



User Manual

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OVERVIEW

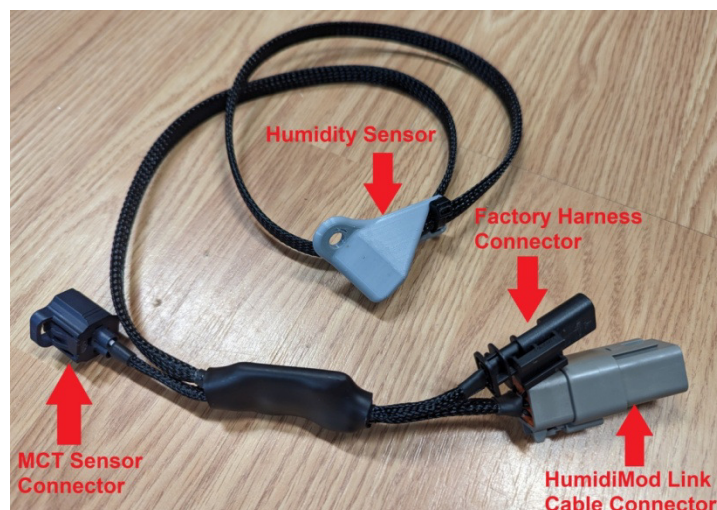
OEM engine control logic attempts to predict spark timing where engine knock commences, known as "Borderline" timing. Many factors affect Borderline timing, but the factory hardware does not include ambient humidity measurement. It is well established and documented that humidity has a significant effect on knock since it changes combustion rate. At typical humidity variation, this timing effect can be 3-5 deg, or much more at extreme conditions. A humidity Borderline spark timing correction can be used to ensure engine safety at low humidity and increase power at high humidity. The HumidiMod adds an ambient humidity sensor and uses the signal to modify the Manifold Charge Temperature (MCT) output. Since MCT is used by the PCM logic to correct Borderline spark timing, it can be safely modified to account for changes in humidity. Typically, at low humidity the MCT output to the PCM would need to be increased in order to cause a timing retard, and vice versa.

The HumidiMod can also be used to entirely offset the MCT output to the PCM such that Borderline timing can be increased or decreased on they fly, with or without the humidity correction. This feature is particularly useful if you do not have the ability to change the engine calibration or want to adjust Borderline timing on-the-fly without having to re-program the PCM calibration.

The HumidiMod was designed to be installed on a 2015-2023 Mustang GT equipped with a Whipple Supercharger. The MCT sensor calibration in the HumidiMod matches the IAT2 sensor calibration in the Whipple PCM tune.

The HumidiMod may work on other vehicles that use an IAT2 MCT sensor, but there is no guarantee. The humidity sensor cable may not reach an optimal mounting location or the MCT sensor calibration may not match the IAT2 sensor calibration in your vehicle's PCM tune.

Disclaimer: The use of the Humidimod modifies the PCM reading of the mass charge temperature which is used for engine protections. The manufacturer of HumidiMod is not responsible for any engine damaged caused by the use of HumidiMod for any reason, in any vehicle.



INSTALLATION

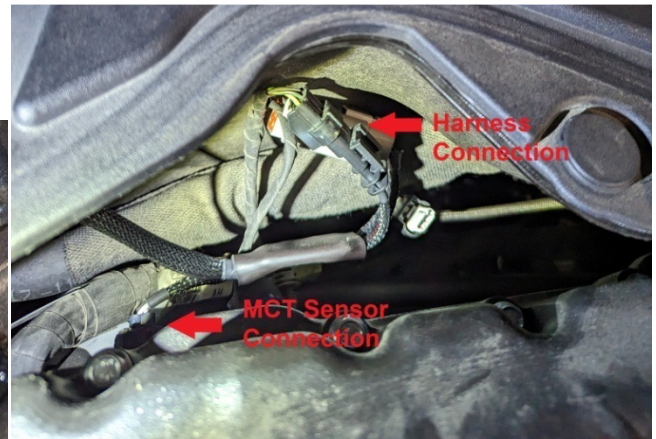
1. Remove the battery box cover.



2. Remove the short cable between the MCT sensor and the factory wiring harness.



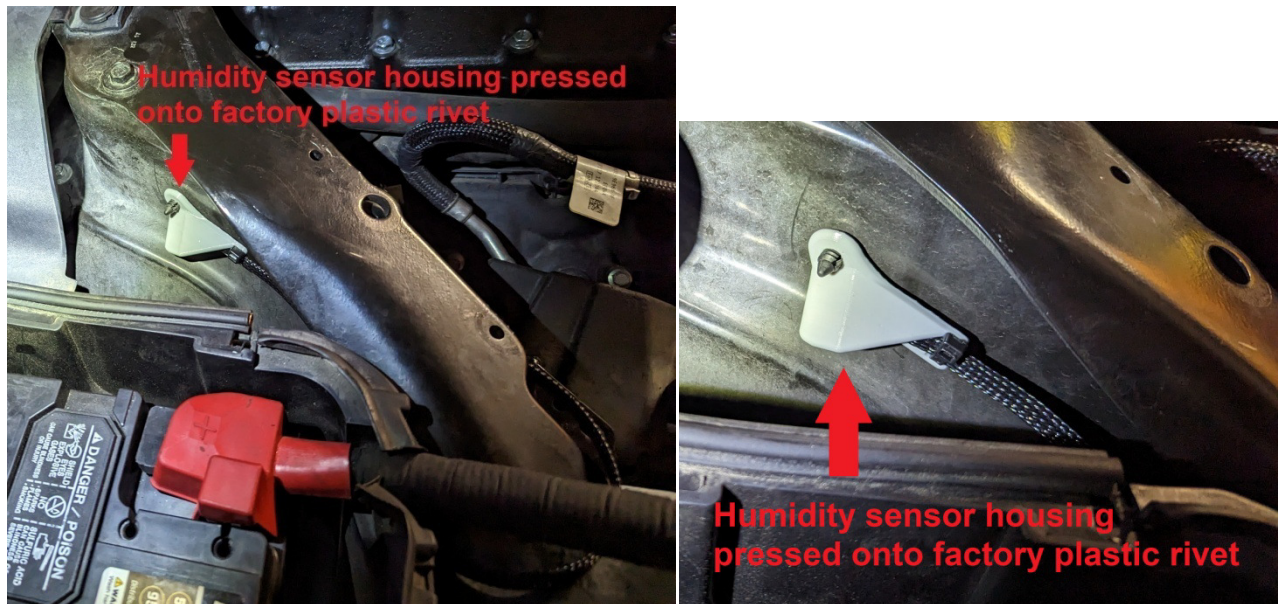
3. Connect the HumidiMod to the MCT sensor and the factory wiring harness.



4. Route the humidity sensor cable towards the passenger side of the vehicle, along the outside of the battery compartment then back up into the battery compartment near the strut tower. Zip tie in place as needed.



5. Press the humidity sensor housing into factory plastic rivet at the location shown below. It is important that the humidity sensor cable is routed downward for a short distance from the humidity sensor housing to create a drip loop to prevent water dripping down the cable and onto the humidity sensor.



6. Replace battery box cover.

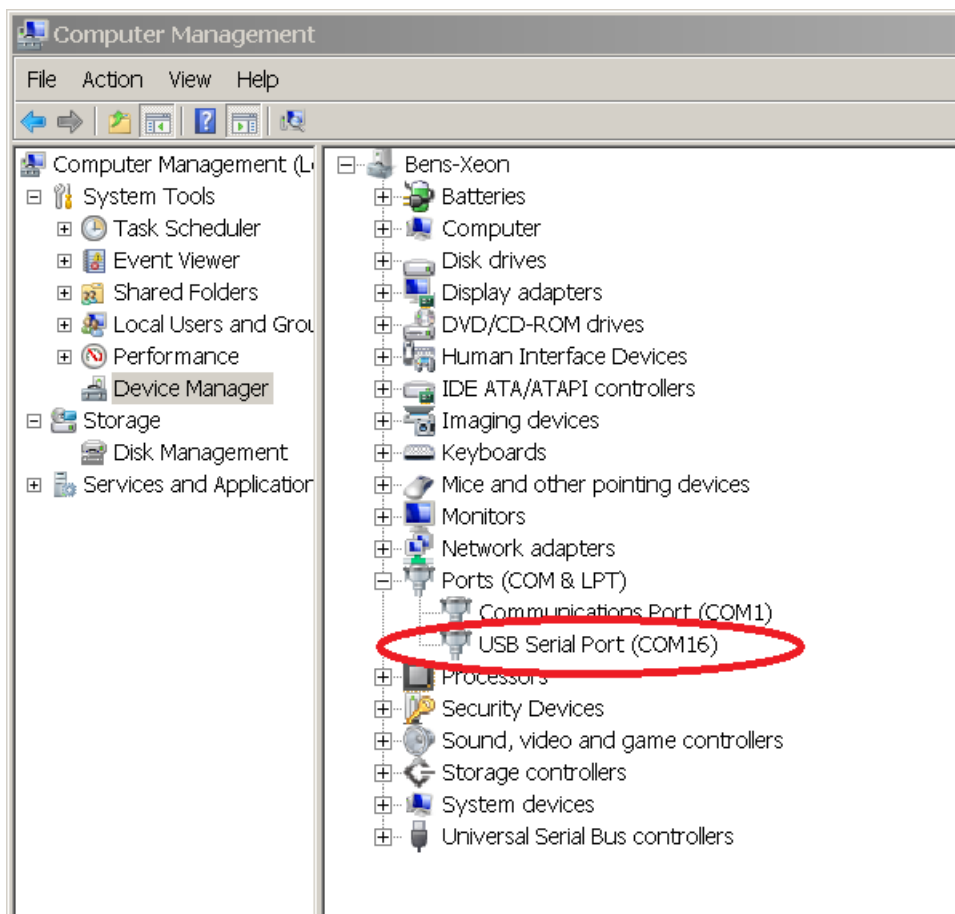
Note: The HumidiMod connector for the HumidiMod Link cable comes with an empty cover attached for protection from the elements. Keep this empty cover attached whenever the Link cable is not in use.

LINK CABLE INSTALLATION

Windows 7 and later will normally detect, download and install the correct FTDI driver for the HumidiMod Link Cable.

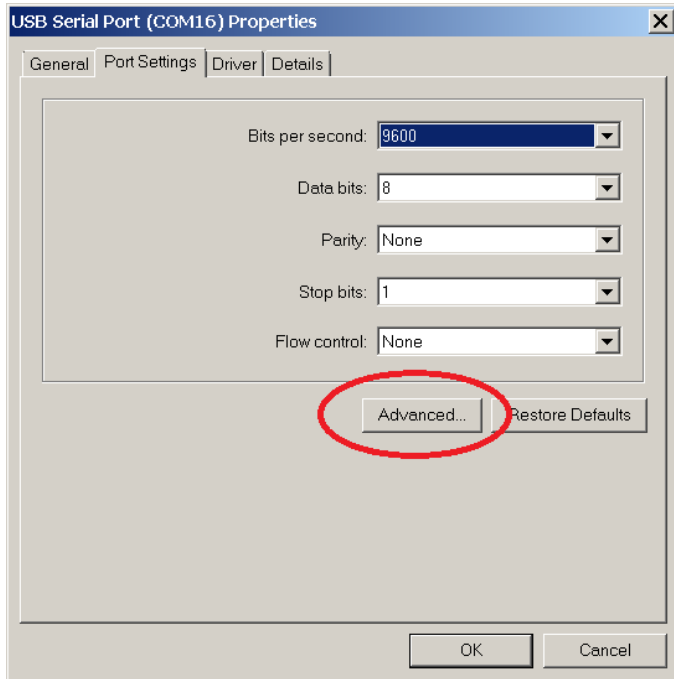
If automatic driver installation does not complete after plugging the cable into your laptop, you may need to manually download and install the driver. The correct driver is listed under the "D2XX Direct Drivers" section on the manufacturers webpage here: <https://ftdichip.com/drivers/d2xx-drivers/>

After driver installation determine which Com Port the Link cable is using by opening Windows Device Manager, expanding the Ports (COM & LPT) section and finding the entry labeled "USB Serial Port (COM??)". Take note of this Com Port number as it will be needed later.

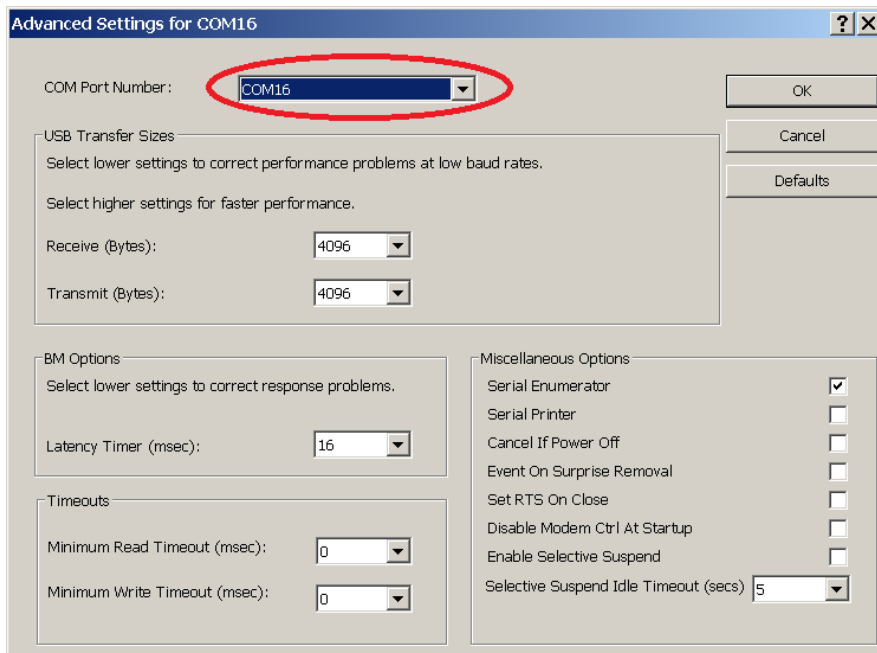


Note: The Com Port number needs be between 1 and 16. If the Com Port number is larger than 16 then the following additional steps must be performed, otherwise skip to the next section, "HumidiMod Link Software Installation".

Additional Steps: Right click on the USB Serial Port and select "Properties". Next click on the "Advanced" button.



Change the selected "Com Port Number" in the pull down selection bar to any value between 1 and 16 then click the "OK" button:



Click "OK" in the Properties box to close it.

Link Software Installation

If any previous version of HumidiMod Link software is installed, uninstall it first by using the "Add or remove programs" feature of Windows.

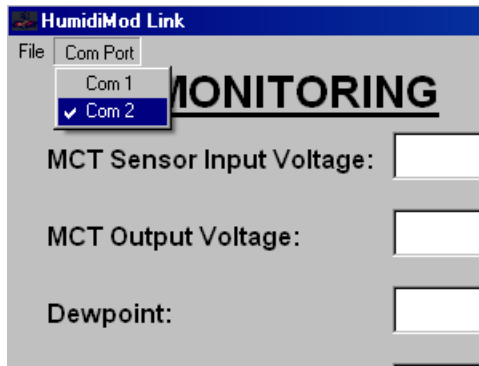
Download the latest version of the HumidiMod Link software from here: <https://humidimod.com>

Unzip the installation folder in the "HumidiMod Setup.zip" file and run the "setup.exe" file inside. Follow the steps in the setup software to complete the installation.

Link Program Connection

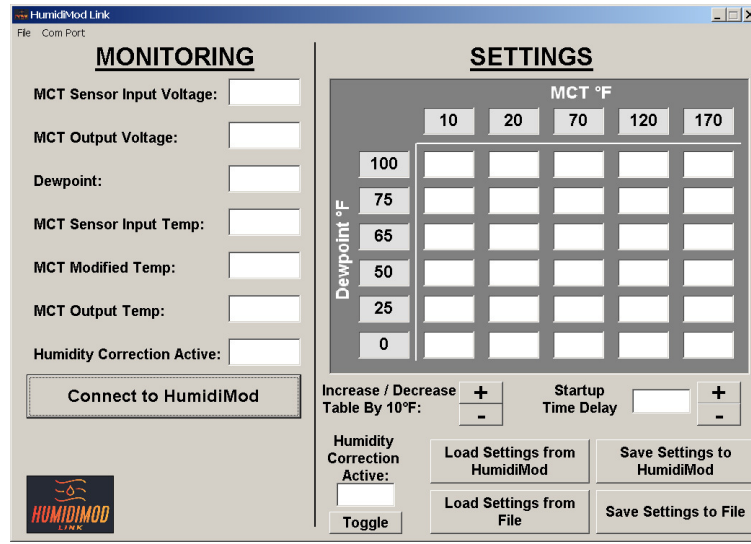
Before the HumidiMod Link software can connect to the HumidiMod, the USB Link cable must be connected to the HumidiMod and a Windows Laptop/PC, the vehicle's ignition must be on, and the correct Com Port must be selected in the HumidiMod Link software.

The Com Port is selected by left clicking on "Com Port" in the menu bar then left clicking on the Com Port number determined in the "HumidiMod Link Cable Installation" section above:



Link Program Use

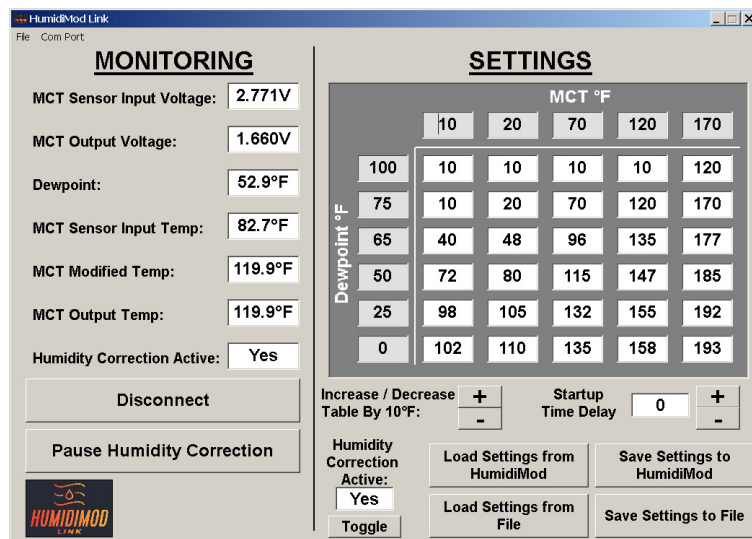
An image of the HumidiMod Link Software as seen after startup is shown below:



Monitoring

By clicking the "Connect to HumidiMod" button, the HumidiMod Link software will continuously display the MCT sensor voltage and corresponding temperature along with the modified humidity adjusted temperature value and the output of the HumidiMod (both voltage and temperature.)

Once connected the ability to pause/unpause humidity correction will become available. The pausing/unpausing of humidity correction will remain active until the vehicle's ignition is turned off for several minutes. Upon restart of the vehicle the use of humidity correction will be based on the "Humidity Correction Active" value saved in the HumidiMod Settings section.



Settings

Modifications to the Settings fields, loading and saving settings files can be performed without connecting to the HumidiMod.

In order to load or save settings to and from the HumidiMod, you must first click the "Connect to HumidiMod" button.

All setting entries must be populated before a save to the HumidiMod device is allowed.

While settings are being saved to the HumidiMod, the output voltage of the HumidiMod is locked to the current value immediately prior to the save.

Once settings have been loaded from or saved to the HumidiMod any changes to the settings in the HumidiMod Link software will be indicated in red to indicate which settings differ from what is saved in the HumidiMod. This also applies to loading settings from a file after loading from or saving to the HumidiMod.

MCT vs Dew Point Table

The values selected for any combination of mass charge temperature (MCT) and dew point will determine the output temperature (voltage) of the HumidiMod. Temperatures and dew points that fall between column and row values are linearly interpolated. The row and column axes are the Humidimod inputs from sensors and the table values are the MCT outputs to the PCM. If the table value matches the column axis (MCT) value, then the Humidimod will essentially just pass the MCT signal through unmodified. A higher table value will generally yield less borderline timing commanded, and a lower table value will yield more borderline timing commanded.

Row (dew point) and column (MCT) headings can also be modified. Column values must be ordered so that left to right is least to greatest.

As a safety precaution, if a MCT sensor reading is above the right most column value, the output temperature will be 290°F. If the MCT sensor reading is below the left most column value, the output value will be selected from the left most column.

Row values must be ordered so that top to bottom is greatest to least. If a dew point reading is above (or below) the highest (or lowest) row heading then the output value will be selected from the highest (or lowest) row.

Startup Time Delay

The "Startup Time Delay" can be used to prevent humidity correction after vehicle startup until the specified amount of time has elapsed. This setting is only available in 30 second increments from 0 (disable startup delay) to 30 minutes. The timer for this starts when the HumidiMod is powered up. This usually occurs when the vehicle door is opened (not when the ignition is first turned on).

Humidity Correction Active

The "Humidity Correction Active" setting can be used to completely disable humidity correction. If set to "No", the HumidiMod will act as a pass-through device where the MCT input voltage will be outputted to the PCM.

Failure Modes

This section covers how the HumidiMod responds to the failure of either the MCT sensor or the humidity sensor.

MCT Sensor

When a vehicle without a HumidiMod has lost connection to the MCT sensor, the PCM will read a 5.0V signal and go into protect mode. The HumidiMod has been designed to "pass through" this failure to the PCM. If the HumidiMod senses an MCT input voltage greater than 4.90V (equivalent to less than -40°F) or less than 0.14V (302°F), it will output 5.0V to the PCM. Disconnecting the MCT sensor from the HumidiMod will cause the HumidiMod to sense 5.0V on its input.

Humidity Sensor

The humidity sensor signal is deemed to be healthy if the calculated dew point (based on the sensor temperature and relative humidity readings) falls between 0 to 100°F. Any dew point reading that falls outside of this range will default to a reading of 0°F. This causes the HumidiMod to output the safest (highest) temperature available on MCT vs Dew Point settings table. Pausing or disabling humidity correction will bypass the use of the humidity sensor and allow the HumidiMod to pass-through the unaltered MCT sensor value.