bolted or welded in place depending on the environment and equipment.

4.2 DXMR90



Each M12 female A-code port is a stand separate Modbus Master Just plug in the sensor to the port. That's all you need to do.

1. The DXMR90 can be purchased as a kit with DXMR90 fully programmed with a mounting Bracket from Vibe-Sight. Part number: **VS-305-1**
2. A two pack of DXMR90's is also available, to allow all six sensors to be connected. Part number: **VS-305-1B**

4.3 Hardwired Serial connection of the M12 sensors.

This is **not allowed** on the High-Speed Vibe-Sight.

5. Using the Screens:

5.1 Main Screen:

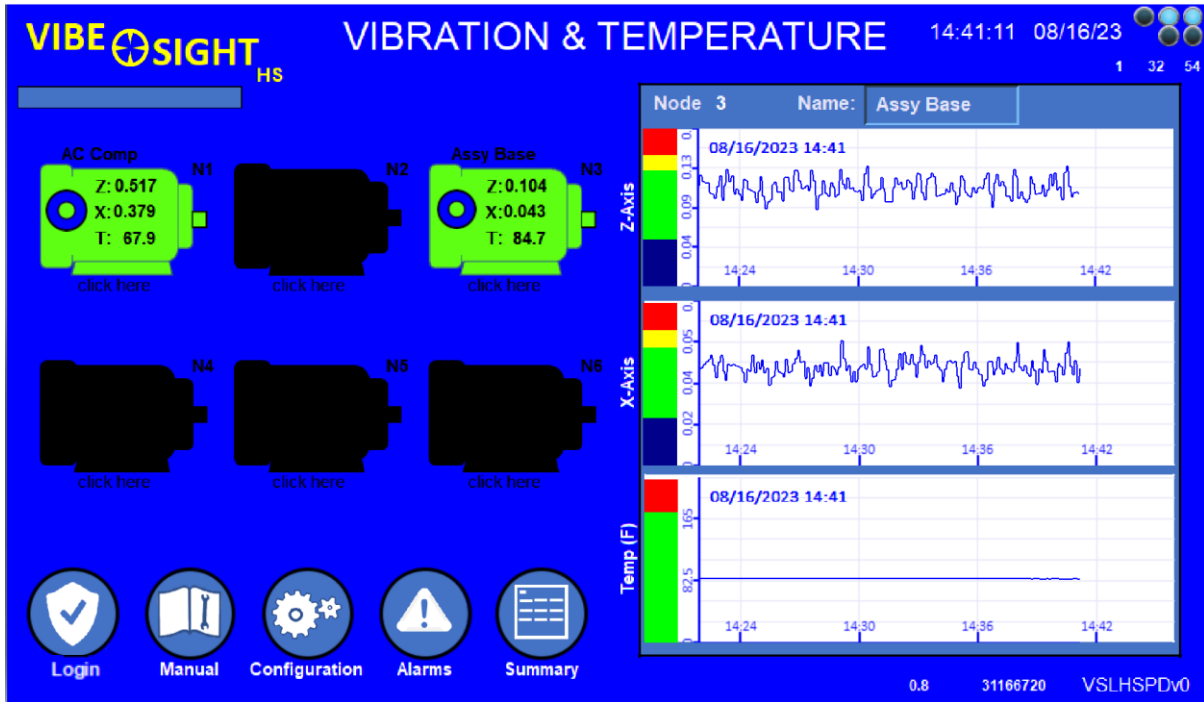
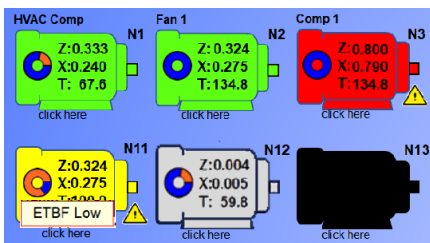


Fig 3

The primary reason for the Main Screen is to allow Realtime data for viewing the Health of your plant or system.

5.1.1 Real Time Monitoring:

Each Motor Icon displays the State of the Sensor Node (Device)



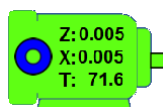
1. **Black** is a disconnected sensor
2. **Grey** is a connected device that is not Running
3. **Green** is a device that is Running
4. **Red** is a device that has exceeded its Vibration Set point.
5. **Yellow** is a device that has exceeded its Temp. Set point.
6. **Alarm State Icons** display for historical alarms

7. Each node displays the **Real Time Vibration** for both **Z** and **X** Axes and **Temperature**.

8. Each node is represented by its numerical node reference and an English Description or Nick-Name. This can be manually entered at any time.

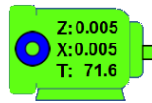
9. Clicking the node opens the Nodes information screen. (More on this later)

5.1.2 Vibration and Temp Display

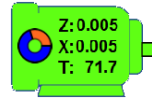


Real time **Z-axis** and **X-Axis** Vibration and Temperature are displayed on each of the devices. This will update every 4 seconds or less.

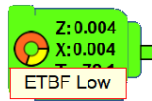
5.1.3 Health Halo (Predictive Health Display)



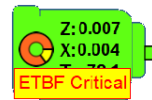
The full Blue Circle (Halo) depicts a perfectly Healthy System



You will see increasingly more red on the Health Halo as the device Health starts to decline. This is at 70% Health. This condition is not major but at 50% you should definitely look to see what the issues may be.

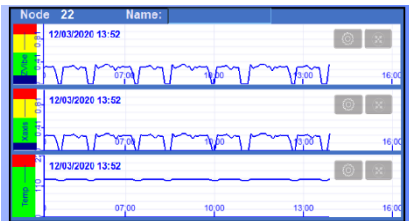


At 30% You really need to start scheduling an outage to see what is wrong. An ETBF (Estimated Time Before Failure) warning will be indicated. These show up in the alarm history and an Email will be generated



At 15% device failure is eminent. You need to service this device as soon as possible. An ETBF Critical alarm will be indicated. These show up in the alarm history and an Email will be generated.

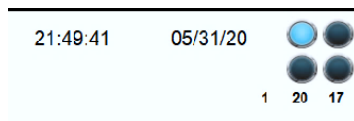
5.1.4 Visualization of Data:



A set of Trend Charts give you a visualization of Vibration Axis and Temperature for each bound node. The charts update to a new device every 6 seconds. The indicator bar colors indicate state levels of the data, **Blue** – Noise Floor (Off), **Green** – Operating Zone, **Yellow** – Warning Zone and **Red** - Critical Zone. The Axis with the highest vibration sets the max scaling.

5.1.5 System Data and Time:

The top right-hand corner gives us the System Date and Time displayed in 24-hour time.

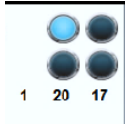


System date and time can be changed by clicking anywhere inside of the Date and Time area.



This opens up a Pop-up window which allows the setting of time and date directly from the graphical interface.

5.1.6 System Operation information:



The Icons at the top right give Vibe-Sight information at a glance on System Operation.

1. The top left Icon goes true (turns light blue) When there is an active connection to the Banner Gateway.
2. The Icon to its right goes true when data is being exchanged with the Gateway.
3. The Bottom two Icons display internal functions used while a node display is being generated. The sequence you will see is the Bottom left Icon goes true, then the bottom right icon goes true. When they both turn off the Node should be displayed.
4. The digits on the bottom Show system resources.
The left most display shows active remote connections to the system
The next display shows % of processor utilization
The final display on the right shown the total amount of memory used.

5.1.7 Navigation Buttons:

The Main Screen not only provides a complete real-time view of your system Health, it provides the launching point for all activities on the Vibe-Sight system.

The obvious points are the six buttons on the bottom right of the screen.



The Login Button opens a User Sign in Popup to allow you to sign in with your password. Select your Name or Group from the Dropdown list and enter your password. **Make sure to hit Enter** after entering the password or it will not be accepted when you press the Login button on the Popup.



The Manual Button allows you to open Vibe-Sight's Web based Manual. This can be achieved by either clicking the QSR code Icon displayed or scanning with a Phone or Tablet. (See Section NN)



The System Config button takes you to the System configuration page. Here you can set up the Global System settings for Vibe-Sight. Access to this is limited to Class C access privilege.

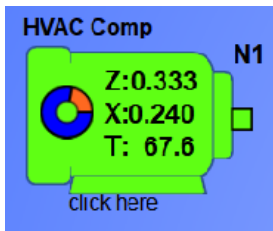


Alarms takes you to the Global Alarm Page. Here you can see alarms for every node. Access to this is limited to Class A access privilege.



The Summary Screen Button takes you to a Summary Display Screen that provides a simplified view of only the Sensors configured. This is the default Main Screen for Mobile Devices.

5.1.8 Calling Device Status Screens:



Clicking on any one of the Motor Icons for each Device will bring up the Device Status Screen for that device. While this screen provides real time data for each specific node, it is also the place where the Node is configured.

Real time data, Vibe Class, Running Setpoints, Dynamic Tracking, Node Binding and Site Surveys are a few of the additional functions found on the Node Screens.

5.2 Node / Device Status Screen:

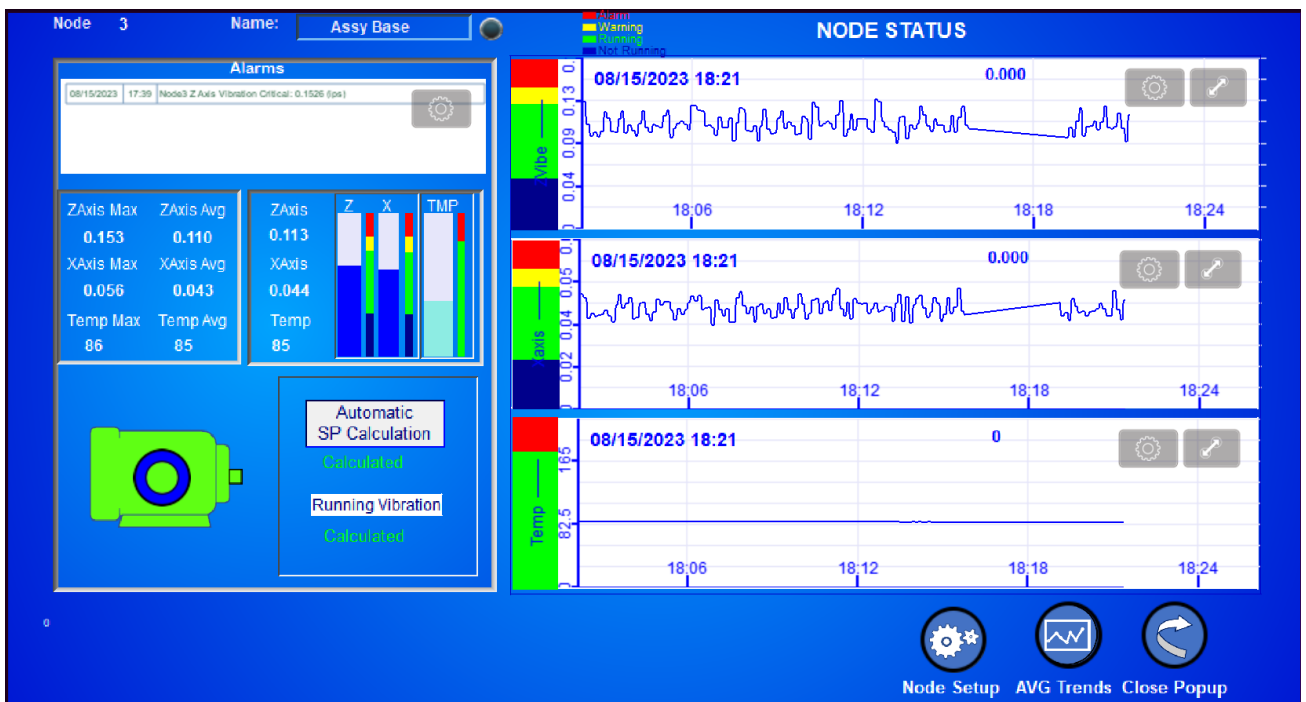


Fig 4

Once you click the Motor Icon for your device of choice you will see the **Device Status Screen**.

The left of the window gives you **Real Time Visualization** of the Node's Condition.

These are detailed below:

5.2.1 Alarm Display:

Alarms	
22:48	Node2 Temperature Critical levels: 181 (F)
22:48	Node2 Z Axis Vibration Critical: 0.410 (ips)
22:35	Node2 Z Axis Vibration Critical: 0.410 (ips)

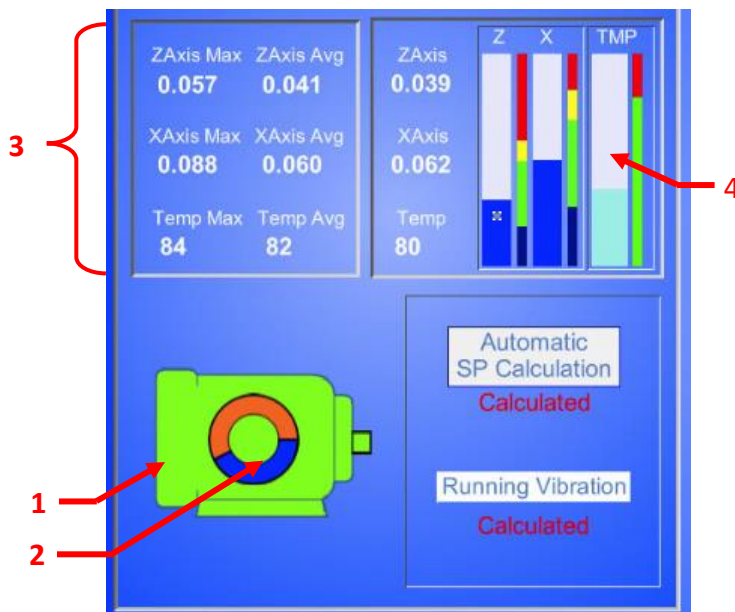
A sub-window displays the Alarms present for the selected Node.

The Alarm Conditions are color coded.

1. Red on a yellow background is an active alarm that has not been acknowledged.
2. Yellow is Acknowledged but still active.
3. Green is Acknowledged and no longer active.

You **Acknowledge** an alarm by clicking on the individual alarm condition.

5.2.2 Real Time Visualization:



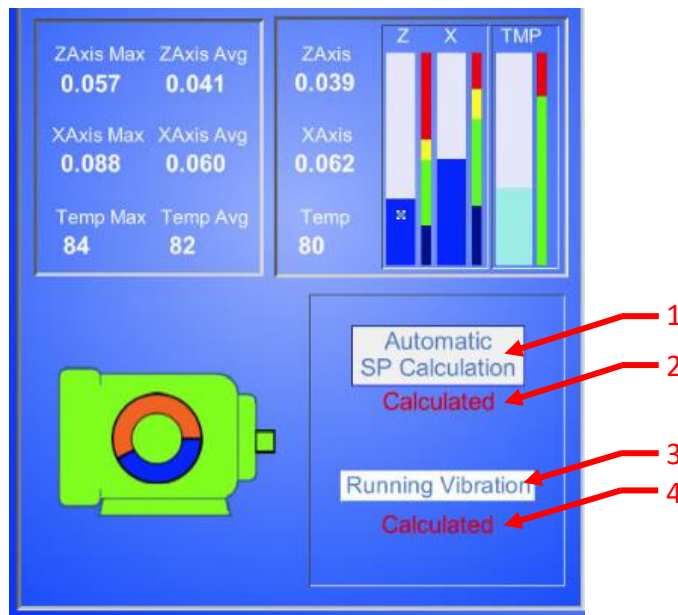
Located just below the Alarm window is a graphic that provides Visualization of the Data coming from the Node. This provides the following information:

1. The Node State Icon is color coded to give a quick indication of the Nodes Health at a glance.
 - **Black** – Not Bound
 - **Grey** – Bound but not Running

- **Green** – Running
 - **Red** –Alarm for Vibration exceeding the Node’s Vibration Set points.
 - **Yellow** –Alarm for Temperatures above the Nodes Temperature Set Points.
2. The **Health Halo** indicates the devices Health.
- **Solid Blue** is great Health.
 - Increasing levels of **Red** indicates a reduced Health.
3. The following Numeric Data is displayed for each Node:
- **Daily Max Data** for both Vibration and Temperature.
 - **Daily Running Average** of the Running data only, for Vibration and Temperature. Avg and Max are reset at the end of day when the Daily Summary is calculated
 - **Real time Data** for Vibration and Temperature.
4. In addition to numeric data, the real time data is visualized via Bar charts. Each Chart has a Dynamic colored axis with Running, Alarm, and Critical fault depicted in color bars. These are updated every time setpoints are changed

5.2.3 Device Configuration:

Located on the bottom right-hand corner of the screen is the Node Configuration pane. This gives you information on how the specific node is configured.



1. This Window displays which Vibration Set Points are selected. They are as follows:
 - **“Select Vibration Type”** if this is displayed the Node has never been set up.
 - **“Manual User Entry”** if this is displayed the user can enter unique data into the fields.
 - **“ISO Vibration Class 1”** (See Section 8. Determining Setpoints)
 - **“ISO Vibration Class 2”** (See Section 8. Determining Setpoints)
 - **“ISO Vibration Class 3”** (See Section 8. Determining Setpoints)
 - **“ISO Vibration Class 4”** (See Section 8. Determining Setpoints)
 - **“Automatic Setpoint Calculation”** (See Section 9. Using Statistics)
2. This indicator is displayed if “Automatic Set Point Calculation” is selected. It lets you know if the calculation is ongoing (**Calculating**) or if it is complete (**Calculated**).
3. This is the label for “Running Vibration” indication.
4. The “Running Vibration” setpoint is by default, automatically sampled and calculated. This indicator shows “Calculating” while the sampling is being gathered and “Calculated” while done. Sampling is taken over an 8-hour period of running operation.

5.2.4 Real Time Trend Charts:

Located on the Right side of the Screen are the Trend Charts of Real time Data.

There are three charts in total with one each for Z-axis Vibration, X-axis Vibration and Temperature. Specifics of these Charts is as follows:

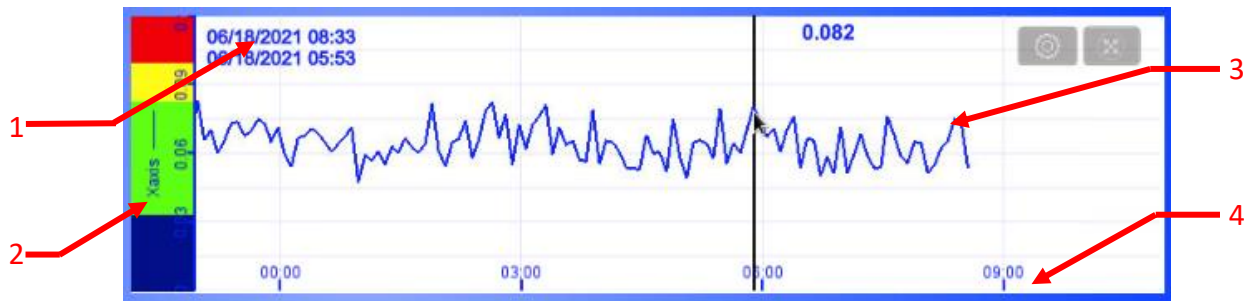


Fig 5

1. This is the Current Date and Time of the latest Sample
2. As with the Bar Charts the Y axis of the Chart has a Dynamic color bar in addition to the axis gradients. This helps you to know where the Ranges are.
 - **Off State** or the Vibration Noise floor is depicted in **Blue**
 - **Running State** depicted in **Green**
 - **Alarm State** is depicted in **Yellow**
 - **Critical Fault** is depicted in **Red**
3. The Trend Data is sampled and logged every sampling period. This can be as low as 2 seconds per sample. This sampling time is adjustable (more on this latter).
4. The X Axis is demarked in 24-hour time

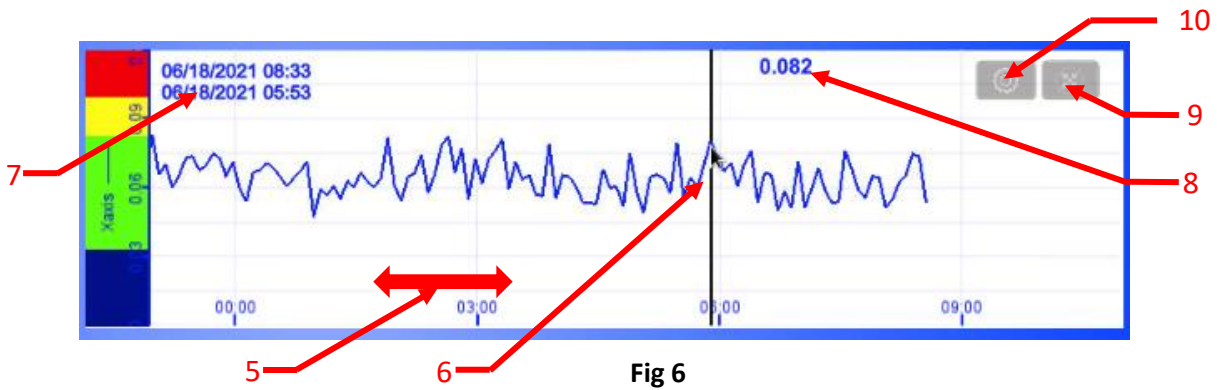


Fig 6

5. Clicking and dragging on the chart will move it backwards and forwards in time.
6. Single clicking the chart will result in a Watch Line being placed on the chart. This line captures data from the position on the chart.
7. This second time stamp registers the point in time of the Watch Line.
8. This gives the Value of the chart at the Watch Line. Note, this may have old data until you click the chart.
9. Clicking this Icon will allow you to zoom in and out in the time axis. See below:

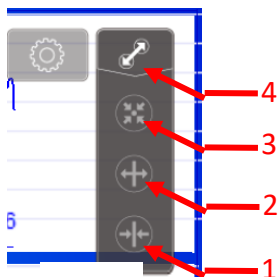


Fig 7

1. This Icon “Zooms In” the charts X-Axis (time)
2. This Icon “Zooms Out” the charts X-Axis (time)
3. Returns the Chart back to default and brings it to current time
4. This closes the Icon stack

10. The Data charts are stored in day long files, clicking this Icon will allow you to pick which day data log you wish to look at. (Note, Keep Y-Axis scrolling disabled)
See below:

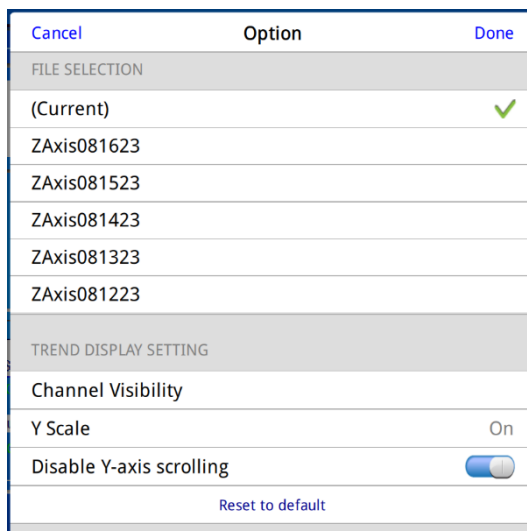


Fig 8

Each Data log will be represented by its physical axis followed by the date code. 081623 is August, 16 2023.

Do not remove the disable of y-axis scrolling.

5.2.5 Node Number and Name:

The Node status screen is also the area where you can add in or modify a unique Node name or Nick-Name. Looking at the top of the Window you will see the following:



Fig 9

You cannot change the Node (Device) number that is fixed. You can though, put a Nick-Name in for the Device in the Name Field. Click on the recessed area and you will be able to enter a name with up to 10 characters. **Remember to press the “Enter Key” when done.**

5.2.6 Navigation Buttons:

Located at the bottom right of the Node Status Screen are three Navigation Buttons.



Fig 10

1. **“Node Setup”** will open a pop-up window enabling configuration of the Node (See section 5.3). Node Setup is limited to Class B access privilege.
2. **“AVG Trends”** will open the Trend Screen for the daily average trends
3. **“Close Popup”** Closes the Node Screen and returns you to the Main Display Screen.

5.3 Node / Device Configuration / Setup Screen:

The Node Configuration Screen Pops up when you press the “**Node Setup**” button on the Node Status Screen. Note, by default the Device Nodes are set up in automatic mode and have Dynamic Tracking enabled.

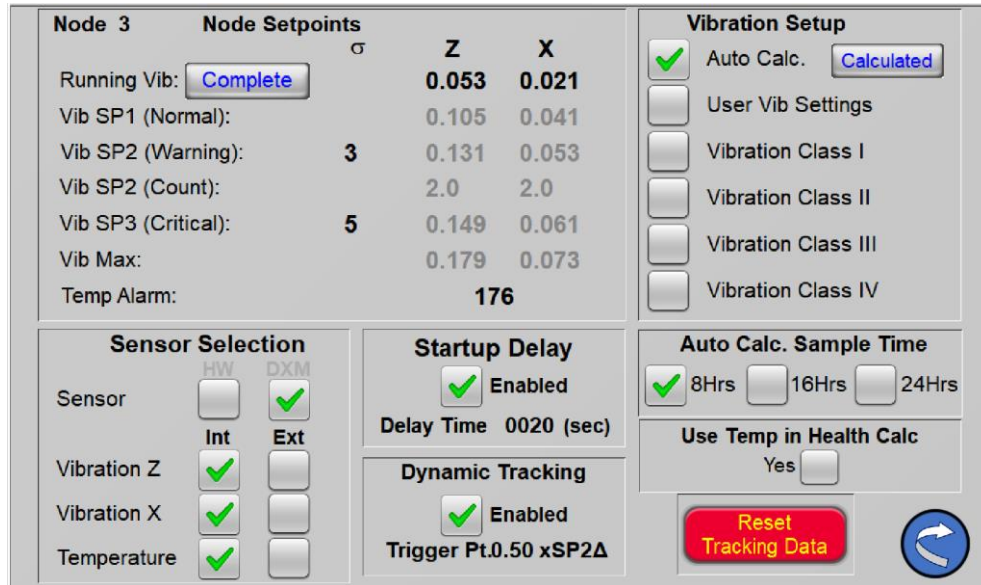
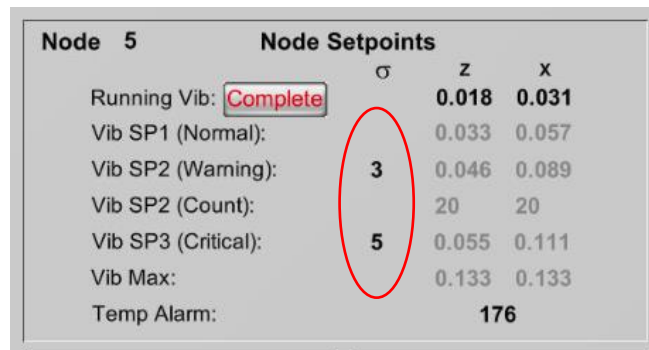


Fig 11

The screen can be broken down into the following sections:

5.3.1 Node Setpoints

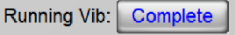


This is where you can see or enter data for your Nodes Setpoints.

If the display is grayed out you cannot modify it. If black you can enter new data.

Please note, if you input a new value **remember to hit the “Enter Key” to complete the entry.**

1. Running Vib:

Running Vib is calculated for both the Z axis and the X axis Vibration Sensors. Running Vib is calculated over an 8-hour period of running conditions. **By default, it starts calculating as soon as the node is bound. Note, erroneous readings may occur if “Running Vib” is calculating the entire 8 hours while the line is not running.** If you set up a sensor during an outage or machine downtime. You may restart Running Vib by pressing the button associated the Running Vib label. 

Running Vib takes into account the average running levels of the Vibration and the Noise floor of the off condition to develop / calculate a viable Running Vib set point. This set point is used to determine when the node is considered running (Green Icon) and for calculating the Run time Standard Deviation used for the Vibration Set points.

You can additionally recalculate The Running Vib setting by clicking the button marked “Complete.” It will change to Calculating and will calculate for an additional 8 hours.

You will note the display for Running Vib is not grayed out. Sometimes your running conditions are too erratic or your noise floor is too great and you cannot get a great calculation of Running Vib. If so, you can pick a value by looking at the Trend charts and manually enter that value. Just make sure to Toggle the Running Vibe button to show Calculated on this screen and on the Node Status Screen.

2. Vib Setpoint 1 (Normal):

Vib Setpoint 1 is the nominal running condition of the system. It is a component of the ISO data charts for vibration. (See section 8. Determining Setpoints). While in the Automatic Setpoint Calculations, Vib Setpoint 1 is the Running Average found during Setpoint calculation. It is used to develop the alarm and fault setpoint along with the Standard Deviation of the sample run.

e.g. $SP2 = SP1 + x\sigma$. (See section 9. Using Statistics)

This is only Editable if “Manual User Entry” is selected in Vib Class.

3. Vib “Setpoint 2 (Warning):

This is the warning alarm level. It is set based on the Vibe Class Selected and what is deemed to be the Top Level of Normal Operation. (See section 8. Determining Setpoints) Any levels past this are considered abnormal or alarm state conditions. This point is calculated based on SP1 and the Standard Deviation when “Automatic Setpoint Calculation” is selected.

There is one additional data column that is displayed only while in the “Automatic Setpoint Calculation” mode. It is the σ column. The Greek letter σ or Sigma is the Symbol for Standard Deviation. This column is where you select the number of Standard Deviations to be used in calculating the Setpoints. In example if 3 is entered into the σ column, Setpoint 2 will be calculated in the following manner.

$SP2 = SP1 + 3(\sigma)$. This column will always be editable when in the Automatic setpoint mode. By default, this is set at 3.

4. Vib Setpoint 2 (Count):

Vib Setpoint 2 Count is used to determine when the alarm condition is triggered. If the Count is set to 1.0 the alarm will trigger as soon as the vibration level reaches setpoint 2. If set to 2.0 the alarm will not be triggered unless the alarm level has been recorded in two concurrent samples. This helps remove unwanted false alarms due to spurious alarm data. Default setting is 3.0.

Neither the Setpoints or Count are editable unless you are in "Manual User Entry."

5. Vib Setpoint 3 (Critical):

This is the Critical fault level. It is set based on the Vibe Class Selected and what is deemed to be the Critical vibration fault level. (See section 8. Determining Setpoints) Running the machine at this level is expected to be the result of, or will result in damage to the system.

This point has been determined by the ISO Vibration class Chart.

This point is calculated based on SP1 and the Standard Deviation when "Automatic Setpoint Calculation" is selected.

There is one additional data column that is displayed only while in the "Automatic Setpoint Calculation" mode. It is the σ column (See Item 2). The Greek letter σ or Sigma is the Symbol for Standard Deviation. This column is where you select the number of Standard Deviations to be used in calculating the Setpoints. In example if 3 is entered into the σ column, Setpoint 3 will be calculated in the following manner.

$SP3 = SP1 + 3(\sigma)$. This column will always be editable when in the "Automatic setpoint mode." By default, this is set at 5.

Vib Setpoint 3 is not editable unless you are in "Manual User Entry".

6. Vib Max:

Vib Max is the maximum displayed value on Charts and Graphs in Vib-Sight.

It is determined in the Vib Class ISO Setpoints. When in "Automatic Setpoint Mode" it is 120% of Setpoint 3. The Max setting will be the largest setting from both Axes.

7. Temp Alarm:

When the Temperature exceeds this value, the alarm will trigger. The Temp alarm is preset by default to 176 Deg F. This value is always editable. You should look at the system specifications and environmental conditions to determine the Temp alarm.

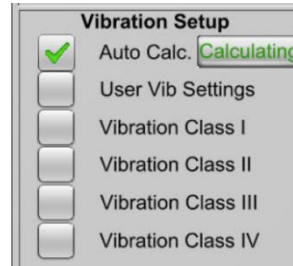
Note, Max temp is not listed but is set at 1.25% of the Temp alarm setting.

8. σ :

σ is used as a symbol for **Standard Deviation**. The Numbers shown below σ represent the multipliers used to create the alarm setpoints. This is only used in the Automatic Setpoint calculations. This is not displayed unless the Automatic Setpoint Calculation is used. Note you can change these depending on your needs. A default multiplier of 3 is used for the Warning Setpoint and 5 for the Critical setpoint.

5.3.2 Vibration Class Setup

This is where you select the Vibration Class you wish to run. For more information on the Vibration Classes and Automatic Calculation of Vibration, (see Section 7. Determining Setpoints and Section 8. Using Statistics). The selections are as follows:



1. Auto Calc:

With the Auto Calc setting Vibe-Sight will automatically calculate the Vibration Setpoints by looking at a sample runtime data selectable from 8, 16 or 24 hours of runtime. This is discussed in section 8 “Using Statistics”. The indicator shows Calculating when in process and calculated when complete. Clicking the button will restart the calculation.

If you had to recalculate Running Vib while in Auto Calc., Click the Auto Calc button to restart.

2. User Vib Settings:

When “User Vib Settings” is selected all of the Setpoint Data Points will become editable. You can configure a unique set of setpoints for a specific node. This will keep the last displayed data to be used as a starting point.

3. Vibration Class 1:

When this is selected ISO Vibration Class 1 will be selected for the Node.
(See section 8. Determining Setpoints)

4. Vibration Class 2:

When this is selected ISO Vibration Class 2 will be selected for the Node.
(See section 8. Determining Setpoints)

5. Vibration Class 3:

When this is selected ISO Vibration Class 3 will be selected for the Node.
(see section 8. Determining Setpoints)

6. Vibration Class 4:

When this is selected ISO Vibration Class 4 will be selected for the Node.
(See section 8. Determining Setpoints)

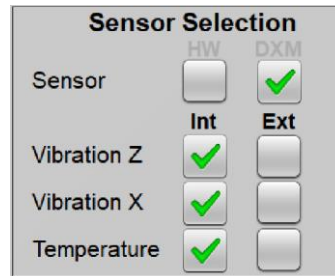
5.3.3 Auto Calc. Sample Time



If Auto Calc is selected a sample is taken during running conditions.

This selection box allows you to select whether you wish to sample over 8, 16 or 24 hours of sample time. Smooth systems typically require 8 hours. Very erratic systems may require a 24-hour sample.

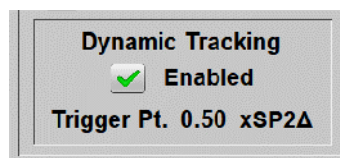
5.3.4 Sensor Selection



Standard with Vibe-Sight_{LT}, you can now select whether your sensors for the device are connected via the Banner DXM90 Snap Signal controller or hardwired directly into the sensor ports on the side of the Vibe-Sight enclosure. With Vibe-Sight_{HS} you may only use the DXM90 controller. This setting is locked into DXM and the selections are greyed out. If you select (Int) the signal will come from the DXM controller. Banner Qm30-VT2 Modbus sensors will be connected to the DXM90 controller.

If you select Ext or External there are a group of Tags that Vibe-Sight makes available for connecting to. These data points are exposed via the built-in Edge Gateway. See the Edge Gateway section for more information.

5.3.5 Dynamic Tracking



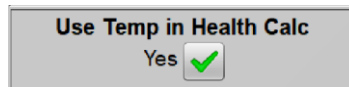
Also new in Vibe-Sight is Dynamic Tracking. (See Section 10. Dynamic Tracking) for a detailed look in how this works. In a nut shell, Dynamic Tracking is used to help determine if an exponential failure or “Hockey Stick” failure is occurring. When Dynamic Tracking is selected and the Daily Average goes above the Trigger point, the Regression line will be reloaded so that it reacts quicker to perturbations in Vibrations. Setting a Trigger point too low will assure that Vibe-Sight reacts to the change in vibration rapidly but may result in false alarms. 50% of the alarm setpoint is used by default but may be changed.

5.3.6 Reset Tracking Data



Another new item in Vibe-Sight V2. If you correct a failed component in your system or move a Vibration sensor the new sensor data may become skewed and greatly affect the performance of the regression line resulting in incorrect Health results. Resetting the Tracking Data will allow the system to compensate for the new data. Effectively resetting its datum. Note, a challenge screen will pop up to assure you wish to reset the data.

5.3.7 Temp. In Health Calculation



Under the proper conditions where ambient temperature is controlled Temperature may be used in the Health calculations. If Ambient temperature is not controlled the ambient temperature swings may adversely affect the Health calculation if Temperature is tracked.

Select "Yes" if ambient conditions are controlled and will not effect the process.

5.3.8 Startup Delay



New with Vibe-SightHS is the ability to delay sampling for the Daily Average, Run mode calculations, AutoCalc and warning alarms. This helps with machines that may have a significant bump in vibration on startup. You may set the time of this delay in the delay time window.

5.3.9 Return to Node / Device Status



Pressing the Return Icon will close the Node Setpoints Window and return you to the Node Status Screen.

5.4 Alarms Screen:

ALARM LIST				
DATE	TIME	ALARM	ACK TIME	RTN TIME
05/28/2020	16:13:13	Node1 Z Axis Vibration exceeded norms: 0.385 (ips)	16:15:13	16:15:13
05/28/2020	16:15:13	Node1 Z Axis Vibration exceeded norms: 0.756 (ips)	16:15:13	
05/28/2020	16:16:13	Node1 Z Axis Vibration exceeded norms: 0.765 (ips)		

The Alarm Screen shows all Alarms on the System. Each node is represented by its Node Number, then the Alarm Condition with value are listed. Finally, the Acknowledgement time and the time the alarm returns to its normal condition are displayed. Color Code is as follows:

- **Active Alarm** – Red on a Yellow Background
- **Acknowledged Active Alarms** – Yellow
- **Acknowledged Inactive Alarms** - Blue

You have the ability from this screen to acknowledge the alarms all at one time with the **“Acknowledge Alarms”** button. (This is limited to Class B Access privilege.) Additionally, you can clear the alarm history stack using the **“Clear Alarms”** button. (This is limited to a Class C Access privilege.)

Pressing **“Print Prep”** removes the buttons, allowing you to print just the alarms as a chart without the buttons visible. Tapping on the area of the chart around the buttons will make them visible again.

“Return” takes you back to the Main Screen

5.5 System Configuration Screen:

System Configuraiton			
LAN 1 (Read Only) IP Address: 192.168. 11. 62 Net Mask: 255.255.255. 0 MAC: 00 :0C:26 :21 :1E:65		LAN 2 IP Address: 192.168. 0.100 Net Mask: 255.255.255. 0 MAC: 00 :0C:26 :21 :2E:05	
Global Defaults		Vibration Class	
Sensor Selection Sensor: <input type="checkbox"/> HW <input checked="" type="checkbox"/> DXM Int: <input checked="" type="checkbox"/> Ext: <input type="checkbox"/> Vibration Z: <input checked="" type="checkbox"/> <input type="checkbox"/> Vibration X: <input checked="" type="checkbox"/> <input type="checkbox"/> Temperature: <input checked="" type="checkbox"/> <input type="checkbox"/>		Default Setpoints <input type="checkbox"/> Vibration Class I Vib SP1 (Normal): 0.230 <input type="checkbox"/> Vibration Class II Vib SP2 (Warning): 0.570 2.0 <input type="checkbox"/> Vibration Class III Vib SP3 (Critical): 0.905 <input checked="" type="checkbox"/> Vibration Class IV Vib Max: 1.086 Temp Alarm: 176 Restore Default Values	
Vibration Setup <input checked="" type="checkbox"/> Auto Calc. <input type="checkbox"/> User Vib Settings <input type="checkbox"/> Vibration Class I <input type="checkbox"/> Vibration Class II <input type="checkbox"/> Vibration Class III <input type="checkbox"/> Vibration Class IV		Count 2 (sec)	
Use Temp in Health Calc Yes <input checked="" type="checkbox"/>		Startup Delay <input checked="" type="checkbox"/> Enabled Delay Time: 0020 (sec)	
Dynamic Tracking <input checked="" type="checkbox"/> Enabled Trigger Pt: 0.50 x SP2Δ		Auto Calc. Sample Time <input checked="" type="checkbox"/> 8Hrs <input type="checkbox"/> 16Hrs <input type="checkbox"/> 24Hrs	
Auto Calc # of SDV SP2 #σ 3 SP3 #σ 5		Summary Main Screen Yes <input checked="" type="checkbox"/>	
		Go To Driver Settings	
		Go To Scheduling	
		User Admin	
		Screen Saver 30 (min)	

Clicking the “Configuration Icon” Button on the Main Screen will bring up the System Configuration Popup Screen. This screen can be broken down into key sub screens these are as follows:

5.5.1 LAN Connection Display

LAN 1	LAN 2
IP Address: 192.168. 11. 11	IP Address: 192.168.100. 1
Net Mask: 255.255.255. 0	Net Mask: 255.255.255. 0
MAC: 00 :0C:26 :3B :CB:63	MAC: 00 :0C:26 :3B :FA:43

The LAN Connection display section is a **read only** sub window that gives you information about the LAN setup on your cMT-FHD. (See the section on Re-configuring your cMT-FHD for information on changing your address.)

5.5.2 Standard Vibration Setpoints

Vibration Class	Default Setpoints	Count
<input type="checkbox"/> Vibration Class I	Vib SP1 (Normal):	0.230
<input type="checkbox"/> Vibration Class II	Vib SP2 (Warning):	0.570 2.0
<input type="checkbox"/> Vibration Class III	Vib SP3 (Critical):	0.905
<input checked="" type="checkbox"/> Vibration Class IV	Vib Max:	1.086
	Temp Alarm:	176

Use this section to Customize your default vibration levels. Section 8. Determining Setpoints, discusses the Different Vibration Classes in depth. The setpoints are predefined by ISO standard, but you wished to make a custom class for your system you can modify “Globally” one or all of the Vibration Classes.

Want to revert back to factory default? Click the "**Restore Default Values**" Button. Access to this button is limited to Class C access privilege.

5.5.3 Global Defaults

Global Defaults

<h5 style="text-align: center;">Sensor Selection</h5> <table style="width: 100%;"> <tr> <td></td> <td style="text-align: center;">HW</td> <td style="text-align: center;">DXM</td> </tr> <tr> <td>Sensor</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> </tr> <tr> <td></td> <td style="text-align: center;">Int</td> <td style="text-align: center;">Ext</td> </tr> <tr> <td>Vibration Z</td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td>Vibration X</td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td>Temperature</td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> </table>		HW	DXM	Sensor	<input type="checkbox"/>	<input checked="" type="checkbox"/>		Int	Ext	Vibration Z	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Vibration X	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Temperature	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<h5 style="text-align: center;">Vibration Setup</h5> <p><input checked="" type="checkbox"/> Auto Calc.</p> <p><input type="checkbox"/> User Vib Settings</p> <p><input type="checkbox"/> Vibration Class I</p> <p><input type="checkbox"/> Vibration Class II</p> <p><input type="checkbox"/> Vibration Class III</p> <p><input type="checkbox"/> Vibration Class IV</p>
	HW	DXM																	
Sensor	<input type="checkbox"/>	<input checked="" type="checkbox"/>																	
	Int	Ext																	
Vibration Z	<input checked="" type="checkbox"/>	<input type="checkbox"/>																	
Vibration X	<input checked="" type="checkbox"/>	<input type="checkbox"/>																	
Temperature	<input checked="" type="checkbox"/>	<input type="checkbox"/>																	
<p>Use Temp in Health Calc</p> <p style="text-align: center;">Yes <input type="checkbox"/></p>	<h5 style="text-align: center;">Auto Calc. Sample Time</h5> <p><input checked="" type="checkbox"/> 8Hrs <input type="checkbox"/> 16Hrs <input type="checkbox"/> 24Hrs</p>																		
<h5 style="text-align: center;">Dynamic Tracking</h5> <p><input checked="" type="checkbox"/> Enabled</p> <p>Trigger Pt: 0.50 x SP2Δ</p>	<h5 style="text-align: center;">Auto Calc # of SDV</h5> <p>SP2 #σ 3</p> <p>SP3 #σ 5</p>																		

The Global defaults section allows you to set the general default configuration all new sensors with start with. By default, these are preset to DXM feed for the sensors, sensors set to Internal (Int), Temp in Health Calc turned off, Dynamic Tracking turned on, Vibration Setup as Auto Calc, Auto Calc sample time set to 8 hours and Standard Deviations (SDV) set to 3 for SP2 and 5 for SP3.

5.5.3.1 Vibration Setup

This Vibration Setup allows you to select the type of Vibration monitoring you wish to use as the **Global Default** for newly selected Sensor Nodes.

“**User**” allows you to modify an existing baseline. Vibe-Sight uses Class 4 by default.

“**Class 1 – Class 4**” are the ISO standards (See Section 8)

“**Auto**” is the factory default setting this setting will use Statistics to calculate the necessary Vibration alarm setpoints.

5.5.3.2 Autocalc Sample Time

This allows you to predetermine the sample time used when Auto Calc is selected.

8 Hours will sample 8 hours data that is above the running setpoint.

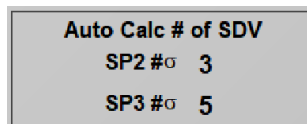
16 Hours will sample 16 hours of data that is above the running setpoint.

24 Hours will sample 24 hours of data that is above the running setpoint.

Use 8 hours if you have a very contiguous vibration with very little variance.

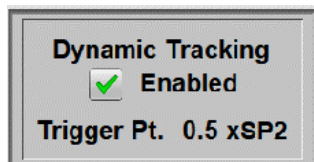
Use 24 hours if the vibration data is very variable. Use 16 hours if the vibration data is somewhat variable.

5.5.3.3 Auto Calc # of SDV



This allows you to select the multiplier of the Standard Deviation (SDV) or sigma (σ) that is used to generate the Warning and Fault setpoints. By default, Vibe-Sight is set to 3 x SDV for the warning alarm and 5 x SDV for the Critical alarms. These numbers can be modified to allow for unique situations.

5.5.3.4 Dynamic Tracking and the Trigger Multiplier

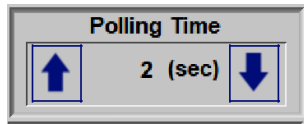


You can change the default setting of Dynamic tracking.

If “**Enabled**” is selected, all nodes will have Dynamic Tracking turned on as they are Bound. You can also change the Trigger point where Dynamic Tracking starts. By default, it is set at 50% of the Setpoint 2 deHSa. When the Trended Daily Average reaches 50% of the Alarm Setpoint, Dynamic tracking will kick in. (See Section 10. Dynamic Tracking for more information.)

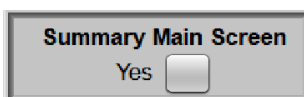
You can also change the time before the screen saver kicks in.

5.5.4 Polling Time



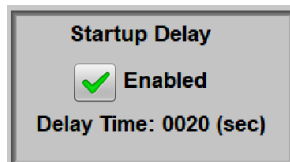
Polling Time allows you to adjust the periodic time that Vibe-Sight samples the vibration data from the Sensors. This is unique to Vibe-SightHS. Polling time adjusts in 2 second intervals. The lower the sample time is the more defined the vibration signals are but the data logs will fill up faster. Set this to allow for your sampling needs. Access to this is limited to Class C access privilege.

5.5.5 Summary Main Screen



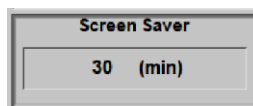
Vibe-Sight allows two screens to be used as the Main Screen. The default Main screen or the Summary Screen which provides a more abbreviated view of the system. The Summary Screen is the default screen for Mobile devices but can also be selected with this radio button to allow the Summary Screen to be the main screen. This is off by default. See section 5.6 for more information on the Summary Screen.

5.5.6 Startup Delay



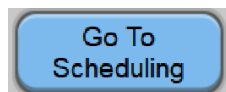
Under normal operation conditions, you may have a device that has transient startup conditions that exceed the normal vibration levels of the device. If Startup delay is enabled Vibe-Sight will still data log the vibration but will not use the vibration in its calculation of Runtime, Daily Average, Auto Cal of the Setpoints or triggering of the initial Warning Alarm. The Critical Alarm will still be triggered. This condition will continue until the delay time is complete. Selecting this Delay will set the default for new device setups. Startup Delay is not enabled by default. You may set the startup delay for each device on its configuration page.

5.5.7 Screen Saver



Use this to set the time of Vibe-Sights Screen Saver. When the screen saver is triggered, it will start Vibe-Sights screen saver also shut off any inactive remote user connections.

5.5.8 Go To Scheduling



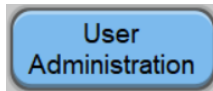
Press this button to go to the Scheduling screen. The scheduling screen allows you to set the time of day and days of the week that the Daily Average, Trend Charts and Machine Health will be calculated. There is also a scheduler that sets up block time to keep Vibe-Sight from operating this allows you to effectively turn off Vibe-Sight for CIP and Maintenance on the system. More on this in section 5.6. Access to this is limited to Class C access.

5.5.9 Go To Driver Settings



Press this button to go to the Driver Settings Screen. This screen enables you to setup and configure the drivers used to communicate with external devices like the DXMR90 Gateway. Access to this is limited to the Site Administrator.

5.5.10 Go To User Administration



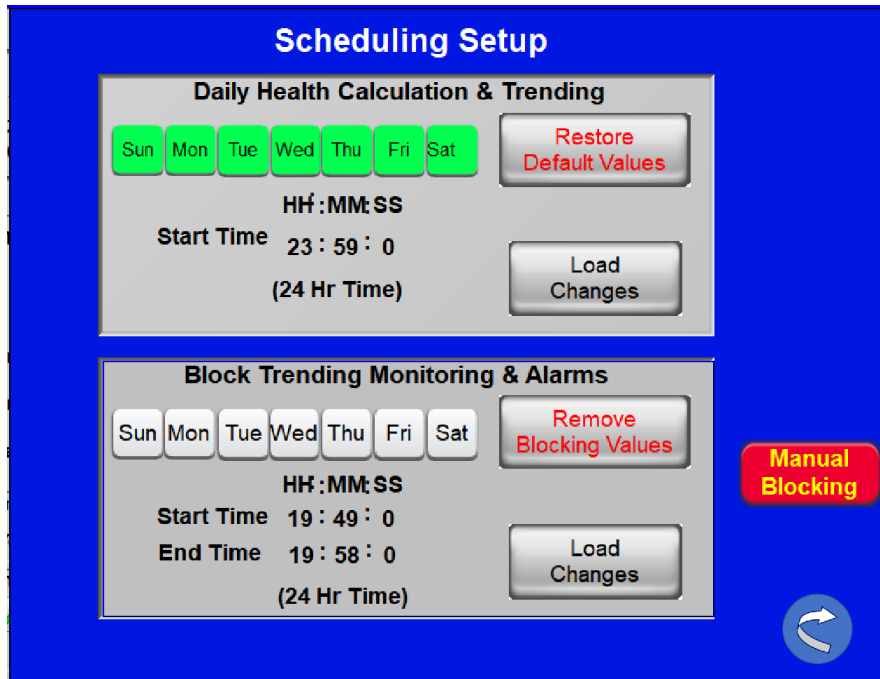
Press this button to go to the User Administration Screen. This screen enables you to manage user log in and passwords along with permission levels for each user level. Access to this is limited to the Site Administrator.

5.5.11 Return to Main Screen



Pressing the Return Icon will return you to the main Screen.

5.6 Scheduling Setup



From here, you can change the Time and Days the Daily Average, Health Calculation and Daily trending. You can also setup the Time and Days that you will block the Trending and monitoring of alarms for CIP and Maintenance.

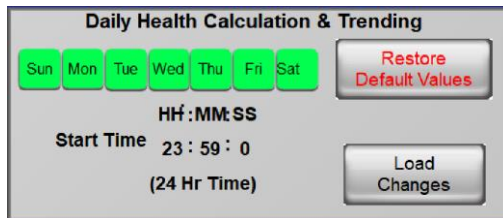
If the Day is Green it is selected if you click it and it goes Gray it is deselected. If you don't work on Saturday and Sunday you may wish to deselect "Sat" and "Sun"

Place the Time you wish the event to occur the Time Fields. Time is in 24-hour time. Each field is accessed individually. **REMEMBER hit Enter** after your entry or these will not be accepted. When you finish your change you must press "Load Changes"

If you wish to go back to default on the Health Calculations (as seen above) press the "Restore Default Values" button.

A detail of these functions is stated below.

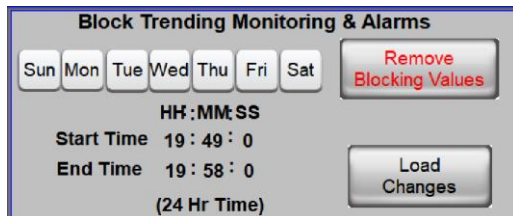
5.6.1 Daily Health Calculation & Trending



The Health Calculation and Trending data is calculated once a day using the accumulated data from the days operation. You can schedule when this occurs. Default is as shown, 7 days a week at 23:59. You may change when this occurs and the days it

occurs. If you don't run production on Saturdays and Sundays you can delete these days.

5.6.2 Block Trending Monitoring & Alarms



When you are doing CIP or maintenance the Vibration levels and or temperatures may exceed normal operation. To eliminate the need to shutdown Vibe-Sight during this time you may select specific days and or hours to block monitoring on during these times. Vibe-

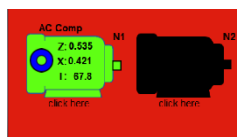
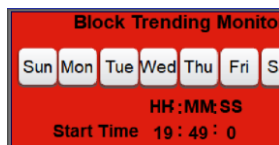
Sight will continue to data log vibration and temperature but will not trend or alarm the events.

5.6.3 Manual Blocking



Sometimes CIP or maintenance does not occur on a scheduled basis. Vibe-Sight has included a blocking button to allow you to block the Trending and monitoring just like the scheduled events.

5.6.4 Indication of blocking



When blocking has occurred either by schedule or manual blocking the block schedule will turn red along with the main screen to let you know this has occurred.

5.7 Driver Settings

Driver Setup

Device #2 Serial Connection Com2

Mode:	<input type="text" value="1"/>	Node:	<input type="text" value="1"/>
Baud:	<input type="text" value="2"/>	Parity:	<input type="text" value="0"/>
Data Bits:	<input type="text" value="8"/>	Stop Bits:	<input type="text" value="1"/>

Device #4 DXM Controller (on Nic Port 2)


IP Address:

Port#:

Device #5 Ancillary Device (on Nic Port 1)

IP Address:

Port#:



This allows the Site-Admin the ability to change the addresses for the communication Drivers. **Do not change this unless you know what you are doing.**

5.8 User Administration

User Administration ✕

Currently Logged In

<input type="button" value="Login"/>	<input type="button" value="Add"/>	<input type="button" value="Set Privilege"/>
<input type="button" value="Logout"/>	<input type="button" value="Delete"/>	<input type="button" value="Set Password"/>

Auto Logout (min)

The User Administration screen allows the Site Administrator to set up and modify User passwords and privileges. Additionally, it is used to set the Auto Logout time for passwords. Each of the functions of this screen will be covered below:

5.8.1 Current Login

Currently Logged In

This shows the current login it should show the Site Admin.

5.8.2 Login



This opens the Same Login Popup accessed from the login Icons on the main screen.

Login ✕

Index:

Password:

The Login Popup allows you to pick from an index of preassigned Users. Note this can be an assigned group or up to 11 individuals. Once you select the User the Password must be entered. **Make sure to hit the Enter**

Key once the password has been entered or the password will not be accepted.

By default, this is group based. The groups are listed below:

- **Supervisor – level A (default password 111111)**
- **Maintenance – Level A & B (default password 222222)**
- **Maintenance Mgr – Level A, B and C (default password 333333)**
- **Site Admin – Level A – L (default password 444444)**
- **Administrator is a special group assigned for Vibe-Sight engineers.**

5.8.3 Logout

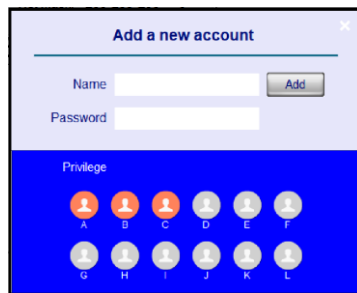


This logs out the existing user.

5.8.4 Add New Account



This opens the Popup that allows the Site-Admin to add an additional User.

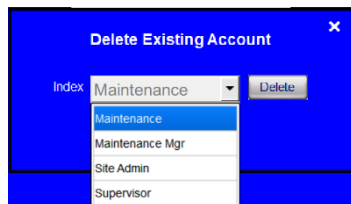


Add New Account popup allows the Site-Admin to put in a user Name and Password for the new user and select the level of privileges for that user. Note you must select all of the privileges up to the last privilege set up for the user. Note, in the picture the user is setup for privilege level C.

5.8.5 Delete Account



This opens the Delete Popup that enables the Site- Admin to delete a user.



Using the dropdown box, select the user to delete and click Delete.

Be Careful do not select Site-Admin! If you do it might require a site visit from a Vibe-Sight Engineer or RMA for repair to get this corrected.

5.8.6 Set Privilege



This opens the Set Privilege popup that enables the Site-Admin to change the privilege classification of each user.



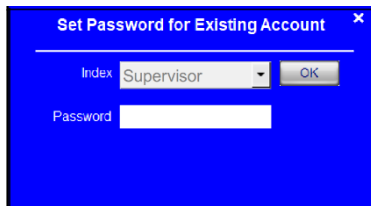
Using this popup the Site-Admin selects the user via the dropdown window. Once selected, the Admin can see and change the user privileges of the user.

Like the new user popup you need to make sure all privileges are selected up to the highest level wanted. In the example to the left privilege level B is selected. Privilege level A must also be selected.

5.8.7 Set Password



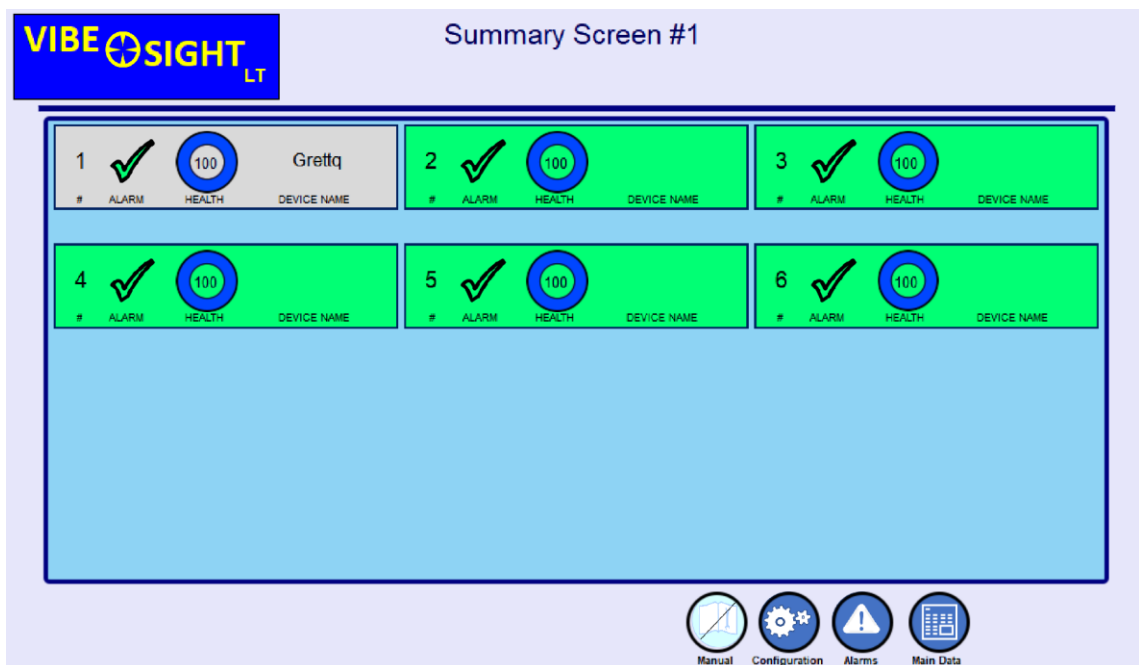
This opens the Set Password popup that allows the Site-Admin to change the passwords to new secure passwords. These can be alpha numeric with a max character count of 12 characters.



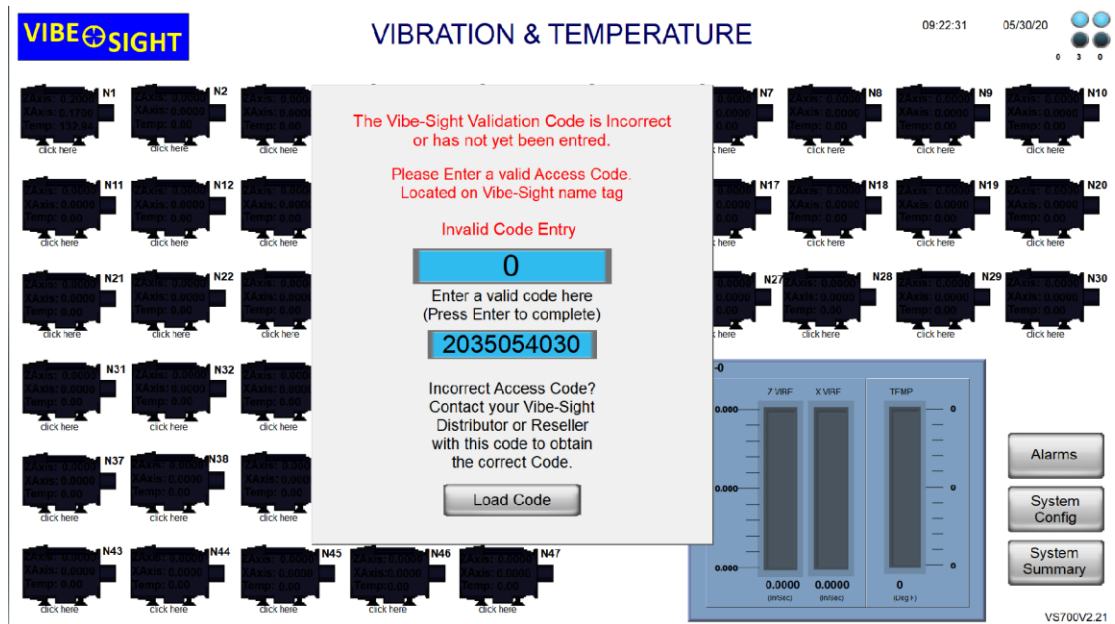
Select the existing User Account via the dropdown menu. Then type in the new password. As stated above this is alpha numeric with a max of 12 characters.

5.9 Summary Screen:

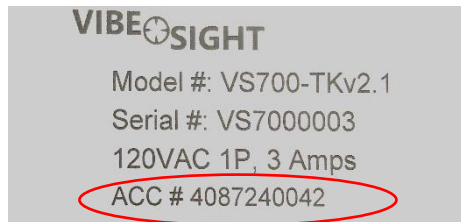
The summary Screen provides a concise way to see only the sensor nodes connected and their status. This is great way to view the sensor nodes with mobile devices. It is the default home screen for remote access.



5.10 System Validation Code:



If you accidentally erase the memory on a Vibe-Sight unit this window will pop up. Data logging and Analytics will not operate until the proper ACC# is entered. If you look at your Vibe-Sights Name plate you will find an ACC# located on the Label.

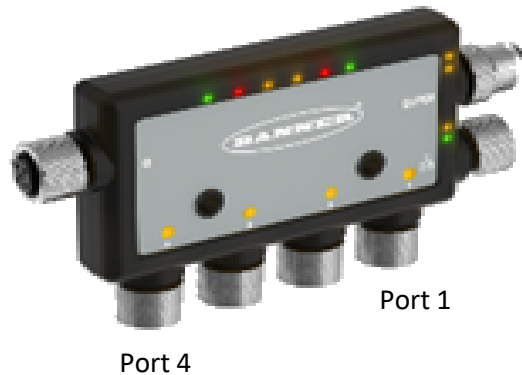


Enter the ACC# in the Data Field. Note, each Vibe-Sight Data Engine has a different ACC Number.

If you need to replace a cMT-FHD due to failure, it must be purchased through a Vibe-Sight Distributor or reseller. Make sure you say that the purchase is for a Vibe-Sight unit. If you purchased a replacement it should come preloaded and will have a new ACC #. If for some reason it does not, please contact your Vibe-Sight Distributor, or reseller for assistance in this manner.

Note, by EULA, you do not purchase the software running the Data Analytics engine, you purchase the rights to use it and modify it. Copying and redistributing the software without express permission of Vibe-Sight is forbidden.

6. Adding in a Sensor:



Adding a sensor into the Vibe-SightHS echo system is as easy as connection the QM30VT2 Modbus sensors (Vibe-Sight part VS105-1) to one of the DXMR90 ports. The port number will be the node / device number of the Sensor.

Port 1 – Node 1

Port 4 – Node 4

If you are using more than 4 sensors you will need two DXM90's you will need Vibe-Sight part# XS305-1D or make sure you have the proper XML files loaded from Vibe-Sight. Then the secondary DXM will be connected to the master DXM with a short cable from port 0 on the right-hand side to port Zero on the left-hand side. Then Port 1 on the secondary DXM will be Node 5 and Port 2 on the secondary DXM will be Node 6.

7. Determining Setpoints:

Determining actual Vibration setpoints can be quite tedious. It is based on but not limited to the frequency of operation, Natural harmonic resonance, balance of your machines rotating components and how well the system is anchored into place.

To help with this, the International Standards Organization "ISO" came up with a chart that listed viable Vibration ranges for different types of Machinery. As seen below:

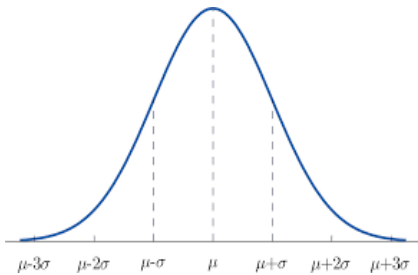
VIBRATION SEVERITY PER ISO 10816						
Machine		Class I small machines	Class II medium machines	Class III large rigid foundation	Class IV large soft foundation	
in/s	mm/s					
Vibration Velocity Vrms	0.01	0.28				
	0.02	0.45				
	0.03	0.71		good		
	0.04	1.12				
	0.07	1.80				
	0.11	2.80		satisfactory		
	0.18	4.50				
	0.28	7.10		unsatisfactory		
	0.44	11.2				
	0.70	18.0				
	0.71	28.0		unacceptable		
	1.10	45.0				

Since these standards are quite often used when selecting Vibration, we have added these classes in as Setpoints.

If you need to modify these settings select the closest setting and then select **“Manual User Entry”** you can then modify the Setpoints to meet your needs.

There is another way to look at These set points. Since we are looking at change in Vibration as a vehicle to determine System Health, we can use statistics to determine vibration that is acceptable or out of range for a sample set of vibration data.

8. Using Statistics:



If **“Automatic Setpoint Calculation”** is selected we sample the data over 8, 16 or 24 hours of actual run time (8 is default). Note this does not occur until the Automatic Runtime calculation has been completed. When complete, we calculate the Standard Deviation of the Sample set. Then By default, we select 3 Standard Deviations as the Alarm Condition effectively just outside of the standard curve, and 5 Standard Deviations as the Fault condition. This can be adjusted as required.

You may also select your own count of how many samples above the alarm setpoint are required to be an Alarm.

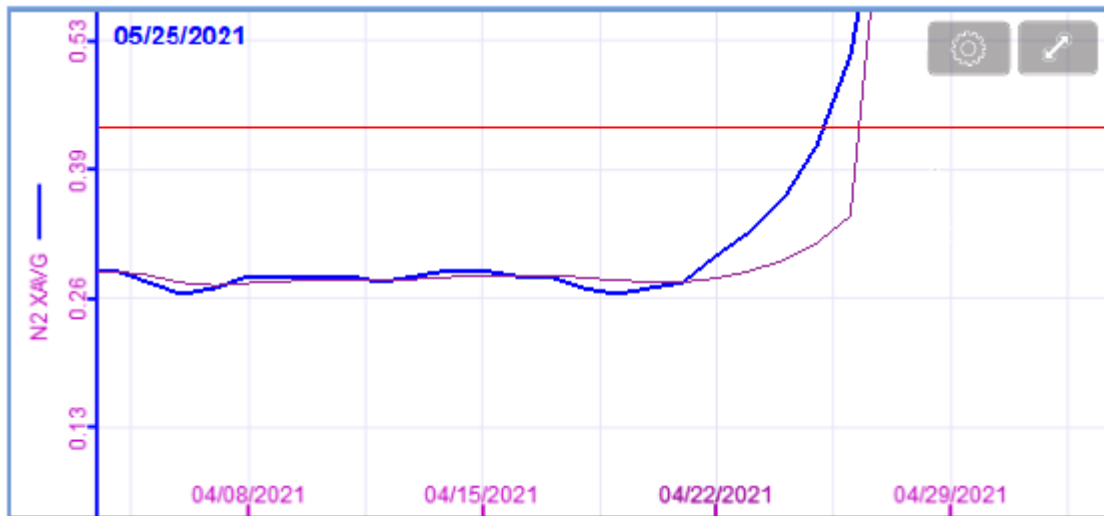
Health is calculated with a proprietary algorithm that looks at Axis conditions and the Regression line of the Daily Average Trend lines.

9. Dynamic Tracking:

New in V2, is the ability to turn on Dynamic tracking. When Dynamic tracking is on, Vibe-Sight will track fast swings, which occur with catastrophic failure or certain bearing failures.

The key to making Dynamic Tracking work is setting the trigger point at a level that is can respond to the changes and not generate false alarms. By default, Vibe-Sight uses 50% of the alarm set point SP2. It is 50% of the difference between the normal operation SP1 and the alarm SP3. If you get too many false errors. Either turn off Dynamic tracking or set the default set point higher.

Here is an example of a Bearing failure without Dynamic Tracking:



You can see that it takes several days to respond to the failure.

Here is an example of bearing failure with Dynamic tracking turned on:



You can see the Regression line bending to track the error in near real time.

10. Remote Viewing of Vibe-Sight Screens

You can connect up to the cMT HMI via a number of paths.

1. You can connect to the default WIFI access point (Optional) ESSDI Vibe-Sight, password Vibration1
2. You can connect via the LAN port of the cMT HMI. The Sign-in to this is by default 111111.
3. You can connect remotely through the Tosibox Security Appliance or Easy Web

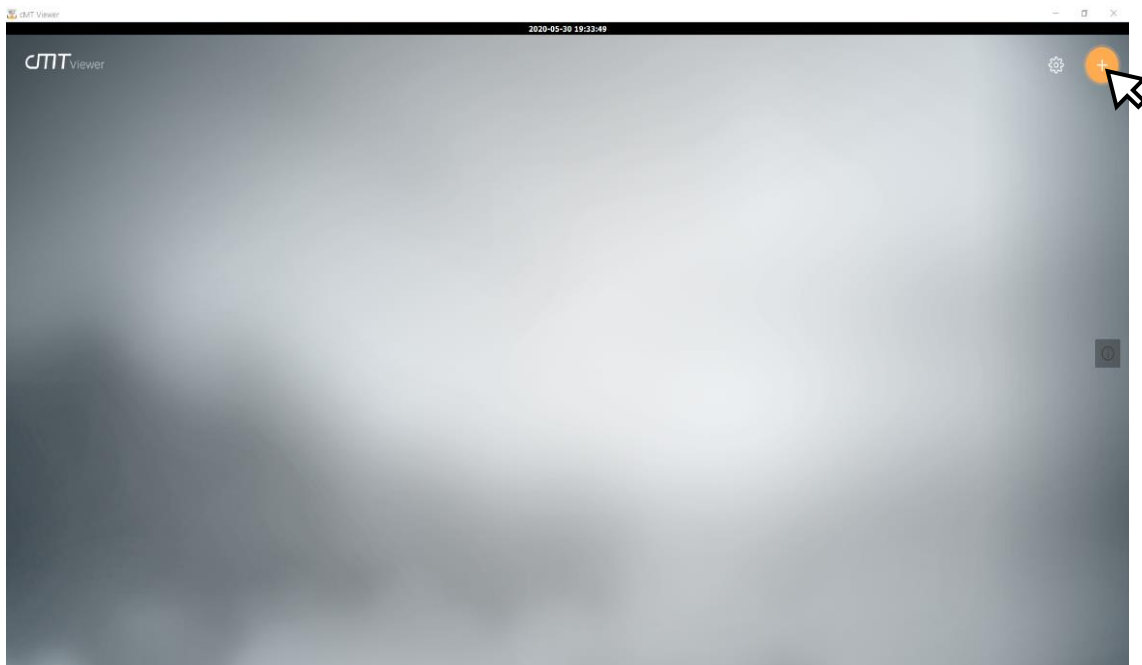
Whichever way you decide to connect you will have access to the Predictive Maintenance Appliance. The application for this is the cMT-Viewer.

If you are using a Windows Computer or Windows based Tablet to access the appliance there is a copy of cMT-Viewer for windows stored on the Tosibox Key included with your Vibe-Sight System.


If you are using an Android or IOS Phone or Tablet you may download the app form Googles Play Store.

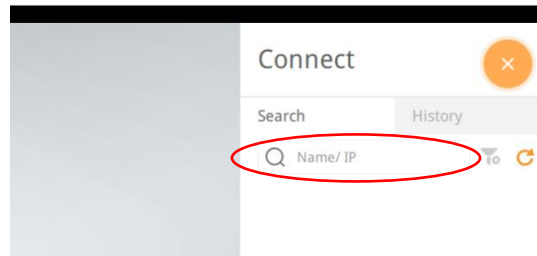
10.1 cMT Viewer

Once loaded the cMT View looks Like the following:



If the orange “+” is not displayed click and hold on the top lefthand side of the window until is displayed.

-  Click the Orange + this will open up the connection setup.



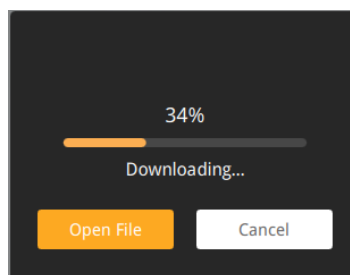
Type in the IP address of your Vibe-Sight Appliance.

The Default IP address is **192.168.11.62**. If you have changed the address and are unsure what it is connect locally and look at the System Configuration. You will see it at the top of the Window, LAN 1.

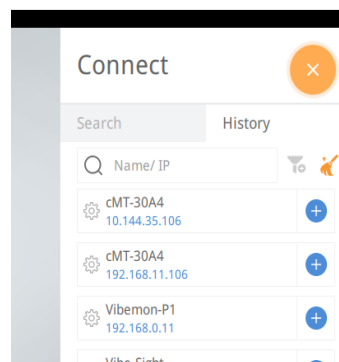
If you are connecting remotely through Tosibox the Default address is via a 1:1 Nat translation and may be different on your system. Please read the next section on Tosibox to see how to connect in and obtain Vibe-Sight's IP address.

You may be asked for a password. The default password is 111111.

If this is the first time you have connected you will see a Download window. This is Normal and it the Lite client downloading pertinent information for the connection. When Downloaded Vibe-Sight will Open.



Once you have opened cMT-Viewer on following occasions, you can use the History Tab to connect directly to your Vibe-Sight appliance. Note if you have connected locally and remotely through Tosibox you will have both IP addresses listed to pick from. Just press the + adjacent the appropriate Device.



10.2 WebView

Vibe-Sight also has a built in WebViewer this allows you to directly access Vibe-Sight's screens. Just enter Vibe-Sight's URL address into your browser. You will be prompted for a password. The Default password is 111111. Unlike cMT Viewer You will be sharing the screen with the main view of the system. What page you view will be viewed on the main system as well.

11. Remote Connection to Vibe-Sight Via Tosibox

11.1 Default Connections:

Vibe-Sight uses Tosibox's Lock 175 as its Layer 3 Router with 1:1 NAT and Security Appliance. This Wan port is typically passed through the Plant Network to the Internet. The Lock 175 also allows many different ways of connectivity. Our Default connections are as follows:

1. WIFI – The lock 175 is WIFI enabled. By default, we have set it up as a WIFI Access point. You can connect to it via WIFI enabled computers, Tablets and Smart Phones.
SSID – Vibe-Sight
Password – Vibration1, (We suggest you change this password to a more secure one at your facility)
2. Remote Access via the Tosibox Security System. The WAN port of the Tosibox router is setup to request an IP address via DHCP from your facilities Switch / router or security appliance that has access to the Internet. Once Internet Access is granted the Tosibox Security system will control remote access via a high-level PKI algorithm with 2-part authentication. More on this later.
3. Optional Cellular Remote access. Vibe-Sight can have an optional Cellular Router for connection to the Internet. This is now a very economical way to gain remote access and keeps the system Isolated from your network.

11.1.1 Connect Directly to Vibe-Sights LAN:

By default, the ethernet patch cable is connected from the RJ-45 receptacle on Vibe-Sight's enclosure to port 1 of the Vibe-Sight analytics engine. The default IP address is 192.168.11.62

11.1.2 Tosibox Lock-175 WIFI as a Client to You Guest Account (Optional)

The Tosibox (optional) WIFI Radio can be converted to a WIFI client and allow Tosibox's WAN to connect wirelessly to your plants WIFI account or Guest WIFI account. Using Tosibox on a guest account together represent the one of the most secure connection for your Vibe-Sight Echo System. Converting the WIFI to a client on your Guest account allows Tosibox to have access to the Internet without tying into your plants network, keeping

everything isolated. The only access into Vibe-Sight is now controlled by the Tosibox security appliance which will only allow Tosibox Key holders access into its Echo System. A VPN Tunnel is then formed for all remote Key holder connections into Vibe-Sight. **See addendum 3.0 for information on changing the WIFI to Client mode.**

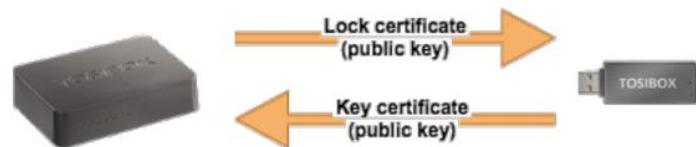
11.1.3 Tosibox Lock-175 with Cellular Network (optional)

The Tosibox Lock-175 has a built-in Cellular Modem. Tosibox uses the “Teal” Network with an eSim card. This allows Tosibox to connect to the most favorable network. Vibe-Sight has configured the Tosibox Cellular modem but the Sim card must be activated with a monthly plan from Tosibox to be used. Using Item 12.1.1 and 12.1.3 together represents the most secure connection for your Vibe-Sight Echo System. Using the Cellular Radio allows Tosibox to have access to the Internet without tying into your plants network, keeping everything isolated. The only access into Vibe-Sight is now controlled by the Tosibox security appliance which will only allow Tosibox Key holders access into its Echo System. A VPN Tunnel is then formed for all remote Key holder connections into Vibe-Sight. **See addendum 3.0 for information on using the Cellular mode.**

11.2 How does Tosibox Work?

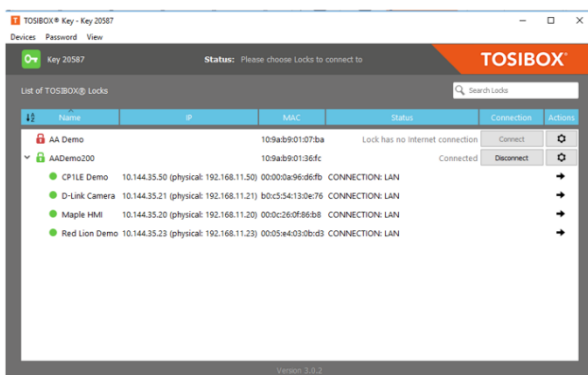
The minimum setup for Tosibox is one Tosibox Lock and one Tosibox Master Key. The Master Key shares a PKI certificate and secure password with the Tosibox lock by a patented serialization routine. When the Lock is powered up, the Master Key is inserted into the Locks USB port. This serializes the Key to the Lock. Once the Lock is serialized it can not be serialized to another Key.

The Key provided with Vibe-Sight is pre-serialized to the Lock 150.

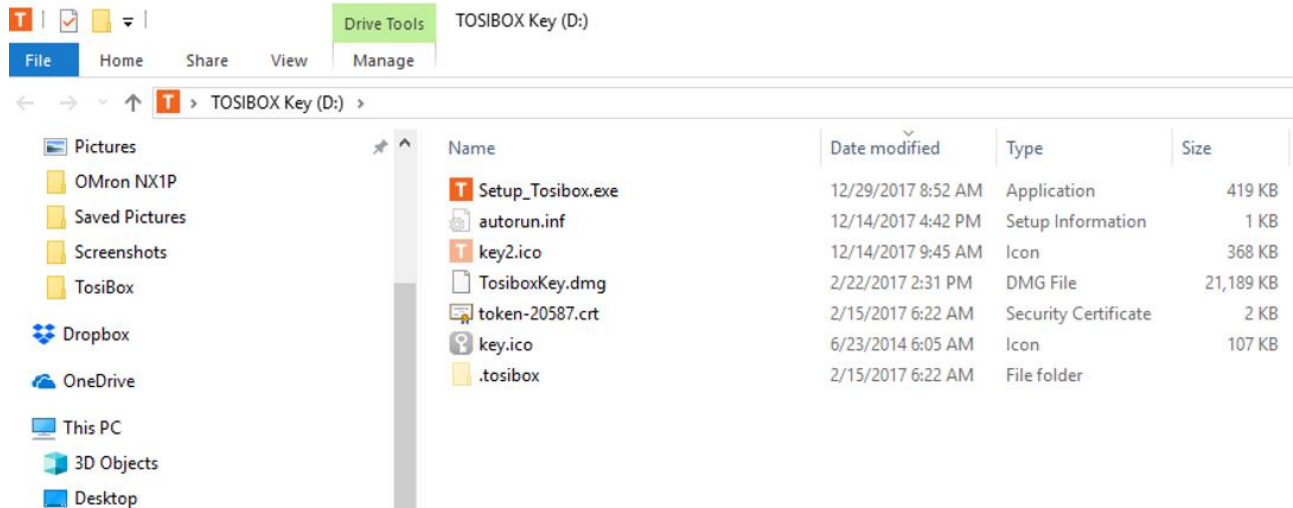


The Master Key looks like a regular USB memory stick, but in reality, has a Cybersecurity Chipset embedded in it. The security on this serialization is 2048-bit encryption.

When you first plug in the Key to your computer, it attempts to load an App on your computer.

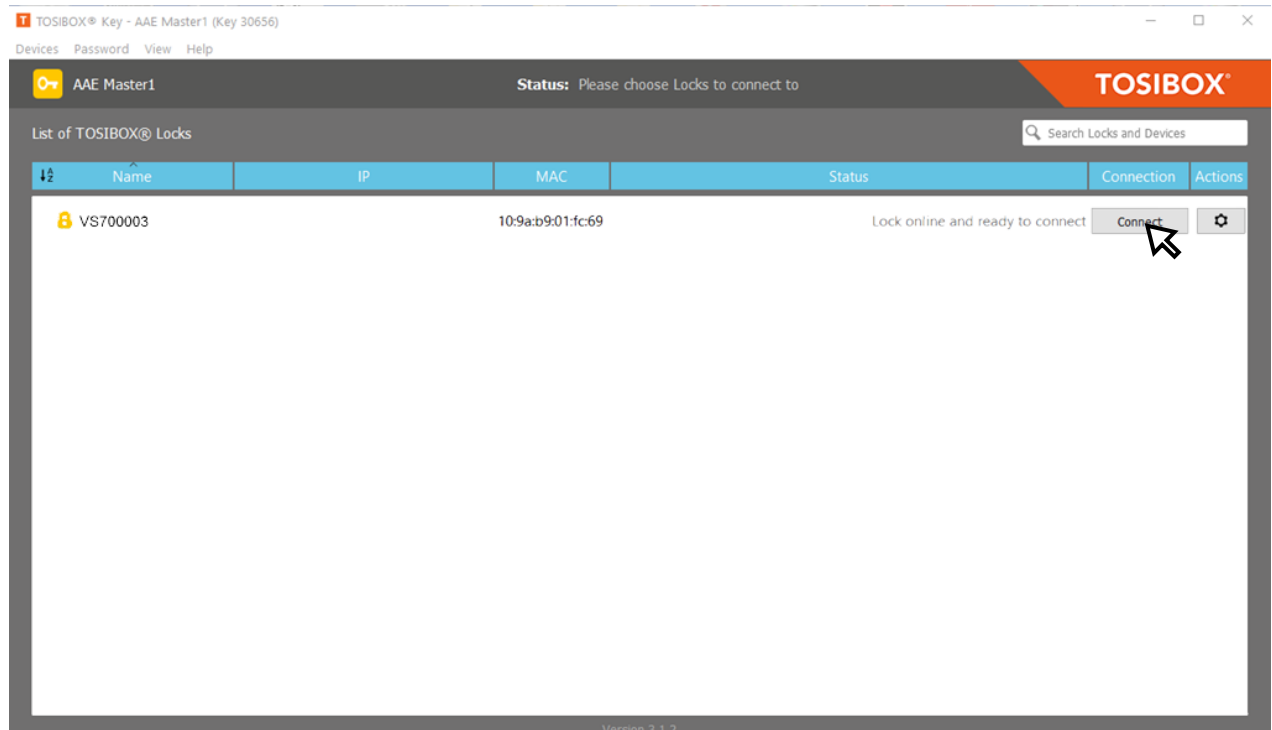


If your computer does not allow that to automatically load the File is located on the Root of the KEY. You can access this via Windows Explorer, just like a standard USB Drive.



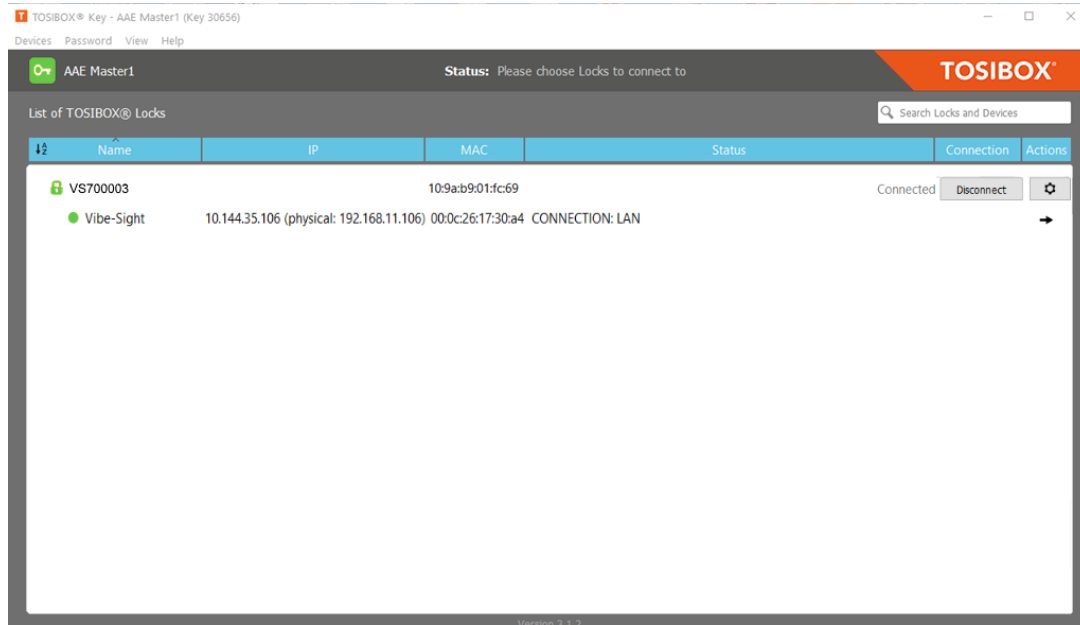
Run the file “Setup_Tosibox.exe.”

This will load in the application. When you next put your Key in the Computer the following Window will popup.



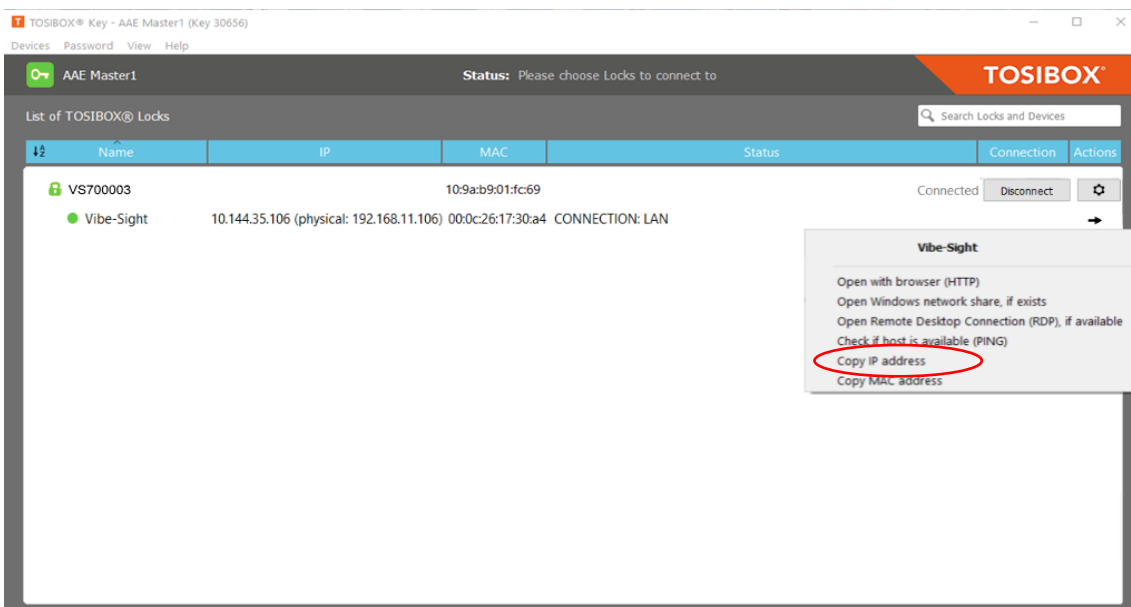
If your Lock is connected to the Internet it will show up Yellow. If it is not yet connected it will show up Red. Once you have it connected to the internet you can continue. By clicking on the “Connect” button.

Once you are connected you will see the following window.



You will see the Lock turns Green, the Key turns Green and the Vibe-Sight shows up Green. This lets you know you are ready to connect. To Vibe-Sight.

You will see that Vibe-Sight has two IP addresses. One is the Physical address and the other is the NAT address. The NAT address is the one you want to use. There is a quick way to copy the NAT address for use with cMT-Viewer. Click the little arrow on the right had side of the window.



Select Copy IP Address and the address will be copied to your clipboard. When cMT-Viewer asks for an address paste this in place. See Addendum 2 for more information on Tosibox.

ADDENDUMS:

1. 1st LAN port on the cMT

The second LAN port of the cMT is connected to the Banner DXMR90. Leaving only the 1st LAN port for communications. Optionally, this is connected to the Tosibox Security Appliance.

1.1 Want to connect Vibe-Sight to an MES network or to an existing plant network? Vibe-Sight can pass data through Tosibox (optional) to the remote system. If your MES or SCADA system cannot act as a Modbus Servant, you can connect the first LAN port on the cMT directly to your plant network.

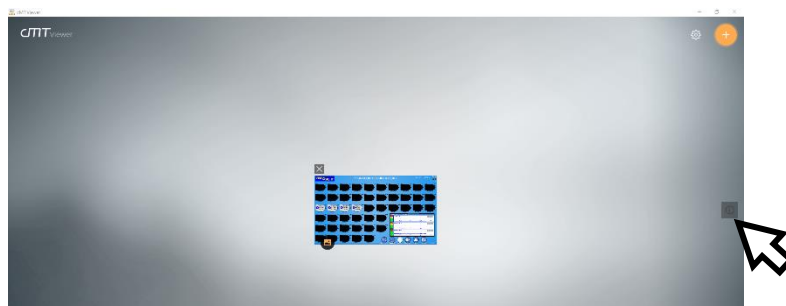
1.2 You can access the cMT Dashboard to configure the LAN ports in two different ways.

1.2.1 Via cMT

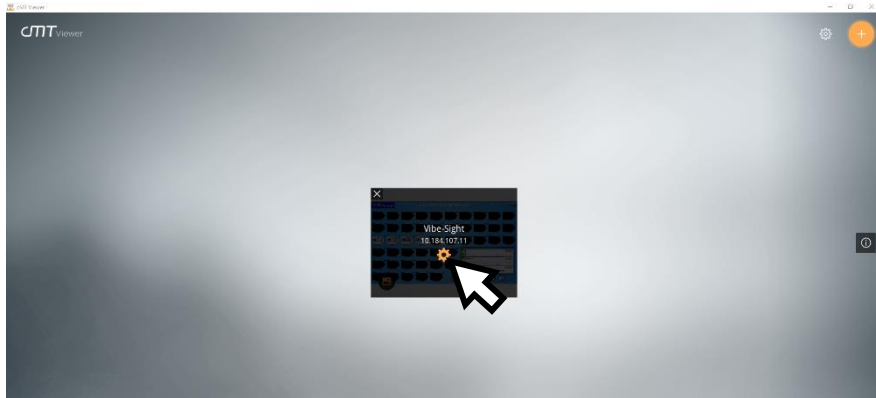
Then, click and hold the top lefthand corner of the screen



This will open up the cMT configuration page



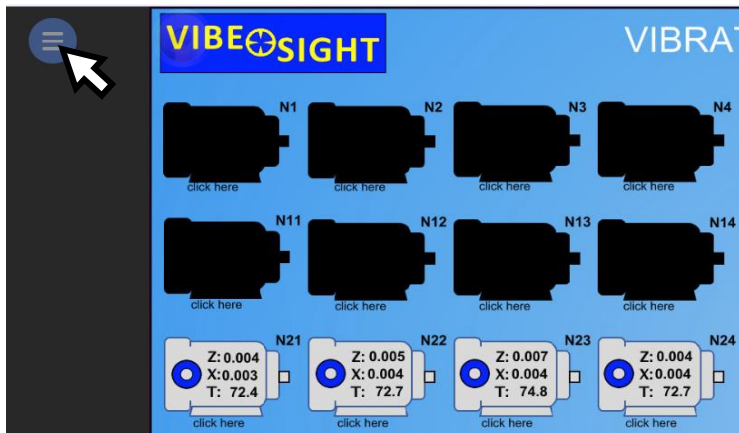
Then click on the small grey power button located on the middle right side of the screen.



This will bring up the access to the cMT Configuration page. Click the Orange Sprocket in the center of the greyed-out Vibe-Sight Screen Icon.

The cMT EasyWeb will be displayed.

The default password is 111111, you may change this at any time.



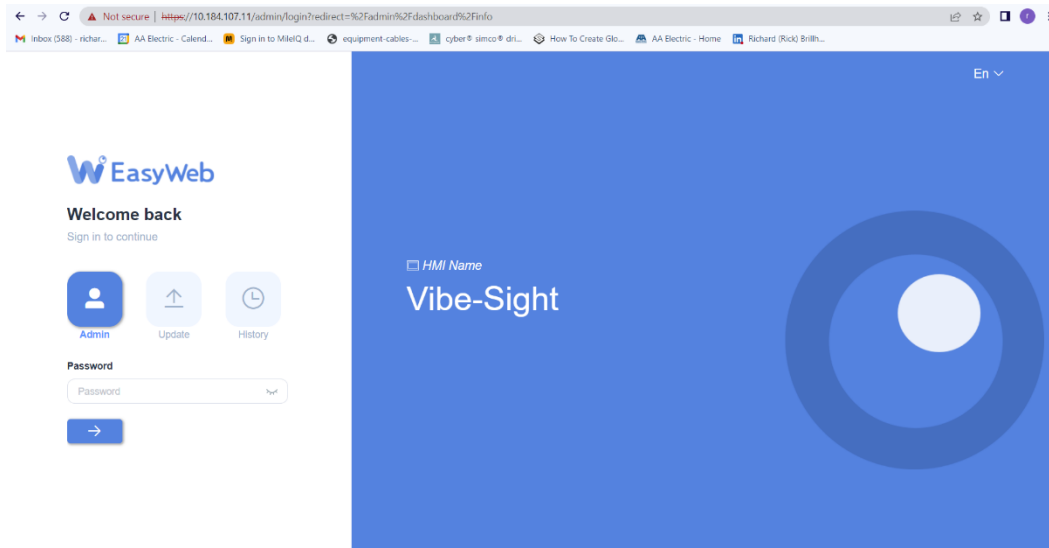
Click the blue circle with the 3 horizontal bars.



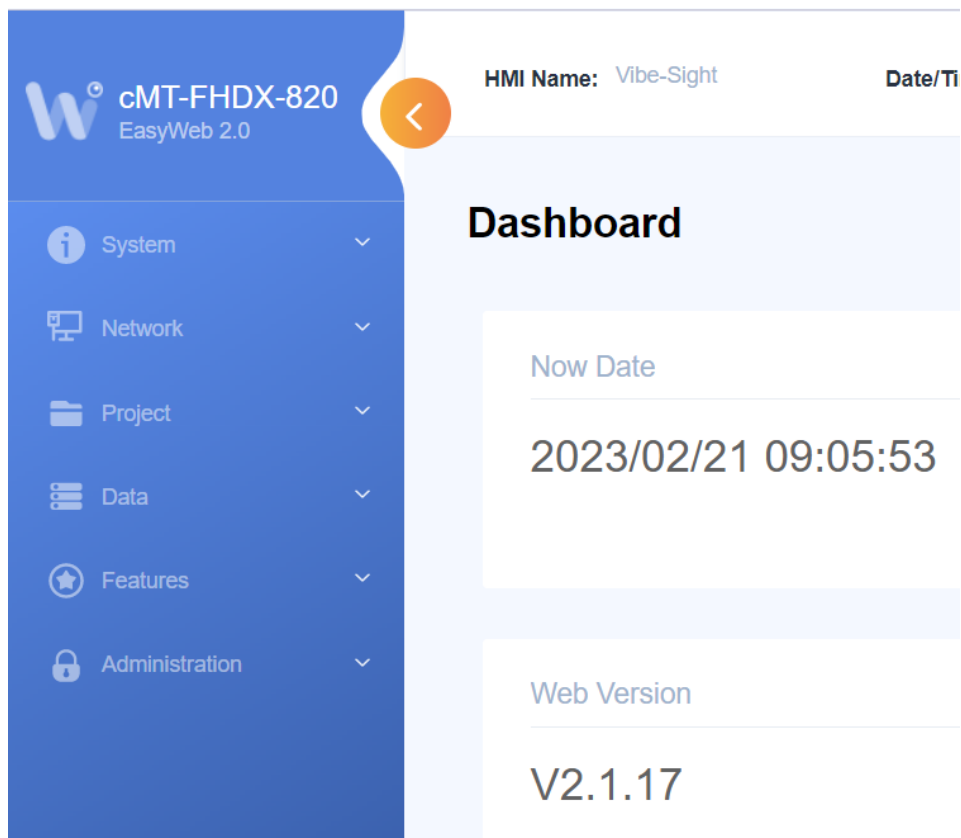
Click the white Sprocket.

This will open the EasyWeb Portal. You want to be on the Admin Icon.

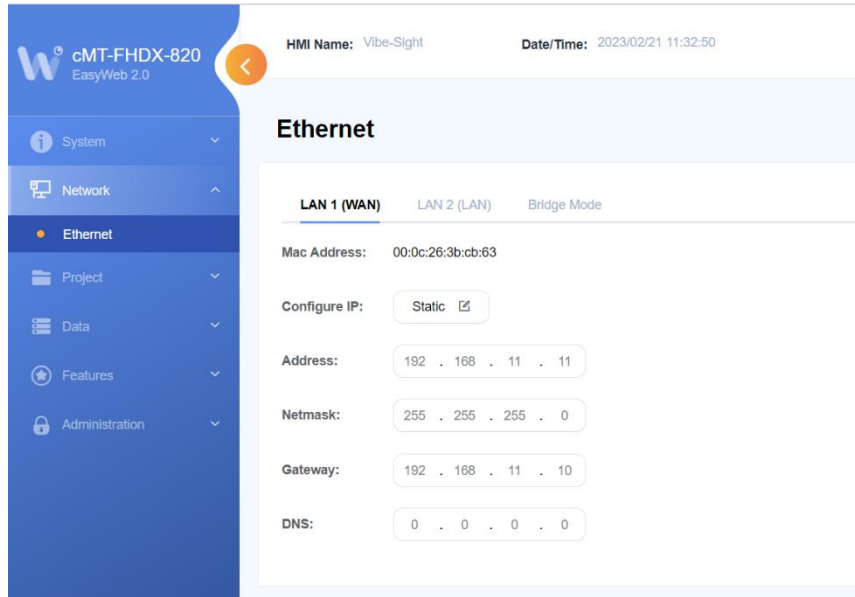
The default password is 111111.



This will open up the cMT Dashboard.



Select Network and then Ethernet



Here you can set up your IP address on the 1st or 2nd port. Do not change the 1st port unless you are changing all Vibe-Sight devices.

Click save and then Logout when you are complete.

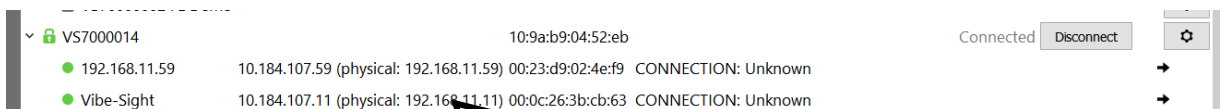
1.2.2 Via EasyWeb

Alternately you can directly access the EasyWeb typing the LAN 1 IP address into a browser (use the direct IP address if you are connected via the Lan or the Nat address if connected via Tosibox. You may also double click the Vibe-Sight line on the Tosibox App.

a.

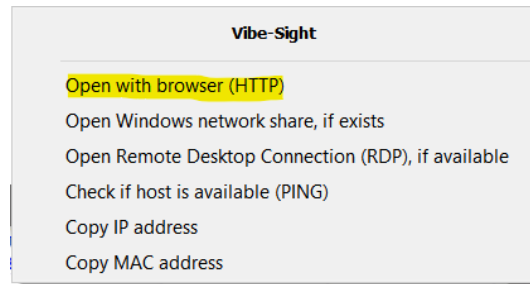


b.



c. Or select the arrow on the right of the Vibe-Sight listing and select

“Open with browser (HTTP)”



2. Introduction to Tosibox

2.1 Minimum Setup:

1. You need at least one Lock
 - a. Vibe-Sight uses the Lock-175.
2. You will need one Master Key.
 - a. A Pre-Serialized Key is included with each Vibe-Sight.
3. The Master Key must be linked to the Lock. These **must be serialized**, Master Key to Lock
4. Note the Lock-175 must be serialized using remote matching.
5. With this setup one individual can gain access to the lock from anywhere with a secure VPN connection.

2.2 Adding Additional Personnel (keys):

1. Once you have made the one “Master Key” it can make additional keys, the lock is not required for that.
2. There is a small applet that is loaded by the key when it is first inserted into a computer. Your computer may not auto load the software, but it is in the key. Look at the key as if it was a USB memory stick and manually start the setup program. “Setup_Tosibox.exe.”
3. More on this applet later, but this is used to make “backup keys” of the Master Key and to spawn subordinate keys of the Master.
4. The Sub keys can be given to maintenance Techs, Engineers and Managers as required
5. Sub Keys can be either **Hardware Keys** or **Soft Keys** (See your Vibe-Sight Distributor or Reseller for information on additional Keys)

2.3 Adding additional sites (Locks):

1. The Master Key must **physically** be serialized to **each new Lock**
2. Its best to bring each lock into your office to serialize it to the Master key before sending it out.
3. You **do not** have to bring in the subordinate keys (more on this latter)
4. Each Subordinate key can be, **selectively linked** to the new Locks.
5. You pick which key goes to which lock by a checkbox selection.

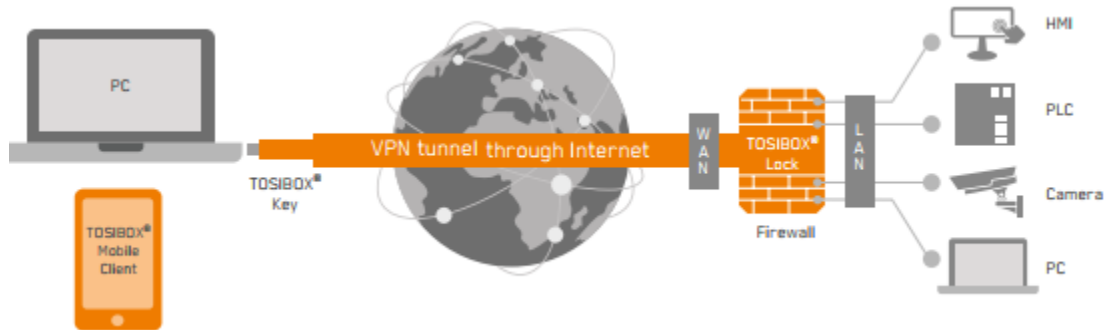
2.4 What happens if you lose your Master Key?

1. **That is what the backup key is for.** Make one and keep it in a safe place.
2. For security reasons, if you do not have your backup key you will need to go on site to each Lock and re-serialize each Lock to the new Master.

2.5 Types of Lock Connections:

The Tosibox Lock can be set up in two modes.

1. Lock mode (Default) will act as your final Layer 3 router, firewall / VPN. The Wan port will connect to your internet connection.
 - The Wan side of the Tosibox lock can sit behind most firewalls and get out. Your Lock could actually be sitting on a guest connection and still make a full VPN connection. Devices set on the Lan side of the Tosibox Lock will be protected.



- The Lock will only allow a connection from the paired key.

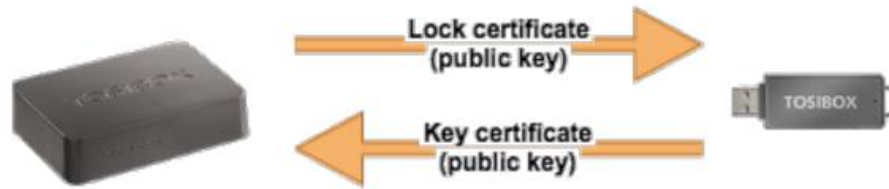
2. The second mode can connect up to your existing architecture acting as a client



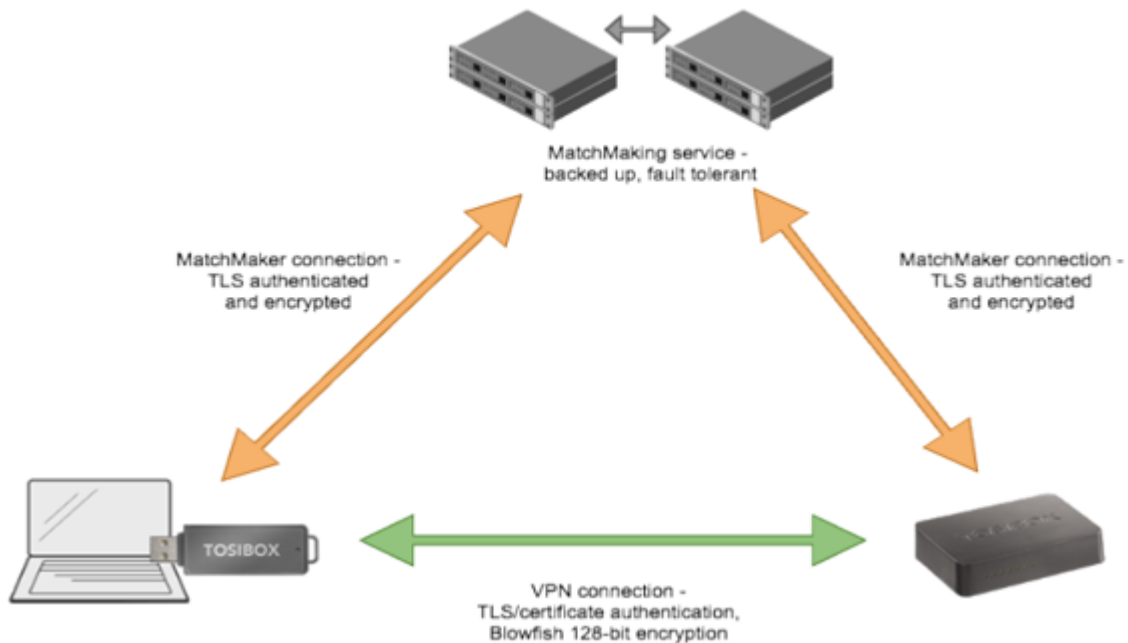
- All of the devices on the network would then be available for remote access.
- This would be beneficial if you were wanting to set up a secure remote access into your office network for remote personnel.

2.6 How does this work?

- The Master Key must be serialized to the Lock:



- The Tosibox Lock will make an outgoing connection to Tosibox's "Match Making Servers."



- Tosibox's server will validate the lock and check for serialized Keys.
- When you plug your Key into your computer the program will load and securely connect to the "Match Making Server" once this Key connects up, the server matches the Key to the Lock.
- The Key and the Lock have a Cryptologic chip set built in.
- Serialization encryption is via 2048-bit RSA key, physical key exchange (this is not a typo)
- Once the Match making service validates to Key to Lock you have a completed VPN connection from Key to Lock.
- At this point the match making server drops out leaving a VPN tunnel between the Lock and Key.
- Encryption on this tunnel can be as high as AES 256 CBC

- You do not need to remember any IP addresses to connect to the Key and Lock. The software will show you available locks and the devices under the locks.
- Once the connection to the lock has been made you can do anything just like you were connected locally to the device.
- Each lock also has full NAT capabilities. The Key file will show you the NAT address and the local address. (You can keep the same IP addresses at the local level on all machines without getting IP conflicts)
- **One key can connect to muHSiple locks.**
- **One Lock can connect to muHSiple Keys.**
- **You only need to have the direct connection once between your Lock and the Master Key one time to set things up.**
- You can also have a password on the Key making it truly 2-part authentication.
- The Key when first connected to your computer will download a small operational applet.
- This will allow you to select which lock to connect to and to administer the Locks and Keys, (if you have the Master Key).
- The Master Key can, through its applet make backup master Keys.
- It can also make Subkeys are what you will give to your necessary staff
- You can dictate which Subkey gets connected to which Lock
- You can change these connections on the fly with the addition of additional Locks.
- There is a Soft-Key that has all of the security but is Loaded on a computer. Configuration of the softkey is similar to a Sub-Key. Sub-Keys when terminated are returned automatically to the parent key.

2.7 Excerpt from Tosibox's Security Paper:

"...TOSIBOX devices identify each other by cryptographic pairing (serialization) in which the devices must be serialized/paired with each other before use. This is achieved by connecting the TOSIBOX devices together physically. In the serialization process, the key device (Key) is inserted into the USB port of the Lock device. The Lock and Key then exchange the public key of the keypair with each other in order to create a mutual trust relationship. The encryption key is stored in a closed memory location of the crypto processor on the Key device. It cannot be copied or tampered with. Establishing a connection is impossible without the correct encryption keys. Additionally, each encrypted data stream is protected with disposable encryption keys that are exchanged with the DH method..."

2.8 Simulthaneous Connections:

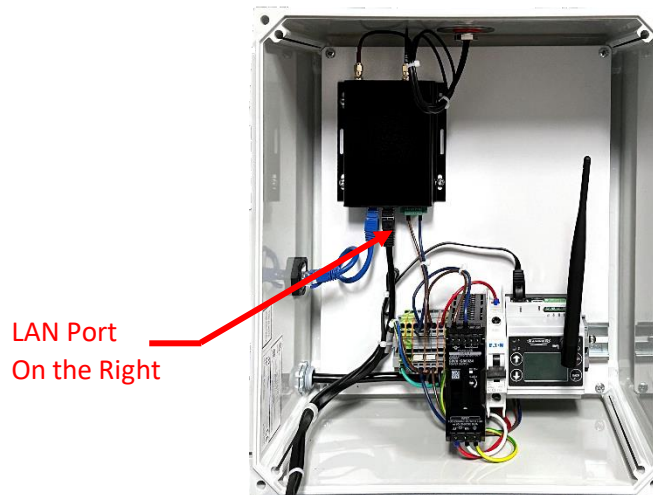
1. A Lock 175 allows 10 simulthaneous connections at a speed of 10MBPS
2. Vibe-Sight will allow 4 remote connections and 1 local connection.

3. Setting Up Tosibox as a WIFI Client

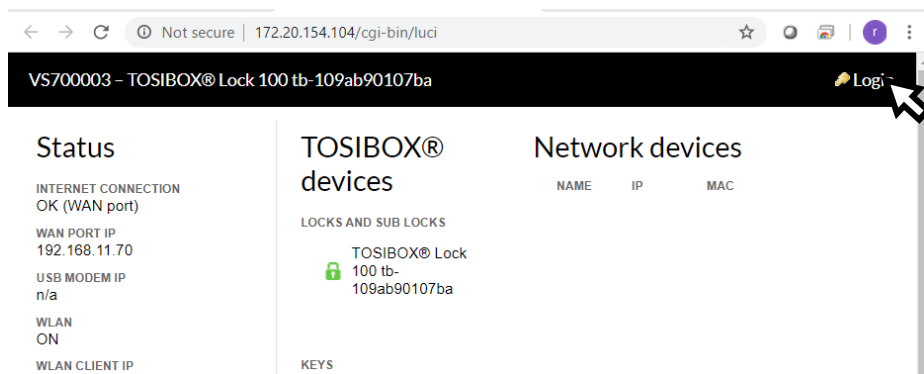
The WIFI radio on your Tosibox Lock-175 can be set up to be a WIFI Client. When that occurs, the Lock obtains its WAN port connection from its WIFI channel. This lets you connect to your plant WIFI network or Guest Account.

The following information lets you configure your Tosibox Lock-175 as a WIFI client:

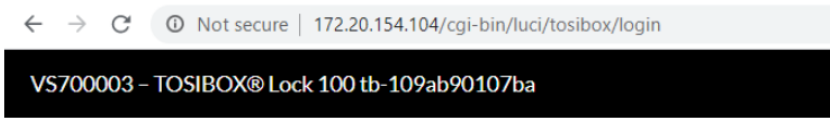
You must connect to the Tosibox. This can be done via the Tosibox Applet. If you have not yet connected it into the internet you must go through the LAN-Port.



Using an Internet Browser connect to Tosibox's internal Webpage. Its IP address is 10.10.10.254. The Tosibox Password on Vibe-Sight is pre-configured to VS and the Password on the bottom. When you connect the following screen will display.



Once connected You will need to click the Login field in the top right-hand corner. The Sign-in screen will look like the following:



Authorization Required

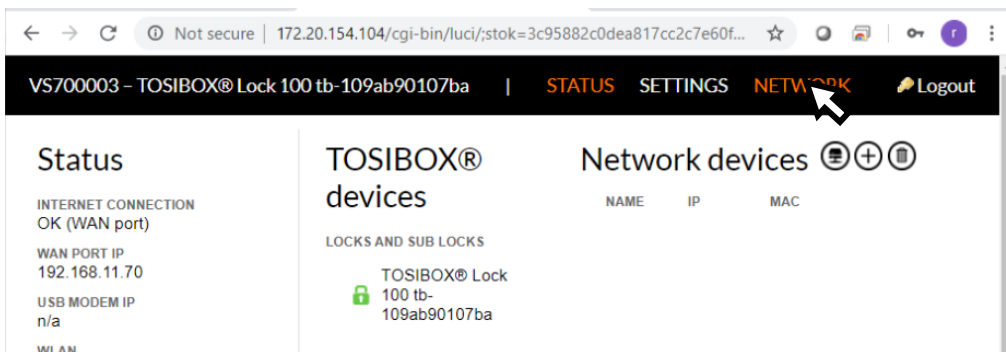
Username:

Password:

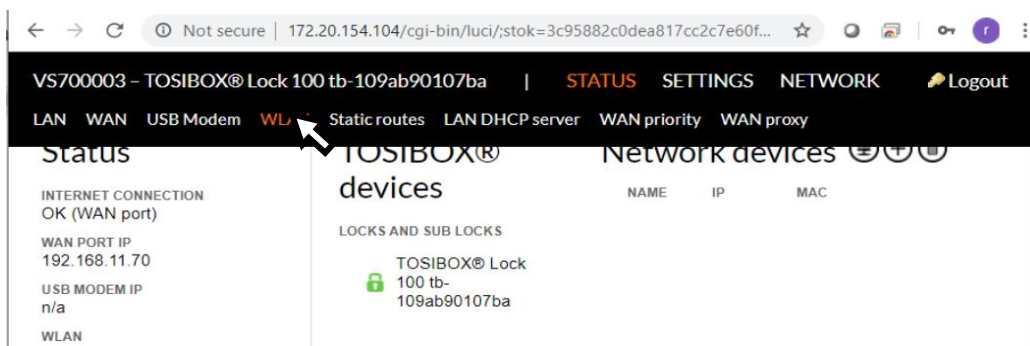
Login

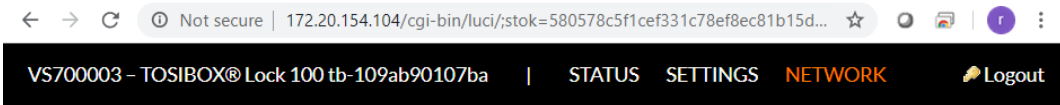
If there is not a small label on the visible side of your Lock-175 you will need to look at the backside of the Lock. Each Lock has a unique password.

Once you have logged in you will need to click Network, see the following page:

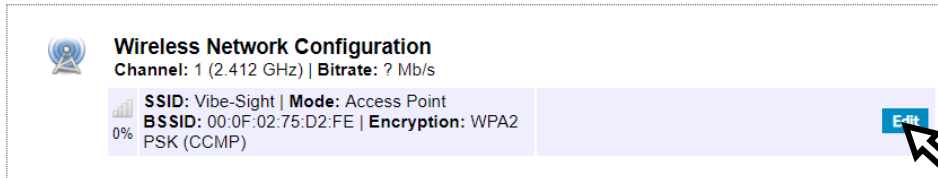


Once you are in the Network Section click WLAN

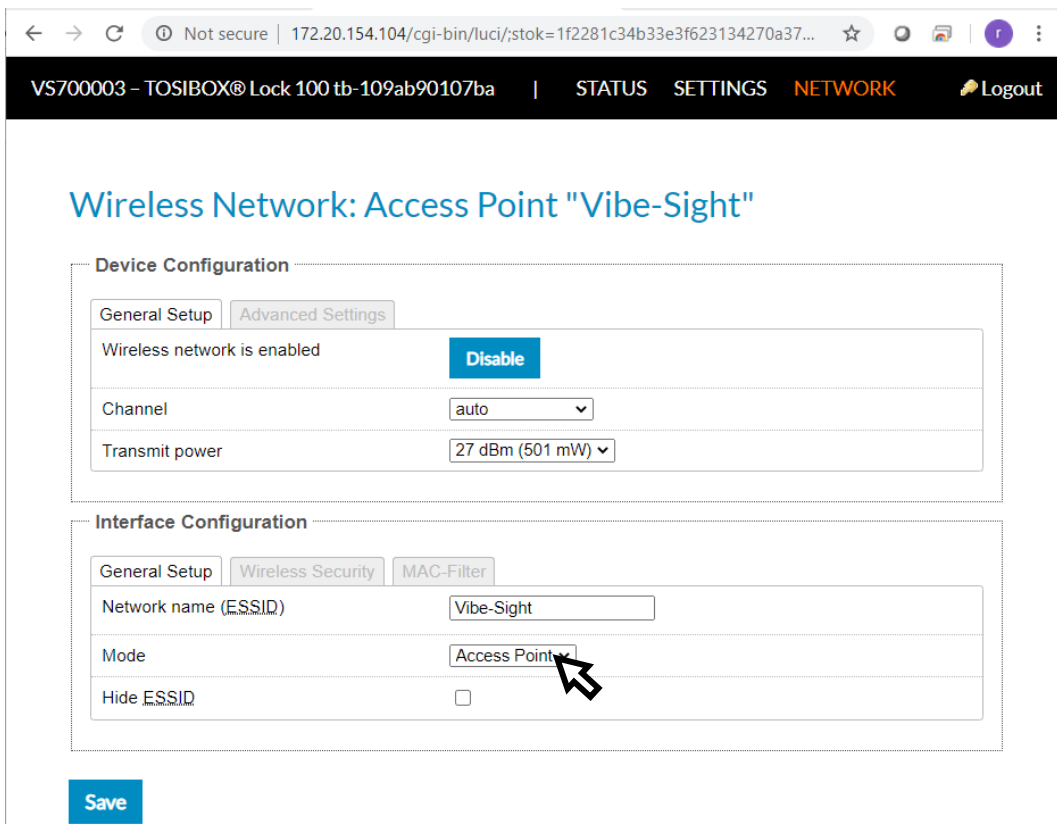




Wireless Overview



Click the Edit button to change the WIFI Settings.



Click on the Mode field. It is displaying Access Point. You will have a choice of Access Point or Client. Pick Client.

Wireless Network: Access Point "Vibe-Sight"

Device Configuration

General Setup | Advanced Settings

Wireless network is enabled **Disable**

Channel: auto

Transmit power: 27 dBm (501 mW)

Interface Configuration

General Setup | Wireless Security

Network name (ESSID): AAEGUEST

Mode: Client

Save

You will now need to change the Network ID to the ESSID of your Plants WIFI network. For reference it is shown as AAEGUEST.

Click on the Wireless Security Tab to enter in the password for your WIFI Network.

Wireless Network: Access Point "Vibe-Sight"

Device Configuration

General Setup | Advanced Settings

Wireless network is enabled **Disable**

Channel: auto

Transmit power: 27 dBm (501 mW)

Interface Configuration

General Setup | Wireless Security

Encryption: WPA2-PSK

Key: [masked]

Save

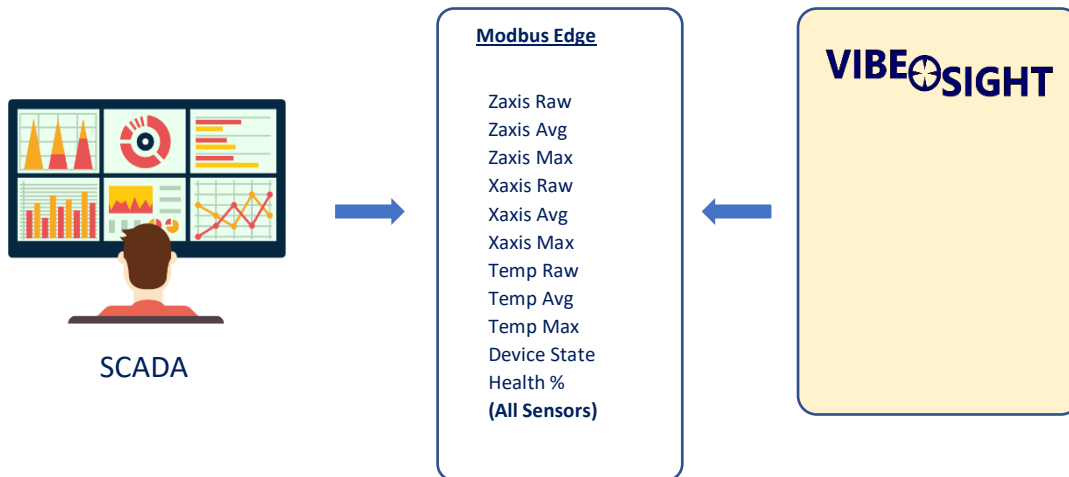
Set the Encryption type and then enter the password into the field marked Key. Hit Save. Your lock will restart and will connect to the Internet.

Connect back to the Webpage and with status see if you are connected.

4. Vibe-Sight Edge Server:

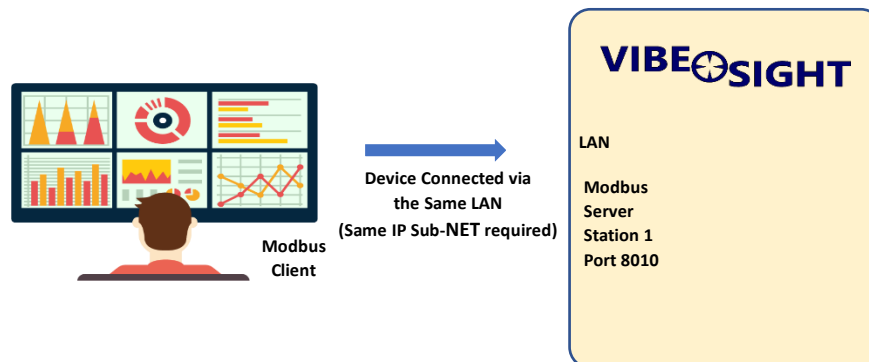
Vibe-Sight has a buiHS in Modbus Edge Server that will provide pertinent information to External Devices such as:

- MES Systems
- Scada
- Data Historian
- Cloud Systems
- Plant information Systems



Data Exchange Configuration:

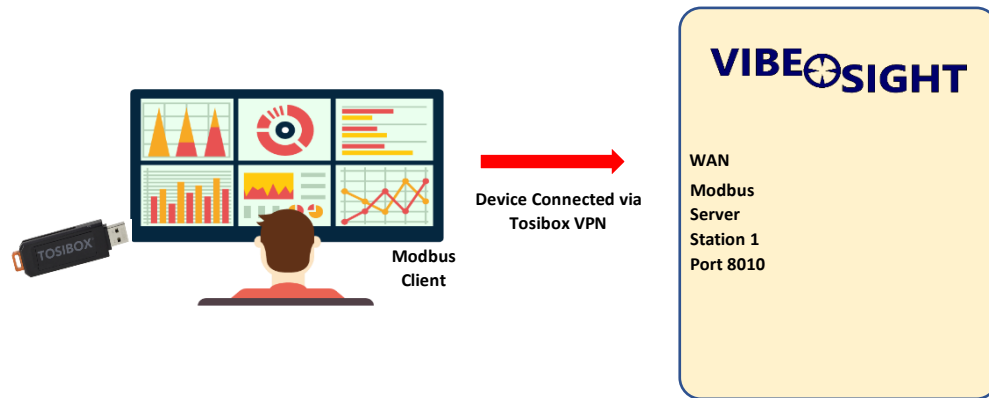
4.1. Connection Via the Same LAN:



For this connection the external connection from **Vibe-Sight** needs to be the internal Lan connection from the switch, or make the second Network port on the cMT match the Plant Network Subnet and use it. **Vibe-Sight** will have to be changed to the same subnet or the second port on the cMT will need to be set up. (See Addendum 1). Note, on **Vibe-Sight_{HS}** you must use port 1 disconnecting it from Tosibox.

4.2. Remote Connection Via Tosibox VPN Tunnel:

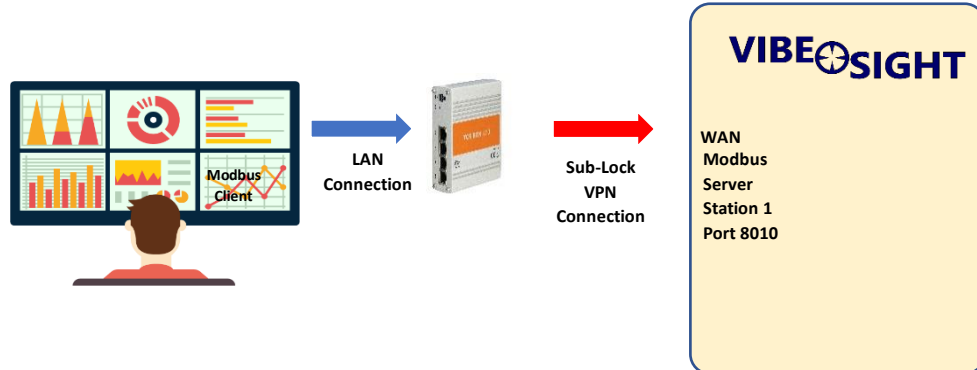
4.2.1. Using a Tosibox Key



For this connection the external connection from Vibe-Sight needs to be to the WAN port on the Tosibox security Device.

The SCADA or MES Computer must be connected via Tosibox. The simplest solution is to either use a Tosibox Hard Key or Soft Key. The connection will need to be reconnected on power up of the system. This works if the SCADA Computer has a connection to the Internet or both the Scada and the Vibe-Sight WAN are connected to the same Sub-Net.

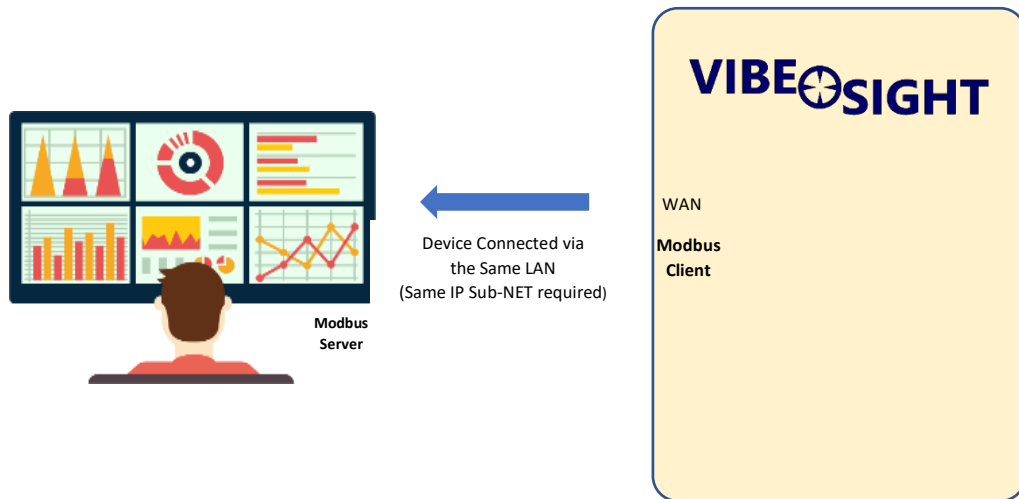
4.2.2. Using a Sub-Lock



For this connection the external connection from Vibe-Sight needs to be to the WAN port on the Tosibox security Device.

The SCADA or MES Computer needs to connect to a Tosibox Lock. The SCADA Lock can be a Sub-lock to Vibe-Sight or the reverse, Vibe-Sight to SCADA. (See Addendum 2 for information on Tosibox). With this connection the locks will reconnect on power up requiring no monitoring or assistance. You may also choose to connect via a full Tosibox platform. If so, please see your Vibe-Sight representative.

4.2.3. Remote Connection Routed through Vibe-Sight WAN:



If your SCADA or MES Computer can be set up as a Modbus Server, the Vibe-Sight gateway can be setup as a Modbus Client. With this, the Data can be routed from the WAN port of Vibe-Sight past its firewall and through to the Server.

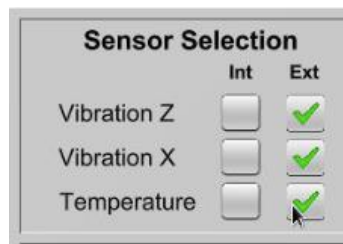
This will require Integration to set up a new device in the cMT and pass the appropriate data to the SCADA / MES compute.

4.3. Parameters List:

Exposed Data Modbus Server Vibe-Sight to Device								
	Definition	Data Type	Modbus Start	Modbus End	Addressing Notes	Starting Address	Access	Format
1	Z Axis Vibration (Raw)	Int	40100	40120	Node 1 starts at 40101 each successive node increments up by 1	651	Read Only	Data x 1000
2	Z Axis Avg Daily Vibration	Int	40150	40170	Node 1 starts at 40151 each successive node increments up by 1	701	Read Only	Data x 1000
3	Z Axis Max Daily Vibration	Int	40200	40220	Node 1 starts at 40201 each successive node increments up by 1	751	Read Only	Data x 1000
4	X Axis Vibration (Raw)	Int	40250	40270	Node 1 starts at 40251 each successive node increments up by 1	801	Read Only	Data x 1000
5	X Axis Avg Daily Vibration	Int	40300	40320	Node 1 starts at 40301 each successive node increments up by 1	851	Read Only	Data x 1000
6	X Axis Max Daily Vibration	Int	40350	40370	Node 1 starts at 40351 each successive node increments up by 1	901	Read Only	Data x 1000
7	Temperature (Raw)	Int	40400	40420	Node 1 starts at 40401 each successive node increments up by 1	951	Read Only	Data XXX
8	Temperature Avg Daily	Int	40450	40470	Node 1 starts at 40451 each successive node increments up by 1	1001	Read Only	Data XXX
9	Temperature Max Daily	Int	40500	40520	Node 1 starts at 40501 each successive node increments up by 1	1051	Read Only	Data XXX
10	Predictive Health	Int	40550	40570	Node 1 starts at 40551 each successive node increments up by 1	1101	Read Only	Data XXX
11	Device State	Int	40600	40620	Node 1 starts at 40601 each successive node increments up by 1	1151	Read Only	0 Not Bound, 1 Bound not Running, 2 running 3 Vib. Fault, 4 Temp. Fault

4.4. External Vibration / Temperature Data

If you have external devices providing Vibration or Temperature Data, you can pass them two Vibe-Sight via the following registers. Make sure to select External on the Sensor Selection section of the Node Setup page on Vibe-Sight.



Exposed Data for External Data Modbus Server Device to Vibe-Sight								
	Definition	Data Type	Modbus Start	Modbus End	Addressing Notes		Access	Format
1	Z Axis Vibration (Raw)	Int	41000	41020	Node 1 starts at 41001 each successive node increments up by 1		Read/Write	Data x 1000
4	X Axis Vibration (Raw)	Int	41050	41070	Node 1 starts at 41051 each successive node increments up by 1		Read/Write	Data x 1000
7	Temperature (Raw)	Int	41100	41120	Node 1 starts at 41101 each successive node increments up by 1		Read/Write	Data XXX

1. EULA

1. The End User is licensed to use the Vibe-Sight program on the one Vibe-Sight appliance purchased.
2. The End User does not Purchase the rights to own or distribute the Vibe-Sight Program
3. The End User is allowed to save copy the Vibe-Sight program to assure a backup is available.
4. Vibe-Sight may at times release an upgrade to the Vibe-Sight Program. The End User may load the new release of the Vibe-Sight program free of charge on the Vibe-Sight Analytics Engine.
5. The End User is not allowed to load the Vibe-Sight program onto any other hardware except that that is purchased through a Vibe-Sight authorized representative as a replacement part.
6. The End User or its designated agent may modify the existing display screens and add additional functions as desired.
7. Modified Screens must still retain the Vibe-Sight Logo.
8. Modifications to Vibe-Sight are the full responsibility of the End User. Vibe-Sight will though, provide Tech Support for changes.
9. The End User owns any of the Data and Logs generated by Vibe-Sight and may save and distribute at their digression.
10. While Vibe-Sight may provide free tech support by phone any on-site support visits will be on a fee plus peridium basis.
11. Operating this Vibe-Sight appliance is a acceptance of this EULA.

2. Important Links

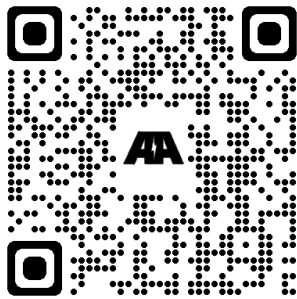
2.0 Manuals

Banner Engineering

H10 Data Radio

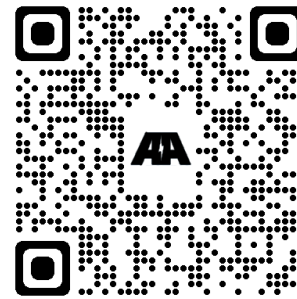
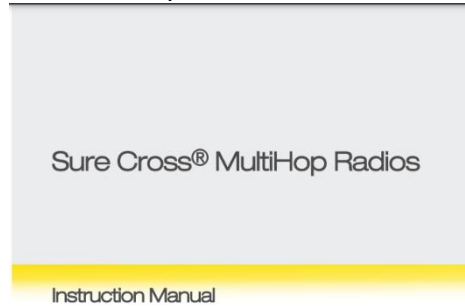


MultiHop H10 Data Radio



(Scan or click)

MuHSi-Hop Instruction Manual

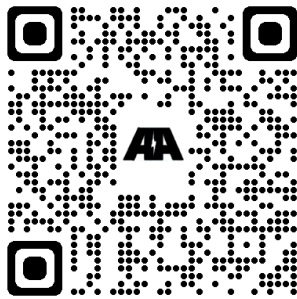


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Installing Your Sure Cross Radios

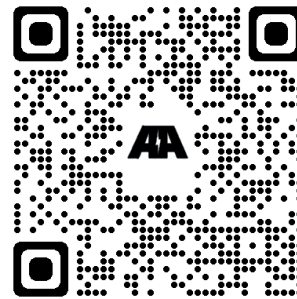


Installing Your Sure Cross® Radios



(Scan or click)

QM30VT1 Vibration and Temp Sensor



(Scan or click)

Tosibox

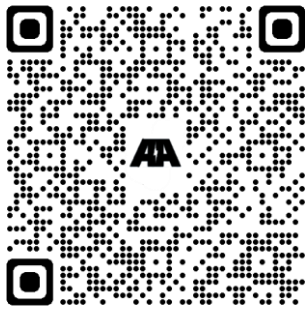
Lock-175 Data Sheet



TOSIBOX

Advantages of TOSIBOX®

- Simple**
Build and manage secure OT infrastructure in minutes
- Secure**
Tested & audited security
- Modular**
Unlimited expandability and flexibility
- Timeless**
Deals with legacy and future systems
- Unique**
Globally patented point-to-point connection



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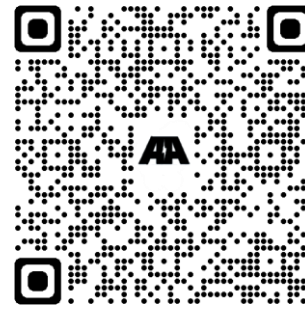
Tosibox User Manual



USER MANUAL

TOSIBOX® Lock 150
TOSIBOX® 175
TOSIBOX® Lock 210
TOSIBOX® Lock 250
TOSIBOX® Lock 500
TOSIBOX® 610
TOSIBOX® 650
TOSIBOX® 670
TOSIBOX® 675
TOSIBOX® Key

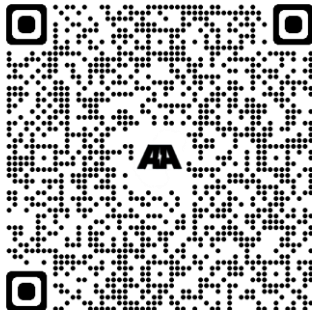
TOSIBOX



(Scan or click)

Tosibox Hard Key

TOSIBOX

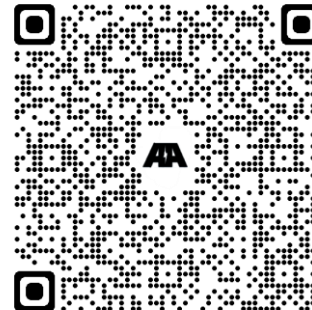


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Tosibox Key Quick Start Guide

TOSIBOX

Preparing your Key
Quick Start Guide

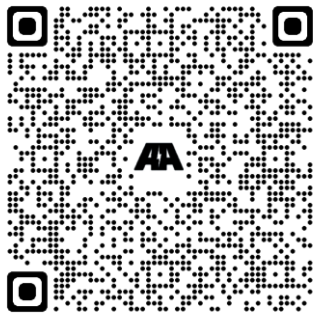


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2.1 White Papers

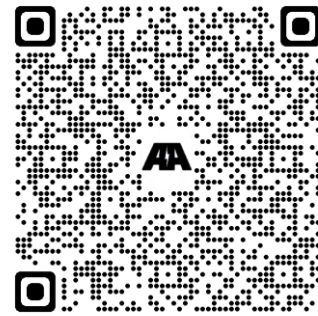
Vibe-Sight

Predictive Maintenance Made Easy



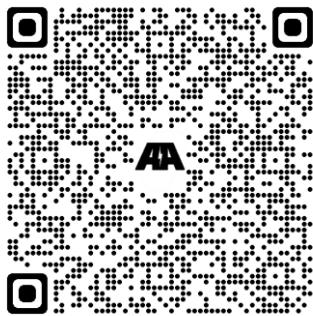
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Predictive Analytics to Forecast Failure



(Scan or click)

Early Detection of BeHS Failure CSA1



(Scan or click)