

TCM Studio for TCM3 & TCM5

Windows Quick Start

Software Setup:

Launch the TCM_3_5 Installer and follow the prompts.

Hardware Setup:

1. Connect the unit to a serial port of the PC via the cable included with the Developer's Kit or refer to the manual for pinouts. (A USB to Serial Adapter can be used; Keyspan USA-19QW was tested.)
2. Supply power, 5VDC.

Connection Tab:

Initial Connection:

1. Select 38400 as the baud rate.
2. Select the serial port the unit is plugged into.
3. Click on the **<Connect>** button.
4. Once a connection is made the "Connected" light will turn green and the Module, Firmware Version and Serial Number will be displayed.

Change Baud Rate:

1. Select new baud rate for the module.
2. Click on the **<Power Down>** button.
3. Select same baud rate for the computer.
4. Click on the **<Power Up>** button.

Change Modules:

Once connection has been made, the TCM Studio will remember the last settings. Any time a module is switched out, clicking on the **<Connect>** button once the new module is attached will reestablish a connection as long as the module baud rate is the same as the previous unit.

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Configuration Tab:

Note: No settings will be changed in the unit until the **<SAVE>** button has been selected.

Mounting Options:

Note: If the selection is grayed out or not listed the unit connected does not support this feature. Refer to “Mechanically Mounting – mounting option” section for additional information on mounting options.

Standard: When selected the unit is to be mounted with the main board in a horizontal position (the Z axis magnetic sensor is vertical).

Standard 90 Degrees: When selected the unit is to be mounted with the main board in a horizontal position but rotated so the arrow is pointed 90 degrees clockwise from the front of the host system.

Standard 180 Degrees: When selected the unit is to be mounted with the main board in a horizontal position but rotated so the arrow is pointed 180 degrees from the front of the host system.

Standard 270 Degrees: When selected the unit is to be mounted with the main board in a horizontal position but rotated so the arrow is pointed 270 degrees clockwise from the front of the host system.

X Sensor Up: When selected the unit is to be mounted with the main board in a vertical position (the X axis magnetic sensor is vertical).

X Sensor Up Plus 90 Degrees: When selected the unit is to be mounted with the main board in a vertical position (the X axis magnetic sensor is vertical) and rotated 90 degrees clockwise from the front of the host system.

X Sensor Up Plus 180 Degrees: When selected the unit is to be mounted with the main board in a vertical position (the X axis magnetic sensor is vertical) and rotated 180 degrees from the front of the host system.

X Sensor Up Plus 270 Degrees: When selected the unit is to be mounted with the main board in a vertical position (the X axis magnetic sensor is vertical) and rotated 270 degrees clockwise from the front of the host system.

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Y Sensor Up: When selected the unit is to be mounted with the main board in a vertical position (the Y axis magnetic sensor is vertical).

Y Sensor Up Plus 90 Degrees: When selected the unit is to be mounted with the main board in a vertical position (the Y axis magnetic sensor is vertical) and rotated 90 degrees clockwise from the front of the host system.

Y Sensor Up Plus 180 Degrees: When selected the unit is to be mounted with the main board in a vertical position (the Y axis magnetic sensor is vertical) and rotated 180 degrees from the front of the host system.

Y Sensor Up Plus 270 Degrees: When selected the unit is to be mounted with the main board in a vertical position (the Y axis magnetic sensor is vertical) and rotated 270 degrees clockwise from the front of the host system.

Z Sensor Down: When selected the unit is to be mounted with the main board in a vertical position (the Z axis magnetic sensor is vertical).

Z Sensor Down Plus 90 Degrees: When selected the unit is to be mounted with the main board in a vertical position (the Z axis magnetic sensor is vertical) and rotated 90 degrees clockwise from the front of the host system.

Z Sensor Down Plus 180 Degrees: When selected the unit is to be mounted with the main board in a vertical position (the Z axis magnetic sensor is vertical) and rotated 180 degrees from the front of the host system.

Z Sensor Up Plus 270 Degrees: When selected the unit is to be mounted with the main board in a vertical position (the Z axis magnetic sensor is vertical) and rotated 270 degrees clockwise from the front of the host system.

North Reference:

Magnetic: When the Magnetic radio button is selected, heading will be relative to Magnetic North.

True: When the True radio button is selected, heading will be relative to True North. To use North Heading in 'True' mode, the declination needs to be set in the 'Declination' window.

Endianess:

Use to select either Big Endian or Little Endian; default is Big Endian.

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Filter Settings:

Taps: Use to select either a 0 (no filter), 4, 8, 16, or 32 samples and apply the values to a FIR filter prior to calculating the heading. These filters allow for a much more stable reading, but can make the acquisition of the data by the program slower. The default setting is 32.

Acquisition Parameters:

Mode:

- When Poll is selected the TCM Studio program requests the data from the unit, and once it has been sent, the program will request the data again at the interval set in the 'Poll Time' box. If the time is set to 0 then the TCM Studio will request the data as soon as the previous request has been fulfilled.
- When Push is selected the unit will be in **Interval Mode**, which is internal to the unit. Once the unit has been set to **Interval Mode** and the interval time has been set in the 'Interval Time' setting box, the unit will send out the preset data at the desired interval without prompting. If the interval is set to 0 then the unit will send the data as soon as the previous data stream has been sent.

Acquire Time: The Acquire Time setting box sets the time between samples taken by the unit. This is an internal setting that is NOT tied to the time with which the unit transmits the data out to the program or host.

Flush Filters: The filtering is set to only update the filter with the last sample taken, for example once the initial 32 samples are taken any new sample is added to the end with the first sample being dropped. In the case where the Acquire Time is set to a value it would be prudent to set the unit to flush the filter prior to calculating the heading. This flushing will require the unit to take 32 new samples to use for the calculation.

Note: If the 'Flush Filters' checkbox is checked, it will take longer for the unit to output updated data.

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User Cal Settings:

Stability Checking: By default the unit will wait for the readings to be stable for 3 consecutive readings when in calibration mode prior to saving the sample for use in the calibration. This is why the unit must be held steady between points during the User Calibration. This stability helps to ensure a proper heading and allow for higher accuracy, but it also takes more time. If the user *de-selects* the check box, then the unit will NOT wait for a stable reading and instead take a reading once the minimum change between points threshold has been met.

Automatic Sampling: When selected the unit will take a point once the minimum change requirement and the stability check, if selected, has been satisfied. If the user wants to have more control over when the point will be taken then Auto Sampling should be deselected. Once deselected, the **<Take Sample>** button on the **Calibration** tab will be active. Selecting the **<Take Sample>** button will indicate to the unit to take a sample once the minimum requirements are met.

Calibration Points: The user can select the number of points to take during a calibration. The minimum number of points needed for a successful calibration is 12. The unit will need to be rotated through at least 180 degrees in the horizontal plane with a minimum of at least 1 positive and 1 negative Pitch and at least 1 positive and 1 negative Roll as part of the 12 points.

Enable 3D Model: Some computer systems may not have the graphics capability to render the 3D Model. For this reason it may be necessary to turn off this feature.

Default:

This button will set the TCM Studio program back to the factory default settings.

Revert:

This button will have the TCM Studio program read the settings from the unit and display them on the screen.

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Calibration Tab:

Note: The default settings of the unit are recommended for the highest accuracy and quality of calibration.

Samples:

1. Click on the **<Start>** button to begin.
2. To take a sample point, the unit will need to be held steady for a short time. Once the window indicates the next number, the unit can be moved some distance and held steady for the next sample. A minimum change of 30 degrees in heading or tilt is required for a sample to be taken. The larger the distance between points the better. The amount of Pitch and Roll during the calibration will determine the amount of Pitch and Roll the unit will be able to compensate for during use. Once the pre-set number of samples has been taken the calibration is complete.

Note: The minimum points the unit can use for a successful calibration is 12. The unit will need to be rotated through at least 180 degrees in the horizontal plane with a minimum of at least 1 positive and 1 negative Pitch and Roll as part of the 12 points.

Results:

1. Once the calibration is complete the “Coverage” window will indicate the quality of the calibration. The X, Y, and Z values show a percentage of each vector that has been covered during the calibration. The only way to get a Z value greater than 50% would be to take some points with the unit upside-down. The value shown in μT refers to the standard deviation of the measured samples when compared to the calculated values. The smaller the number the better. If a better score is needed, click on the **<Start>** button to begin a new calibration.

Note: The value in μT only refers to the quality of the calibration and NOT the accuracy of the heading. It is possible to have a “good” calibration but poor accuracy if the field the unit is exposed to during use is not the same as that which was present during the calibration.

2. If the calibration is sufficient then click on the **<Save>** button to save the calibration. If this button is not selected then the unit will need to be recalibrated after a power cycle.

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Current Configuration:

Stability Checking: Indicates if the Stability Checking option has been selected.

Automatic Sampling: Indicates if the Automatic Sampling option has been selected.

Number of samples is: Indicates the number of samples to be taken for the current calibration.

Options:

Audible Feedback: If selected the TCM Studio will give an audible signal once a calibration point has been taken.

Clear:

This button will clear the user calibration in the unit. Once selected, the unit will revert back to its factory calibration.

Test Tab:

Current Reading:

Once the **<GO>** button is selected the unit will begin outputting Heading, Pitch and Roll information. Selecting the **<Stop>** button or changing tabs will halt the output of the unit.

Contrast:

Reverses the background color of the current reading window.

Acquisition Settings:

This window indicates the pertinent setting information.

3D Model:

The helicopter will follow the movement of the attached module and give a clear representation of the module's orientation.

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Data Logger Tab:

1. Select the data to log in the Data window.
2. Use **Shift-Ctrl-Click** and **Ctrl-Click** to select multiple items.
3. Click on the **<GO>** button to start logging; click the **<STOP>** button to stop logging.
4. Click on the **<Export>** button to save the data to a file.
5. Click on the **<Clear>** button to clear the data from the window.

Note: The data logger uses ticks for time reference. A tick is 1/60 second.

System Log:

Export:

Select the **<Export>** button to save the system log to a file.