Machine Health Monitoring (MHM) 2.0 Installation Guide

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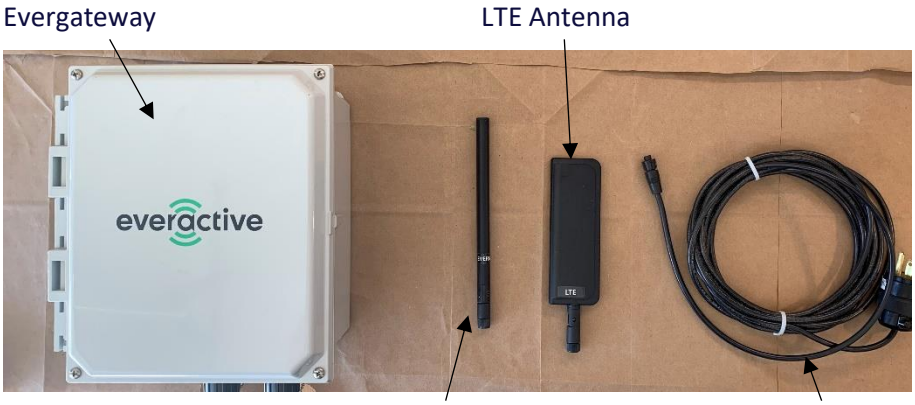
Evergateway

Components



Installation

1. Evergateway
2. Determine a central location between all sensors and has adequate structure for installation.

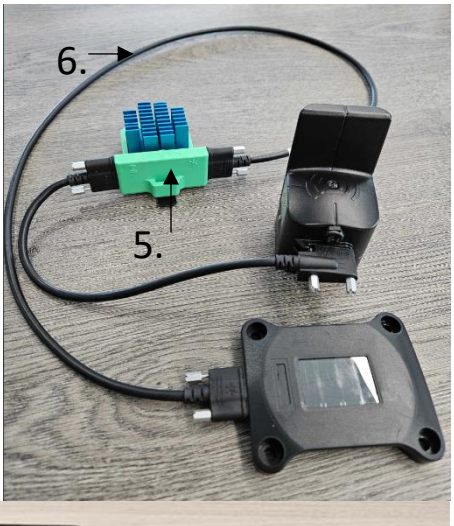
3. Evernet Antenna gets screwed into the top right corner.
4. LTE Antenna gets screwed into the bottom left corner.
5. Power cord is plugged in at the bottom right corner then plugged into power.

Configuration

If pairing Eversensors to an Evergateway that has already been configured, skip this section. Troubleshooting can be found here: https://support.everactive.com/hc/en-us/articles/1500004086202-Gateway-Troubleshooting-

Eversensors

Components



1. Eversensor
2. [Optional] photovoltaic (PV) harvester (outdoor)
3. [Optional] Photovoltaic (PV) Harvester (indoor)
4. USB-C style custom cable to connect TEG harvester to Eversensor
5. Thermoelectric generator (TEG) harvester
6. [Optional] USB-C style custom cable to connect PV harvester

Important notice: *Only Everactive cables should be used with Everactive devices. The cables should never be plugged into a USB-C style charger or laptop; Eversensors cannot charge from a USB-C charger.*

Eversensor Attachment

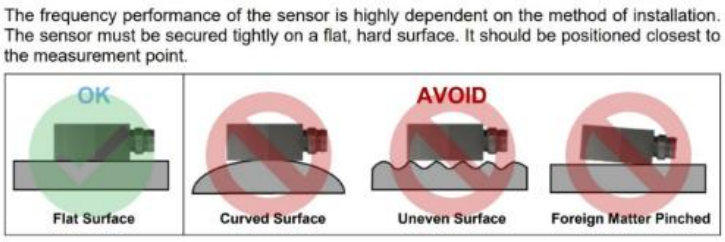
There are two ways of mounting the MHM 2.0 Eversensor: Epoxy and magnets.
Mounting using the magnets built into the base of the sensor is the fastest, easiest way to mount an MHM sensor to an asset, as outlined below.

Magnetic Mounting Process:

An MHM sensor may be mounted to the surface of a machine using the magnetic base when:

- The machine surface is a ferromagnetic material.
- There is approximately a 2" x 2" area to place the MHM sensor.
- The MHM sensor does not "rock" when placed on the machine's surface.

1. Select a location on the asset to be monitored at either the inboard or outboard end of the unit, oriented vertically or horizontally.
2. Place the MHM sensors on the machine with the antenna oriented perpendicular to the machine's axis of rotation. Test to ensure a positive connection between the sensor and the machine by gently "wiggling" the antenna of the sensor. If the MHM sensor "rocks" it will not produce useful data.
    - If the sensor "rocks", reposition the sensor until the sensor shows no rocking motion.



Epoxy Mounting Process:

*Everactive recommends using **Loctite AA 330 No-Mix Adhesive** for epoxy mounting MHM hardware (sensor, TEG, or PV Harvester). Please refer to the Loctite Specifications and MSDS sheets if more information is needed on Loctite AA 330.*

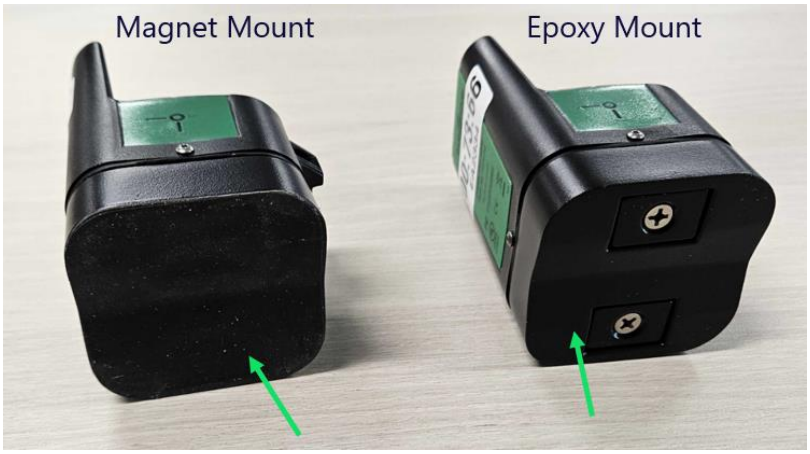
An MHM sensor may be mounted to the surface of a machine using epoxy when:

- The machine surface is uneven (E.g. Cast Steel) and causes the MHM sensor to "rock" when attempting to mount via magnet.

- The machine casing or surface is made of a non-ferromagnetic material.
- The machined casing is finned for cooling.

Epoxy Mounting process:

1. Select a location on the asset to be monitored at either the inboard or outboard end of the unit, oriented vertically or horizontally.
2. Surfaces should be dry and clean of any heavy grease or oil.
3. Sensor mount rubber bottom should be removed.



4. Hold Activator can 1-2 inches from the MHM sensor mount location and coat the surface with Loctite AA 330 Activator.
5. Apply Loctite AA 330 adhesive to the base of the MHM sensor, forming two parallel beads. Place the sensor on the machine ensuring the antenna is perpendicular to the axis of rotation within the machine.
6. Press the MHM sensor to the machine firmly for 60 seconds. Handling strength in 1-2 minutes. Full cure in 4-24 hours depending on environmental conditions. Larger gaps between mount surfaces will increase cure times.

PV Harvester Attachment

If the thermal harvesting source is insufficient, Everactive offers a PV harvester as a supplemental harvesting source. Both the indoor and outdoor PV harvesters connect using the same custom USB-C cables.

1. Connect the PV harvester directly to the TEG harvester, which must itself be connected to the Eversensor.
2. The same epoxy may be used to secure the PV Harvester to the surface of the machine.
3. Angle the PV harvester to maximize direct light to the PV cells once secured.

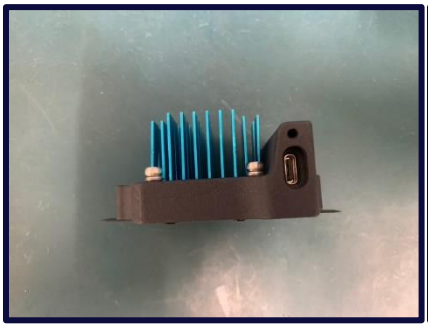
USBC Cable Plug Orientation with Sensor + TEG + Outdoor PV (Straight to Straight Cable)

PV harvester attached to system via TEG harvester

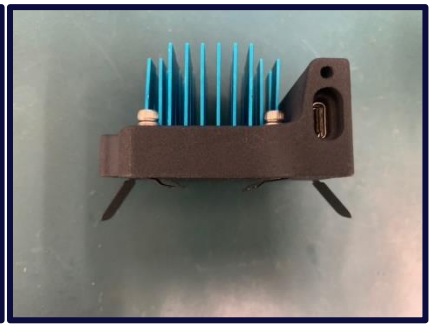
TEG Harvester Attachment

Once the MHM sensor has been attached, it's time to connect and dress the TEG, PV, and cables for the MHM power train.

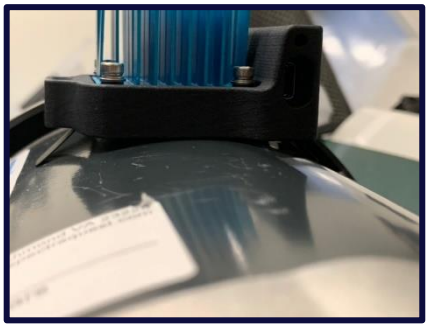
1. Identify the hottest location on the machine or the motor driving the machine to be monitored. This is where the TEG harvester will be attached.
2. Bend the metal tabs down on the underside of the TEG harvester to provide stability along the curved surface of the machine.
3. Secure the magnetic TEG harvester to the machine such that the contact point is centered to maximize heat transfer to the harvesting source.



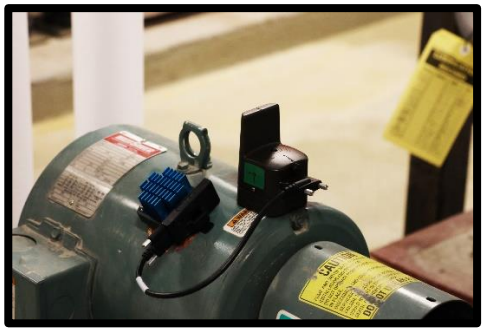
TEG harvester
from factory



TEG harvester with
tabs bent down



TEG harvester with
tabs stabilizing base

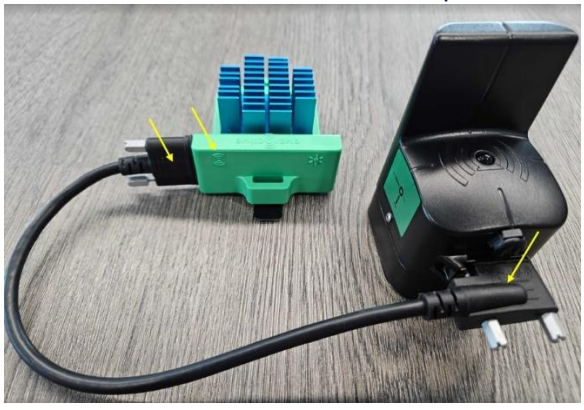


Aerial view of TEG harvester
attachment

Cabling Attachments

The Everactive USB-C cables are custom-keyed to ensure proper connection.

1. Eversensor
   - Right-angle connection only
2. TEG harvester
   - Straight connection from Eversensor USB-C cable into TEG port with “heat waves” icon



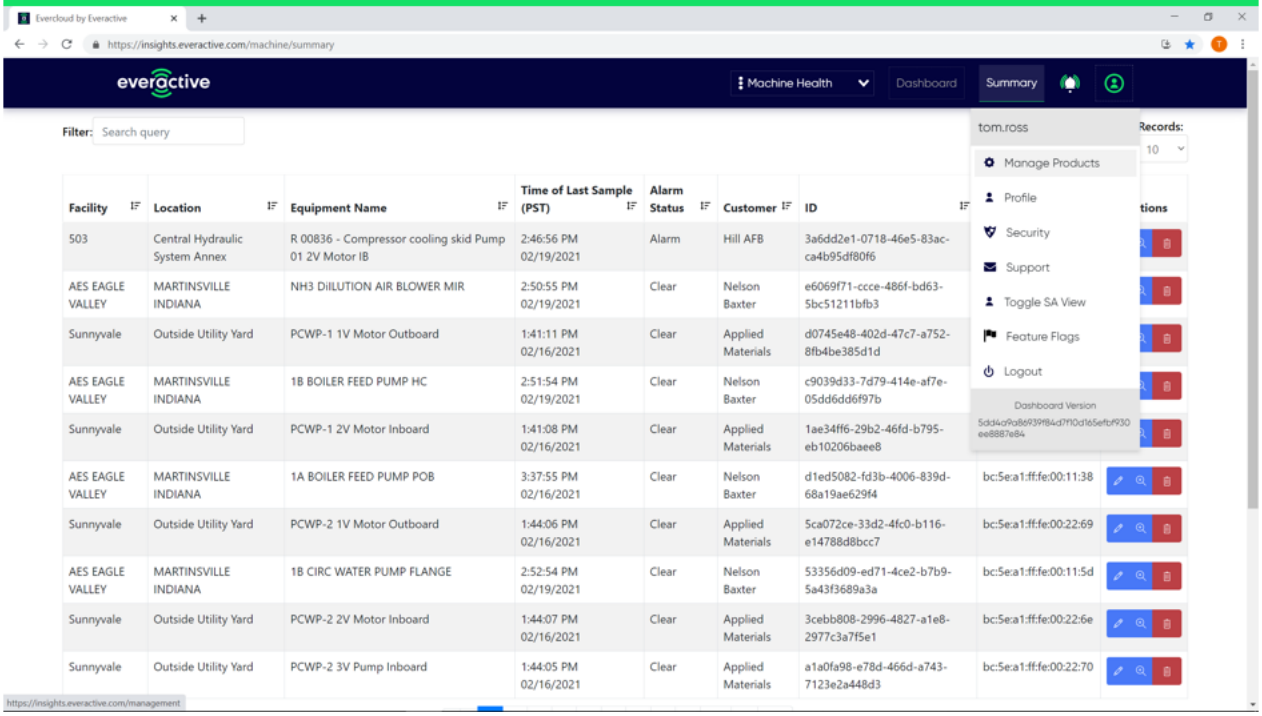
PV harvester

- Straight connection from PV harvester USB-C cable into TEG port with “sun” icon, which should be facing up.

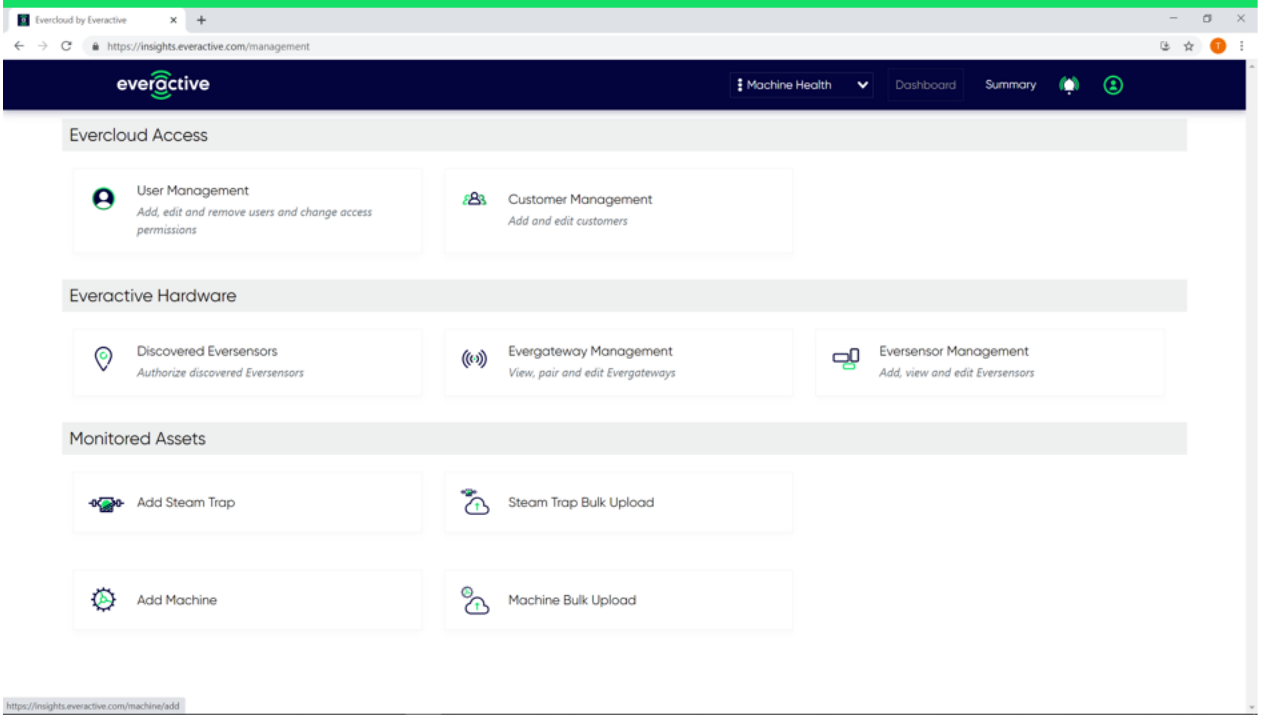
Adding Sensors

Click on the circle icon on the very right of the upper blue bar

Select “Manage Products”

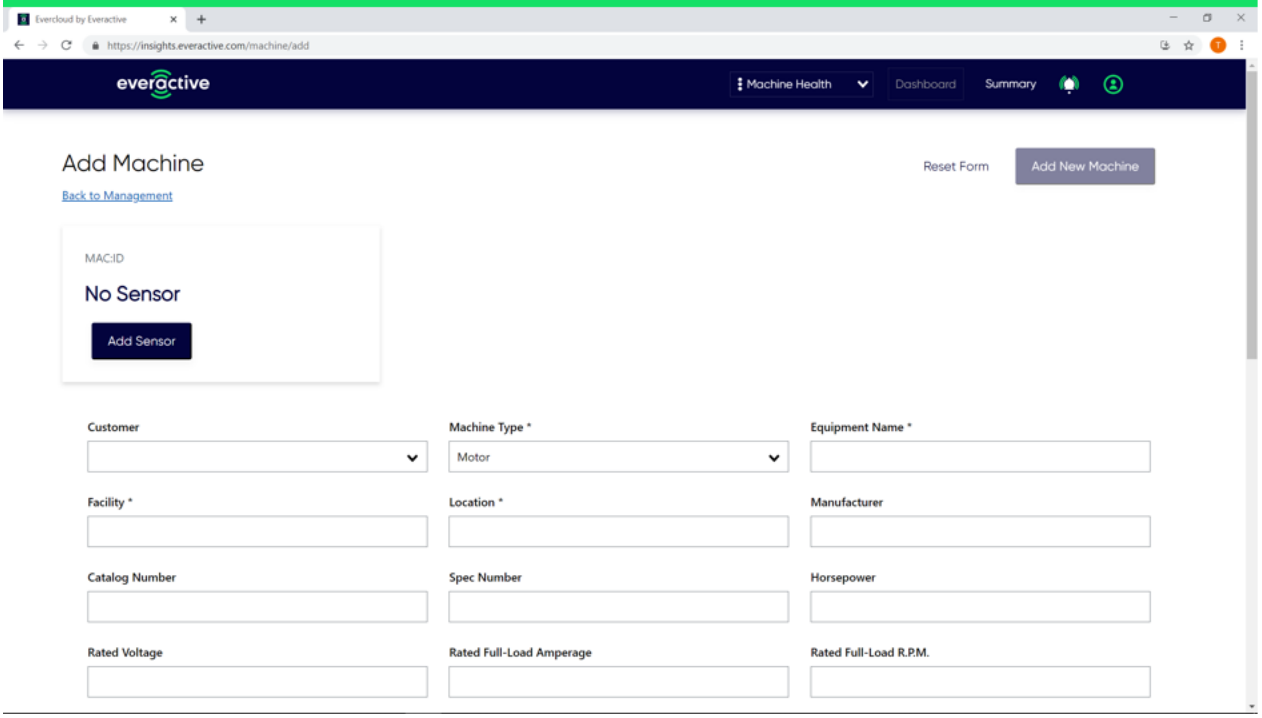


On the Manage Products page
Select "Add Machine"



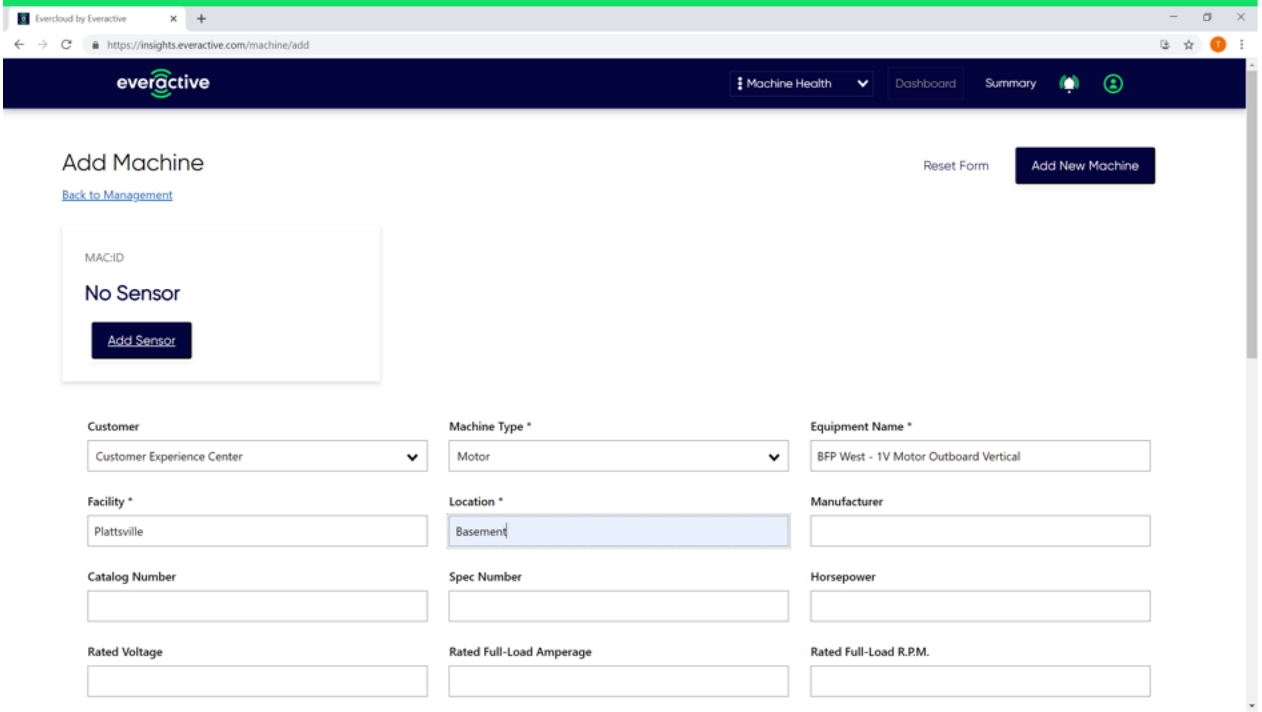
On the Add Machine page

Input information in required fields (those with an asterisk)

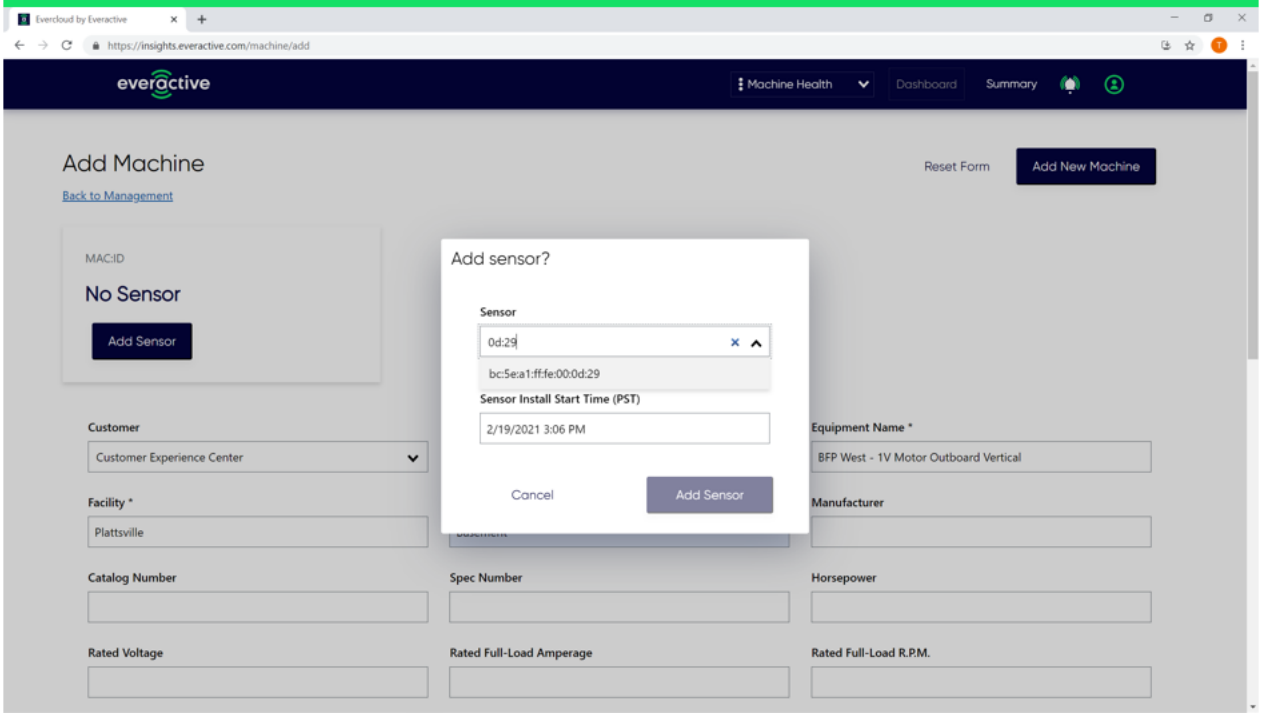


On the Add Machine page

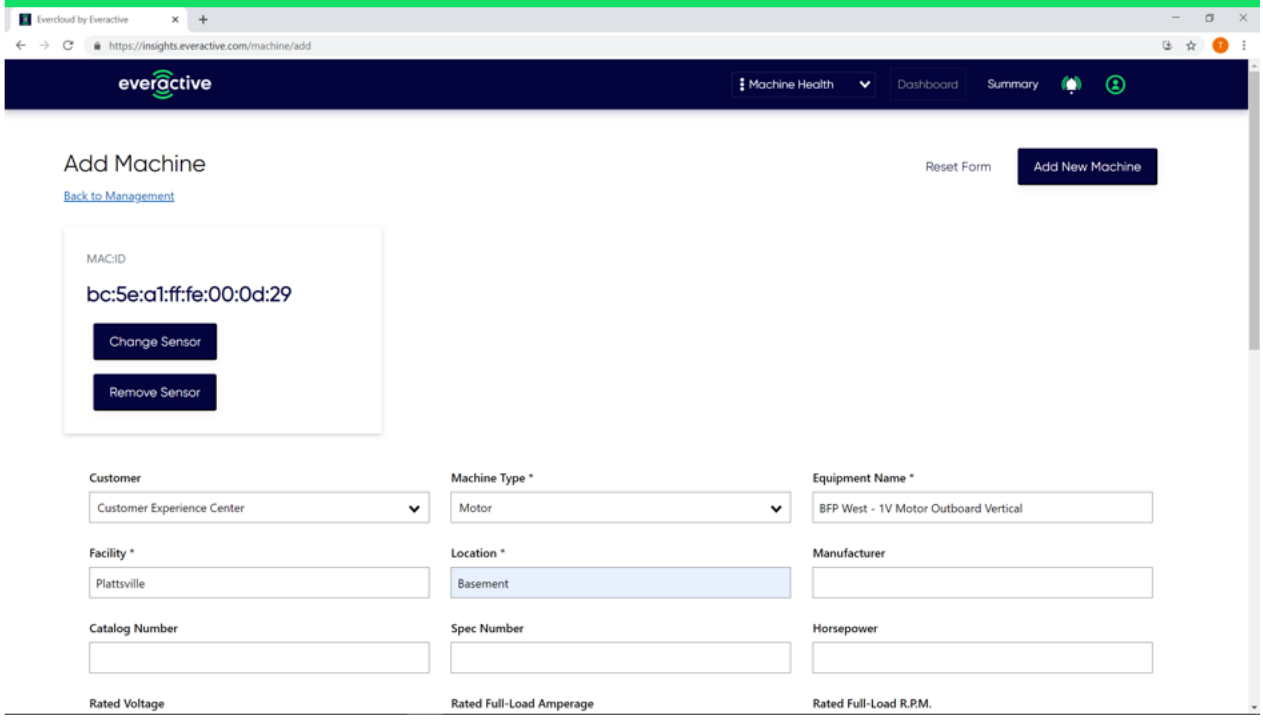
Input information in required fields (those with an asterisk) then click on the "Add Sensor" blue button on the middle left of the screen



In the dialogue box type in the final 5 digits of the sensor MAC:ID, select the sensor then click "Add Sensor"



Click "Add New Machine" button in the upper right



Navigate to new machine and confirm data is flowing