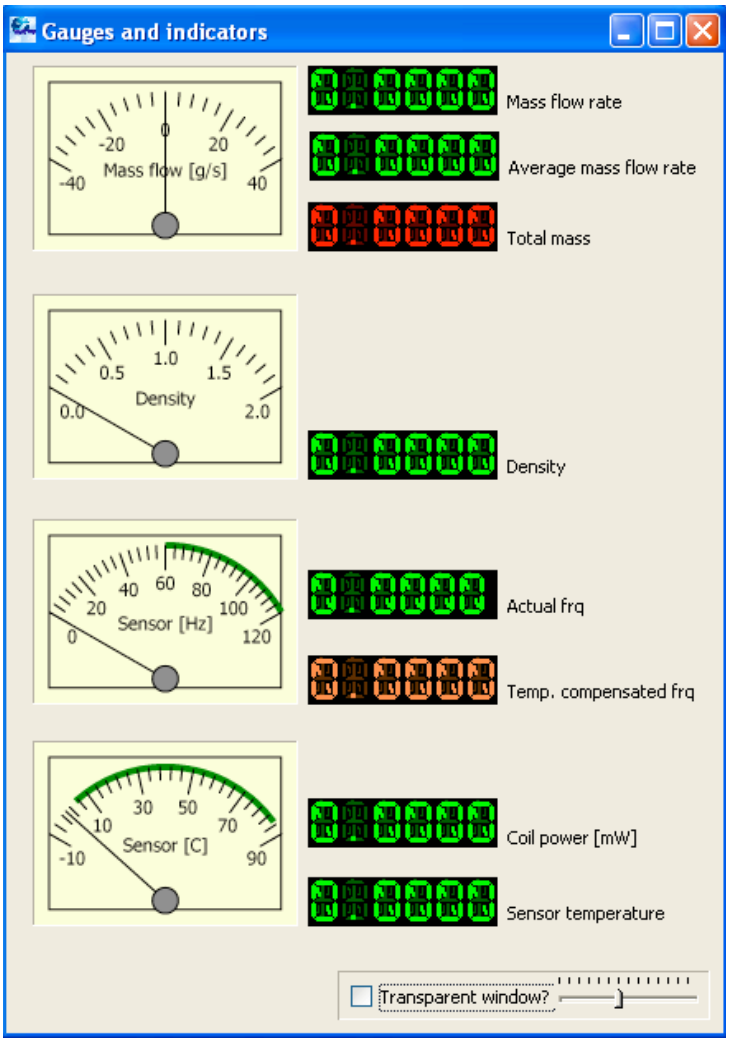
CPFM 8800
Coriolis Flowmeter Software
Installation & User's Guide



Contents

1 Cautions

This guide must be carefully read by all individuals who have or will have the responsibility of using, maintaining, or servicing this product. The product will perform as designed only if it is used, maintained, and serviced in accordance with the manufacturer's instructions. The user should understand how to set the correct parameters and interpret the obtained results.

Warning!

Be sure to operate any instrument under control of this software within the manufacturer's specified ranges for fluid pressure and temperature. If this product is used in process control all necessary safety precautions should be followed to avoid any critical safety problems.

Caution!

Use this product only with specified industrial instruments.

2 Standard Contents of Kit

- CD-ROM of Malema CPFM 8800 software
- Installation/User's Guide

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4 General Information

This user's guide includes information on configuration and use of the CPFM 8800 software, designed to work in conjunction with Malema Sensors' High Purity Coriolis Flow Meter.

Consult the product data sheet or your Malema distributor for information on other applications or sensors.

5 Preparation For Software Installation & Use

Follow all instructions for unpacking, checking, and installing the CPFM 8800 sensor before installing and using this software.

5.1 Mass Flow Sensor & Transmitter Installation

Follow the instructions for installation of the Malema 8800 Series Coriolis Mass Flow Meter, which consists of the sensor and transmitter. Once the sensor and transmitter are wired for power and tested for functionality, use a USB cable to connect the transmitter to the computer that will be using the software for configuration and control.

6 Installing Software

Installation and operation of this software requires the following:

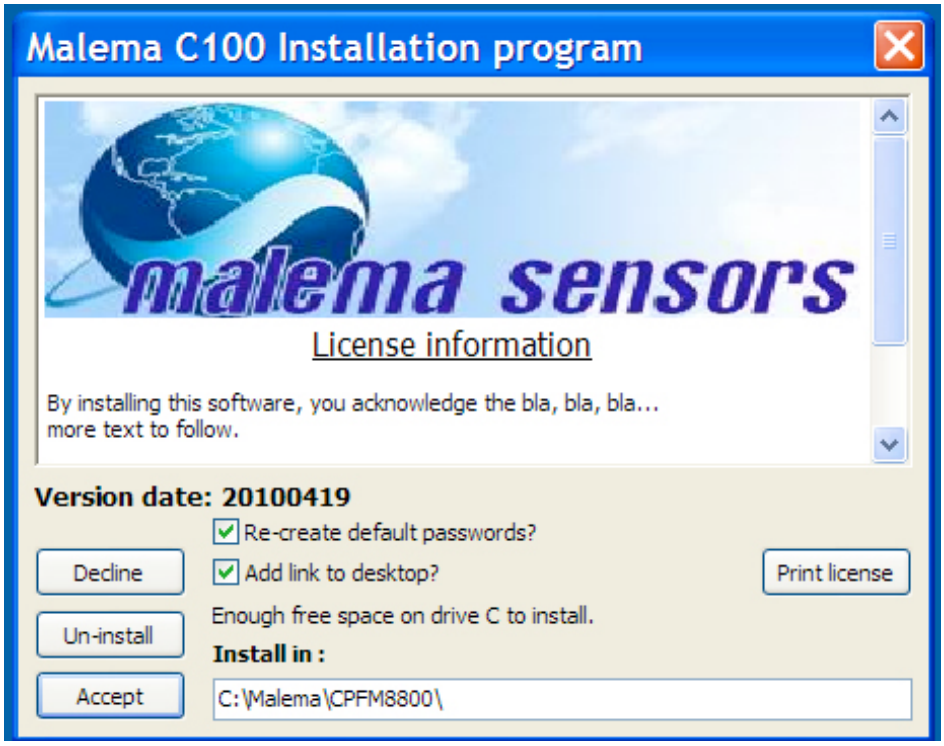
PC running Microsoft Windows XP or Windows 7
500MB of RAM
50MB of hard disc space (more if multiple sensors and sessions are recorded)

Insert the CD-ROM with the software, or download it from Malema's website.

If Autorun is enabled, a screen dialog pops up, asking you to accept the licenses.
If Autorun is not activated, navigate to the CD drive and double-click on the installation icon:

Note: You may receive a security warning from your computer. Dismiss it, and continue the installation.

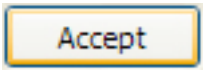
The installation program's main window appears:



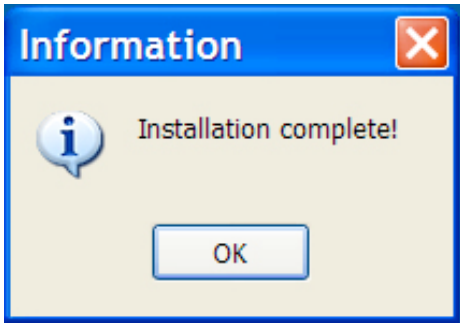
Make sure "Re-create default passwords?" is checked.

Optionally, click "Add link to desktop?" to create a shortcut to the program on your desktop.

Click "Accept" to perform the installation.



Installation is fast. In a few seconds, a confirmation appears, telling you that installation is complete:



Click "OK" to dismiss the installation window and the confirmation.

The program is now ready to run.

Note: This icon appears on your screen's desktop, and the Malema folder on your C: drive is open to show you the program:

7 Running The Program For The First Time

When running the program for the first time, it is necessary to set access passwords and to make sure communication between the computer/software and the flow meter is established.

7.1 Before Starting The Software

It is not necessary to have a flow meter and the computer connected to start the program, but other than setting the passwords, there is very little you can do without the connection. Therefore, it is recommended that you connect a flow meter before starting the program.

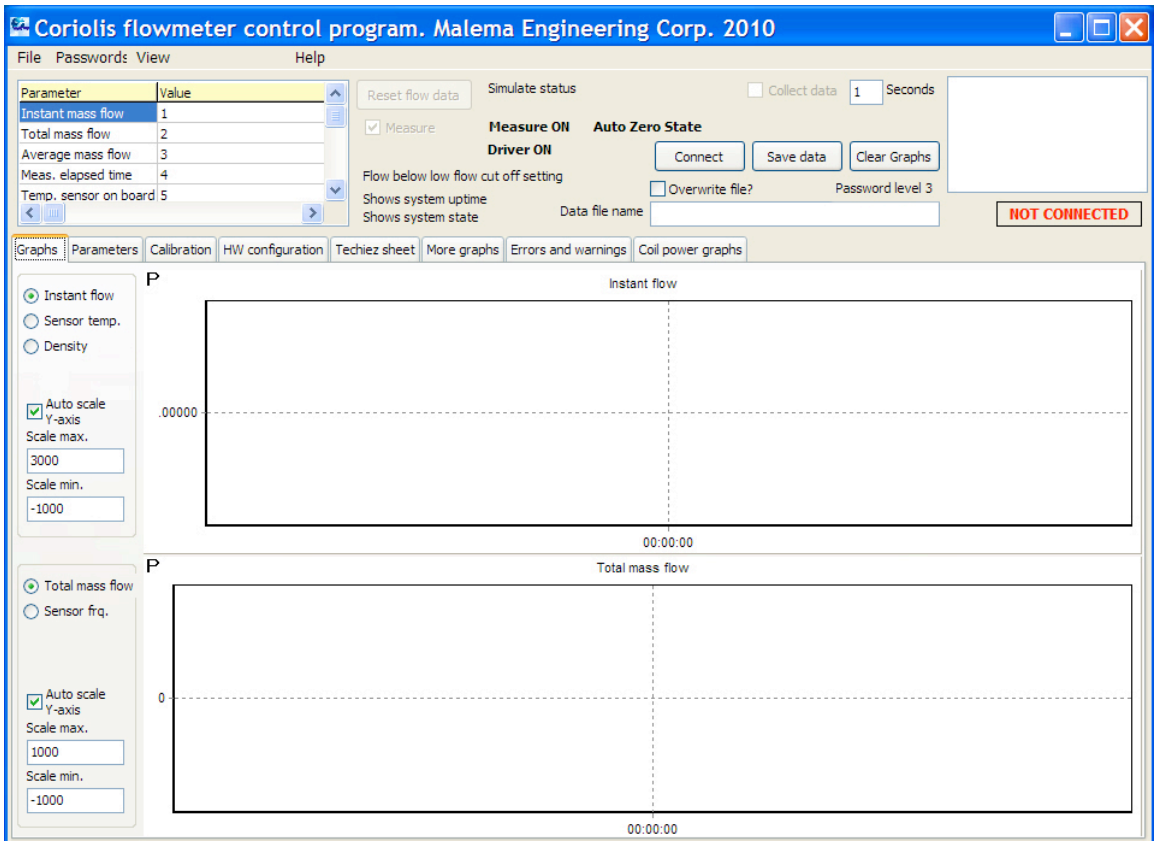
7.2 Starting The Program

Connect the USB cable from the flow meter to the computer.

Turn the computer on.

Start the program by double-clicking the icon on the desktop.

The main screen is shown:



The default password level is 3. If you want to change the password or other parameters, you must input the password. Refer to the next section for details.

Important! If the computer and flow meter are physically connected via cable, but the name and serial number of the flow meter do not appear in the window at the upper right, check the connections and make sure that the cable is not damaged.

7.3 Passwords And Access Levels

Because it is not usually desirable to let everyone change settings, clear files, or make other modifications, you can set passwords that establish different access levels. This requires inputting passwords that must be matched in subsequent sessions whenever anyone accesses the program.

There are four access levels. Three are set by passwords:

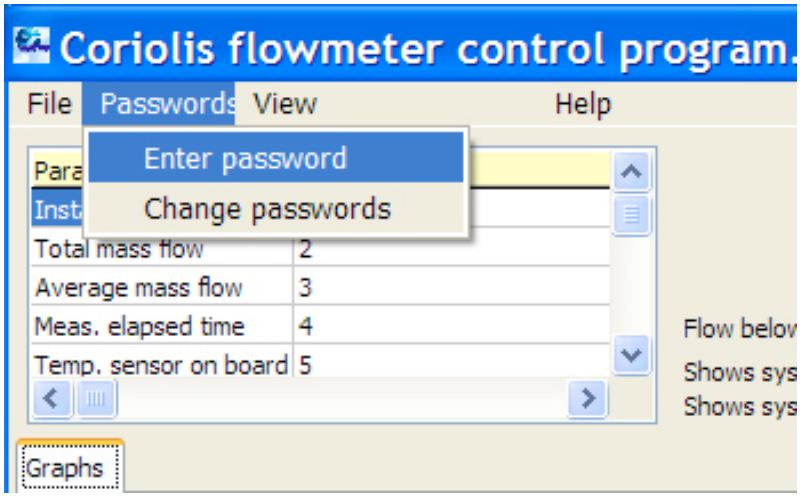
Password Level 0	Super User	All Access
Password Level 1	Assistant	Restricted Access
Password Level 2	Daily User	More Restricted Access
No Password	All others	View-Only Access

Password Level 0 has complete access to view and change all settings (except those set at that factory that are not user-changeable).

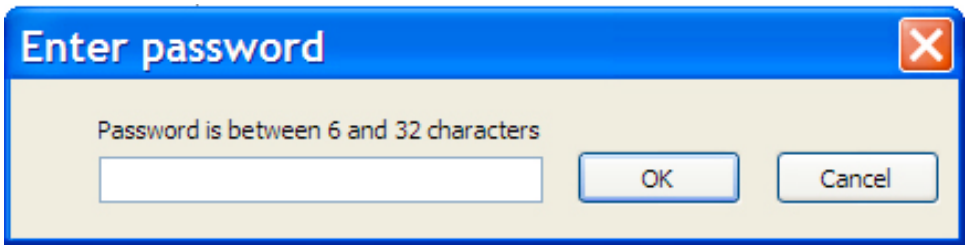
7.3.1 Setting Passwords

It is required that you set passwords the first time you start the software.

Pull down the "Passwords" menu and select "Enter password":



Enter the password into the field:



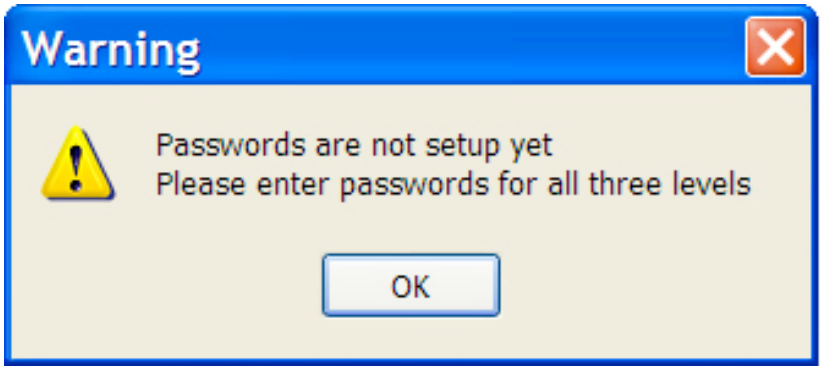
Important! Use the default password this first time:

coriolis1234

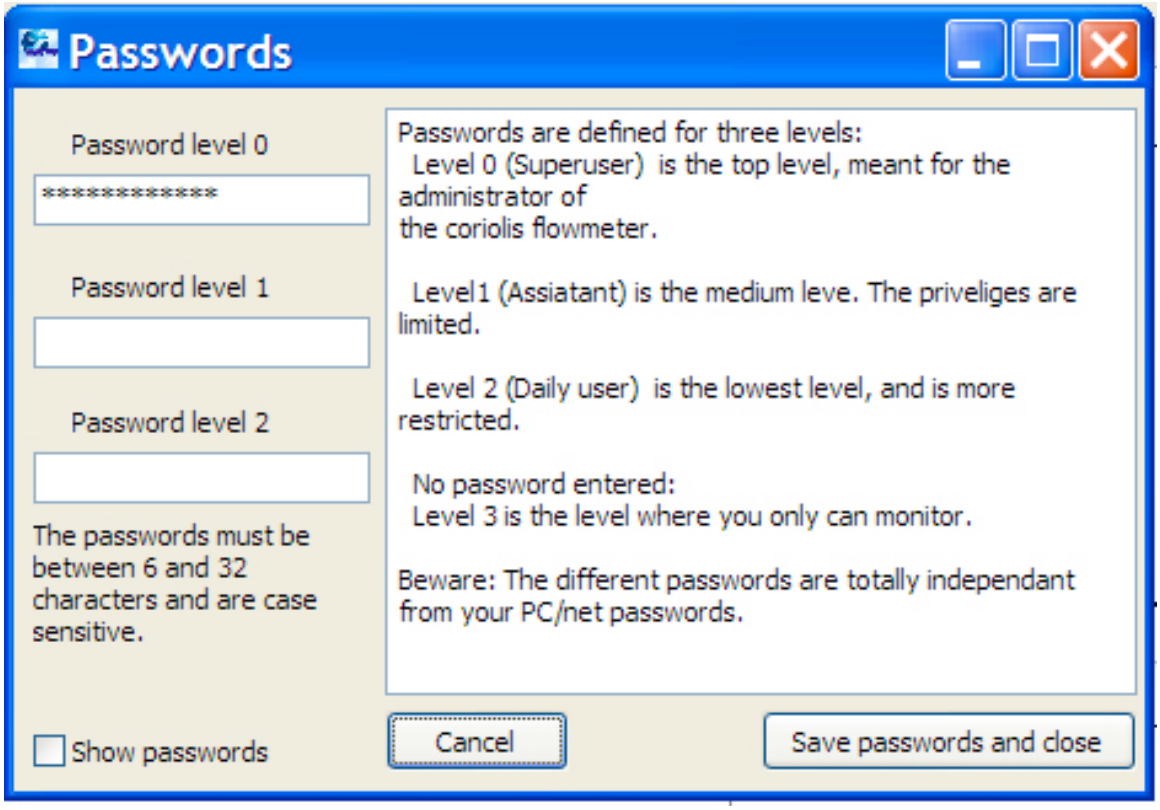
Type the password and click "OK."

Note: Passwords are case-sensitive.

It is easy to tell if the password is accepted. A dialog box appears, telling you that passwords have not been set yet:



Click "OK" to view the password management page:



To prevent inputting a password incorrectly, click the "Show passwords" box. The passwords in the fields are readable (instead of a string of asterisks). When you are done, you may want to click the "Show passwords" box again to hide the passwords.

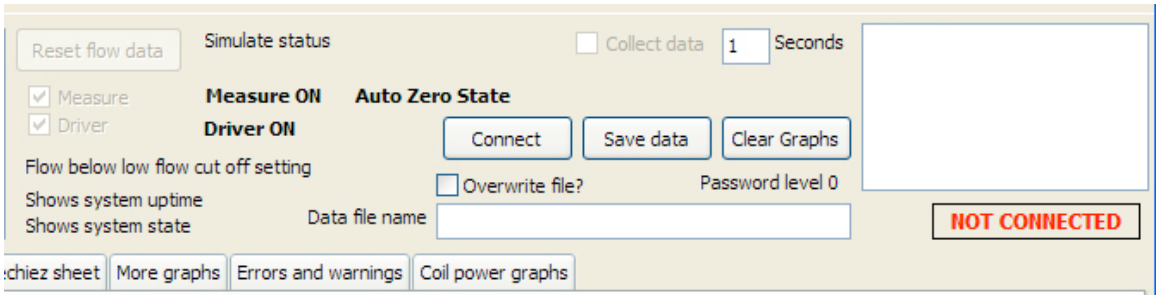
Type the three passwords into the fields. Each password must be between 6 and 32 characters.

When you are satisfied with the passwords, click "Save passwords and close." The new passwords are saved.

If you must exit without saving the changes, click "Cancel."

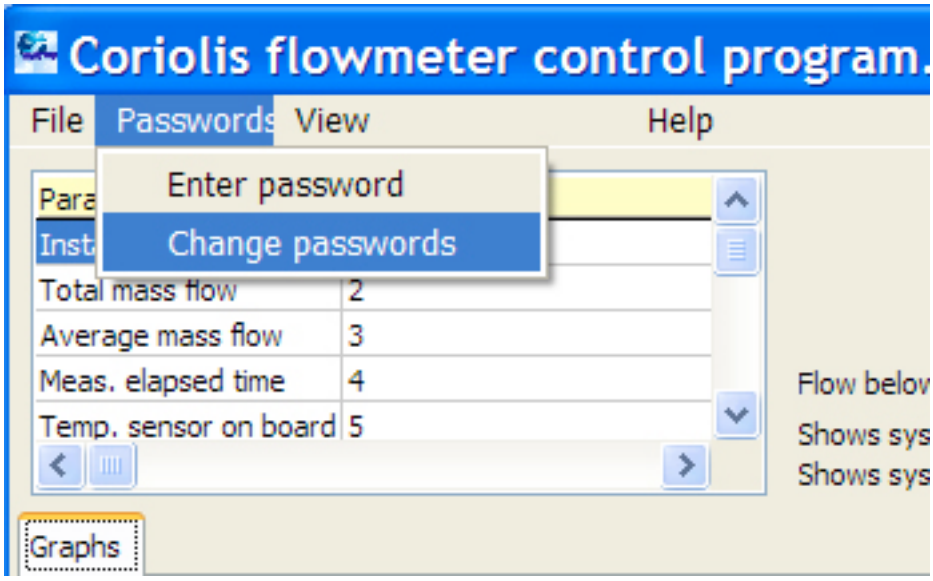
Important: You should store a list of the passwords in a safe location. If passwords are lost and cannot be remembered, you must reinstall the program. Unless you save the parameters that are stored in your computer, they will be overwritten, too. Consult the Troubleshooting section of this manual for details on saving the parameters and reinstalling the software.

In addition to saving the passwords and closing the dialog box, the program now is set for "Password level 0," and the window shows all possible options, plus a message that says "NOT CONNECTED."



7.3.2 Changing Passwords

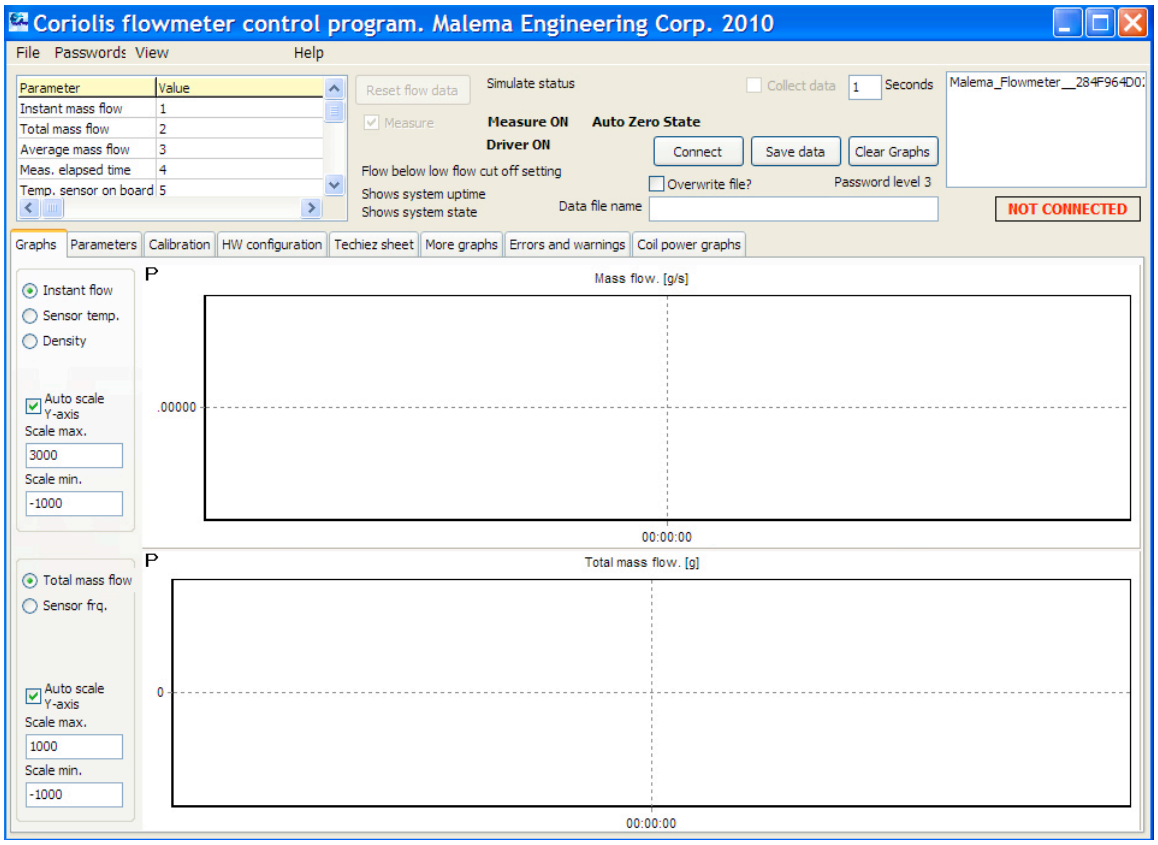
To change your passwords after they have been set, pull down the "Passwords" menu and select "Change passwords":



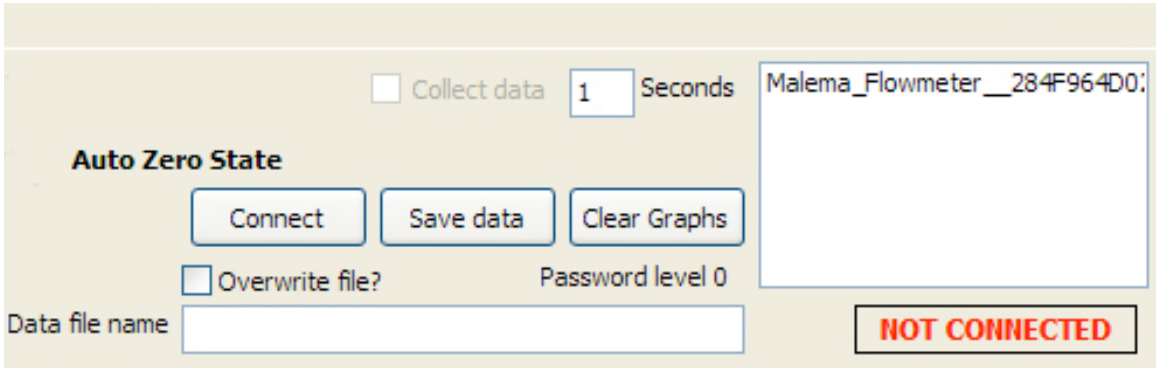
The program must be set to an access level of 0 if you want to change passwords. No other access level allows changing passwords.

7.3.3 Using Passwords To Change Access Levels

Change the password access level to 1, 2, or 3 (depending on how restricted you want access) before you leave.



When the Malema Flow Meter window appears, the screen informs you that the flow meter and computer are not connected with red text that says, "NOT CONNECTED":



This does not tell you whether the computer is not connected to the flow meter. Instead, it informs you that a data connection has not been initiated. In fact, if a flow meter's name and serial number are shown in the window above the "NOT CONNECTED" message,

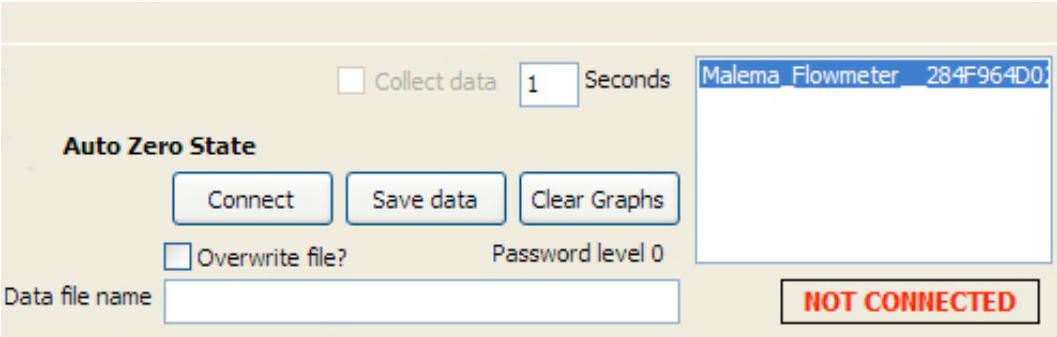
then there is a physical connection between the computer and flow meter, and data transfer is possible.

7.4 Establishing A Connection

Establish the connection between the flow meter and the computer in the following way.

Click the name of the flow meter in the upper right corner of the screen to highlight it.

Note: With this program, you can control multiple sensors. You can only view and make changes to parameters for one sensor at a time, however.

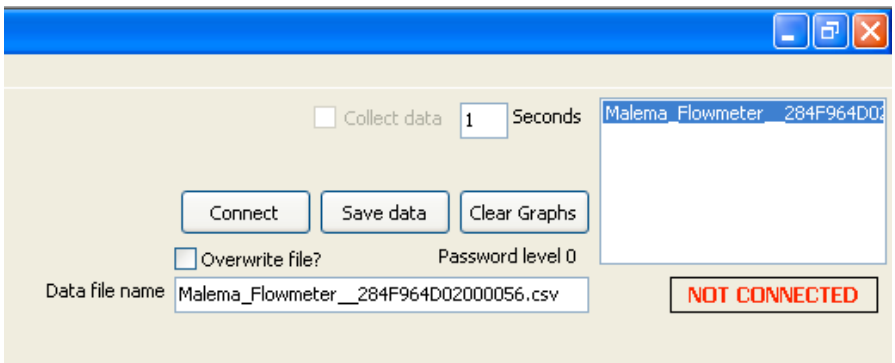


Important! If you click "Connect" without first selecting a flow meter, a connection will not be opened. Always make sure that the flow meter's name is highlighted.

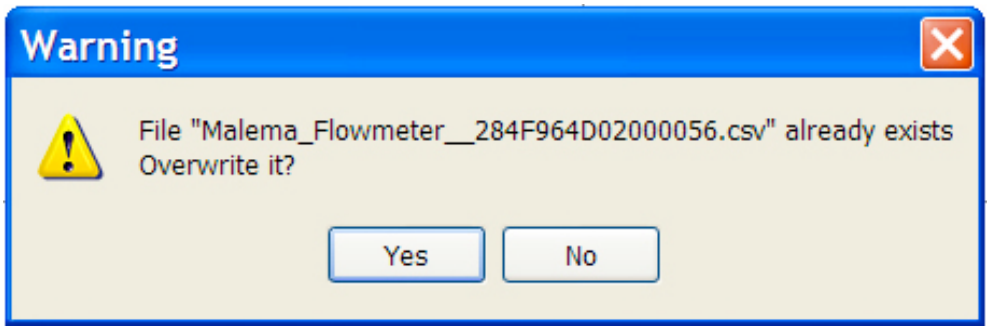
Click "Connect."

The "Data file name" field is automatically populated with a name for a .csv file in which all data will be stored during the time the system is live and connected.

By default, the program uses the name of the meter and its serial number, followed by the .csv suffix. You may change this by typing another name.



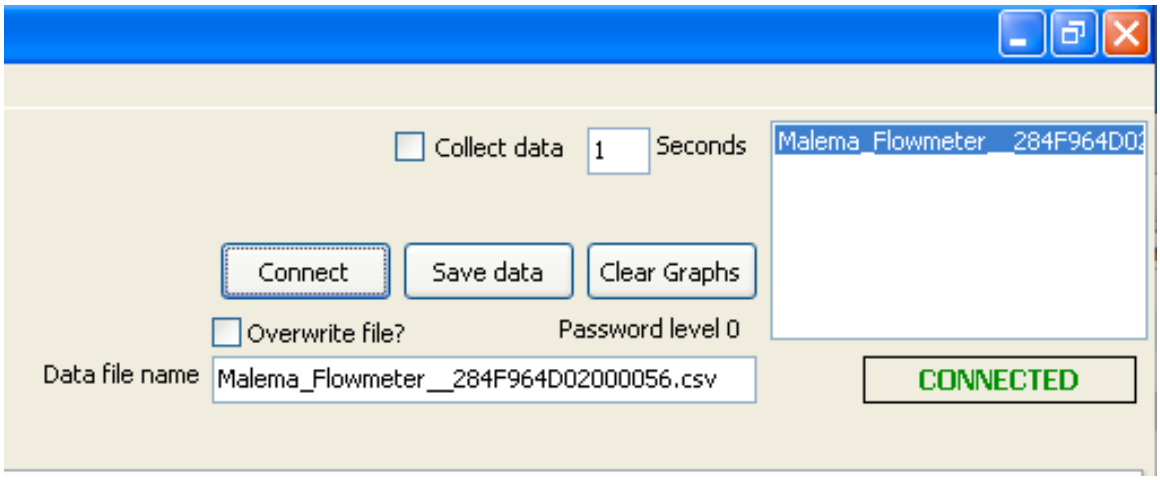
Note: If a file was saved previously with that name, you see this warning:



You have two options:

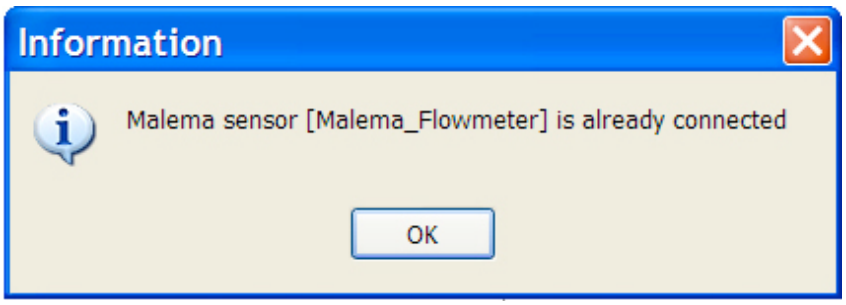
- If you do not want to overwrite the file (which erases all previous data), click "No" and type a new name in the "Data file name" field.
- If you want to overwrite the old data and continue connection, click "Yes."

When connection is successful, the red message "NOT CONNECTED" changes to a green message of "CONNECTED":



Important! If connection does not occur, check the cable connecting the computer to the flow meter. Also, check that the computer is recognizing the port on which the connection is supposed to occur.

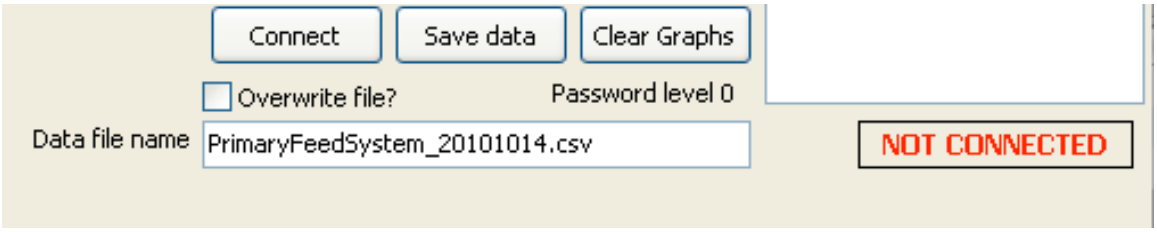
Note: If you click "Connect" again, you see this reminder message, informing you that a connection is already established:



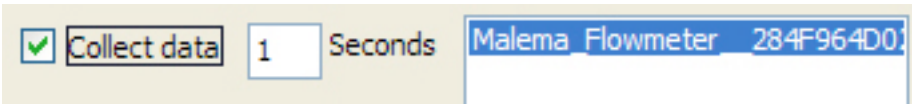
7.5 Collecting Data

Note: It is a good idea to allow the system to stabilize for one hour before collecting data. This ensures that the sensor, flow rate, and temperature are optimized, resulting in more accurate data with fewer anomalies.

To collect data, you must start by making sure that a file is ready to store the data. The first step is to provide the file with a name. In the field labeled "Data file name," use the automatically generated name, or give it a name that you would like. Since the file will be a text file with its data separated by commas (ideal for opening in spreadsheet programs, such as Microsoft™ Excel), make sure it has the ".csv" suffix (which stands for "comma-separated value").

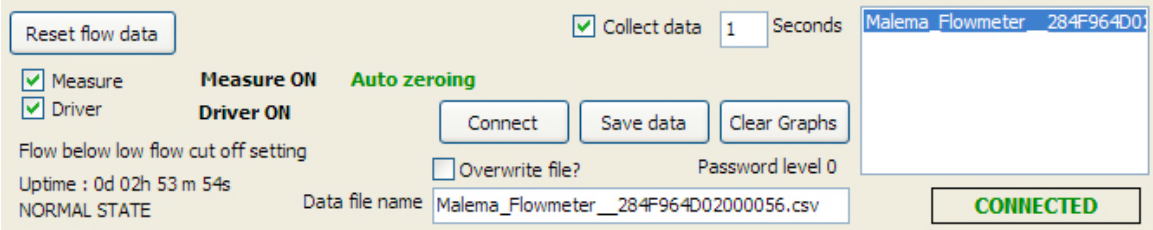


To commence data transfer from the flow meter to the file, click the checkbox labeled "Collect data."



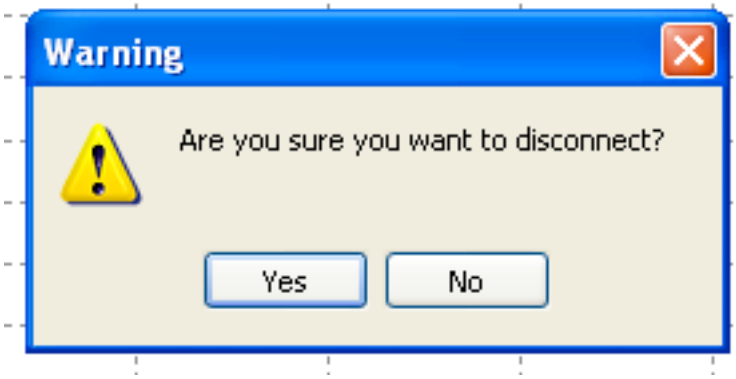
Data collection starts. Notice that "Uptime" is shown (which is the amount of time since the flow meter was last powered up). "Normal State" indicates that the flow meter is operational and is not being calibrated (the message changes to "Zero State" when calibration is occurring; access to this is via the Calibration tab).

When the flow is below the low-flow cutoff point, the message "Flow below low flow cut off setting" appears. When the flow exceeds the cutoff point, a message in blue appears, saying, "Flow above low flow cut off setting."



7.6 Disconnecting

To disconnect the flow meter from the program, click the button that says "CONNECTED." This dialog box appears:



Note: If you choose to disconnect, you can lose data. Therefore, always save your data before disconnecting.

Important: Data is not lost in the sensor, but it can be lost in the computer. If a file is open, it is not automatically closed. When disconnecting from one sensor or when shutting down, make sure all changes have been saved. If another sensor is selected from a list of sensors and the file has not been saved, data from the subsequent sensor(s) can inadvertently be mixed with data from the previous sensor(s).

8 Menus

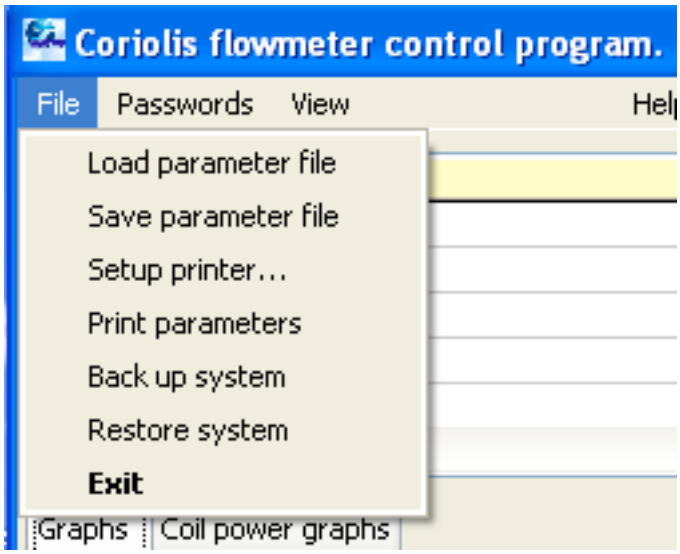
Three groups of pull-down menus are located along the top of the program window. These include:

- File
- Passwords
- View

There is also a fourth choice, Help, which provides access to help.

8.1 File

The File pull-down menu provides access to file-related activities. There are seven options:



Load parameter file

Previously saved parameter files containing configuration data can be loaded here. This file has a .param suffix to identify it as a parameter file.

The default location file is System (C:) >>Malema >> CPFM8800 >> filename.param

Caution! Loading a stored parameter file into the program overwrites the existing parameters. This cannot be undone. Be sure to save your current parameters before loading another set.

8.1.1 Save parameter file

When you save your parameters, they are stored by default in the folder with the program. You can change this by selecting another folder. Perhaps most important is to save the parameters with a name you recognize, and which you copy and save elsewhere (such as on a CD-ROM, online storage site, etc.) in case you need to use them in the future.

The parameter file has a .param suffix to identify it as a parameter file. There is also a text file with the same information; it has a .txt suffix and contains an ASCII text file.

The default location file is System (C:) >>Malema >> CPFM8800 >> filename.param

Note: If you edit parameters and want to reload earlier parameter sets, you can use a stored parameter file. You can also save and load different parameter settings for different jobs.

8.1.2 Setup printer…

This invokes a Print Setup dialog box that allows you which printer to direct the output to. The settings are like others in a Windows environment, including page size.

8.1.3 Print parameters

This sends the current parameters from your system to your selected printer.

8.1.4 Back up system

This backs up the data for the selected sensor. This backs up all parameters and passwords. This also stores current graphs and other data so that when you open the program later, they are immediately accessed.

Note: The flow meter must be connected and a connection established before attempting to back up your system. Otherwise, you receive an error message that says, "No Malema flow system is connected!"

Important!
You should back up your system before disconnecting the sensor and/or turning off its power. Until you perform a backup, the data is not saved and can be lost.

8.1.5 Restore system

If you believe the system data has become corrupted, or if you have made unwanted changes and do not want to retrace your steps, you can simply restore the system from one that was stored previously.

Note: The flow meter must be connected and a connection established before attempting to back up your system. Otherwise, you receive an error message that says, "No Malema flow system is connected!"

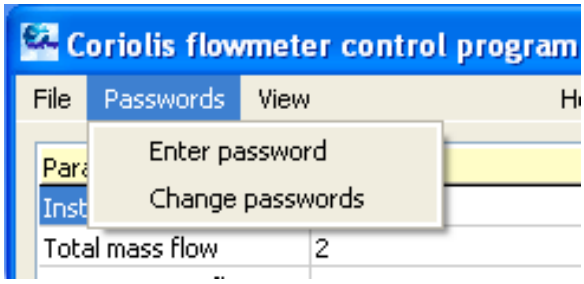
8.1.6 Exit

Use this to exit the program. It is always a good idea to save your parameters and settings if you made changes during the sessions and want to resume with them later or keep them for future reference/loading.

Important! When you exit the program, the flow meter does not stop working. Monitoring via the software ceases and data is no longer captured, but flow continues unchanged.

8.2 Passwords

There are three levels of passwords, plus an additional level that requires no password. See page 16 for information on setting and changing passwords.

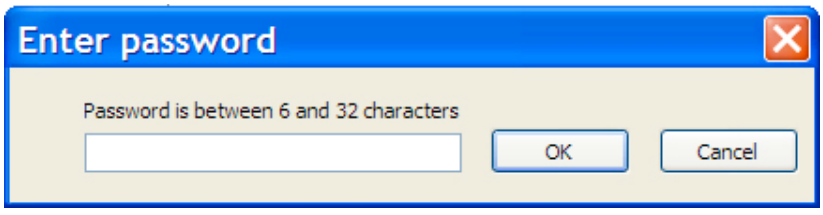


Two options are available:

- Enter password
- Change passwords

Note: If you do not enter a password, the greatest restriction is imposed. That means that you cannot make any changes, and you can only read a limited set of data.

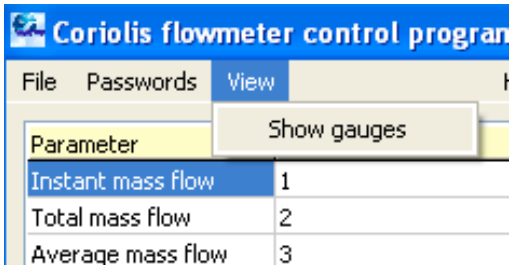
Enter the password into the field (passwords are case-sensitive):



Type the password and click "OK."

8.3 View

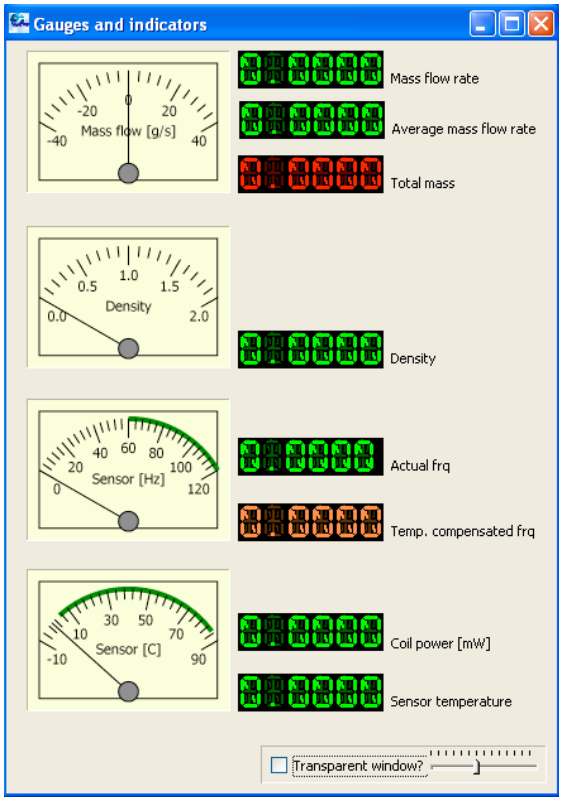
The primary option under "View" is "Show gauges." It opens a window with four gauges that represent the most important monitoring functions.



If you are using this program on a computer that is used for other operations, you can minimize the main window and leave the gauges visible to provide "at a glance" monitoring information. In a single window, it shows:

- Mass Flow
- Density
- Sensor Frequency (in Hz)
- Sensor Temperature

Click "Show gauges." This window appears:



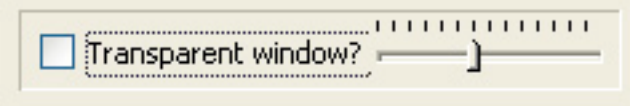
This window can be minimized, but minimizing it doesn't allow constant viewing. Therefore, a "selectable transparency" feature is available.

8.3.1 Setting Gauge Window Transparency

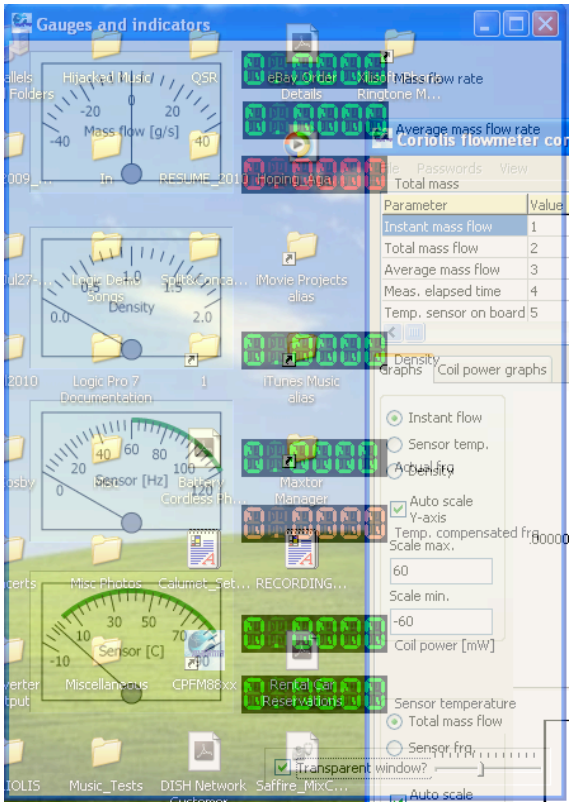
Gauges can be visible without being obtrusive by setting their transparency.

To change the window's opacity:

1. Click the box labeled "Transparent window?"



2. Adjust the slide control to the right of that box until you find the amount of transparency that suits you.



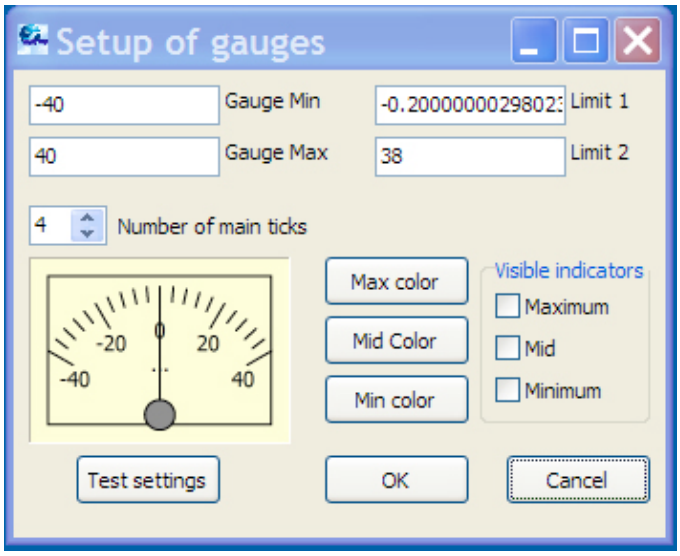
That's all you have to do. You may change the transparency at any time.
Note: You can also minimize the window (instead of keeping it on the screen at all times) by clicking the "minimize" (the leftmost button in the trio at the upper right of the window).

8.3.2 Setting Thresholds For The Gauges

Each gauge has several settings to make it more useful. You can set minimum and maximum values for the range it covers, the number of increments indicated on the dial, and Maximum, Mid, and Minimum zones (each individually color-codeable).

Click on any gauge.

This dialog box appears, containing parameters for that gauge:



Here you can set the following:

- Gauge Min
- Gauge Max
- Limit 1
- Limit 2
- Number of main ticks
- Max color
- Mid Color
- Min Color
- Visible indicators (Maximum, Mid, Minimum)

There are three more buttons:

- Test settings. When you make changes, you can test them as you go.
- OK. This commits the changes.
- Cancel. This cancels the changes you have made and tells the program to continue using the existing settings.

8.3.3 Gauge Min

This sets the lowest point on the gauge (for example, -40). The increments used correspond to increments that you set elsewhere.

Note: Do not set the Gauge Min value above the Gauge Max value.

8.3.4 Gauge Max

This sets the highest point on the gauge (for example, 40). The increments used correspond to increments that you set elsewhere.

Note: Do not set the Gauge Max value below the Gauge Min value.

8.3.5 Limit 1

This is the setpoint for the lower threshold of where the Mid color occurs on the gauge.

Note: Do not set the Limit 1 value above the Limit 2 value.

8.3.6 Limit 2

This is the setpoint for the lower threshold of where the Max color occurs on the gauge.

Note: Do not set the Limit 2 value below the Limit 1 value.

8.3.7 Number of main ticks

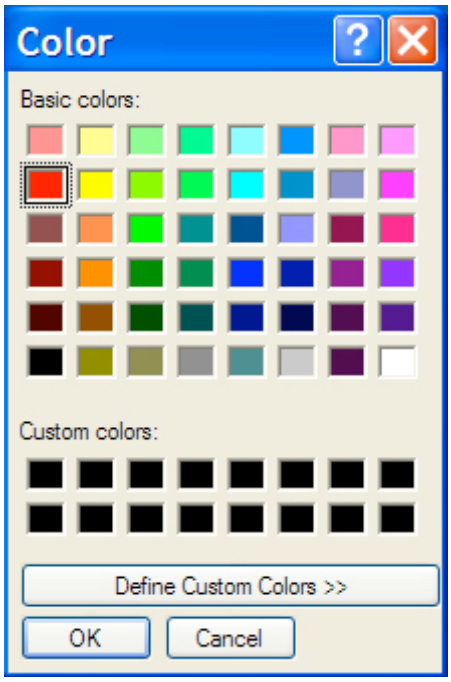
Set the number of increments ("ticks") shown on each gauge. Use the up and down arrows to step to higher or lower numbers.

Note: Adding increments can enhance the level of detail, but too many can cause clutter.

Note: Changing the increments does not affect the digital readout or data that is saved.

8.3.8 Max Color/Mid Color/MinColor

Click on any of the three color buttons (Max color, Mid color, or Min color). This dialog box appears:



The current color for this value is surrounded by a dotted line (if no color has been selected previously, no color is surrounded).

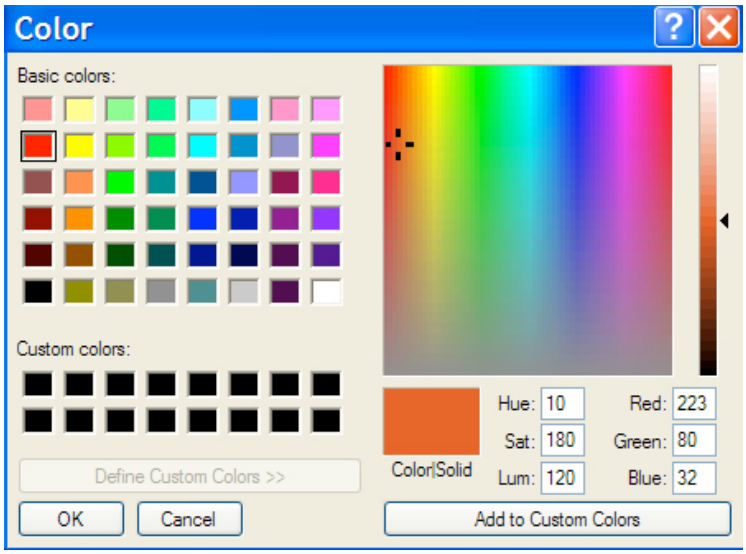
You can now select a color from the main palette labeled "Basic colors" or blend your own Custom color. To create a custom color:

1. Click Define Custom Colors.
2. Select a color by clicking in the rainbow-colored box or set the color using Hue/Saturation/Luminance values or Red/Green/Blue values.
3. When you are satisfied with the color, click "Add to Custom Colors."

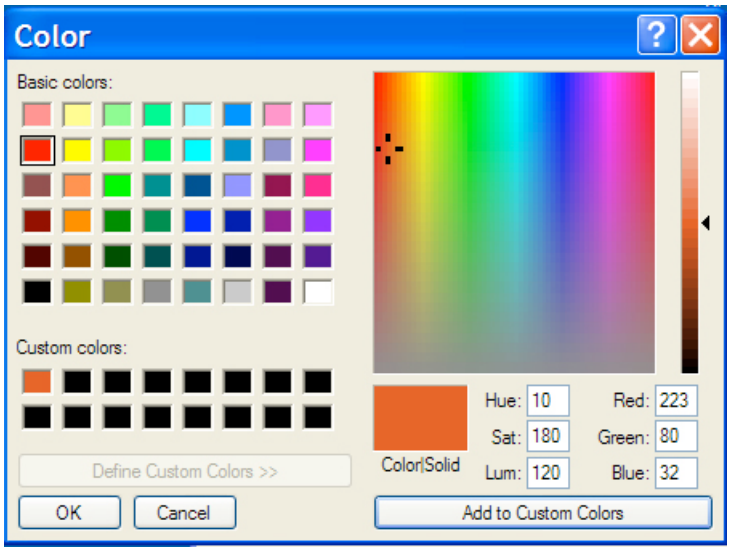
If you want to create another custom color for your palette, click in the rainbow-colored box and select a color. Then click "Add to Custom Colors."

Note: If you want to replace a color, click the box with the custom color you would like to replace. Then choose a color and click "Add to Custom Colors." The new color replaces the old one.

Once you close the color controls dialog box, the gauge reflects the color change:



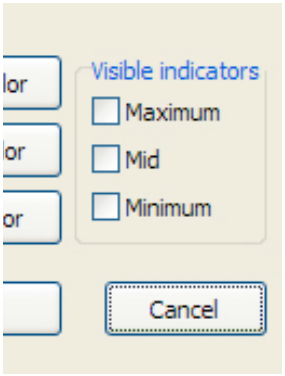
When you click "Add to Custom Colors," an available box in the "Custom colors" area now contains your selected color.



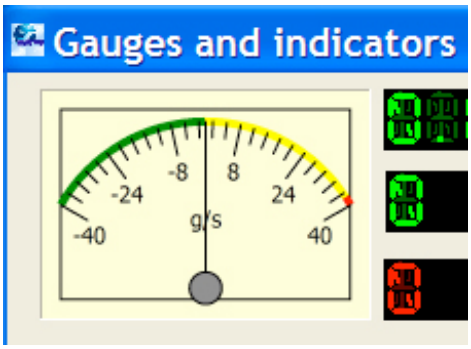
When you are done setting colors, click "OK" to close the dialog box.

8.3.9 Visible Indicators

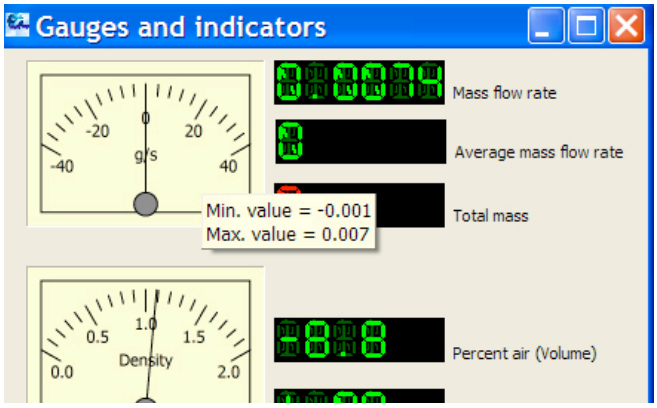
The colors you selected for minimum, mid, and maximum values for the gauge only appear if you select the appropriate check boxes for the Visual indicators to "turn them on." You can use any of the three, all three, or none, depending on how much visual prompting you require.



A gauge with all three Visible indicators turned on is shown here:



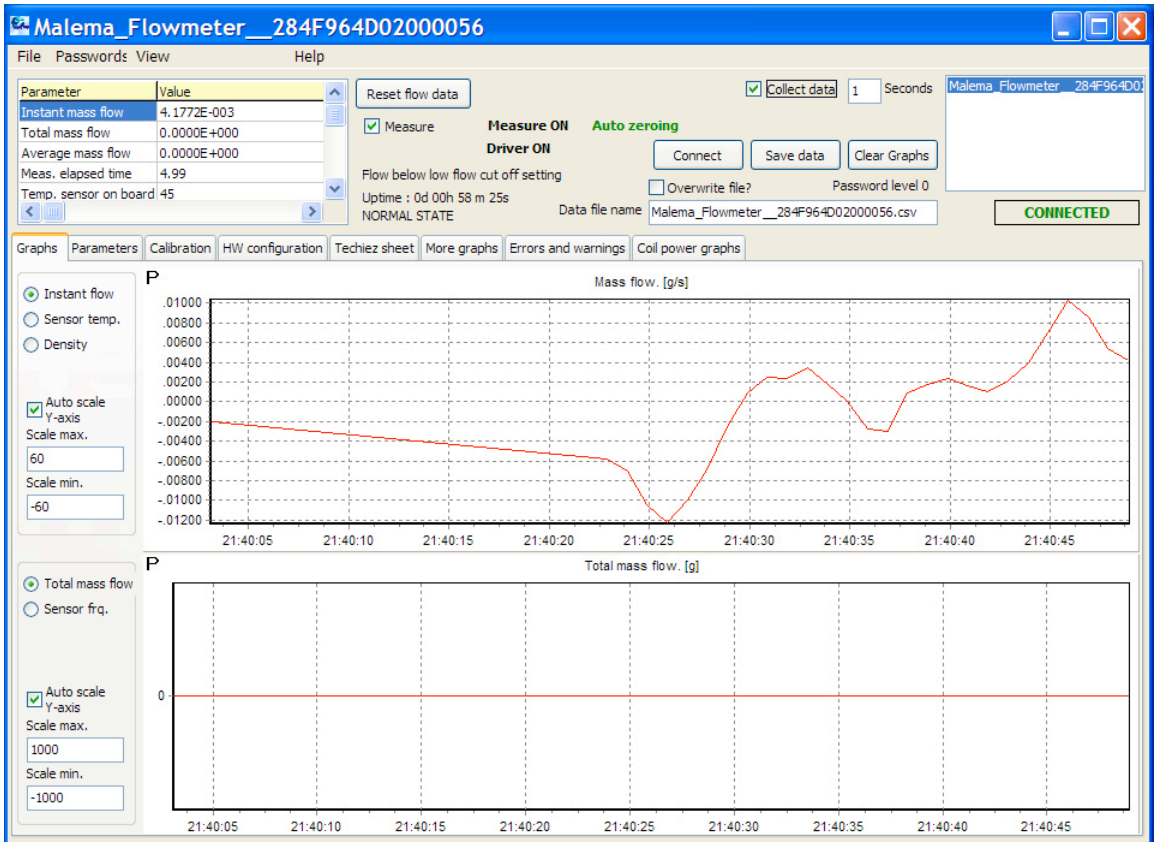
Note: You can view the Min. value and Max. value settings by mousing over a gauge. A small window appears with these values:



9 Main Screen

The following section explains each of the program's screens and their functions. Refer to page 14 for information on establishing connections and setting passwords.

After startup, the main screen is visible:



The main screen consists of two major sections, with global information at the top and specific information, arranged by tabs, on the bottom portion. The upper part allows you to control whether the software is "live," check the uptime and system status, and whether flow is being detected. It also provides a means of setting the collection interval, saving data, and clearing graphs.

9.1.1 Parameter/Value

This is a small control panel that provides a quick view of parameters and values. The parameters include:

- Instant mass flow
- Total mass flow
- Average mass flow
- Measured elapsed time
- Temperature sensor on board

Note: Numerical values after each parameter's name are expressed in units set elsewhere.

9.1.2 Reset flow data

Clicking this button sets the flow counters to zero. This is useful when you want to perform a specific measurement (for example, filling a container with a specific amount of liquid to create a time/volume or other reference) or multiple measurements in which you want to control the start and stop times and attendant data. Click the button, and the flow data resets to zero.

9.1.3 Measure

When the box is checked, measurement occurs and is indicated with a text message to its right that says, "Measure ON" and measurements are performed. When the box is unchecked, measurement does not take place, and the message is "Measure OFF."

Auto Zeroing. This allows setting a zero point that occurs at each measurement when it is turned on. This zero point is related to the low-flow cutoff point. When it is active, the message "Auto zeroing" is shown. When the function is not active, the display shows "Not auto zeroing."

Note: If air bubbles are expected during measurement, it is recommended that you turn Auto Zeroing off.

9.1.4 Flow below low flow cutoff setting

This is the low threshold for detecting flow through the sensor. Below this point, no data is collected.

9.1.5 Uptime

This tells you how long the flow meter has been in operation since power was applied to the sensor.

9.1.6 NORMAL STATE

This is the state in which data can be collected (Calibration mode is no longer enabled).

9.1.7 Collect Data

This initiates data collection from the flow meter. Values in the Parameters window are updated at the collection interval, and the graphs reflect the incoming data.

9.1.8 Seconds

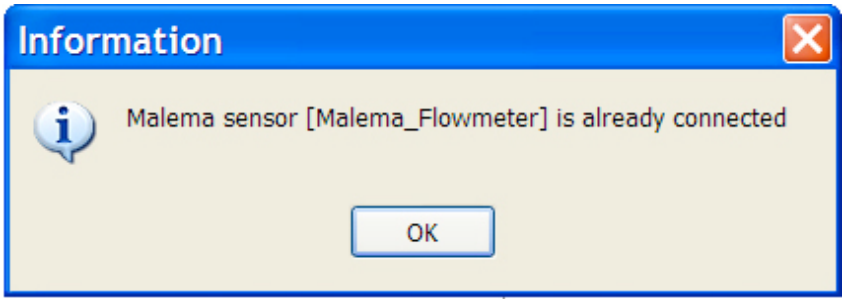
This sets the data collection interval, in seconds. Click the box and input a number to represent how often you want a data point to be captured.

Note: This only accepts whole numbers, and large numbers of data points require more storage space on your hard drive for data.

9.1.9 Connect

Clicking this button initiates the connection between the flow meter and the program. Until this button is clicked, no data can flow.

Important! The Connect button is exclusively for connecting. If you click it again once connection is established, this error message appears:



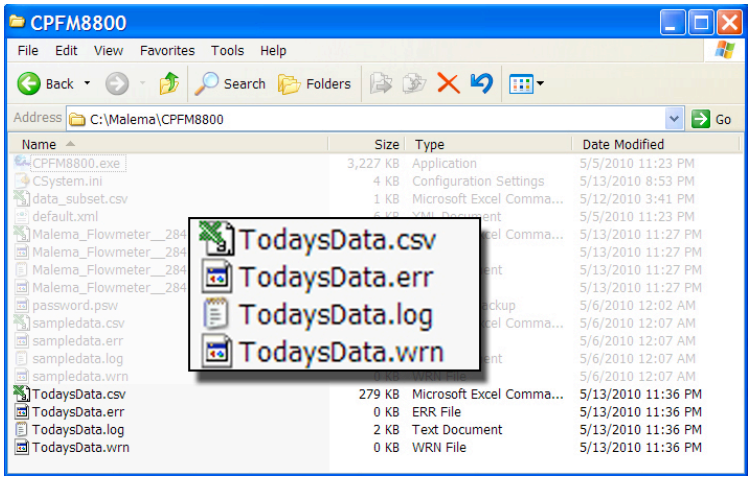
If you want to disconnect, you must click the box that says "CONNECTED" in green letters.

9.1.10 Save Data

Whenever the program is monitoring a flow meter and data has been coming in, you may save the data that has been collected. You can name the data in the field labeled "Data file name" and give it a specific name (such as a process batch ID, shift number, or in the case of this example, something simple such as TodaysData). Errors, warnings, and a log

file accompany the comma-separated-value file (.csv), all bearing the same name, but with different suffixes.

This data can be opened in a spreadsheet program such as Microsoft Excel and extracted, manipulated, etc.



9.1.11 Clear Graphs

This resets the graphs, removing all representations of data. However, the file remains open. If you want to stop collecting data in the current file, you must save it and create a new file.

To save data without losing the information you want, save the file, and then clear the graph and start a new file with a new file name.

9.1.12 Overwrite File

If you want to overwrite a file (for example, after a false start), simply write a new file with the same name as another file.

Note: There is capacity for 10,000 data points per file. After 10,000 data points have been collected, a file is closed and a new one with the same name plus extra characters (to differentiate it) is created. This process repeats (closing one file, opening a new one) as long as another 10,000 data points are collected. The naming convention for these files is as follows:

filename.csv
filename_1.csv
filename_2.csv
etc.

Also, automatic backups of data occur every 50 samples and 15 minutes, to prevent data loss if power is lost or connections are interrupted.

9.1.13 Password Level

The current password level is shown here as "Password level 0" through "Password level 3." You can change the password level at any time (and increase or decrease access) by pulling down the menu item "Passwords" and selecting "Enter password." Depending on the password you input, access to the program will change. If you do not input a password (or input an incorrect password), then the password level changes to 3, which has the most restricted access.

Note: The password is stored in encrypted form in a file called password.psw. Even if this file is opened in a text editor or other program, it is unreadable. It can only be parsed by the CPFM 8800 program.

Important!
It is a good idea to back up the .psw file. If the program must be reinstalled, you can simply drag the .psw file into the program's folder, replacing the default file and installing your saved password data.

9.1.14 Data File Name

By default, when you start up the program and then select a flow meter for data collection, the field labeled "Data file name" is automatically populated. However, you may want to name the file containing your data something that is more specific to a process run, batch, date, etc. Type that name in this field, and when you click "Collect data," files with that name (including error, log, and global data stored in .csv form) are all stored in the folder for the program.

9.1.15 Flowmeter Name & Serial Number

Each flow meter has a name and unique serial number. Whenever the program and the flow meter connect, the name and serial number are passed automatically to the program. This information is stored along with other data for later correlation.

9.1.16 CONNECTED/NOT CONNECTED

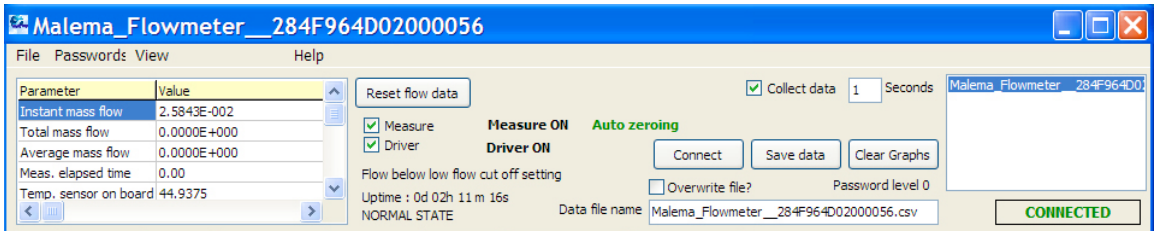
When the computer/software are connected to the flow meter and data transmission is possible, then the word "CONNECTED" is shown in green letters. When the connection is disrupted or intentionally turned off, then "NOT CONNECTED" is shown in bold red letters.

10 Tab-Accessed Screens

The bottom section of the screen provides access to a total of eight screens' worth of data and settings information, all accessed by clicking on tabs. The eight tabs are labeled:

- Graphs
- Parameters
- Calibration
- HW Configuration
- Techies Sheet
- More Graphs
- Errors & Warnings
- Coil Power Graphs

The top section of the screen remains a constant "dashboard" into the overarching system information and does not change, even when different tabs are selected.



The following sections cover the tabs' functions and organization.

10.1 Graphs

Two graphs can be viewed simultaneously, and you can choose them by clicking the buttons along the left side of each graph.

The top graph can show one of the following:

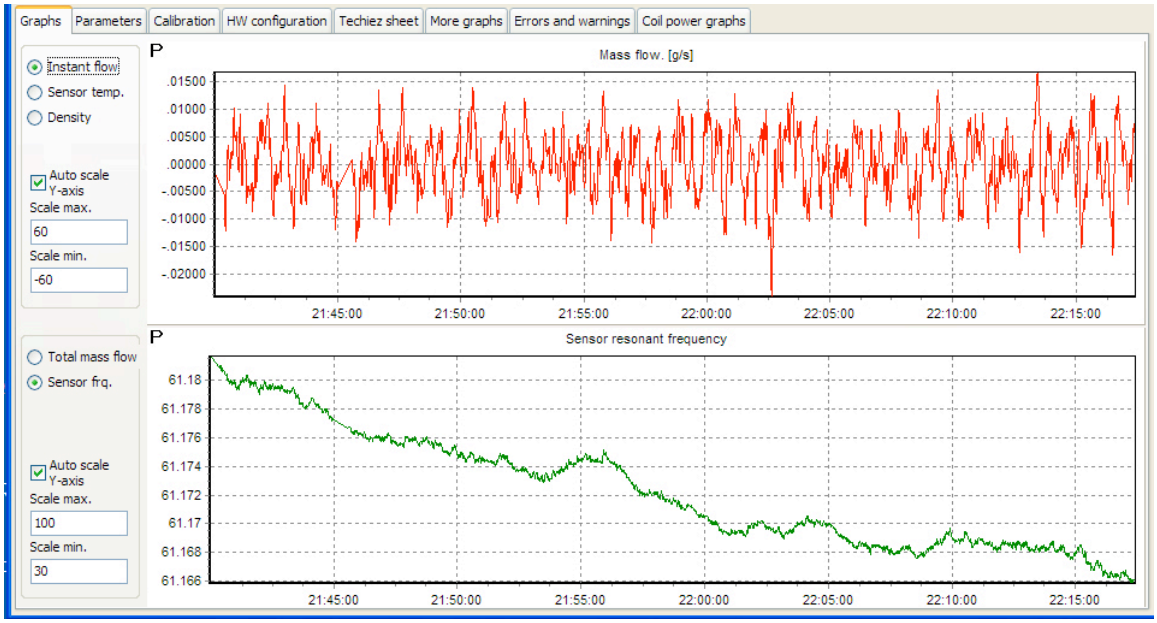
- Instant flow
- Sensor temperature
- Density

The bottom graph can show one of the following:

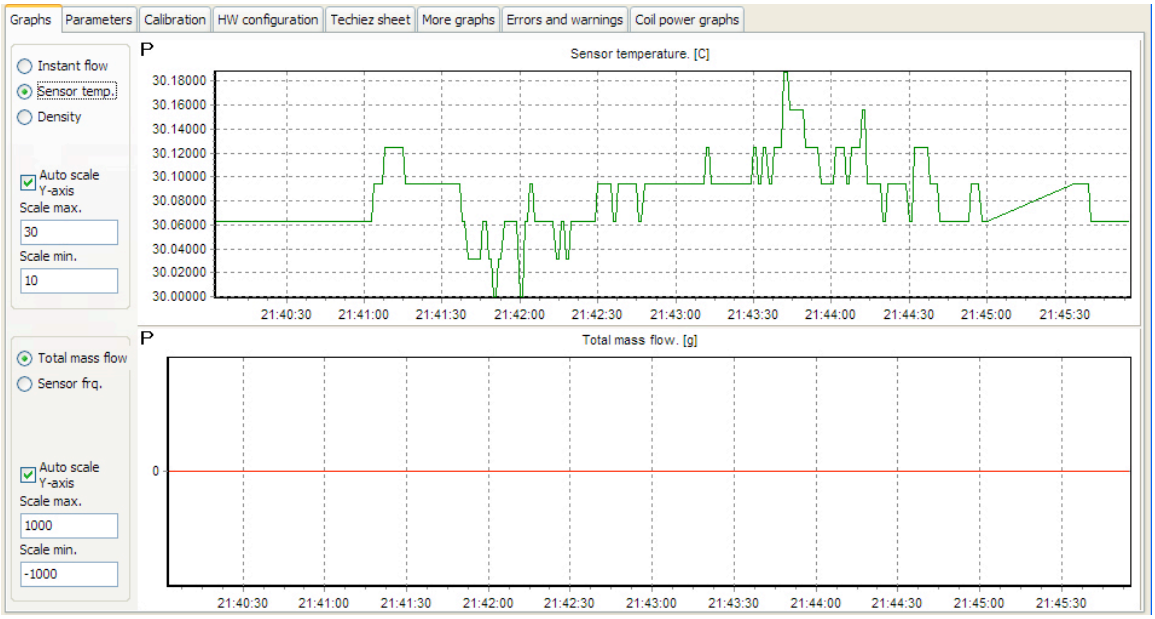
- Total mass flow
- Sensor frequency

Selector buttons along the left side of each graph allow you click to a different data view.

Note: Along the bottom of each graph are time increments, which correspond to the number of seconds you set in the box at the top of the screen (directly to the right of the "Collect data" check box).



Click a different screen's button, and your selected graph is shown instantly:



Note: A simple shortcut for printing graphs is included. Click on the bold letter **P**, at the upper left of either graph, to print that graph.

10.1.1 Instant Flow

Selecting this option tells the program to show the flow rate in the upper graph.

10.1.2 Sensor temp.

This shows the temperature of the sensor in the upper graph. This data is useful when stabilizing a system; more accurate flow rate measurements are made when the temperature is as close to constant as possible.

Note: Temperatures are shown in Fahrenheit, Celsius, or Kelvin units, depending upon your settings.

Important! Temperature units can be changed while live data is being captured and displayed on the graph. However, this may cause confusion, so therefore it is advised that you only change the units before a measurement session.

10.1.3 Density

This tells you the current density of the mass being measured in the sensor.

10.1.4 Auto scale Y-axis

Because there can be large swings in data values expressed in the graphs (especially while adjusting settings, stabilizing, etc.), it is sometimes useful to allow the program to automatically set the Y-axis scale. Click the "Auto scale Y-axis" box to turn this feature on. If you do not want auto scaling turned on, uncheck the box and set your own maximum and minimum vales for scaling.

Important! The scaling for these graphs only affects what you see in the display. Whether you use auto scaling or set your own minimum and maximum values, the data collected and stored is the same.

10.1.5 Scale max.

If you choose not to use the Y-axis auto scaling, you can set a maximum Y-axis value. Set any number and then make sure the "Auto scale Y-axis" box is unchecked.

10.1.6 Scale min.

If you choose not to use the Y-axis auto scaling, you can set a minimum Y-axis value. Set any number and then make sure the "Auto scale Y-axis" box is unchecked.

The bottom graph provides two options, Total mass flow and Sensor frequency.

10.1.7 Total mass flow

This shows the total mass flow through the sensor.

10.1.8 Sensor frq.

This shows the sensor's frequency. Ideally, the frequency is constant (the sensor's resonant frequency). However, the sensor is temperature sensitive. Extreme or sudden fluctuations in the sensor frequency may be an indicator of unwanted or sudden environmental temperature changes (such as opening and closing doors in temperature-controlled rooms).

10.1.9 Auto scale Y-axis

Because there can be large swings in data values expressed in the graphs (especially while adjusting settings, stabilizing, etc.), it is sometimes useful to allow the program to automatically set the Y-axis scale. Click the "Auto scale Y-axis" box to turn this feature on. If you do not want auto scaling turned on, uncheck the box and set your own maximum and minimum vales for scaling.

Important! The scaling for these graphs only affects what you see in the display. Whether you use auto scaling or set your own minimum and maximum values, the data collected and stored is the same

10.1.10 Scale max.

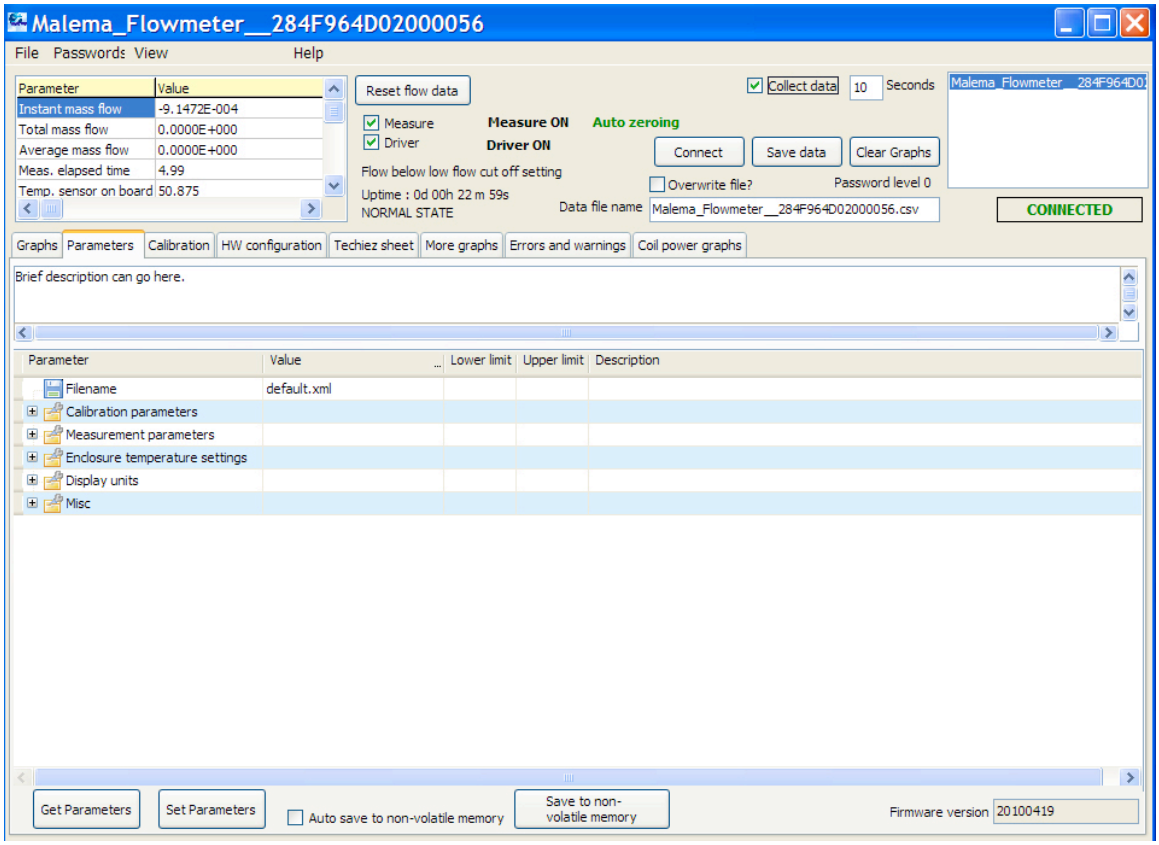
If you choose not to use the Y-axis auto scaling, you can set a maximum Y-axis value. Set any number and then make sure the "Auto scale Y-axis" box is unchecked.

10.1.11 Scale min.

If you choose not to use the Y-axis auto scaling, you can set a minimum Y-axis value. Set any number and then make sure the "Auto scale Y-axis" box is unchecked.

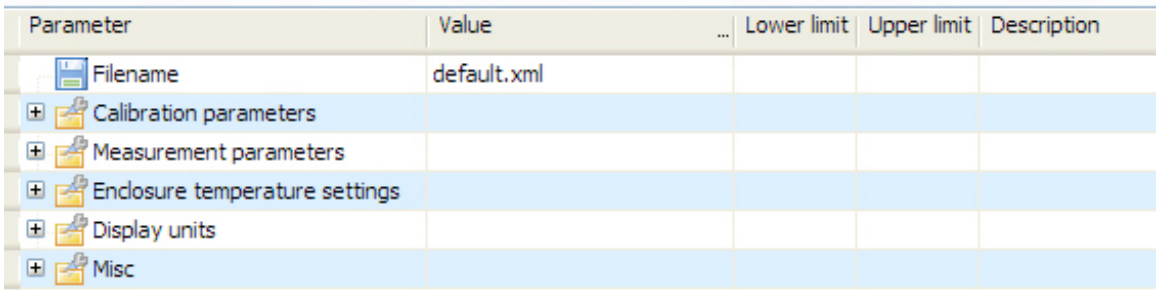
10.2 Parameters

The parameters shown here are a combination of read-only, changeable, and factory-set parameters of the sensor. Because there are many parameters, they are organized into groups and "collapsed" (in standard hierarchical fashion).

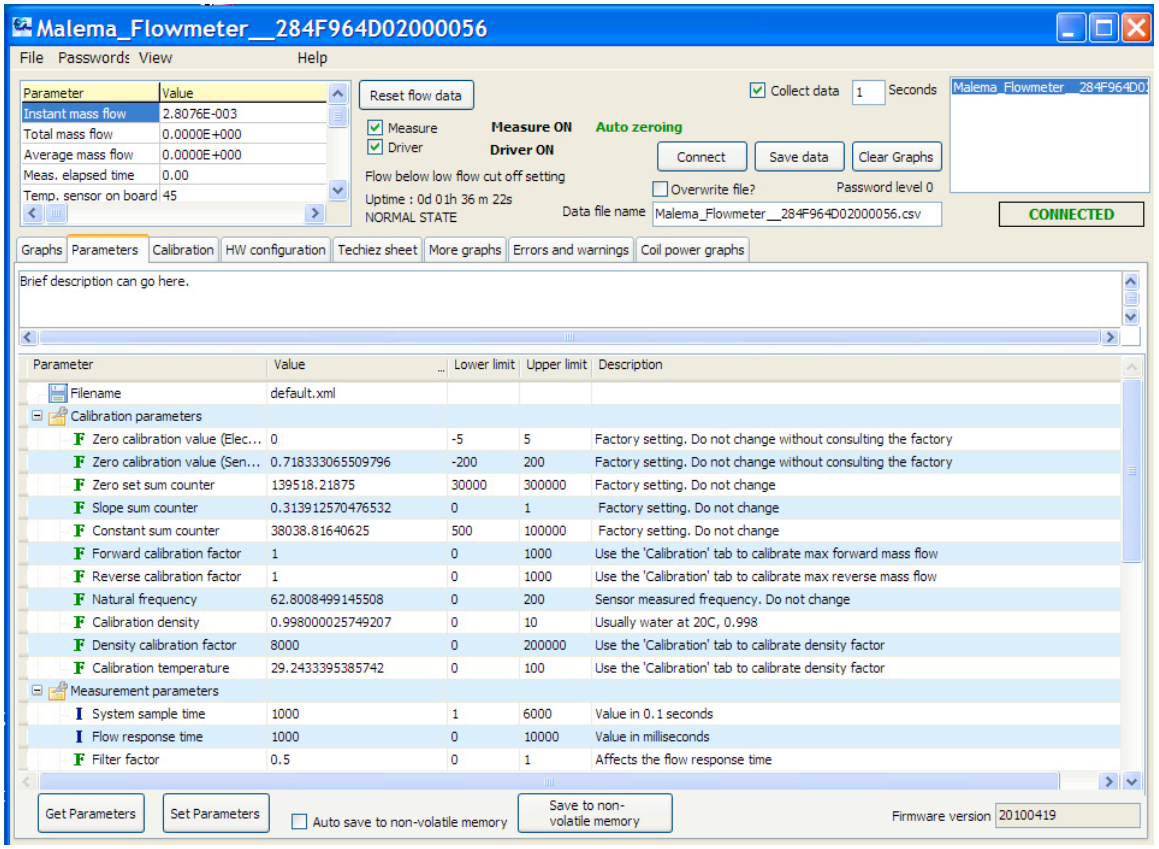


When you click the "+" to the left of one of the expandable items, the item expands to show details of parameters that are organized within it. Clicking on the "-" to the left of an expanded parameter set reduces it. Double-clicking on parameters allows you to change parameters that can be modified.

Important!
Some parameters are set at the factory and should not be altered unless you are instructed by a technician at Malema.



When the parameters are shown, an icon to the left is included, telling the type of parameter information that is included/used for that parameter.



Here are the names of the four icons and their meanings:

I	Integer
F	Floating Point
L	Look-up Table
Bla	Text

Note: When you right-click on any of the lines or parameters, you are given a choice to "Expand All" or "Collapse All," a convenient way of opening or closing all the items and exposing/hiding all parameters simultaneously.

Each Parameter can include a Value, Lower limit, Upper limit, and Description. In "Display Units," Value and Description are the only columns filled with explanatory information.

10.2.1 Parameters Screen Buttons & Information

Along the bottom of the Parameters screen are three buttons, a check box, and an information box. They are described here:

10.2.2 Get Parameters

Clicking this button tells the software to get the parameters from the system.

10.2.3 Set Parameters

Clicking this button sets parameters to the system. Unless you click this button, changes you make to the parameters will not be sent to the system.

10.2.4 Auto save to non-volatile memory.

This saves parameter changes automatically and does not require using "Set Parameters" to commit them.

10.2.5 Save to non-volatile memory

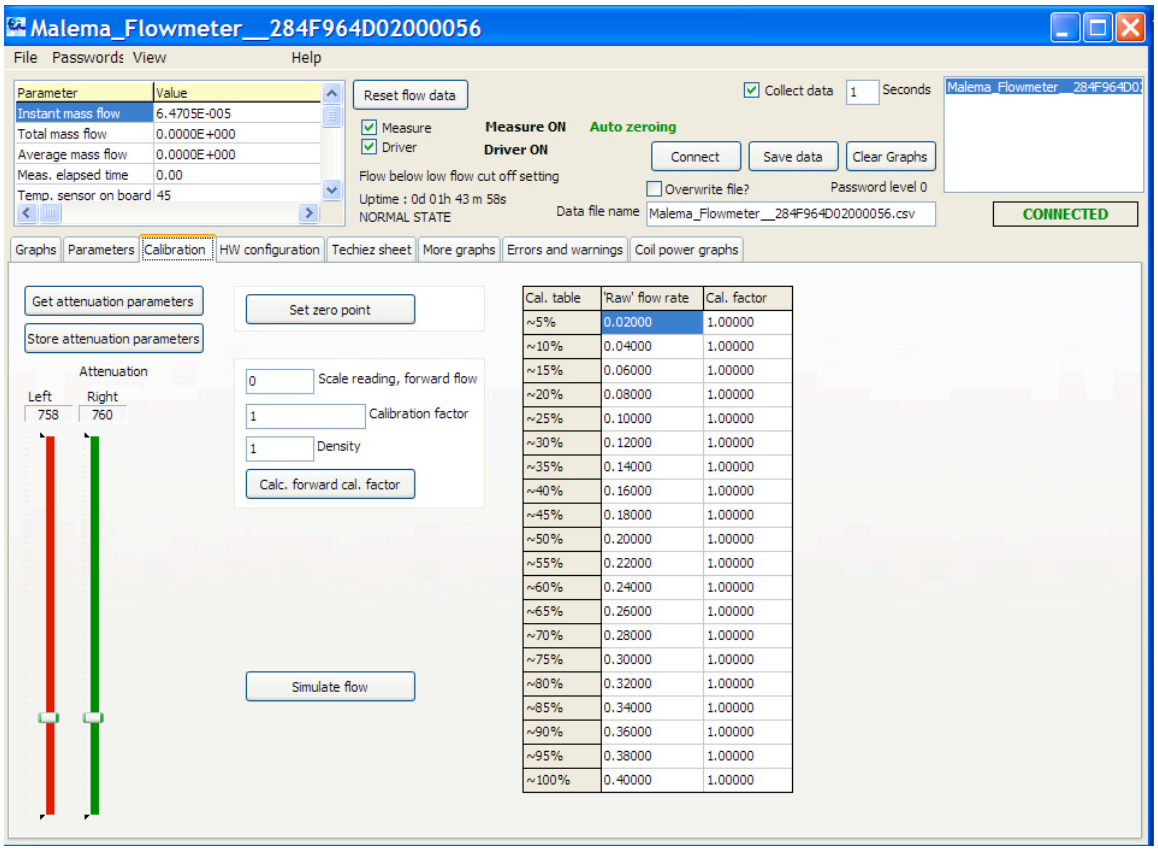
You can save parameters here and use "Set Parameters" to test changes without commiting them.

10.2.6 Firmware version

This tells you the version of the firmware currently running. Check with Malema for updates to the firmware, which can change/improve functionality.

11 Calibration

This tab contains parameters and controls for calibrating the sensor. That is, it is a hardware calibration, or tuning, rather than a calibration of the program itself. The sensor has two transducers (indicated as "Left" and "Right"), which must be set separately for optimum sensitivity and selectivity.



11.1.1 Get Attenuation Parameters

Click this to get and display attenuation parameters from the active sensor.

11.1.2 Store Attenuation Parameters

Click this button to store attenuation parameters on the sensor.

11.1.3 Attenuation

Attenuation is typically unnecessary, but it affects either the left or right transducer in the sensor. It is designed to compensate for differences in the two transducers. However, it should not be adjusted unless the sensor is replaced.

11.1.4 Left

Compensation for the sensor's left transducer is set here.

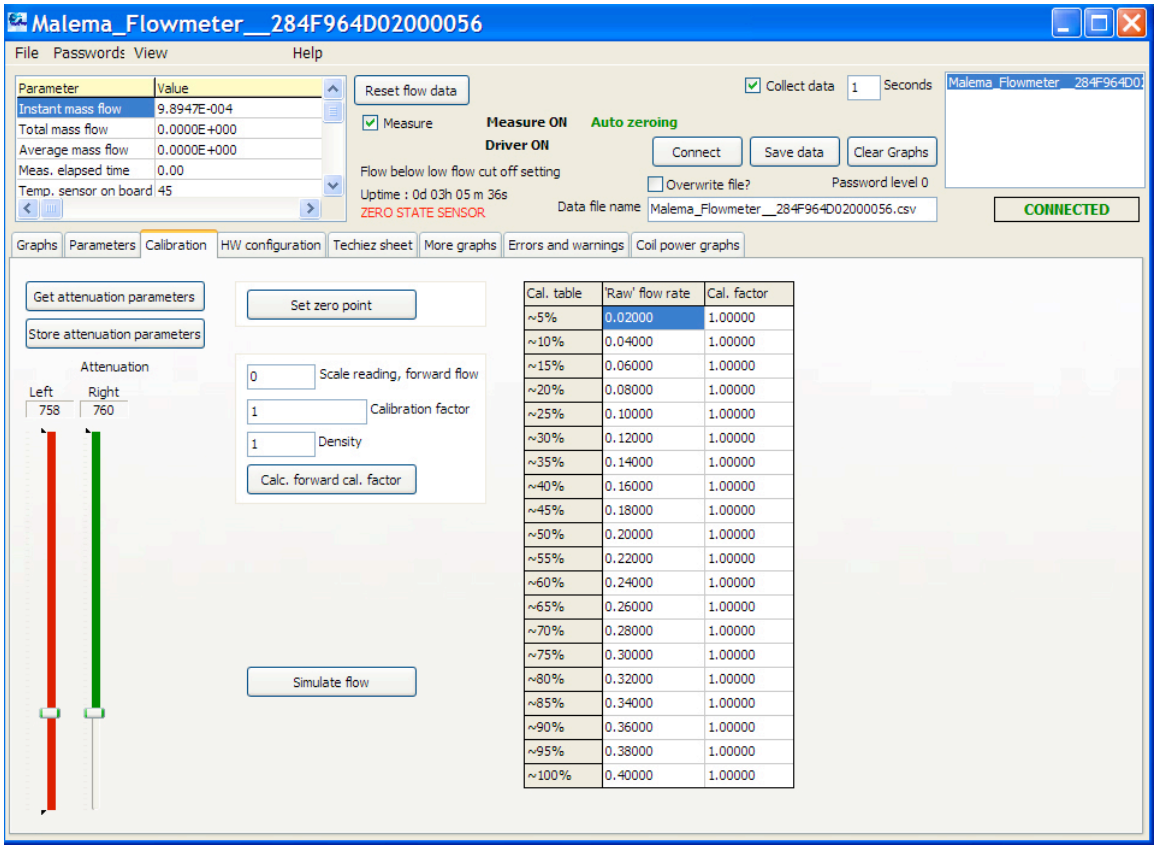
11.1.5 Right

Compensation for the sensor's right transducer is set here.

11.1.6 Set Zero Point

This establishes the zero point reference for measurements by setting an offset. Click this to set a new zero point for the sensor.

Note: Once you click the button, it takes approximately four minutes for the new zero point to appear. During this time, the message "ZERO STATE SENSOR" is shown in red. When the new zero point is set, the message returns to "NORMAL STATE."



11.1.7 Scale reading, forward flow

Use this field when setting a calibration factor to improve sensor accuracy.

11.1.8 Calc. forward cal factor

After you set the zero point, start the flow with one liter of water. Use a scale to weigh the water. It should weigh 1 kilogram. Set the Scale reading forward flow to 1000. Then press Calc. forward cal. factor. If you have a low flow rate, it will take a longer time to collect 1 kilogram. If the flow rate is faster, 1 kilogram will be collected faster. In either case, you use the same number.

To increase the accuracy, you can copy the calibration factor for each of the ranges you desire (5%, 10%, etc.) and place it in the Calibration factor field and press Calc. forward cal. factor each time.

Next, measure 1 kilogram of water. Put 1000 gm in your Scale-reading Forward Flow. Press Calculate Forward Calibration Factor, and a calibration factor is calculated.

11.1.9 Calibration factor

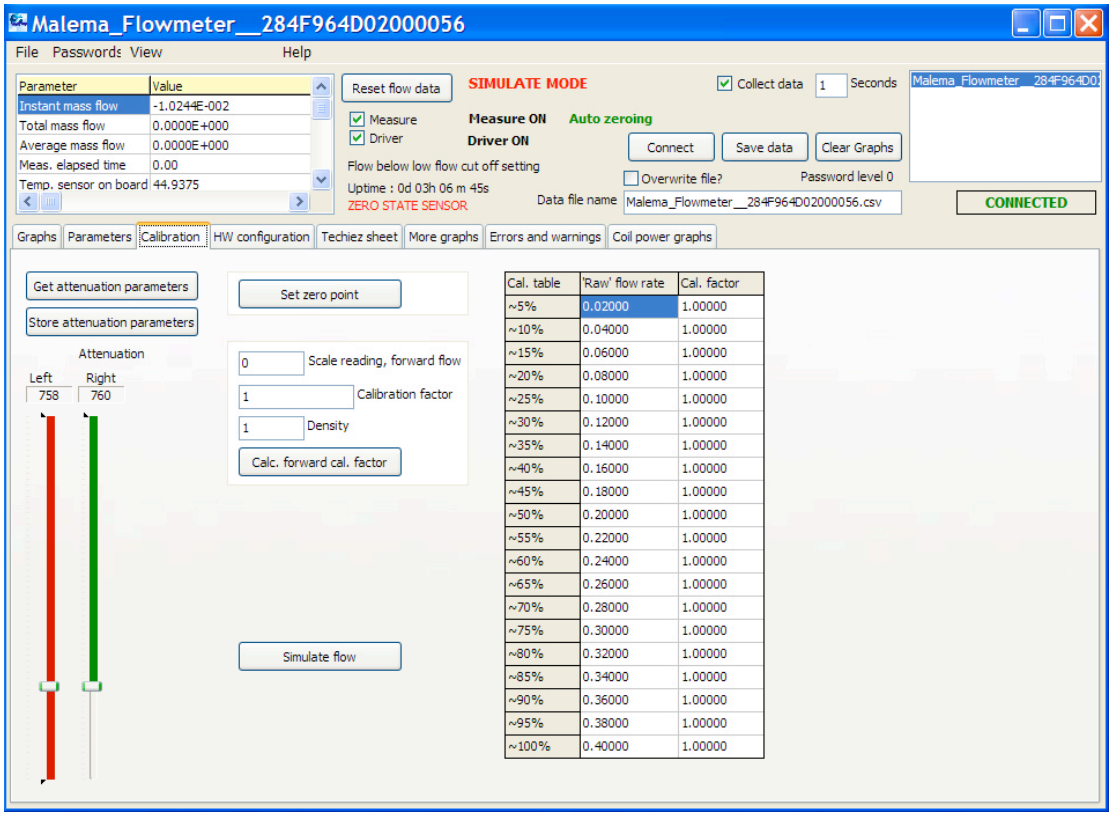
The calculated calibration factor is shown here.

11.1.10 Density

Place a value in here if you want to change the density value. Note that a value of 1 is approximately equal to the density of water.

11.1.11 Simulate flow

If you do not have a flow established but want to simulate it, this button starts a simulation equivalent to 30 grams per second. When you click the "Simulate flow" button, simulation starts, and the words "SIMULATE MODE" appear in bright red letters (instead of "MEASURE ON" in black letters) to alert you that live data from a flow meter is not being received or monitored, although graphs and other data indicate a flow.

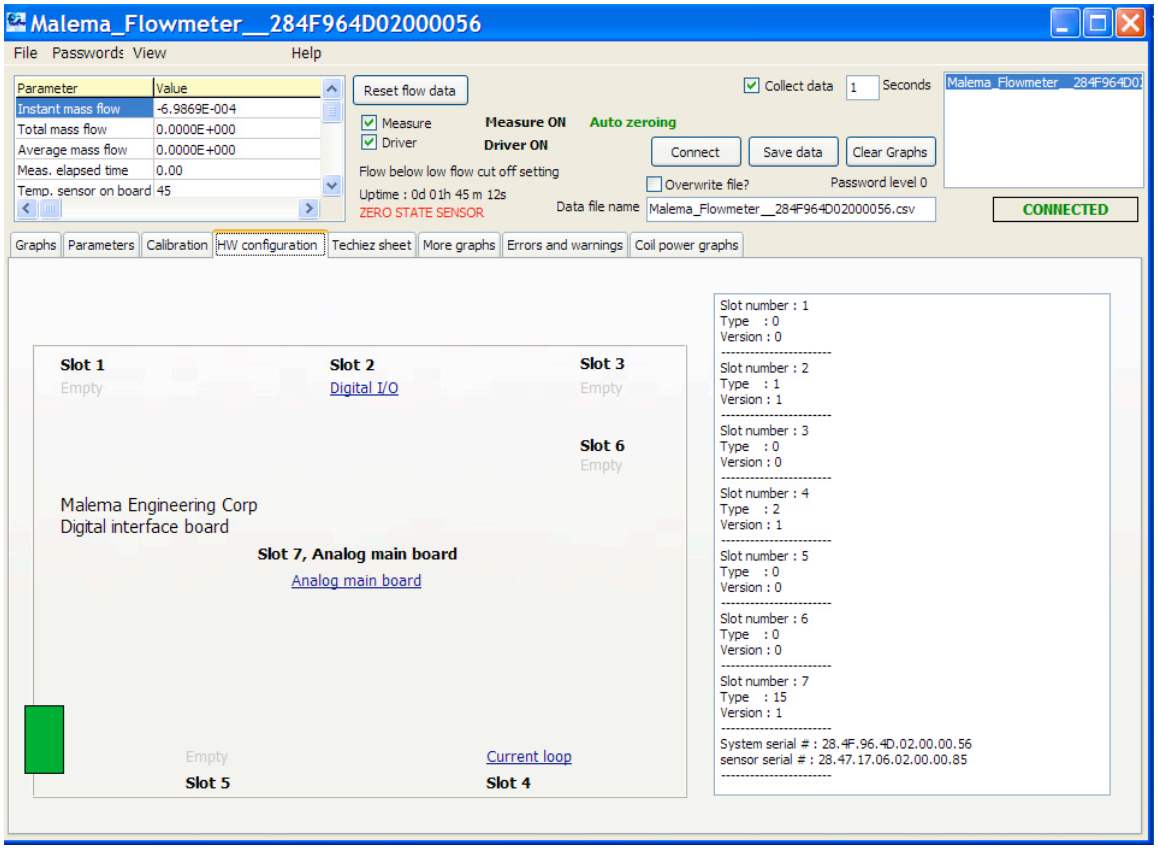


11.1.12 Calibration Table

This is labeled with the headings Cal table/"Raw" flow rate/Cal. Factor.
The % column is the percentage of full flow, as defined for the actual sensor type.
"Raw" flow rate refers to the read flow rate that needs to be adjusted with the calibration factor.

11.2 HW Configuration

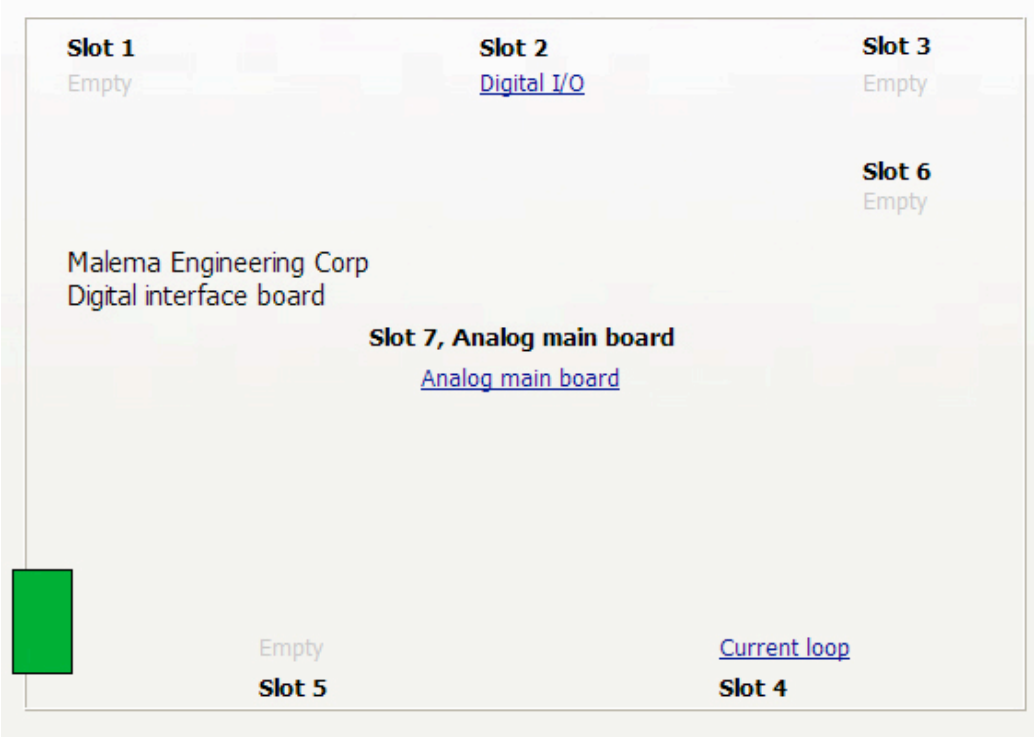
This section is for configuring various aspects of the analog main board associated with a sensor.



11.2.1 Left Window

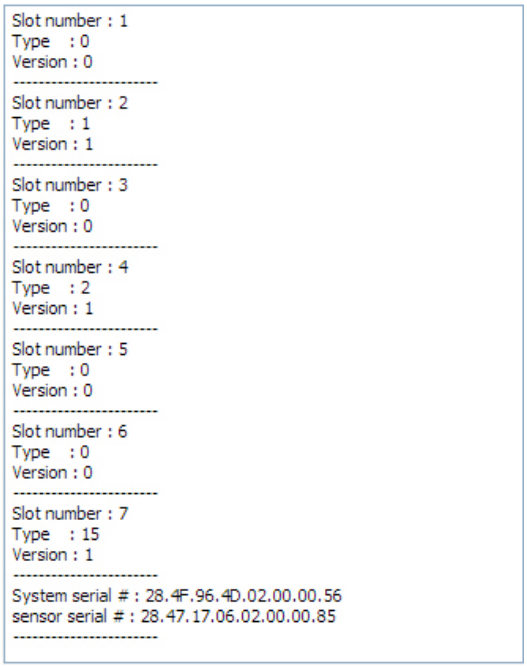
This shows information about the analog main board that is between the sensor and the computer. It drives the left and right signals for the sensor. Up to five slots can be used on the board, and in most cases locations used by plugged-in modules are interchangeable.

Note: Slot 1 is permanently empty. Various optional modules are available from Malema. In addition, Slot 6 can accommodate a display. Digital I/O boards, analog boards, etc., can be placed in any slot; there are not location restrictions.



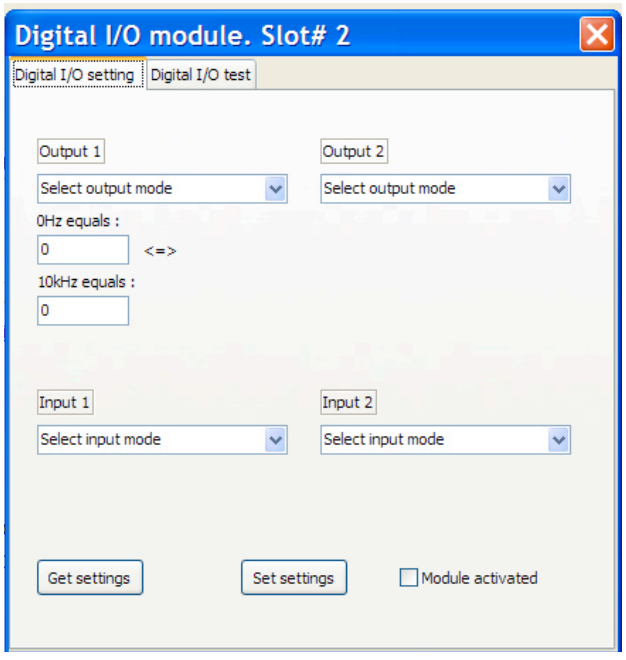
11.2.2 Right Window

This window gives you more detailed reference information about each board located in a slot on the main analog board. It also tells you the system's serial number and sensor's serial number.



11.2.3 Viewing Details

Click on any highlighted text attached to any slot for details and parameters that you can view and set. For example, clicking on Slot 2 brings up this window:



This window is actually two windows, organized and accessed by two tabs, labeled "Digital I/O setting" and "Digital I/O test." The Digital I/O board has two inputs and two outputs.

11.2.4 Digital I/O Setting

Output 1 and Output 2 offer three options, selected via the pulldown menus:

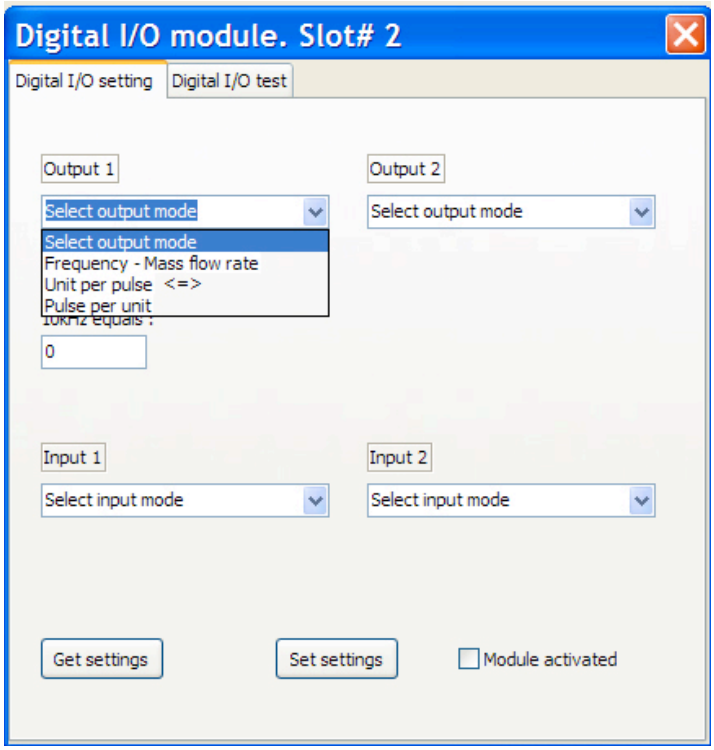
- Frequency – Mass flow rate
- Unit per pulse
- Pulse per unit

Directly below Output 1's selector are two boxes for setting frequency scaling. They are labeled "0 Hz equals" and "10kHz equals."

Input 1 and Input 2 offer the same options, selected via the pull-down menus:

- Reset flow counters – active low
- Reset flow counters – active high
- Start/stop measurement – active low
- Start/stop measurement – active hi

Along the bottom of the dialog box are two buttons, "Get settings" and "Set settings," plus a checkbox labeled "Module activated."

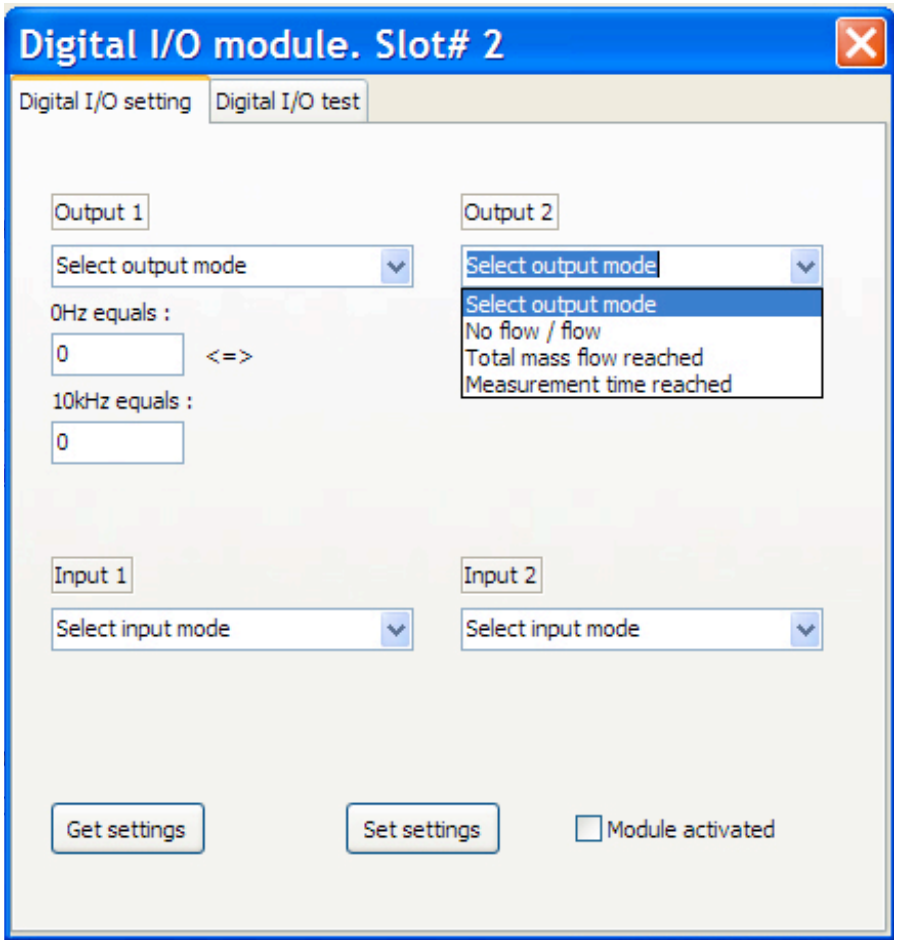


Output 1 offers three options, selected via the pull-down menu:

- Frequency – Mass flow rate
- Unit per pulse
- Pulse per unit

Output 2 has three different options:

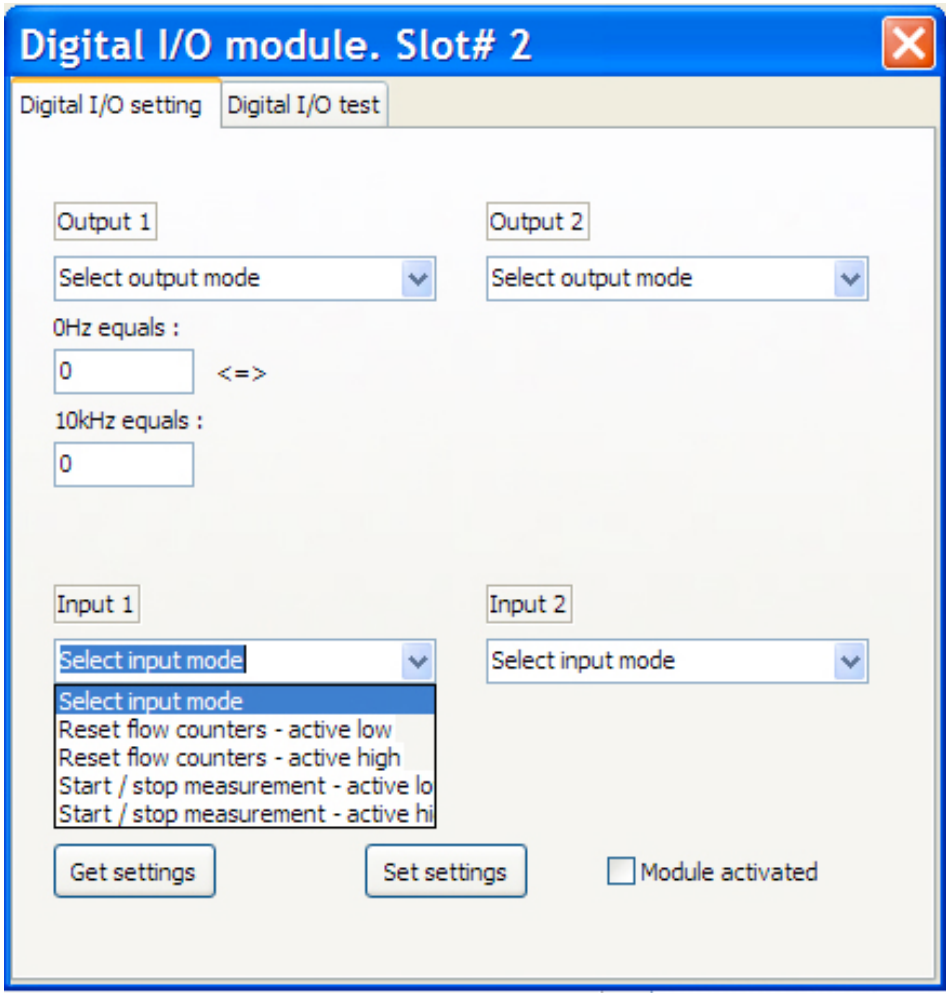
- No flow/flow (measures no-flow or flow above cutoff)
- Total mass flow reached (can send output when threshold is reached)
- Measurement time reached (can send output when measurement time is reached)



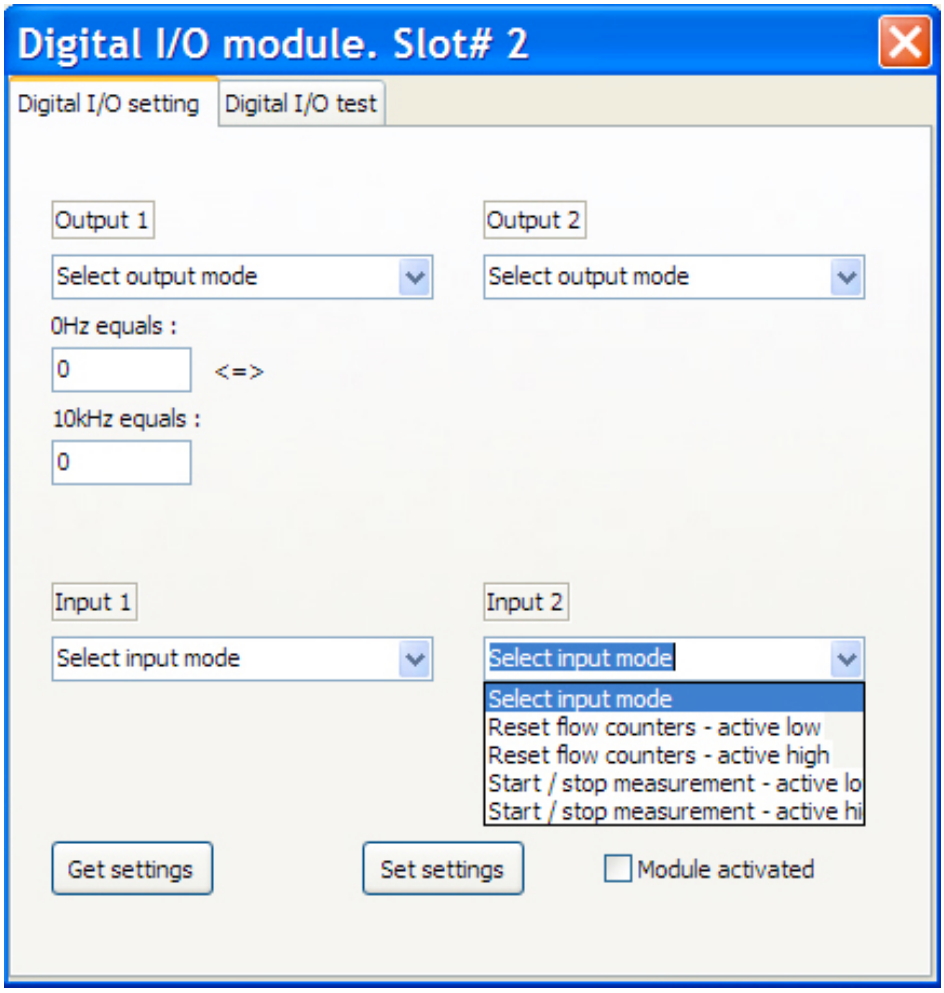
Input 1 and Input 2 offer identical options, selected via the pull-down menus:

Reset flow counters – active low
Reset flow counters – active high
Start/stop measurement – active low
Start/stop measurement – active hi

Input 1:



Input 2:



11.2.5 Get settings

Click this button to get current settings from the module for display.

11.2.6 Set settings

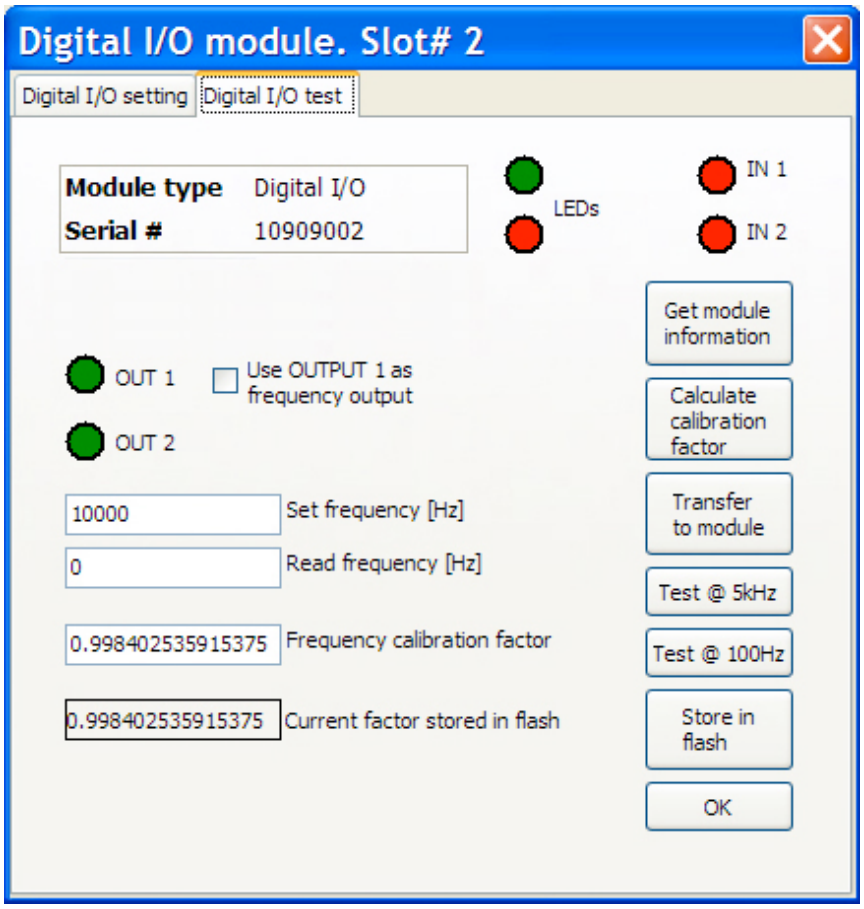
This commits any changes you make to the module's settings to the module.

11.2.7 Module activated

Click this checkbox to activate the module. When the checkbox is not clicked, the module is not active. Note: If you have made changes, click "Set settings" before you check the box labeled "Module activated."

11.2.8 Digital I/O Test

The main purpose of Digital I/O Test is for factory calibration and recalibration by systems administrators.



11.2.9 Module type

This tells what type of module is being represented by this configuration window.

11.2.10 Serial

This is the module's unique serial number.

11.2.11 LEDs

The LEDs represent the LEDs on the physical module.

11.2.12 IN 1 (LED)

Indicates a signal is being received from input 1.

11.2.13 IN 2 (LED)

Indicates a signal is being received from input 2.

11.2.14 OUT 1

Output 1 can be used as a simple digital port or as a frequency output. So, for example, when a threshold of a certain amount of fluid is measured, it can give an output for process control (starting or stopping a process, opening or closing a valve, etc.).

11.2.15 OUT 2

Output 2 can also be used as a simple digital port for controlling processes, etc.

11.2.16 Use OUTPUT 1 as frequency output

Check this box to change Output 1 from a digital (fixed-frequency) output to a frequency output that is proportional to input data.

11.2.17 Set frequency (Hz)

Input an operational frequency here.

11.2.18 Read frequency (Hz)

Input a reading from a frequency counter here. See next section for details.

11.2.19 Frequency calibration factor

This is the frequency calibration factor that is produced as a result of computation by the software after you input a set frequency and read frequency. See next section for details.

11.2.20 Current factor stored in flash

This displays the current Frequency calibration factor stored in flash memory.

11.2.21 Get module information

Clicking this button collects the module's current information and displays it in this dialog box.

11.2.22 Calculate calibration factor

Click this button after inputting a Set frequency value and a read frequency value (derived from a frequency counter; see next section).

11.2.23 Transfer to module

Clicking this button transfers the selected settings to the module. **Caution!** This overwrites any previous settings for the module.

11.2.24 Test @ 5kHz

A frequency output of 5kHz is produced when you click this button.

11.2.25 Test @ 100 Hz

A frequency output of 100 Hz is produced when you click this button.

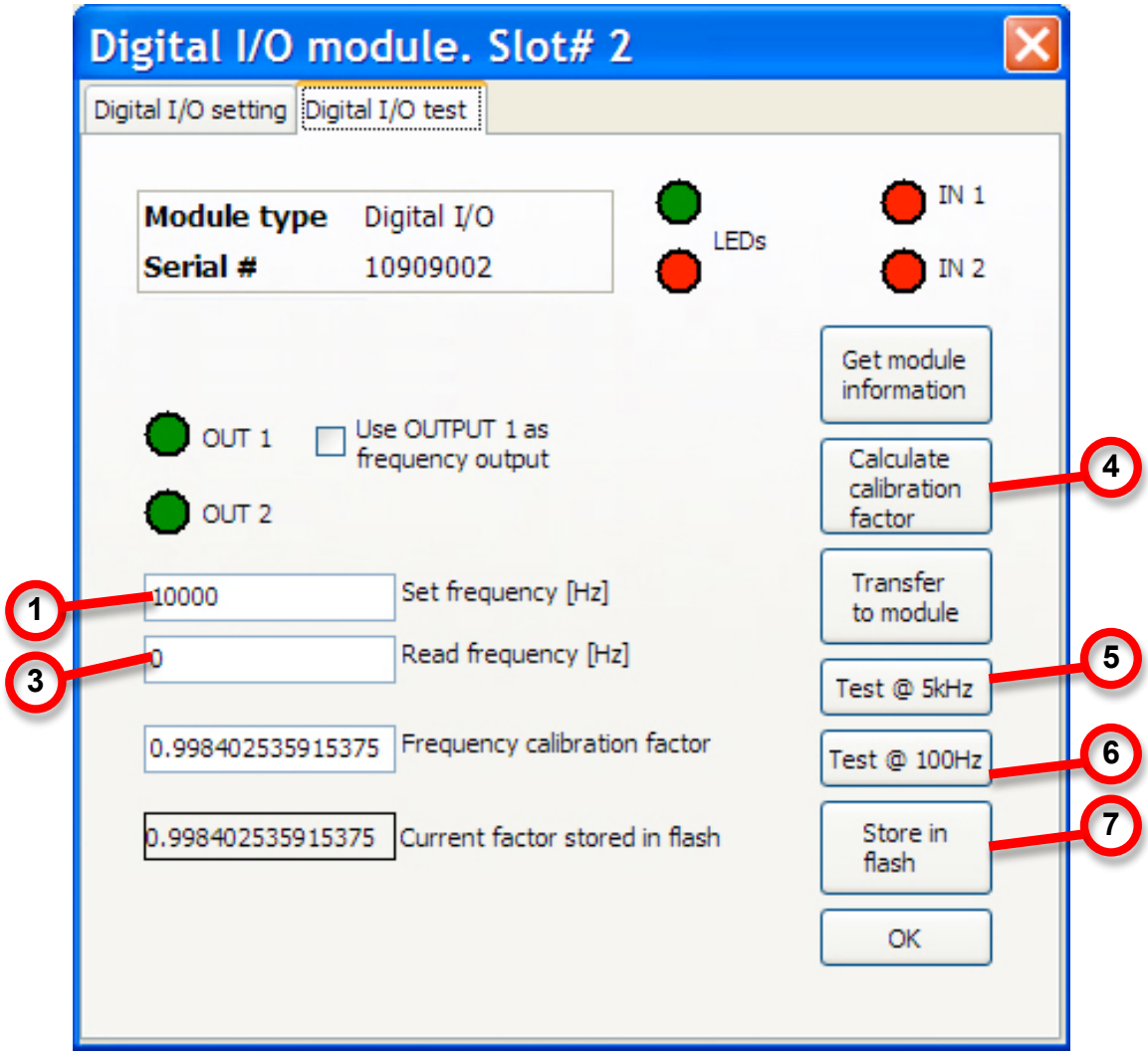
11.2.26 Store in flash

This stores your selected settings to flash memory.

11.2.27 OK

Clicking OK closes this dialog box.

11.3 Performing A Test On The Digital I/O Module



The Digital I/O module is designed for performing diagnoses and tests.

Connect a frequency counter to the output and set it to a range close to the desired frequency.

1. Input the desired reference frequency.
2. Read the frequency at your frequency counter.
3. Input that frequency.
4. Click Calculate Calibration Factor.
5. Click Test @ 5kHz.
6. Click Test @ 100Hz.
7. If you are satisfied with the results, click Store In Flash.
8. When you are done, click OK.

11.4 Analog Main Board

Slot 7 in this case is an analog board. It allows for control of frequency and amplitude of the sensor in three different ways.

Note: Typically, it is not necessary to make any changes to the analog board.

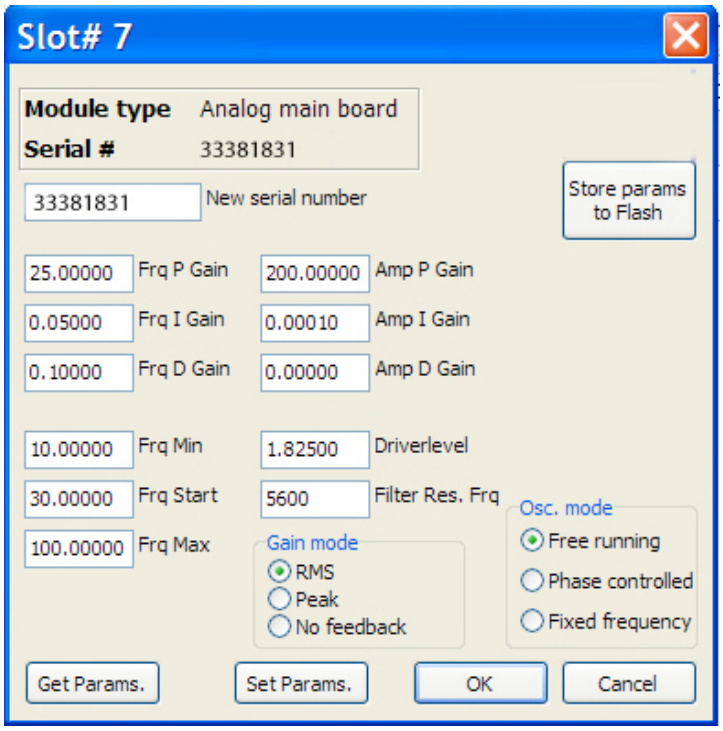
The sensor drive circuit can be controlled in several ways. For example, a free- "tuning fork" oscillator, an active phase-controlled mode, (where the sine wave is generated internally in the u-controller),and a fixed-frequency mode.

In the phase-controlled mode, the u-controller needs to know a starting frequency and a minimum and a maximum frequency at which the sensor type is allowed to vibrate. The u-controller "hunts" for the right frequency in a standard PID loop, with gain settings from the Frq gain block.

The Amp gain block refers to the amplitude of the vibration, and is controlled by the Driverlevel and the PID loop.

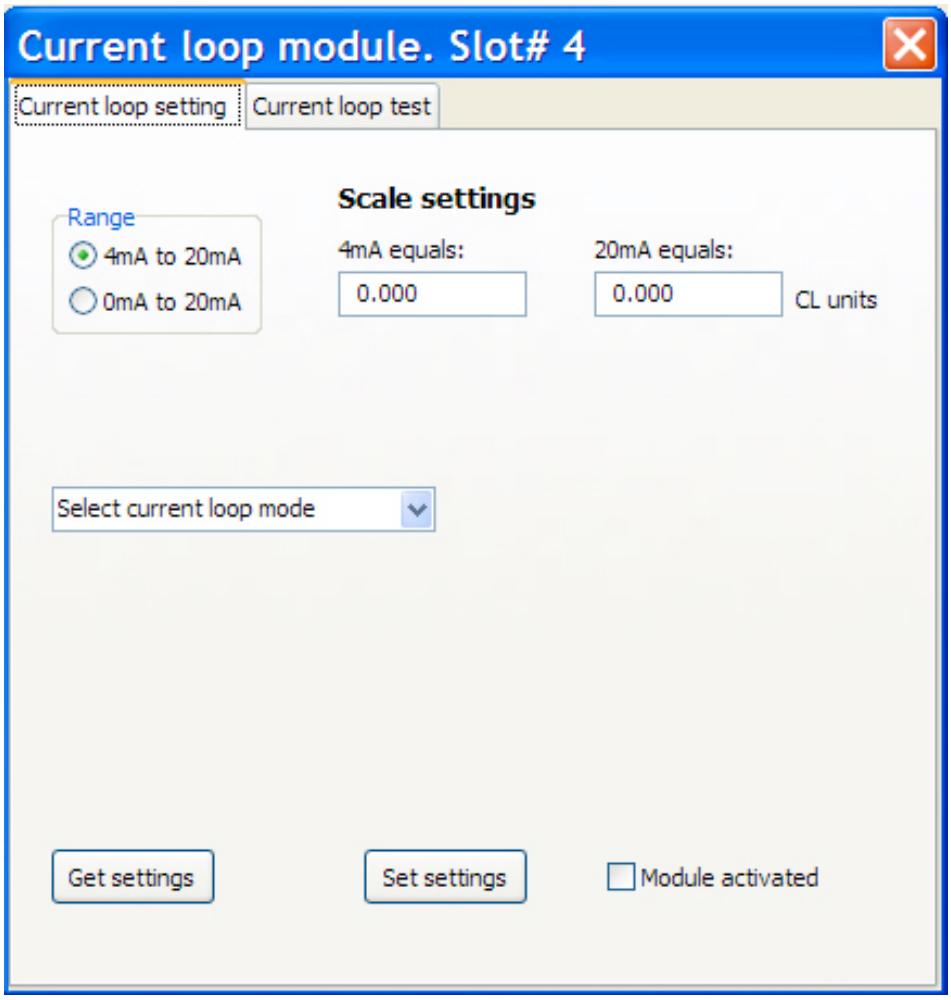
The filter Res. Frq (filter resonant frequency) controls a digital filter.

Gain mode refers to either closed loop (RMS or Peak) or openloop (no feedback).



11.5 Current Loop

A current loop module allows connection with process automation and warning equipment that operates with standard 4-20mA current. This dialog box includes what you need to set equivalent units for the 4mA and 20mA values, set the current loop mode, and activate/deactivate the module.



There are two tabs: "Current loop setting" and "Current loop test."

11.5.1 Current loop setting

This is where you select the range and equivalent values for the current loop, which can be used for connection with external process automation or alarm systems.

11.5.2 Range

This sets the current range for the output. Select either 4ma to 20mA or 0mA to 20mA by clicking on the appropriate button.

11.5.3 Scale settings

These two values for 4mA and 20mA correspond to the minimum and maximum flow, expressed in CL units (current loop units), which are the minimum and maximum flow values. These can be grams or other units.

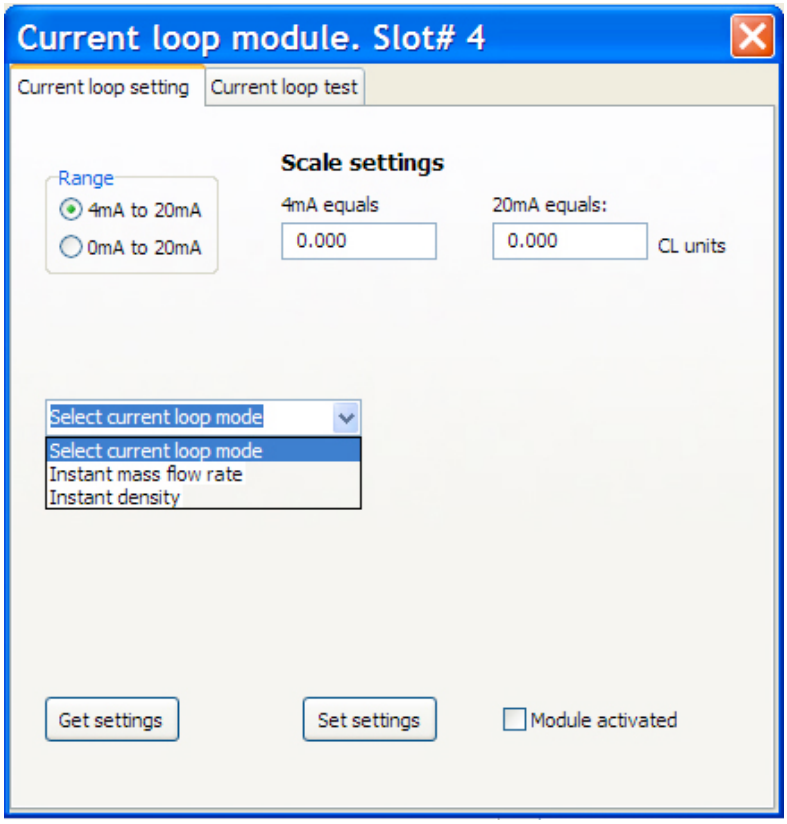
In the box labeled "4mA equals," input a minimum flow value.

In the box labeled "20mA equals," input a maximum flow value.

Note: Do not set a value for the 4mA point that is higher than the 20mA point. Likewise, do not set a 20mA value that is lower than the 4mA value.

11.5.4 Select current loop mode

This pull-down menu is for selecting either mass flow rate or density for the current loop mode.



Use the pull-down menu to select "Instant mass flow rate" or "Instant density."

11.5.5 Get settings

Click this button to get the current (active) settings from the module.

11.5.6 Set settings

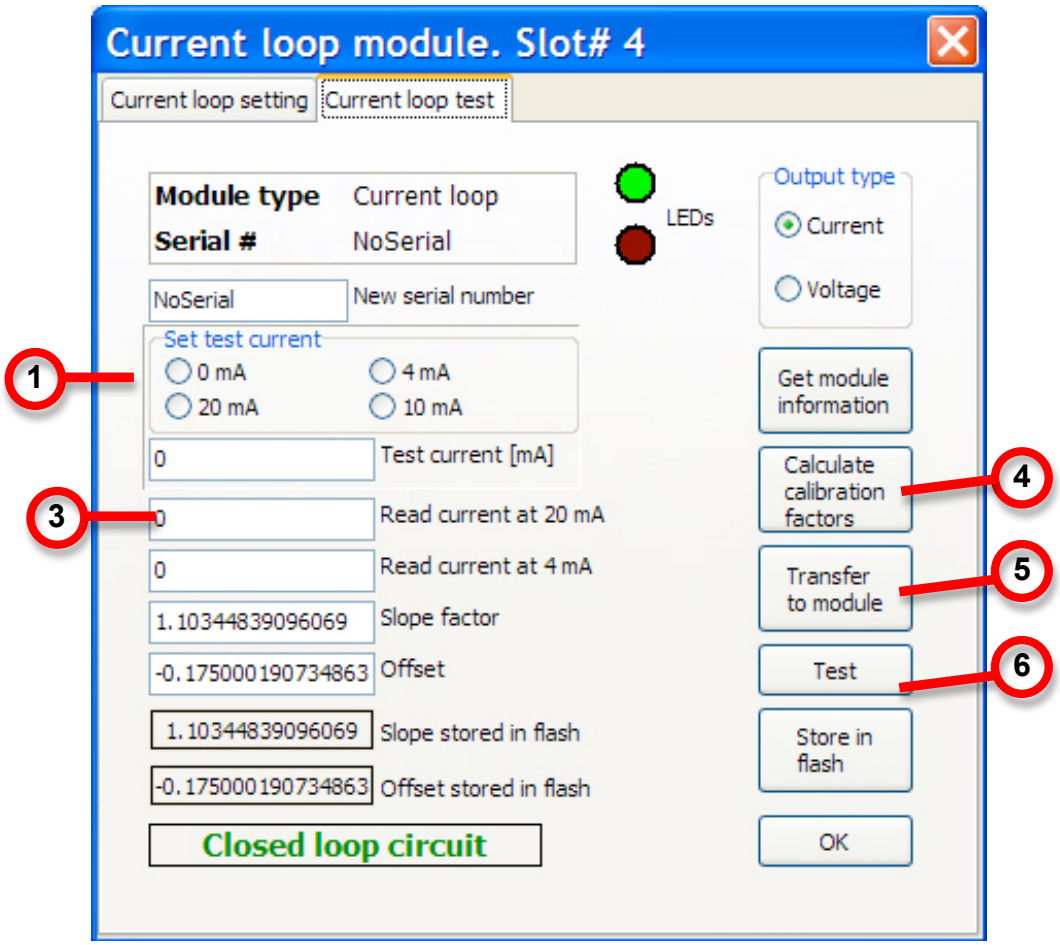
Click this button to send the settings shown on the screen to the module and use them.

11.5.7 Module activated

Click this to activate the module.

11.6 Current loop test – Current Selected As Output

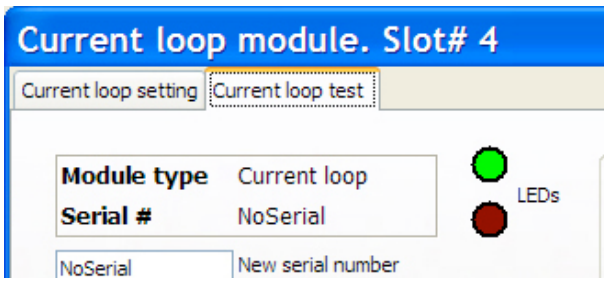
The Current loop module must be calibrated. You can test the current output from the current loop using an ammeter.



Connect an ammeter to the output and set it to read milliamps. Also click the Output Type option for "Current."

1. Set the Test current value to either 4mA or 20mA. The selected value is then automatically shown in the "Test current [mA]" field.
2. Read the ammeter's measurement.
3. Input that value into the "Read current at 20mA" or "Read current at 4mA" field (depending on the value you selected before).
4. Click Calculate Calibration Factors. It automatically calculates the values for the Slope factor and Offset.
5. You can transfer this calibration factor data to the module by clicking "Transfer to module."
6. Click Test.

7. If you are satisfied with the results, click Store In Flash.
8. When you are done, click OK.



11.6.1 Module type

The type of module (current loop, digital, etc.)

11.6.2 Serial

If the module has a serial number, it is displayed (this example is for a prototype, so there is no serial number).

11.6.3 LEDs

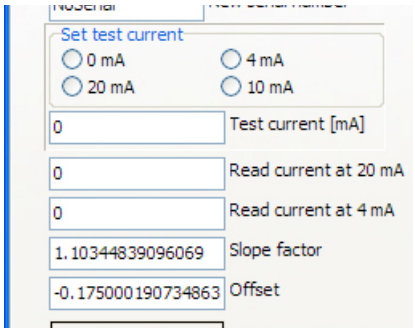
The LEDs shown here are representations of the LEDs on the Current loop module. When an LED glows on the module, it is shown in bright red or green (depending on its state) here.

11.6.4 Set test current

This sets the value for the test current when you run a test to determine the slope factor, offset, etc.

Select one of the following:

- 0mA
- 4mA
- 20mA
- 10mA



11.6.5 Test current (mA)

With an ammeter attached to the output of the module, check the reading and input the value here.

11.6.6 Read current at 20mA

With an ammeter attached to the output of the module, check the reading after 20mA is selected and input the value here.

11.6.7 Read current at 4mA

With an ammeter attached to the output of the module, check the reading after 4mA is selected and input the value here.

11.6.8 Slope factor

When you click Get Module Information or Calculate Calibration Factors, this slope value is provided.

11.6.9 Offset

When you click Get Module Information or Calculate Calibration Factors, this offset value is provided.

11.6.10 Slope stored in flash

This is the slope value that is currently stored in the flash memory.

11.6.11 Offset stored in flash

This is the offset value currently stored in the flash memory.

11.6.12 Closed loop circuit

When a closed-loop circuit is established, the words "Closed loop circuit" appear in large green letters to indicate the connection. If there is no such connection, then the box remains blank.

11.6.13 Output type

The output can be set so that to accommodate the needs of connected equipment (some require data via voltage, while others require it via current changes). Click one of the two buttons to make your selection:

- Current
- Voltage

11.6.14 Get module information

Click this to get the module's information and populate this window.

11.6.15 Calculate calibration factors

After testing and providing settings, click this to calculate calibration factors. See page 65 for details.

11.6.16 Transfer to module

Click this to transfer the currently viewed data to the module.

11.6.17 Test

Click this to test the module with the current settings.

11.6.18 Store in flash

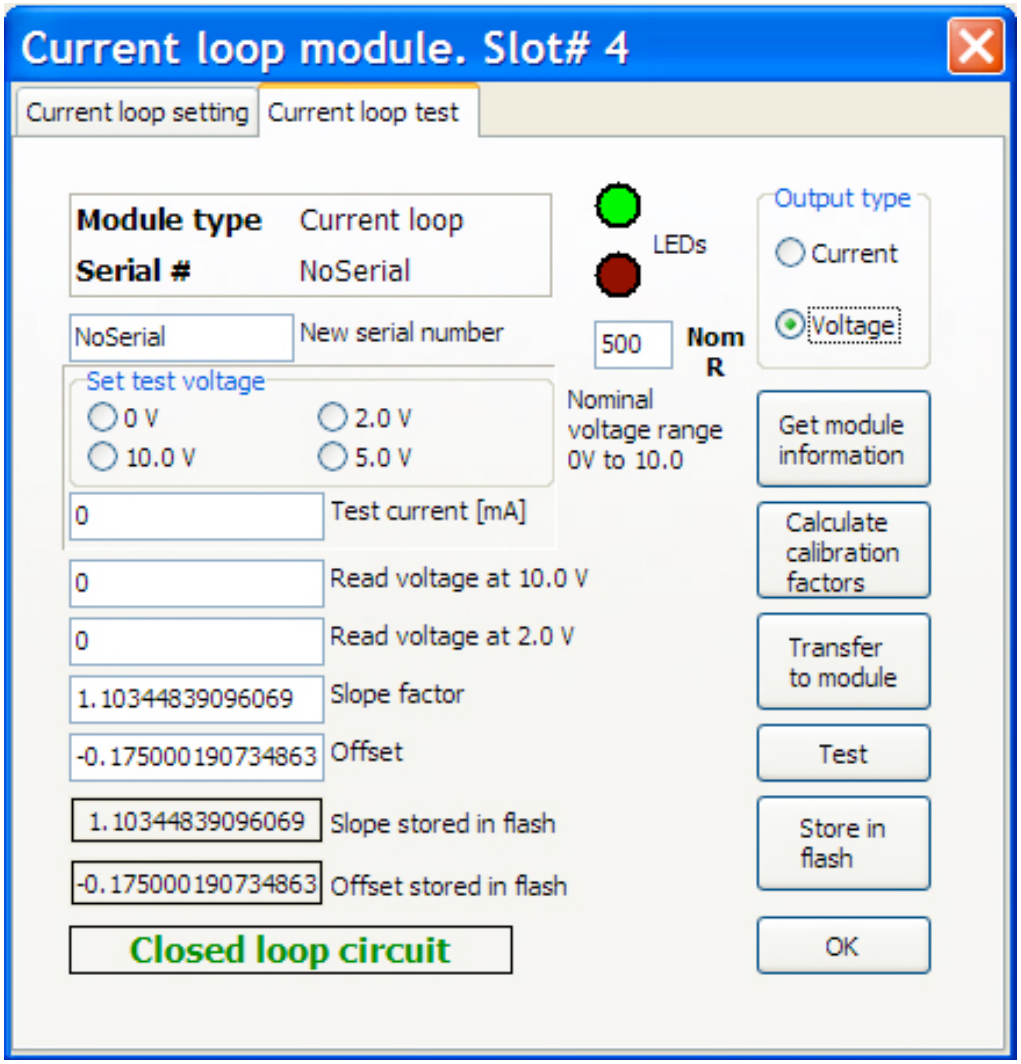
Click to store the module's parameter data in the flash memory.

11.6.19 OK

Click "OK" to exit, closing the Current loop module's setup page.

11.7 Current loop test – Voltage Selected As Output Type

When the Current loop test is set with an output type "Voltage," different options are available than when "Current" is selected:



11.7.1 Module type

The type of module (current loop, digital, etc.)

11.7.2 Serial

If the module has a serial number, it is displayed (this example is for a prototype, so there is no serial number).

11.7.3 LEDs

The LEDs shown here are representations of the LEDs on the Current loop module. When an LED glows on the module, it is shown in bright red or green (depending on its state) here.

11.7.4 New serial number

You can input up to 8 digits to create a new serial number.

11.7.5 Nom R

If the desired output is a voltage instead of a current, a resistor must be inserted between the current loop's output terminals.

Note: The maximum resistor value should not exceed 500 ohms.

11.7.6 Set test voltage

Use a voltmeter to read the voltage across the resistor and

Select one of the following:

- 0 V
- 2.0 V
- 10 V
- 5.0 V

11.7.7 Test current (mA)

Shows the necessary current to generate the desired voltage.

11.7.8 Read voltage at 10.0 V

Note the reading on the voltmeter, and enter the value here.

11.7.9 Read voltage at 2.0 V

Note the reading on the voltmeter, and enter the value here.

11.7.10 Calculate calibration factors

After testing and providing settings, click this to calculate calibration factors. See page 65 for detail

11.7.11 Slope factor

When you click Calculate Calibration Factors, this slope value is calculated, as well as the offset.
The next step is to transfer the calculated value to the system by clicking "Transfer to module"

11.7.12 Offset

When you click Get Module Information or Calculate Calibration Factors, this offset value is provided.

11.7.13 Slope stored in flash

This is the slope value that is currently stored in the flash memory.

11.7.14 Offset stored in flash

This is the offset value currently stored in the flash memory.

11.7.15 Closed loop circuit

When a closed-loop circuit is established, the words "Closed loop circuit" appear in large green letters to indicate the connection. If there is no such connection, then the box remains blank.

11.7.16 Output type

The output can be set so that to accommodate the needs of connected equipment (some require data via voltage, while others require it via current changes). Click one of the two buttons to make your selection:

- Current
- Voltage

11.7.17 Get module information

Click this to get the module's information and populate this window.

11.7.18 Transfer to module

Click this to transfer the currently viewed data to the module.

11.7.19 Test

Click this to test the module with the current settings.

11.7.20 Store in flash

Click to store the module's parameter data in the flash memory.

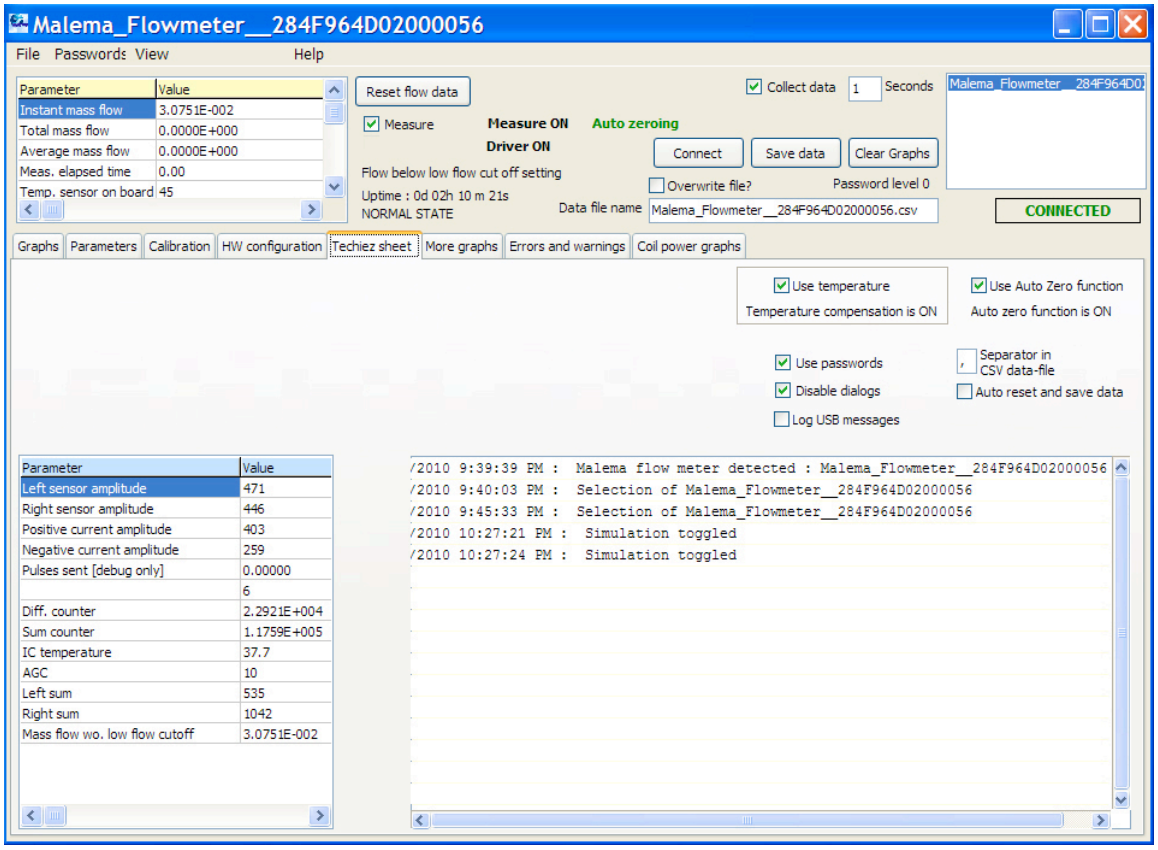
11.7.21 OK

Click "OK" to exit, closing the Current loop module's setup page.

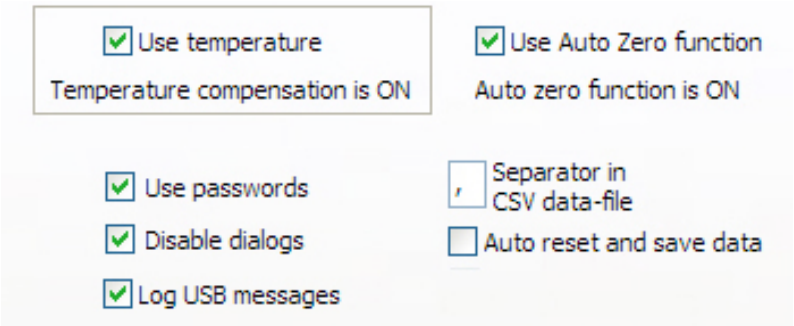
11.8 Techiez Sheet

The Techiez Sheet is a combination control center for an administrator and a good place to get troubleshooting data. The top portion of the window has check boxes that set various parameters and toggle functionality, while the bottom panes provide readouts of data from the sensor.

Important! Use caution when making changes here.



The settings that you can control are in one section:

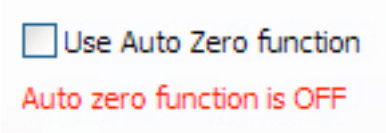


11.8.1 Use temperature

Click "Use temperature" to include temperature compensation.

11.8.2 Use Auto Zero function

Click "Use Auto Zero function" to activate the auto-zeroing function that looks for the low point between flow upswings and sets a new zero point each time it occurs.



11.8.3 Use passwords

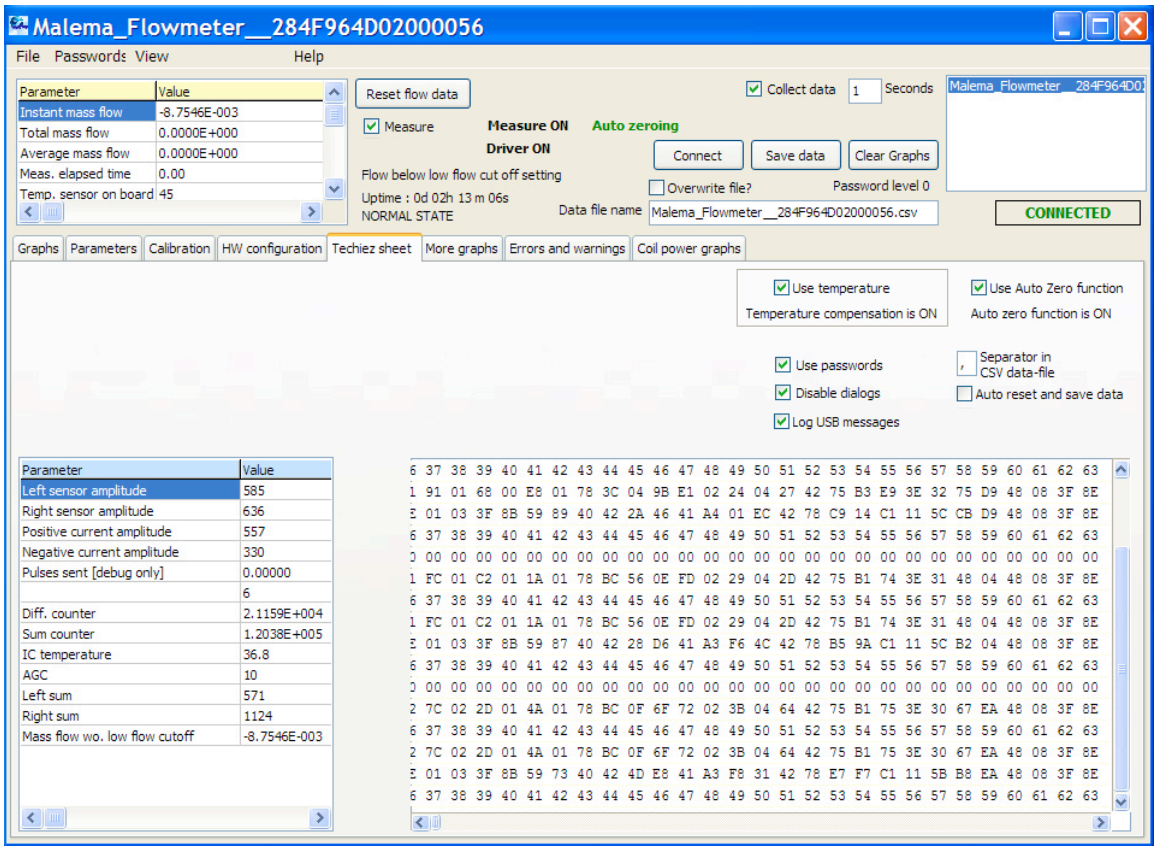
Click this to ensure that password protection is in place. If you do not need password protection, leave this unclicked.

11.8.4 Disable dialogs

Dialogs, also known as "dialog boxes" or "pop-up boxes," are alerts or prompts that act as gatekeepers or confirmation points when you perform an action. A typical one says, "Are you sure you want to exit?" As its name implies, dialog boxes are disabled when you click this. If you perform a lot of parameter changes and exits, then disabling the dialog boxes can save you time.

11.8.5 Log USB messages

When this is clicked, USB traffic is monitored and messages are recorded. All transactions that occur via the USB port are captured. The lower right pane in this image shows how the data appears in raw form on the screen.



11.8.6 Separator in CSV data-file

You may choose a comma, tab, or period (or any other symbol supported by your spreadsheet or word-processing file) to separate data from column to column.

11.8.7 Auto reset and save data

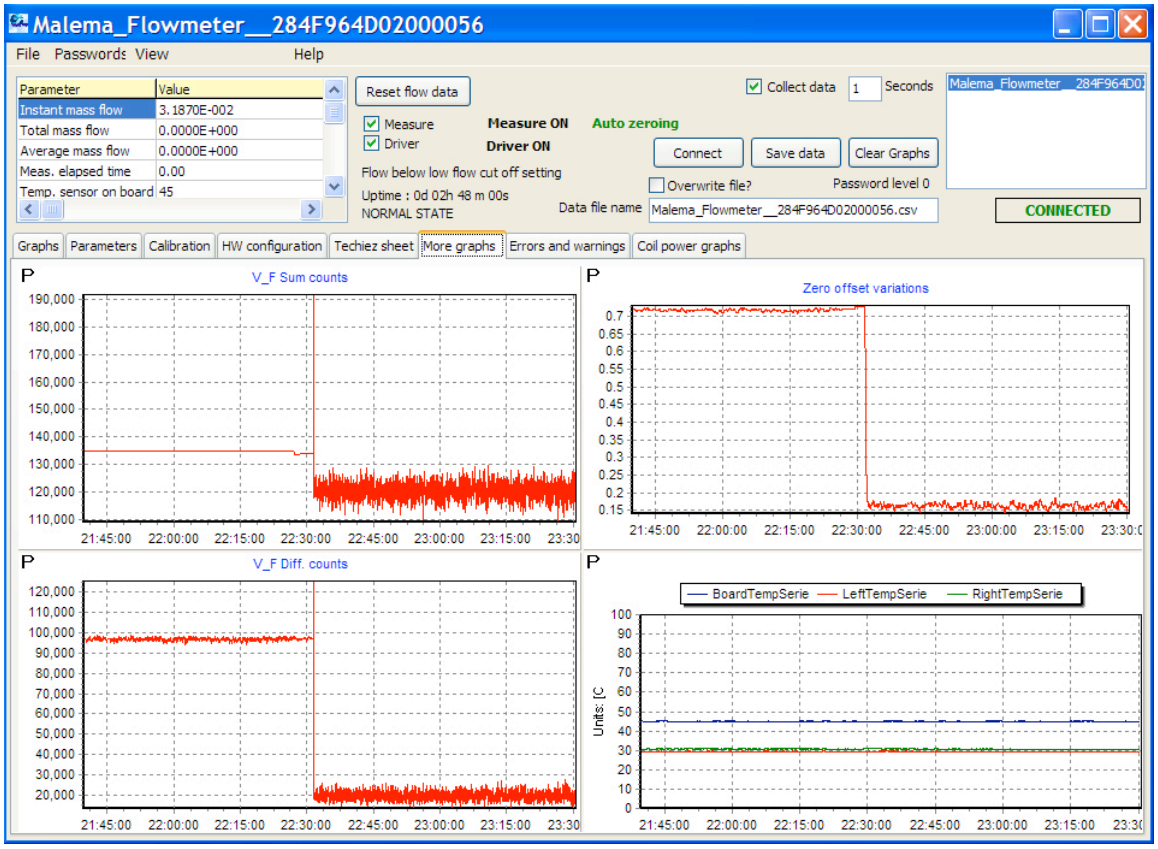
Click this to activate an automatic resetting of data capture and storing of each event in its own file. When the flow rate exceeds the low-flow cutoff point, a new file is generated and stays open until the flow rate drops below that low-flow condition again. This is useful if you are frequently starting and stopping flow measurement and want to collect data. When this is active, you do not need to manually create new files for each start.

Note: This file is saved separately from the normal data files and contains a limited set of data specific to temperature and frequency conditions at the sensor. The format is comma-separated value (CSV).

11.9 More Graphs

The graphs on this screen are primarily for diagnostic use when troubleshooting, providing fast insight into the overall "health" of the system.

Note: Each graph can be printed separately by clicking the "P" in the upper left corner of the graph.



11.9.1 V_F Sum Counts

This graph contains data that is used in conjunction with the data included in V_F Diff Counts to monitor the frequency of the sensor.

11.9.2 Zero offset variations

Shows the zero offset variation when Auto Zero is activated

11.9.3 V_F Diff Counts

This graph contains data that is used in conjunction with the data included in V_F Sum Counts to monitor the frequency of the sensor.

11.9.4 Temperature Data

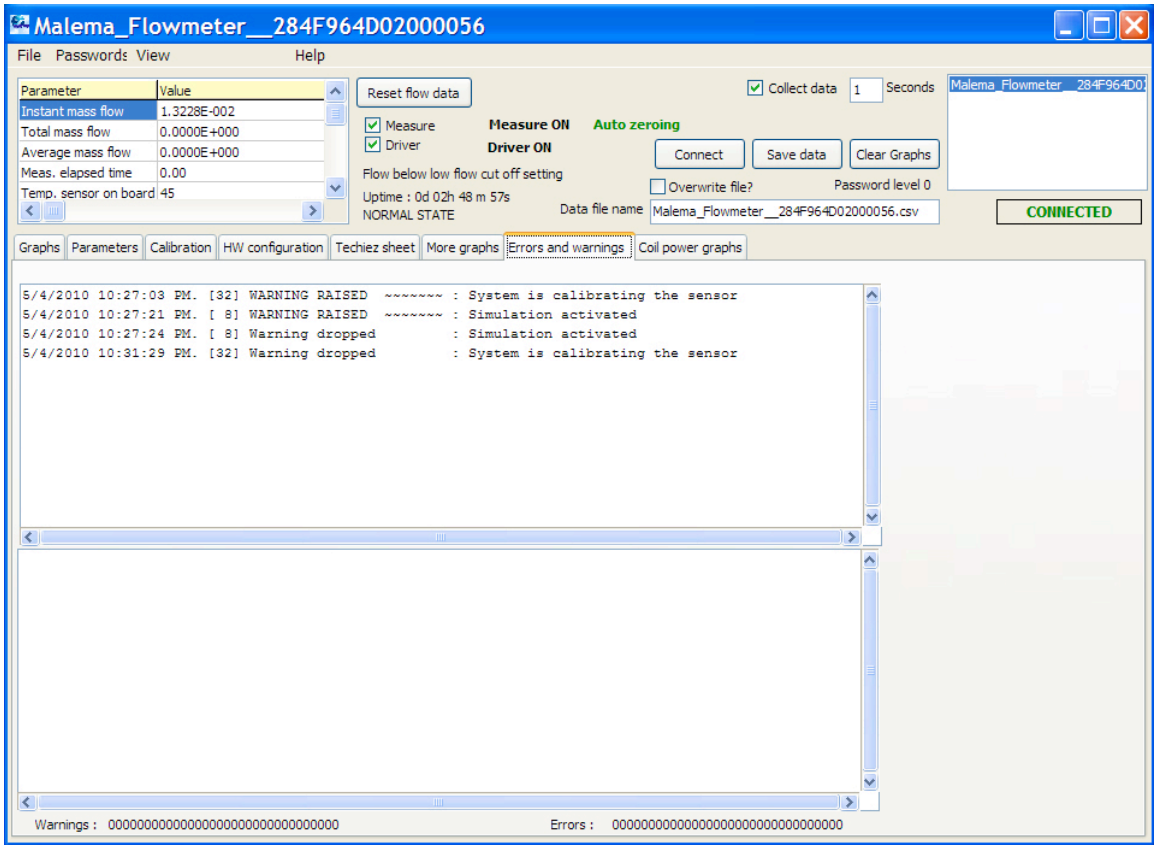
Temperature data from the PC board, as well as the left and right transducers is overlaid on this graph, and temperature scale is indicated along the Y axis in your user-configured temperature units.

11.10 Errors And Warnings

This window is another diagnostic tool, keeping track of errors that are detected in the system. When a session is active, the data collects, but with each new session, the panes are emptied. Therefore, the data represented is only from the current session.

Note: The messages and errors are saved in session-specific files, along with other CPFM 8800 files. In addition, text in either pane can be copied and pasted into documents if further review is necessary.

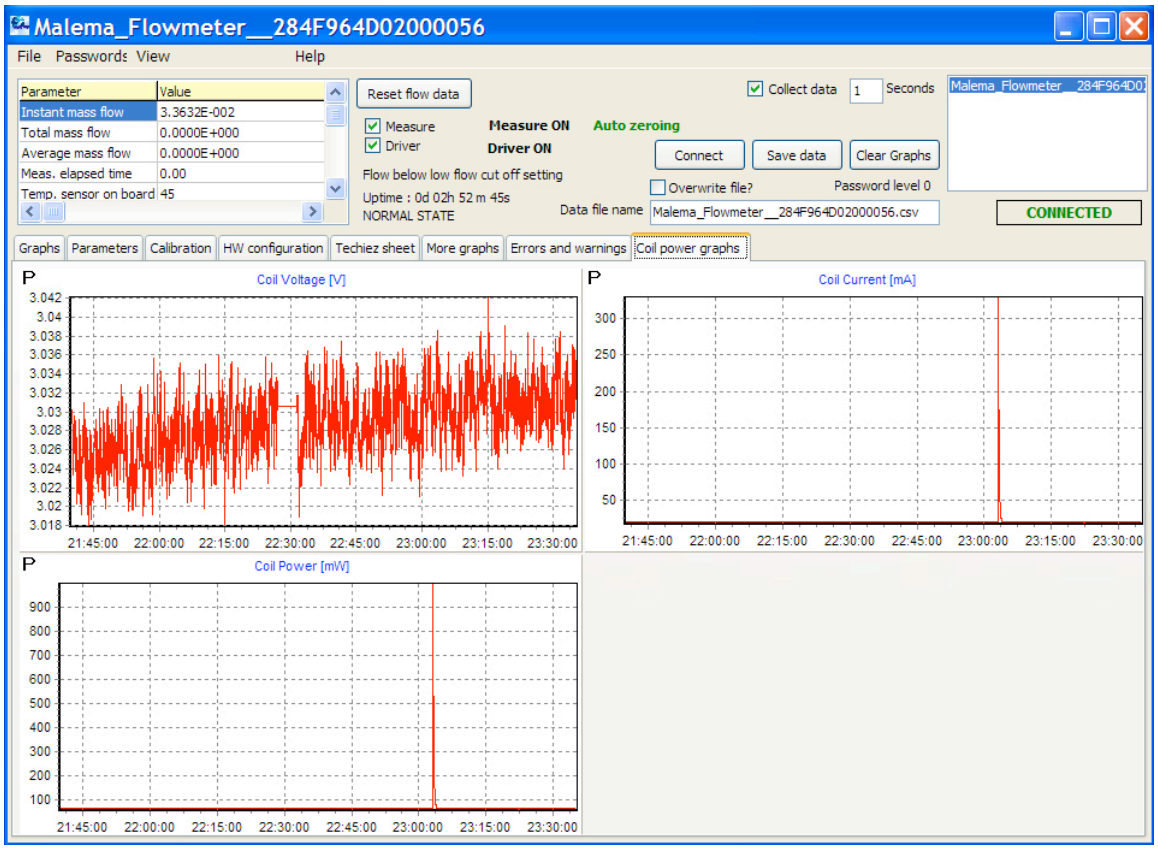
The top pane is for warnings, while the bottom pane is for error messages.



11.11 Power Coil Graphs

These graphs monitor coil voltage, coil current (milliamps), and coil power (milliwatts) for the transducers in the sensor. Data comes from the analog module through the digital board and then into the computer.

Note: You can print any graph on the screen by clicking "P" next to its upper left corner.



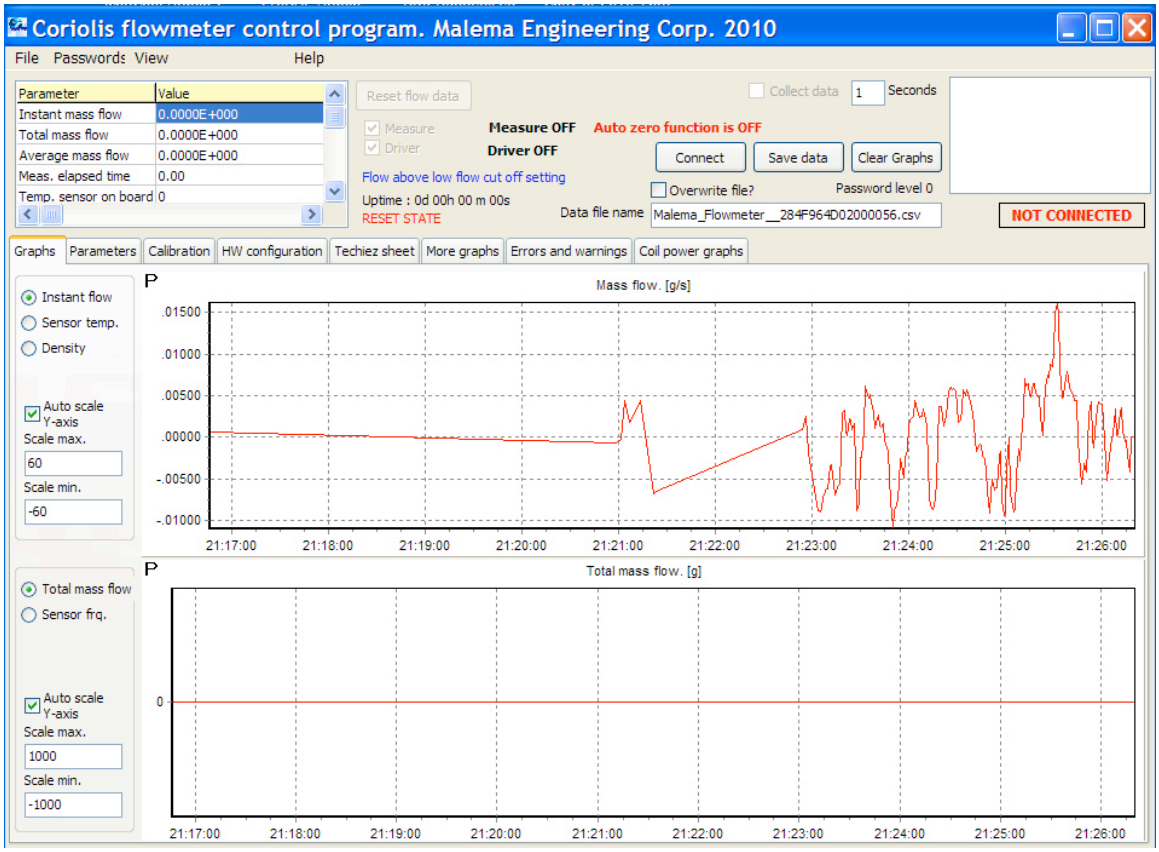
12 Troubleshooting

When power to the flow meter is disrupted, the system goes offline. Several indicators tell you this. Here are some examples of what the screen tells you:

- Measure OFF
- Driver OFF
- RESET STATE
- Uptime: 0d 00h 00 m 33s
- NOT CONNECTED

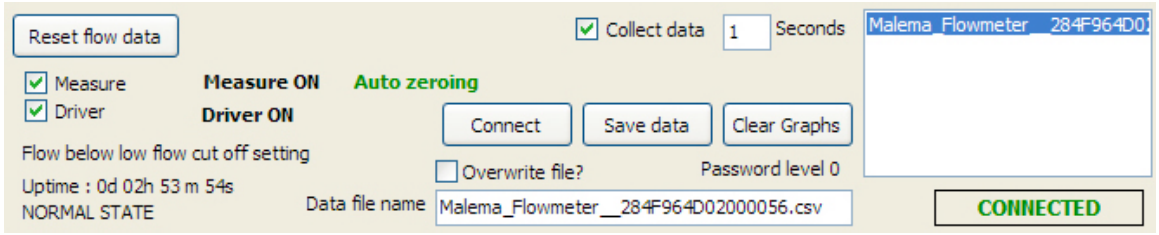
Notice that the window where the name and serial number of the flow meter is blank, indicating not just a failure, but a total disconnection.

Another indication of a problem is if the graphs either are flat or very erratic, compared to your standard baselines. In addition, check for messages in red type that alert you to specific problems or changes of status.



Check all connections, including power to the flow meter and all cabling from the flow meter and the computer. Restart the program and reinitiate data collection.

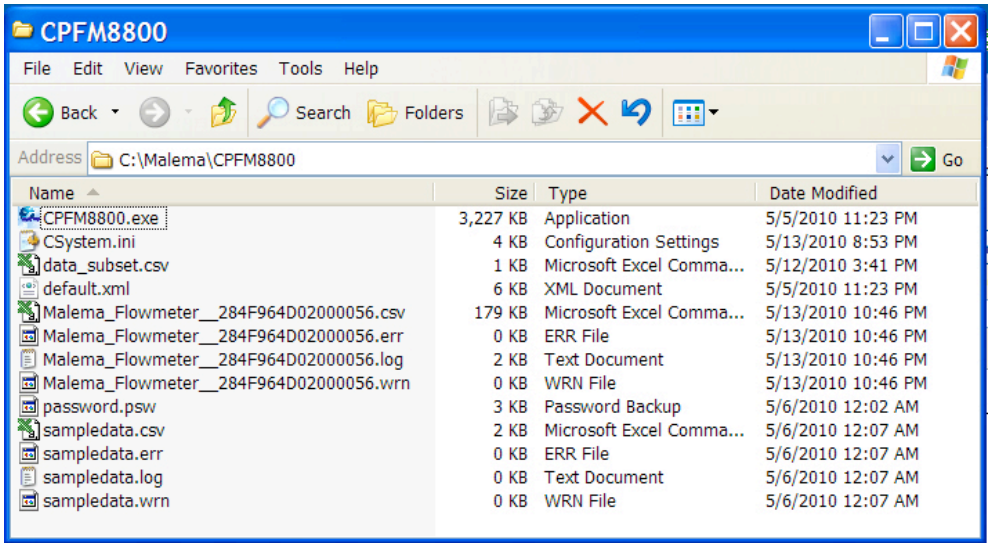
Once measurement starts, several indicators tell you that the system is running. The name of the flow meter should be in the pane on the far right, and the word "Connected" should be clearly visible.



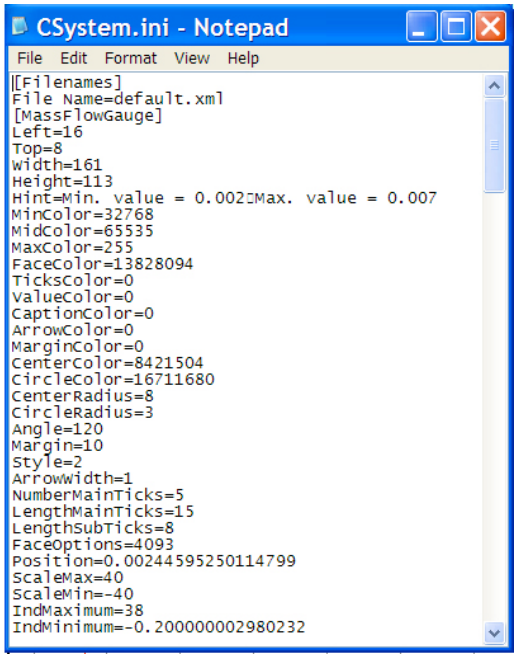
Important!
If negative flow readings are shown, it means that the fluid inlet and outlet are reversed. Stop the system and correct the connections before starting measurement again.

13 Backing Up Parameter Data

In the event of a hard drive crash in your computer, or in case a flow meter requires replacement, it is a good idea to copy all of your data to another hard drive or other storage. The easiest approach is to copy the entire folder containing the various files (by default labeled CPFM8800). If necessary, these files can be used later.



The file labeled "Csystem.ini" can be opened in a text processor such as Notepad and read directly or printed. It contains a great deal about the look and feel of the program and its settings.



The log file (".log"), can be read in a text processor, as well. Files with a .csv extension (for "comma-separated value) are intended for reading in spreadsheet programs that parse the data into columns (Microsoft Excel, for example).

Note: For security reasons, the password file (extension: ".psw") cannot be read directly. It is encrypted and can only be used in the program, but none of its data is "human-readable."

14 Reinstalling Software

If the software ever needs reinstallation, or if a newer version is available for installation, you do not have to delete the earlier version. However, it is a good idea to copy all of the files from the current installation into a backup on another drive before performing a new installation.

Refer to instructions on page 12 for complete installation details.

15 Warranty

Malema Sensors warrants to the buyer that its products are free from defects in materials and workmanship at the time of shipment and during the warranty period. Malema Sensors obligation under this warranty is limited to the replacement of the product(s) by same product(s) manufactured by Malema Sensors or repair of the product(s) at the Malema Sensors facility.

Malema Sensors products are sold with the understanding that the buyer has determined the applicability of the product to its intended use. It is the responsibility of the buyer to verify acceptability of performance to the actual conditions of use. Performance may vary depending upon these actual conditions.

WARRANTY PERIOD:

This warranty is in effect for twelve (12) months from the date of shipment from Malema Sensors place of business.

WARRANTY CLAIMS:

If Malema Sensors products are found to be defective in materials or workmanship within twelve (12) months of the date of shipment, they will be repaired or replaced with same product at the discretion of Malema Sensors at its place of business at no charge to the buyer.

16 Service and Repair

To return Malema Sensors products, please obtain an RMA (return materials authorization) number for the product before returning it, by contacting Malema Sensors (Corporate Office), Boca Raton, Florida, at (800) 637-6418 or (561) 995-0595

All returned equipment must be shipped to the following address:

Malema Sensors,
1060 S. Rogers Circle,
Boca Raton, FL 33487 USA

17 Contacts

Sales and Customer Service:

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Tel : 1 (561) 995-0595
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