Mx2 Dual/Single Mass Airflow Sensor Signal Processor

for use with frequency or voltage(V2 or higher) based sensors

Terms of Use and Sale

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USE

The **Mx2** can be used to:

combine the outputs of two sensors

average the measured flow outputs of 2 sensors

subtract one sensor's measured flow from that of another

convert a sensor's output to emulate a different sensor type

re-scale a MAF without tuning software

Input and output signal types(0-5V voltage or frequency based) can be selected independently. So you can even use variable frequency output sensors with an ECU that needs to receive a variable voltage signal, or variable voltage output sensors with an ECU that needs to receive a frequency modulated signal.

The **Mx2** uses customizable characterization tables with interpolation.

Example Installation (GM frequency based)

The **Mx2** should be mounted away from hot engine parts.

All factory connections to the primary MAF sensor will be maintained, other than the signal out wire which will be cut. The sensor side will now be connected to the **Mx2** Light Green wire and the ECU side will be connected to the **Mx2** Dark Green wire.

The 12V supply and ground circuits of the factory sensor will be shared with the secondary MAF sensor and the **Mx2**.

Only 3 wires are needed for the secondary MAF sensor; 12V, ground and signal out.

Mx2 wiring connections:

Brown loose lead – V2,V3 - engine ground

Red - 12V from factory MAF/Combination Sensor wiring

Black or White - ground from factory MAF sensor wiring(V1 Black, V2 or higher White)

Light Green - Hz or voltage signal in from primary MAF sensor

Blue – V2,V3 - Hz signal in from secondary MAF sensor

         V4 - Hz or voltage signal in from secondary MAF sensor

Gray – V2,V3 – voltage signal in from secondary MAF sensor

Dark Green - frequency modulated signal out to ECU

Orange – V2,V3 - 0-5V signal to ECU

Purple – V2,V3 - Duplicate 0-5V signal to ECU in twin voltage output mode

Pink – V2,V3 - 5V accessory output

White loop inside module - cut for voltage based MAF inputs, uncut for frequency based MAF inputs

V1 not used - white, orange, yellow

V2,V3 not used - pink, *purple, yellow, gray and orange or dark green depending on output type

Calibration

Device setup and calibration is accomplished using the TRP MAF Magic software application.

Install the MAF Magic software on your PC, remove the back cover from the **Mx2** and connect with the appropriate USB cable.

You will see a sensor characterization table. You can switch between 3 different tables; Primary MAF sensor, Secondary MAF sensor, and Output. Each table is loaded to the device separately.

Modes of Operation:

Ensure that the correct mode is selected when programming the device.

"Dual Add" mode is used where two separate intake ducts feed the engine. All 3 MAF tables will be used. The airflows of both sensors are combined and the frequency output will correspond to the combined airflow per the "Output" table.

"Single" mode allows the device to mimic the output of a sensor different than the actual installed sensor, or to re-scale the output of the sensor. Only the Primary and Output tables will be used, although all 3 tables may be programmed. For voltage based MAFs dual mirrored outputs can be selected. This allows the used of a single MAF sensor on vehicles originally equipped with dual sensors.

"Dual Average" mode will output the average 2 sensors installed in the same duct. All 3 MAF tables are used.

"Dual Subtract" mode subtracts the measured flow of sensor 2 from that of sensor 1. All 3 tables are used.

MAF table programming:

Use the drop down box above the table to select the specific sensor table(Primary, Secondary or Output) you wish to program. The software will read from the **Mx2** and display the currently programmed calibration for that table.

Prior to PC app version 7.0: For each table, the step size of the "Frequency" column can be set to either 125 or 150 by selecting either value in the drop down box to the right of the table.

Version 7.0 and up: Any custom values can be entered in the frequency/millivolts column of each table as some newer MAF sensor characterization tables incorporate variable step sizes. The Mx2 must first have the most recent firmware installed.

Versions 11.0 and up, as long as a V2/V3 Mx2 device is connected, the table type may be toggled between **frequency or voltage based** by double clicking on the Frequency/Millivolts column name.

Table values may be entered either manually or via the copy/paste method. If using copy/paste, ensure that the table is fully populated with rational, ascending values to the end of the column. One column is pasted at a time. Select the correct starting cell prior to clicking "Paste". Some vehicle calibrations use shorter tables. For example, where the MAF sensor is only used by the ECU at lower engine RPM conditions. The app will auto-fill the table to the end if the number of pasted values is less than the number of cells in the column. The remaining cells will be filled with the last pasted value.

In voltage based mode, voltage values pasted to the table will be multiplied by 1000 to convert to millivolts. If manually entering individual cell values, use millivolts. * Note: the white wire loop inside the module should be cut if the MAF input signals are voltage based. Uncut for frequency modulated signals. In voltage output mode there is the option for twin outputs where needed by the ECU. Checking this box enables the duplicate output signal.

The currently viewed table may also be populated by selecting one of the preset OE tables from the drop down list immediately above the table.

Duct Size:

Primary and Secondary MAF table values may be scaled if the installed intake duct diameter(s) differ from that of the installation from which the pasted tables were obtained. For example, if using an OE table based on a 4 inch duct diameter, and where the new duct sizes are 3 inches, enter 4.0 in the "Original" box below the table and 3.0 in the "New" box. Then click the "Scale to Duct Size" button.

Each table must be programmed to the device individually while it is open in the app, but if applicable, once a single table has been populated, selecting "Copy to All" will program the same values to all three tables in one step when the "Write Device" button is clicked. Copy to all is not used where flow rates have been scaled for duct size, or where input and output MAF types are not the same. i.e. both frequency or both voltage based.

Other Settings:

Enter the desired secondary MAF "ignore below" value in the green box. For example, a GM LT1 sensor outputs a frequency of approximately 600 Hz even with no airflow. So anything below 600 Hz from the second MAF can be ignored. For voltage based sensors, the entered value represents millivolts. Monitor the MAF sensor output key on/engine off to determine this value. This value is programmed to the device along with table updates.

The "Write Device" button is used to transfer tables and settings to the device. Each table must be separately written to the device unless all 3 tables are identical and "Copy to All" has been selected.

The "Send to TRP' > Device Settings" button is used when TRP support requests your current device settings. As long as your PC is internet connected, and the Mx2 is connected to your PC, clicking this button will email all device settings to TRP.

Use "Send to TRP > Log File" to email a saved log file to TRP.

LED Status Indicator

When the device is running normally, the LED will be flashing at a rapid, constant rate.

Intermittent flashes:

1 double flash - primary sensor signal has been lost

2 double flash - secondary sensor signal has been lost

3 double flash - both sensor signals have been lost

More than 3 double flashes indicate a hardware fault

Logging

The MAF signals can be data logged using our MAF Magic software.
Remove the cover from the **Mx2** box and first power it up by switching on the vehicle ignition or starting the engine. Then connect the USB cable between the **Mx2** and your PC and select either "Live Data" or "Record". Selecting record will allow you to save the log file. You can pause playback and use the cursor to view signal values at any point in the chart. If playing a previously recorded file, use the "Stop" button if you wish to end playback before the file finishes playing. The "Playback Speed" slider can be used to adjust the rate at which the chart scrolls through the file.

Firmware Updates

Download and install the current version of the **Mx2** PC app from http://torquerush.com/downloads.html

If available, firmware updates may be installed to the **Mx2** by one of the following procedures.
*You must use the current version of the PC app to access all functions of the current firmware.

Disconnect the Mx2 from vehicle power. Remove the cover from the **Mx2** enclosure and connect it to your PC using an appropriate USB cable.

Method 1 – Auto Update is available in PC app versions 11.0 and higher. Your PC must be connected to the internet.
1. Click the "Firmware Update" tab in the MAF Magic software.
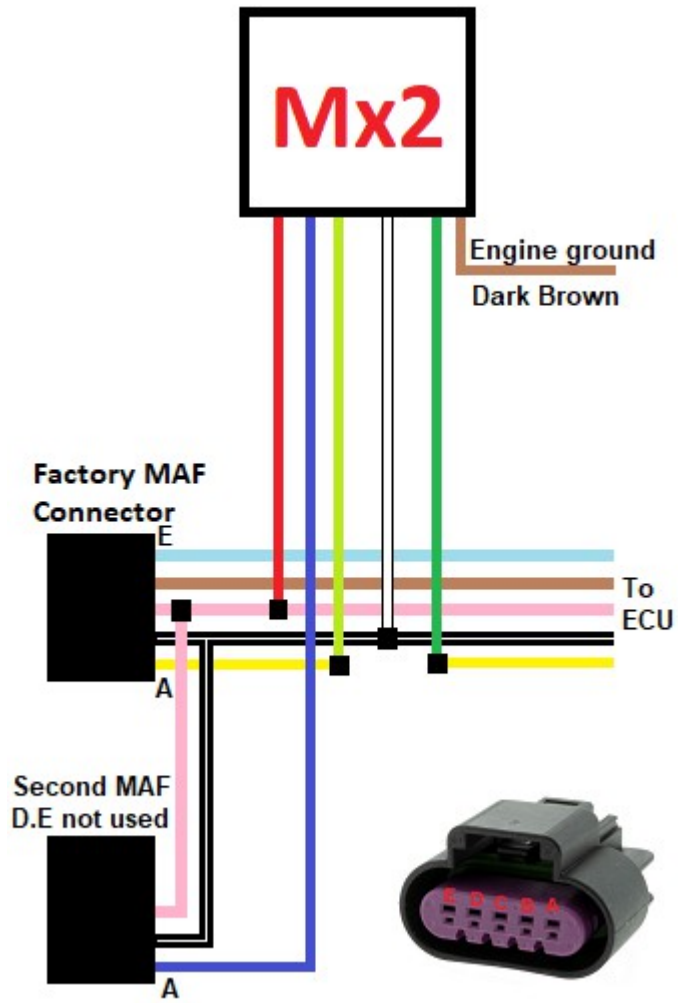2. Click the "Auto Update" button.

Method 2 - Manual Update:
1. Download and save the latest firmware file from http://torquerush.com/downloads.html
    TRPMAF_V1.trp for V1 units, TRPMAF_V2.trp for V2 units and so on.
2. Click the "Firmware Update" tab in the MAF Magic software.
3. Click the "Manual Update" button.
4. Browse to and select the the appropriate ".trp" firmware file.
5. Click "Update Module Firmware".

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Example Installations

GM LS3 frequency based

Bosch 4 wire voltage based