Brooks Expert Support Tool 2 (BEST 2)
Supplemental Manual

Service Software
Version 1.2.2.0

BROOKS® INSTRUMENT

Beyond Measure

European Pressure Equipment Directive (PED)

All pressure equipment with an internal pressure gauge greater than 0.5 bar (g) and a size larger than 25mm or 1” (inch) falls under the Pressure Equipment Directive (PED).

- The Specifications Section of this manual contains instructions related to the PED directive.
- Products described in this manual are in compliance with EN directive 2014/34/EU.
- All Brooks Instrument Flowmeters fall under fluid group 1.
- Products larger than 25mm or 1” (inch) are in compliance with EN directive 2014/34/EU.
- Products of 25mm or 1” (inch) or smaller are Sound Engineering Practice (SEP).

European Electromagnetic Compatibility (EMC)

The Brooks Instrument (electric/electronic) equipment bearing the CE mark has been successfully tested to the regulations of the Electro Magnetic Compatibility (EMC directive 2014/30/EU).

Special attention however is required when selecting the signal cable to be used with CE marked equipment.

Quality of the signal cable, cable glands and connectors:

Brooks Instrument supplies a limited selection of high quality cable(s) which meets the specifications for CE certification.

If you provide your own signal cable you should use a cable which is overall completely screened with a 100% shield.

“D” or “Circular” type connectors used should be shielded with a metal shield. If applicable, metal cable glands must be used providing cable screens clamping. The cable screen should be connected to the metal shell or gland and shielded at both ends over 360 Degrees.

The shield should be terminated to an earth ground. Card Edge Connectors are standard non-metallic. The cables used must be screened with 100% shield to comply with CE certification. The shield should be terminated to an earth ground. For additional instruction regarding Protective Earth (PE) Connections please refer to Section 2, **Electrical Interface** page 29.

For pin configuration: Please refer to the enclosed Instruction Manual.

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1.1 Description

The Brooks' Expert Support Tool 2 (BEST 2) is a Windows®-based application that provides expanded diagnostic monitoring & control of Brooks' digital mass flow controller/meter modes for servicing tasks that include setup, configuration, tuning, control, monitoring, and troubleshooting. For specific device troubleshooting information, refer to the product's Installation and Operations Manual.

BEST 2 is a desktop application similar to BEST software, with a contemporary platform and interface for increased speed and responsiveness for the end user.

BEST 2 includes basic diagnostic features and no software license is required for its use.

Note: Future releases of BEST 2 will include a Pro version with optional advanced features accessible with a software license key.

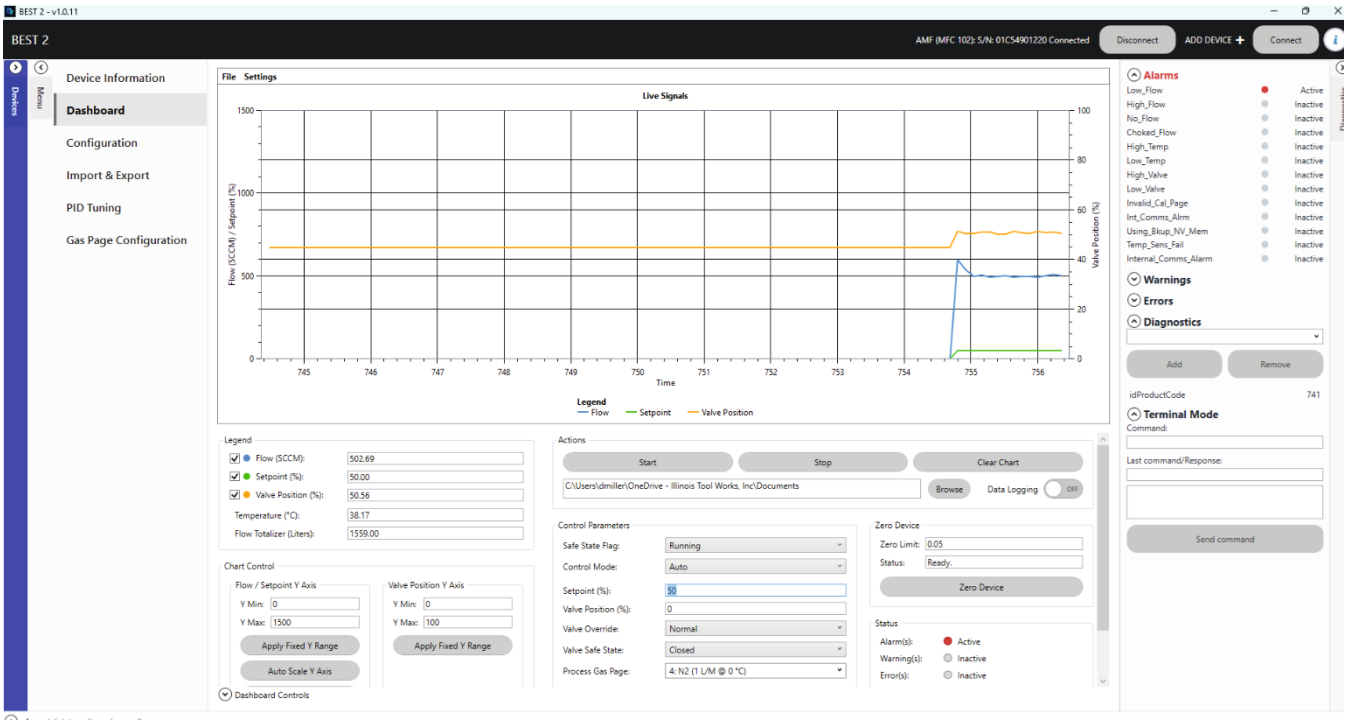


Figure 1-1 BEST 2 Main Screen

BEST 2 is meant to be used as a startup and troubleshooting tool. It is not intended to be permanently connected to the device in your system/application.

See Table 1-1 for all product models currently supported by BEST 2.

Table 1-1 Device Model Families Supported in BEST 2

Model Code	Device Type	Description
AMF	MFC/MFM	Mass Flow Controller, Meter

1.2 How to Use This Manual

It is recommended that you read the device Installation & Operations Manual (IOM) prior to reading this manual. Read this manual in its entirety before installing or using BEST 2.

Note that the images of screens from BEST 2 are illustrative. The exact appearance on your computer screen may vary slightly. Additionally, software versions shown on IOM images may vary slightly from screens visible on your computer.

Note: For detailed device troubleshooting information, refer to the device's Installation and Operations Manual.

1.3 Integrated Help

This user manual is not accessible directly from the software.

This section describes the system requirements, how to install the BEST 2 software onto a personal computer (PC), and how to connect the PC to the device.

2.1 Hardware Requirements

Brooks devices will connect to BEST 2 only via a diagnostic port connection. See Table 2-1.

Table 2-1 Connector Types

Device Model	USB-C
AMF	X

The device is connected from its diagnostic port to a computer via the computer's USB port and a standard USB-C cable.

2.2 System Requirements

This section describes system and software requirements to use the BEST 2 application on a personal computer (PC).

The BEST 2 application can be installed on a Windows PC with the following minimum system requirements:

Table 2-2 System Requirements

Component	Minimum Requirements
Operating System	Microsoft Windows 11 Microsoft Windows 10, version 10.0.17763.0 min.
COM Port	One dedicated USB port (USB 2.0 or higher)
Software License	Not required for BEST 2
FloCom Databases	260608 (supplied with BEST 2 installer)
FloCom	6.10.0 (supplied with BEST 2 installer)
FloCom+	2.11.4 (supplied with BEST 2 installer)

Table 2-3 BEST 2 Features

Feature	Standard Version (No License)
Connection	✓
Terminal Commands	✓
View Device Info	✓
Dump File	✓
Protocol Settings	✓
Get Firmware Revision	✓
Update Firmware	X
Model Code Editing	X
Reboot/Power Cycle	X
Valve Override Control (MFC Only)	✓
Setpoint Control (MFC only)	✓
Graph/Basic Status/Meters	✓
Warning Status	✓
Alarm Status	✓
Data Logging	✓
Sensor Zero	✓
Create Gas Page	✓
Response Tuning	✓
Sensor Tuning	X
Flow Calibration	X
Graph Settings	✓
Warning Settings	✓
Alarm Settings	✓

2.3 Installing the BEST 2 Application

This section describes how to install the BEST 2 application onto a personal computer (PC).

To install the BEST 2 application, download the BEST 2 installer file from the Products/Software section of the Brooks Instrument website:

https://sales.brooksinstrument.com/service-support/download-software

Copy the *.zip file onto your local computer's hard drive, such as in the Downloads folder, then unzip it.

Before starting the BEST 2 installer, close any version of BEST 2 currently running. It is not necessary to uninstall any version of BEST 2 currently installed on the computer.

From the unzipped folder, execute the file BEST2_Setup.exe (right click on the executable and run as administrator):

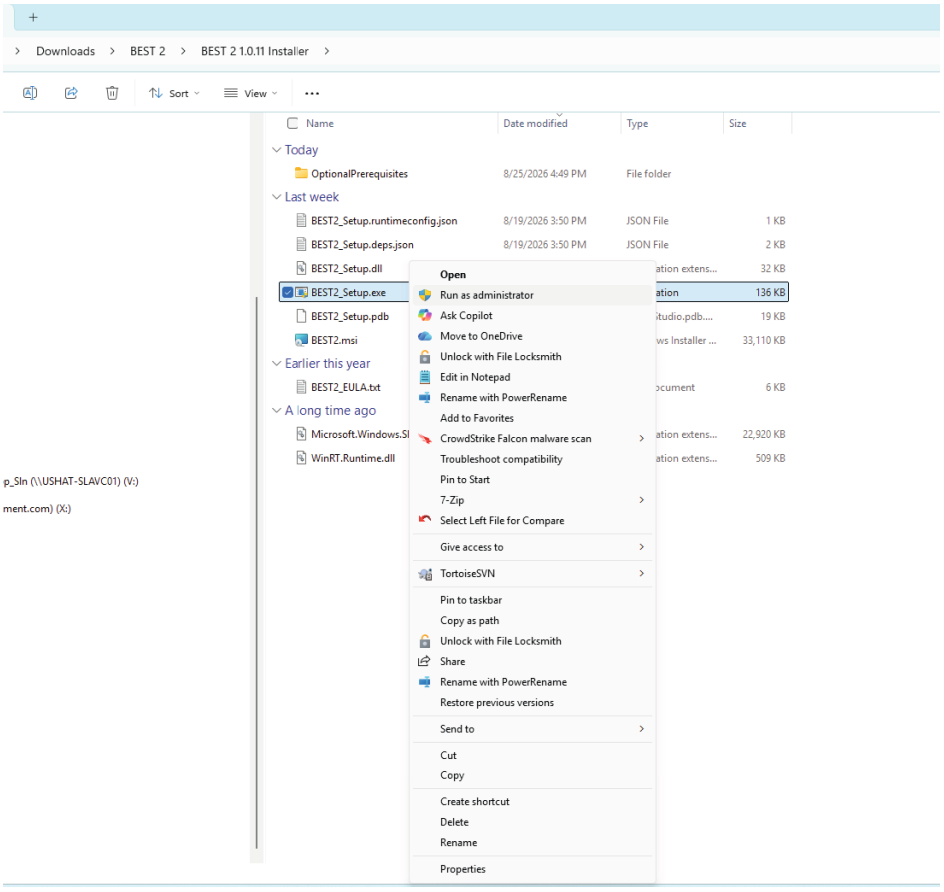


Figure 2-1 Running Setup.exe as an Admin

If the user access control window appears, asking "Do you want to allow this app from an unknown publisher to run…" for BEST2_Setup.exe, click Yes to allow it to run.

In the next window that appears, read the license agreement, then click “I accept the agreement” then Click Next:

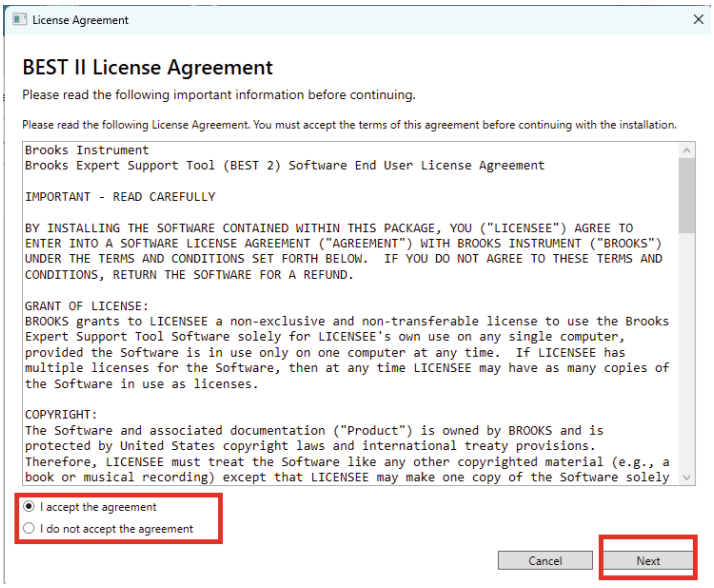


Figure 2-2 License Agreement

At the next window, select the Optional Prerequisites software component checkboxes you need to install in addition to the main BEST 2 program. For the first installation of BEST 2 on a computer, you will need to install all three of these. In other scenarios, you may not need to install all of these (for example, if you already have a newer version of any of these installed). In that case, deselect the components you don’t need to install.

Then Click Install.

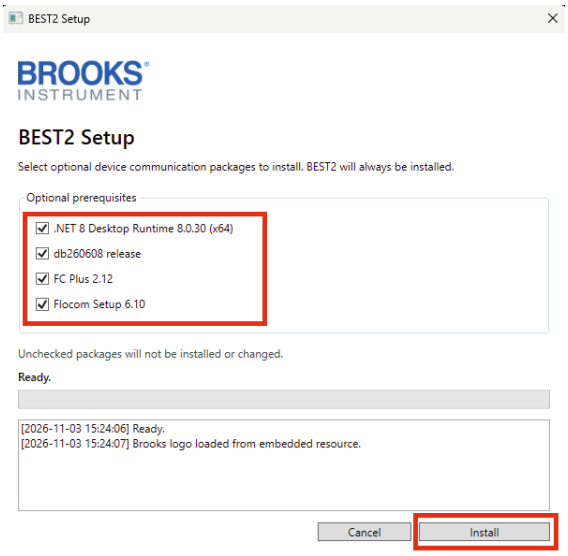


Figure 2-3 Prerequisite Software Components

Allow it time to complete the installation:

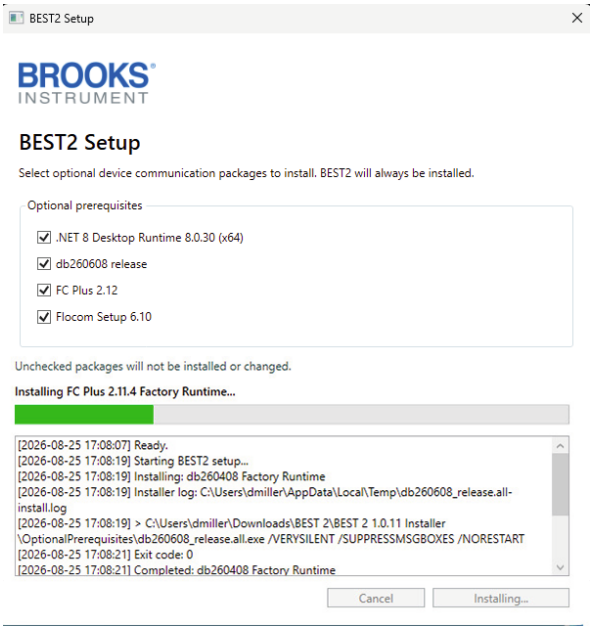


Figure 2-4 Installation Progress

When the installation is finished, you will see the completed message:

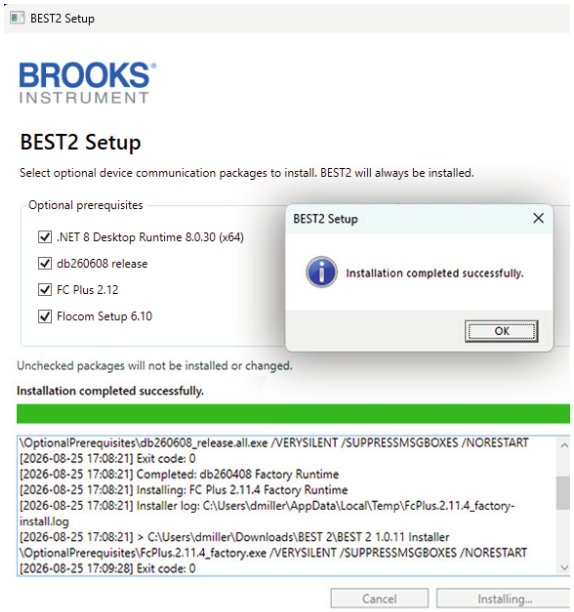


Figure 2-5 Installation Completed

Click OK to finish the installation.

A desktop shortcut will be added to your Windows desktop. Double click it to start BEST 2:

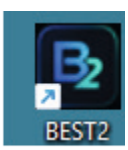


Figure 2-6 Desktop Shortcut

***NOTE:** BEST 2 requires certain versions of FloCom, FloComPlus, and FloCom database be installed for maximum functionality. If you do not install the FloCom drivers provided in the BEST 2 installer, you must ensure that the desired minimum versions of FloCom software components are installed separately from the BEST 2 installer.

Table 2-4 FloCom Minimum versions required with BEST 2 version 1.2.2.0

Program	Required Version
FloCom	6.10.0
FloComPlus	2.11.4
FloCom Database	260608

BEST 2 may be installed on the same computer along with an installation of BEST. However, in order for BEST 2 to work, you must use the minimum versions of FloCom software components specified above for BEST 2. These versions will work seamlessly with BEST. It is recommended, if you are installing both BEST and BEST 2, install BEST first, then BEST 2, or install BEST without installing its supplied versions of FloCom software components.

Virtual COM Port Driver: To establish communications with a Brooks MFC device via the diagnostic port and USB-C cable, a virtual COM port driver is required to be installed. In Windows 11, this driver is typically installed as part of the original Windows installation. If this driver is not installed (Windows 11 or Windows 10), then a virtual COM port driver must be installed separately on the host computer.

2.4 License Installation

No software license is required.

2.5 Uninstalling the BEST 2 Application

To uninstall BEST 2, go to the Windows System Settings -> “Add or Remove Programs”. Look for any items entitled “BEST 2”. Click the three dots on the right side and item and select Uninstall. Follow the onscreen instructions.

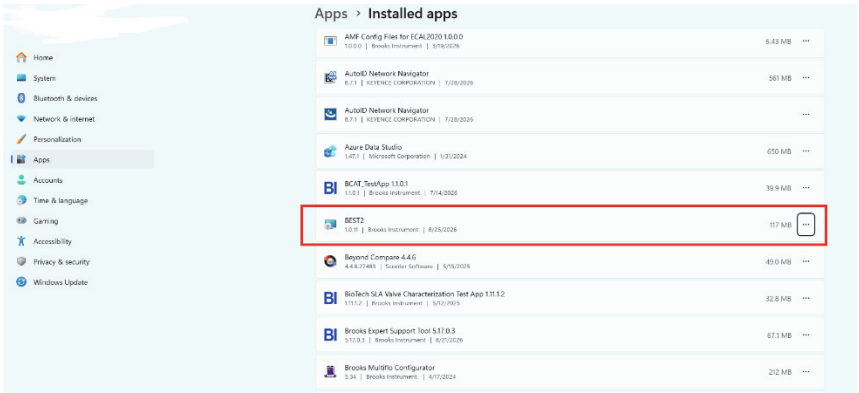


Figure 2-7 Uninstall BEST 2

***NOTE:** The uninstallation of BEST 2 does not uninstall any of the auxiliary components such as FloCom, FloComPlus, or FloCom database, installed with BEST 2. These do not necessarily need to be uninstalled, but to uninstall, repeat the above paragraph (using Windows Add or Remove Programs) for the items “FloCom”, “FcPlus”, etc.

2.6 Connection Procedure

To connect a Brooks device to the computer (via the diagnostic port):

1. Connect power to the device via the M8 connector on the side on the device. Reference the installation manual for more physical connection details.
2. Turn on power to the device.
3. Verify that the device is powered on and the MOD LED is solid green or flashing red.
4. Connect any gas piping as needed.
5. Connect the USB side of the cable to a USB port on your computer. USB-A or USB-C computer ports will both work with BEST 2.
    a. Note: When using the diagnostic interface (USB-C) to connect to the BEST 2 software, care should be taken to prevent ground loops between the power supplying the MFC/MFM and PC. To prevent this case, ensure that the M8 power connector is inserted correctly per the pinout diagram in the device IOM AND the device powers on before connecting the USB-C diagnostic cable.
6. Connect the USB-C connector side of the cable to the diagnostic port on the device.
7. Via Windows ‘Device Manager’, note the COM port name for the new USB connection.

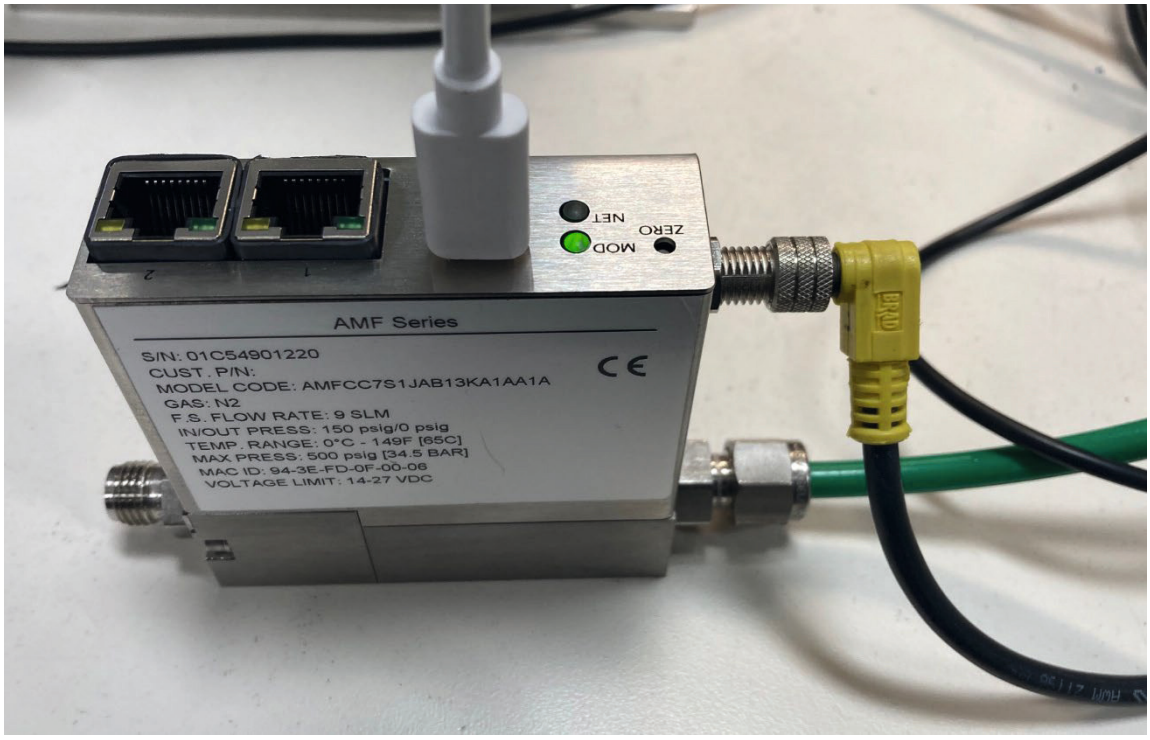


Figure 2-8 AMF Device Connection

2.7 Disconnecting the PC from the Device

When you are done using the BEST 2, you should disconnect the computer from the device.

To disconnect the computer from the device's service port:

1. Detach from the device using the Disconnect button in the Main Bar.
2. Exit from the BEST 2 software, optionally.

This section gives a general introduction to the basic operation of BEST 2, including starting up BEST 2, the main screen, establishing communications with a device, viewing the main graph window, detaching from a device, and the menus.

3.1 Main Screen

To start BEST 2, double-click its application shortcut. The main window displays, with no devices connected.

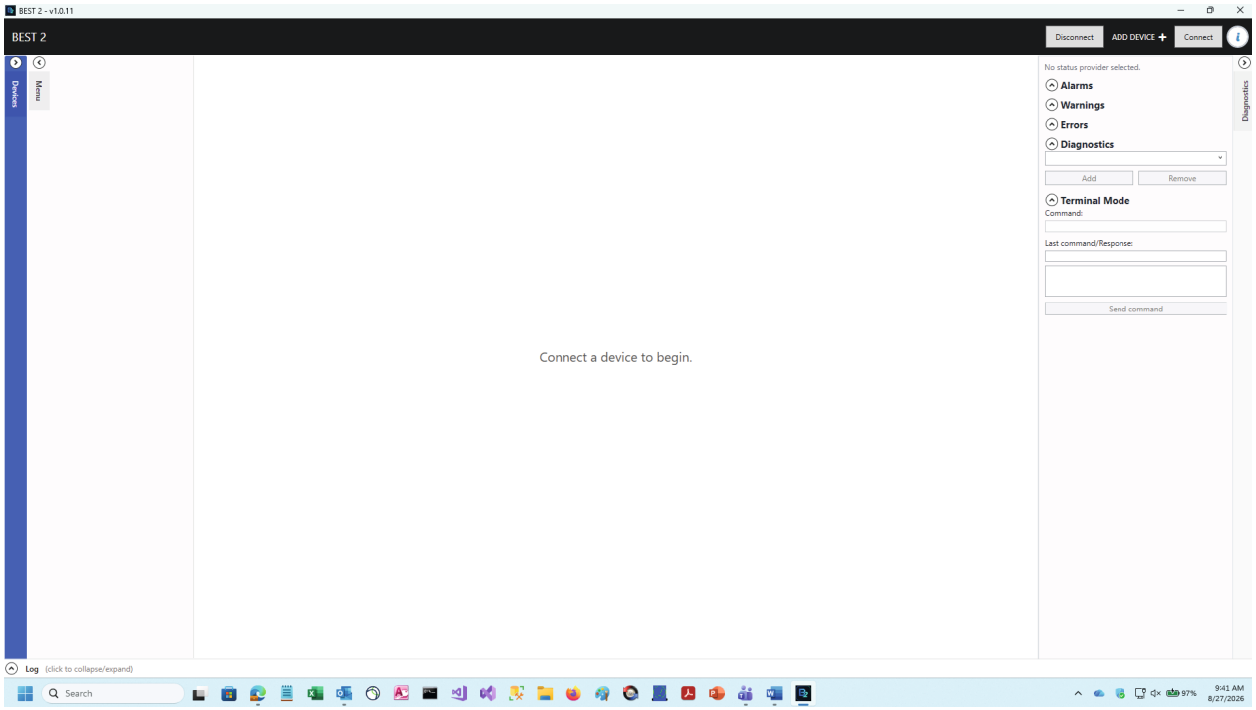


Figure 3-1 Main Screen

The **Title Bar** at the top of the window shows the name and current version of the software. The title bar can also be used to select, move, and maximize the window, according to Windows conventions.

The **Main Bar** is at the top of the window below the title bar. On the right side of this bar are the Connect and Disconnect buttons, along with an Information button (with an “i’” on it). Click on the information button to see information about versions of BEST 2, its plugins, and component software modules (see figure 3-2 below). The function of the Connect and Disconnect buttons are described in the next section of this manual.

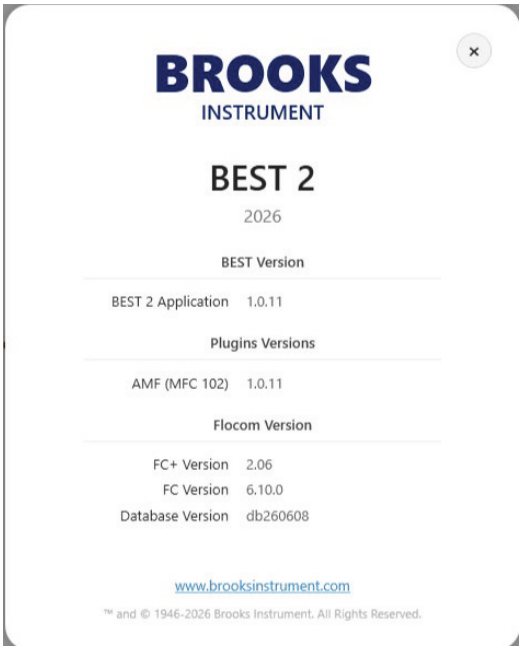


Figure 3-2 Software Information Window

The **Menu Bar** at the left side of the window is where most functionality of BEST 2 is accessed. BEST 2 windows are opened from the menu bar after a device is connected. Menu bar items are typically accessed from left to right and top to bottom. This window can be opened and closed by clicking on the arrow button in the bar.

The BEST 2 desktop is the center panel where all opened BEST 2 windows exist. This is the main location in the program where BEST 2 windows display.

The **Log Bar** at the bottom of the window shows useful diagnostic statuses, history information, and messages about the software and its processes. This window can be opened and closed by clicking on the arrow button in the bar.

The **Diagnostics Bar** is at the right side of the window. It shows useful diagnostic status, and functions. This window, as well as various parts of the window, can be opened and closed by clicking on the arrow buttons in bar. The Diagnostics Bar is always accessible, regardless of which menu is selected.

If the user is using dual monitors, the user may take advantage by moving or stretching the BEST 2 window across the monitors.

The user may run more than one BEST 2 instance simultaneously, although 2 instances is the recommended maximum.

3.2 Attaching to a Device

When the software first starts, it shows the device connection window in the center of the screen (see Figure 3-1) with no device connected. To use most features of BEST 2, you must first “attach” (or establish communication with) a device using the device connection window.

Devices are attached via the device connection window. Click on the Connect Button to open the Device Connection window (see Figure 3-3 below).

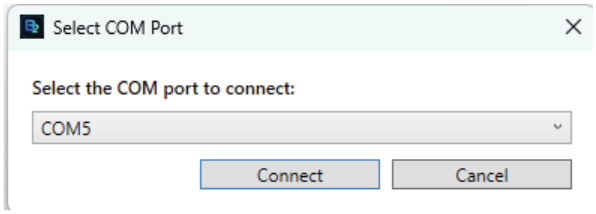


Figure 3-3 Device Connection Window

Select the COM Port in the Device Connection/COM Port drop down list that you are using to connect to your device via to USB-C port. Click Connect.

To close the Device Connection window, click Cancel.

It will take a moment to connect to the device on the selected COM port. After a few moments, if a device is attached, the appropriate menus for the device type are populated in the Menu Bar and Diagnostics section, the BEST 2 desktop shows the device information for the attached device, as shown in Figure 3-4.

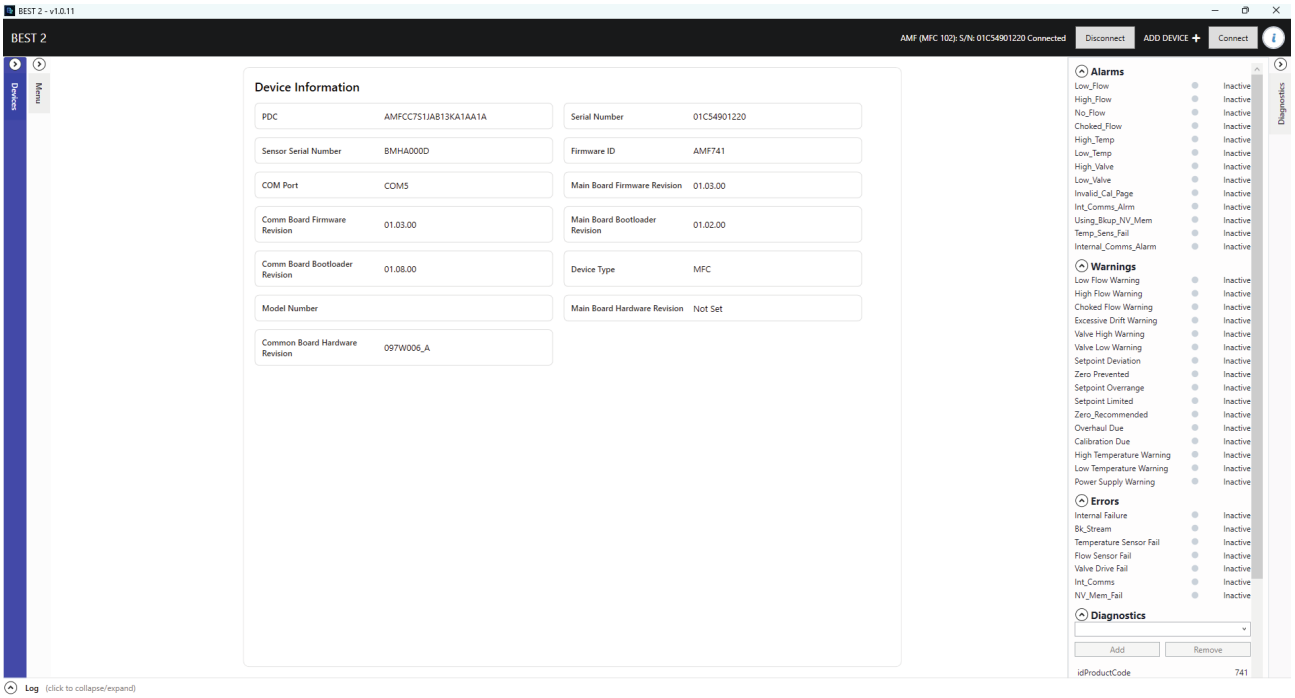


Figure 3-4 Device Information Window, Device Attached

Once the device is attached, the Device Connection window closes automatically.

Only one device at a time may connect to a single instance of BEST 2. However, multiple instances of BEST 2 may run simultaneously, each with a separate device connected. Each device would require its own dedicated USB port and cable. More than 2 simultaneous connections is not recommended.

3.3 Main Graph

Once a device is attached, you can view the main graph to monitor the basic behavior of the device. Click on the Menu Bar arrow to show the menus.

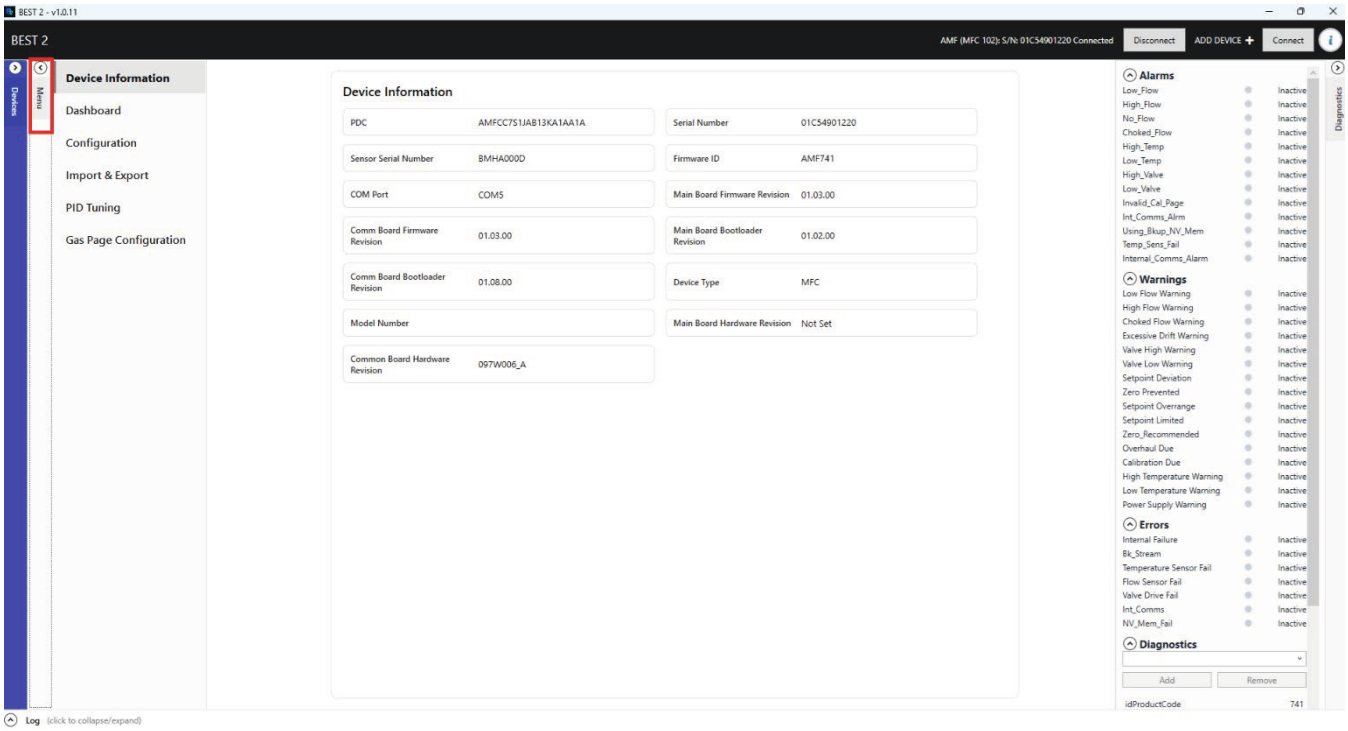


Figure 3-5 Main Window (with menus visible)

Click on the Dashboard menu. This will show the dashboard, which includes the main graph and other control and monitoring features (see Figure 3-6 below).

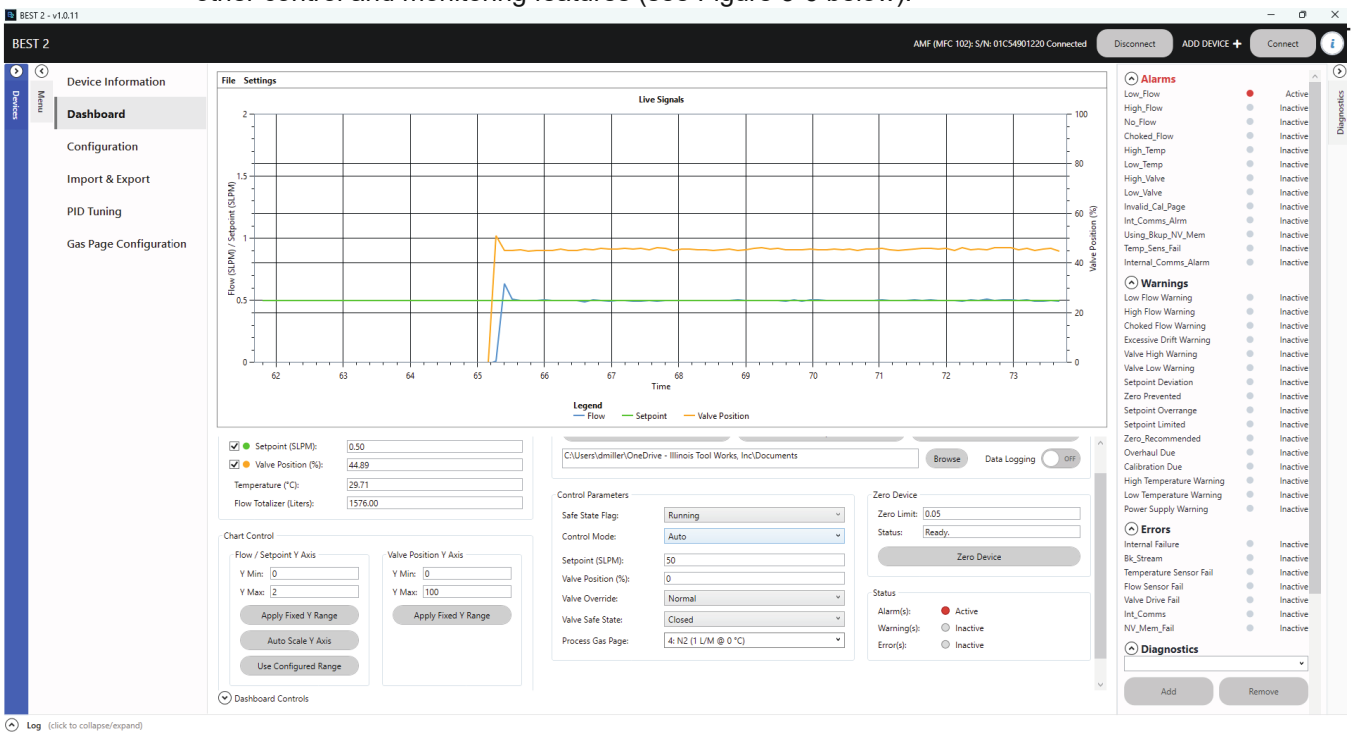


Figure 3-6 Dashboard window with graph

See Chapter 6 for more details about the Dashboard.

3.4 Closing the Session with the Device and Exiting BEST 2

To close the communication session with a device, click the Disconnect button in the Main Bar.

To exit the software, click on the X button at the top right corner of the window.

3.5 BEST 2 Conventions

BEST 2 was designed to remain consistent with regard to how the user interacts with the application across all functions and features. It is also generally consistent with Windows user interface conventions.

The following text field conventions apply throughout the software:

- Some text fields are editable and some are read-only.
- Some editable text fields update the software or device either when the user clicks the Enter button, when the focus moves to another field by using the Tab key or mouse, or when a separate Save button is clicked. See each section in the manual for specific instructions. (See example below in Figure 3-7)
- If a text box contains “NaN” or “n. def.” it means “Not a Number”, not defined, or invalid calculation result.
- A drop-down control allows a user to select one item from a pre-defined list of possible values. Click on the down arrow to see the list. The new value will be selected. Then, in most cases, another Save button must be clicked to make the selection permanent. (See example below in Figure 3-7).
- Sliders are on/off type controls. For an “On” state, the user clicks on the right side of the slider and the slider background turns green. For an “Off” state, the user clicks on the left side of the slider and the slider background turns gray. The user must also click Save to make the change permanent. (See example below in Figure 3-7).
- Number and date formats in BEST 2 must be in English regional format, including decimal points.

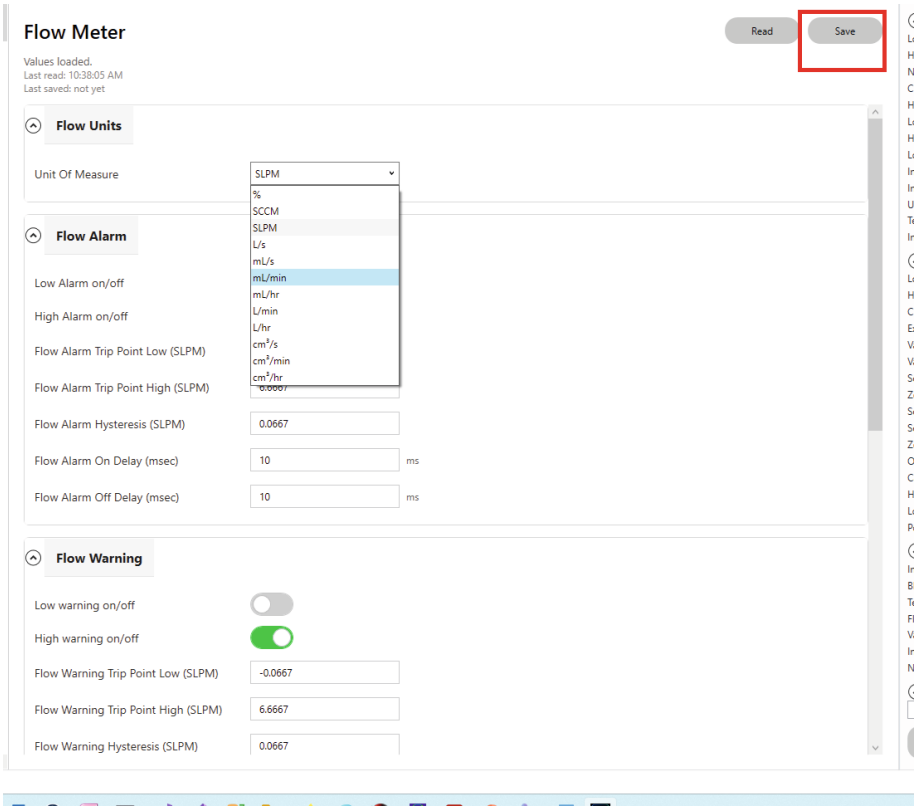


Figure 3-7 Example user controls

3.6 Menu Bar

The Menu Bar (see Figure 3-1) is where most of the functionality of BEST 2 is accessed. Most BEST 2 windows are opened from the menu bar, and then those windows will appear on the BEST 2 Desktop.

Note that this manual shows all menu items. Certain menus may not appear if the features of those menus are not supported by the currently attached device.

Subsequent chapters of this manual describe each of the menus in detail.

4.1 Information Window

The Information Window is where information about the current version of BEST 2 and its software components can be viewed. This is accessed via the Main Bar at the top of the window by clicking on the “i” button. Information provided includes the current version of BEST 2 and it software components. (The current version of BEST 2 is also always visible in the main window’s title bar.)

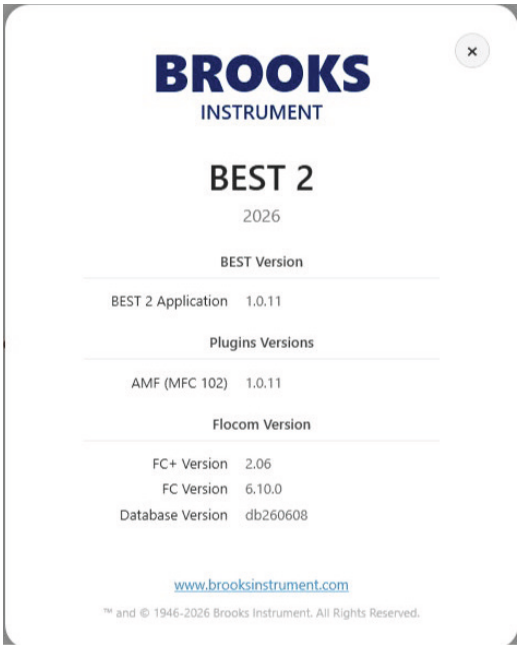


Figure 4-1 Software Information Window

5.1 Settings

In BEST 2, many window states (such as visible or not visible) and other control states will be “remembered” when a user closes BEST 2 and then re-opens it.

The dashboard is the “main” window of BEST 2. To activate it, click the Dashboard menu.

6.1 Graph Options

Some aspects of the Dashboard (including the graph) are user-configurable to an individual user’s preferences.

See Figure 6-1 below for the Dashboard Controls window on the dashboard.

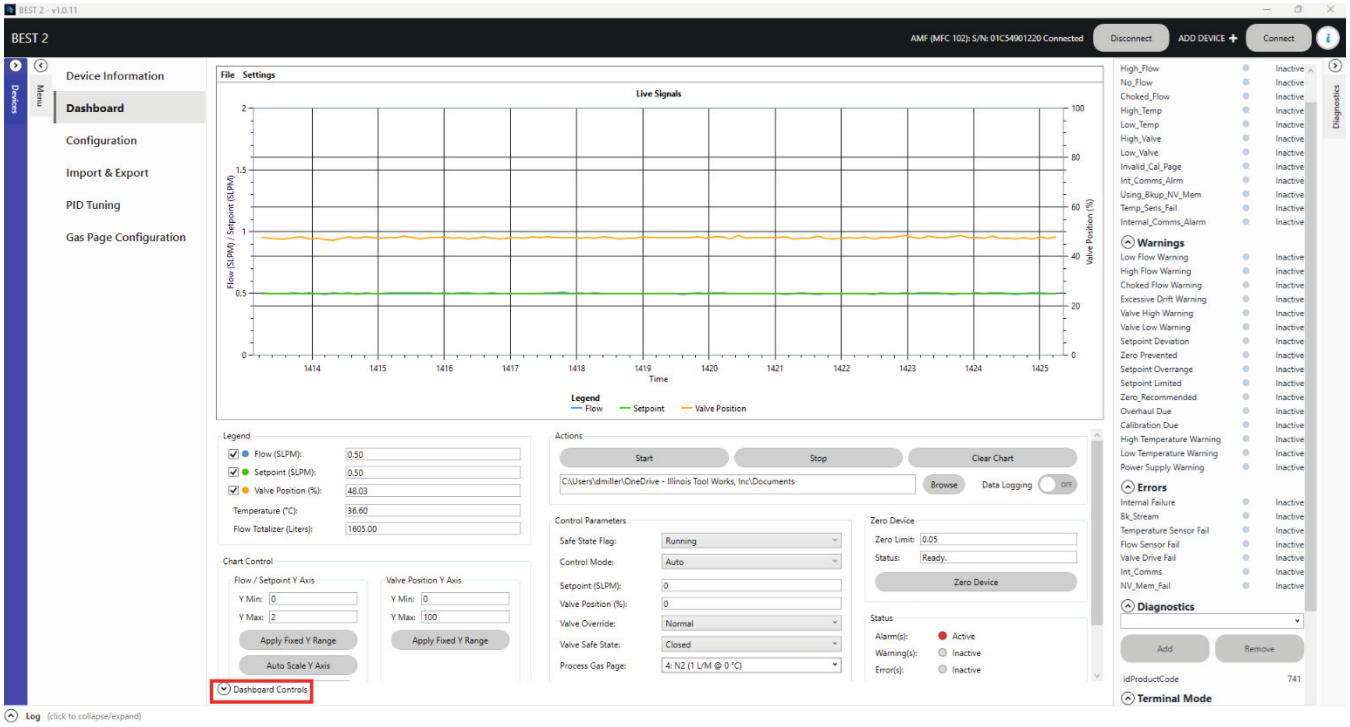


Figure 6-1 Dashboard Controls Window

In the Legend block of the Dashboard Controls window, the user may select which of the parameters (Flow, Setpoint, Valve Position) will be shown on the graph by checking or unchecking the checkboxes.

In the Chart Control block of the Dashboard Controls window, the user may adjust the scaling of the graph.

6.2 Data Logging Options

BEST 2 features data logging. Data Logging allows any data that is displayed on the graph to also be saved to a file. Data logging is accessed via the Dashboard Controls window below the graph on the Dashboard.

To start the logging, click the Start button. Click the Stop button to stop the graph if it is running. Click Clear Chart to clear the chart if necessary. Click Start to start the graph.

Choose a folder for the data file by clicking the Browse button and selecting a folder. The selected folder will appear to the left of the Browse button.

When ready to start recording, enable Data Logging by clicking the slider for “Data Logging” so that it says “ON” and not “OFF”.

Data that is shown in the graph will be saved to a file in the selected file folder. When done saving data, click Stop to stop the chart and the recording. Turn off Data Logging if desired.

If data Logging is ON when BEST 2 is closed, it will turn off automatically when BEST 2 is re-started to save disk space.

Data Logging is saved in a CSV file format.

*NOTE: the sample rate is typically around 10 samples per second, but can vary according to computer speeds.

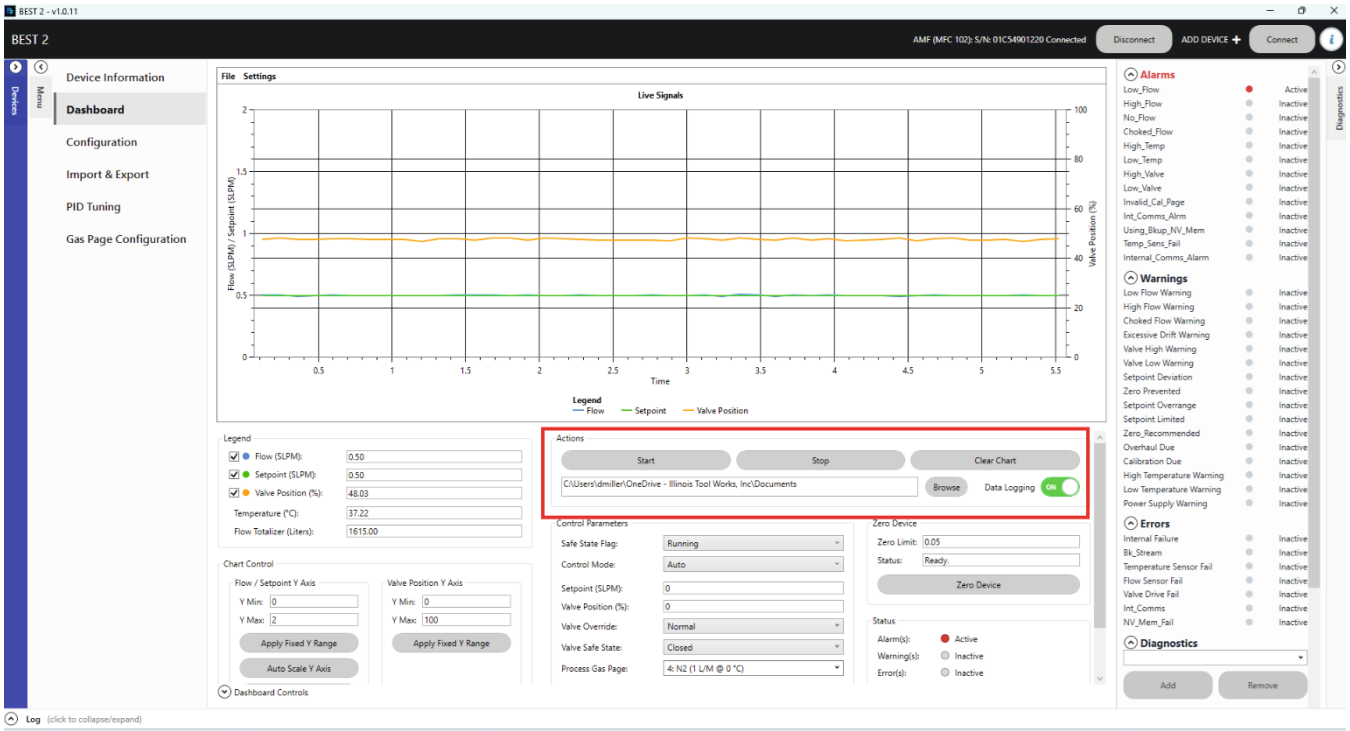


Figure 6-2 Data Logging Options

6.3 Control Parameters

Various control parameters include changing the set point, the device control mode, safe state mode, valve control, and active gas page. These parameters are located on the Dashboard in the Control Parameters block.

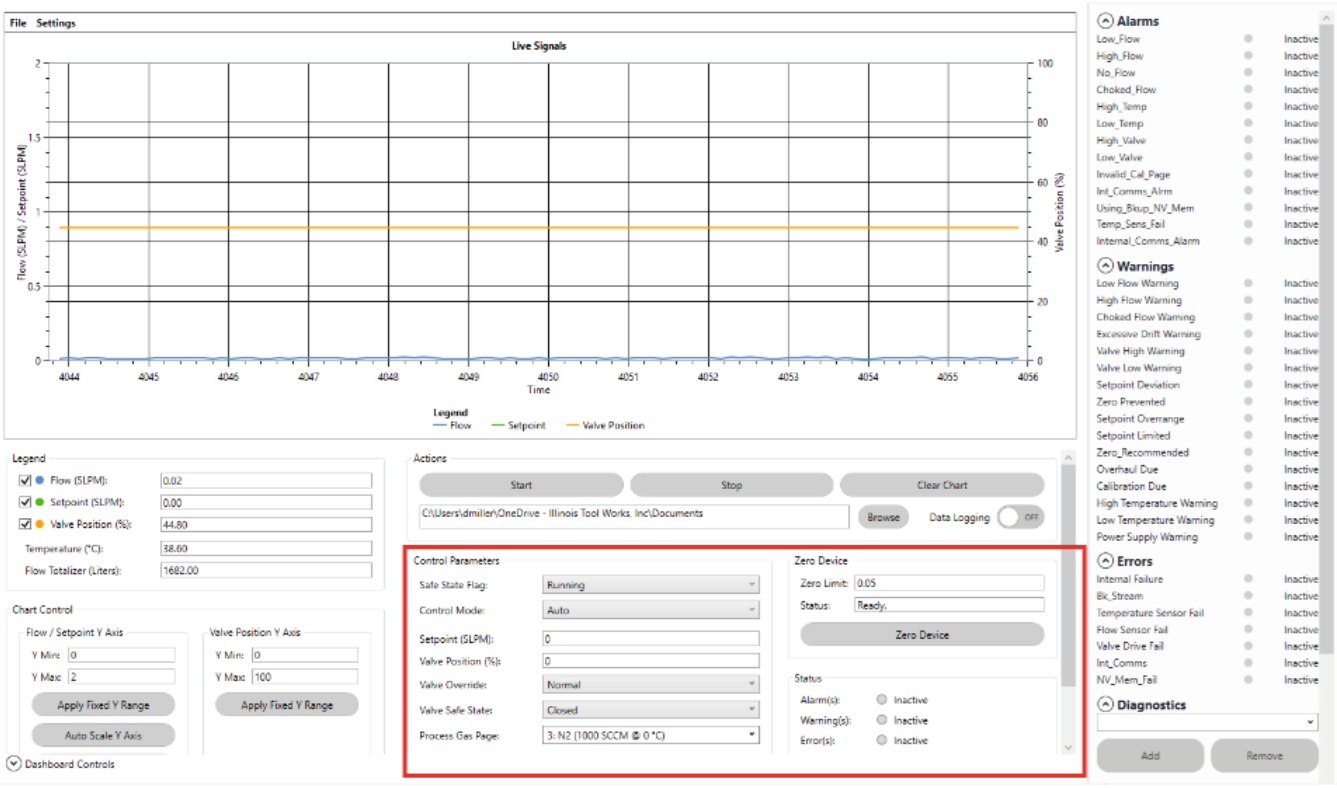


Figure 6-3 Control Parameters

Safe State Flag: Safe state is a mode of the device when it is on default mode, and not controlling flow. Safe state flag can be set to Safe or Running. In order for the device to be controlling flow and changing the set point, the device must be in Running mode.

When this is changed to Safe, the valve immediately goes into the mode selected by Valve Safe State (see below).

***NOTE:** The mode of the device is changed as soon as this mode selection is changed.

Control Mode: This can be set to either Auto or Fixed. Auto sets the controller into normal setpoint Control mode. Fixed overrides the current setpoint, and allows manual control of the valve drive. These control modes may be overridden by Valve Override (below).

Setpoint: This is where the setpoint is entered. This text box is only used when the Control Mode is set to Auto.

The user must type in a numeric value in the units indicated to the left of the text box, and click ENTER.

***NOTE:** after changing the setpoint value, ENTER must be clicked for the change to take effect.

***NOTE:** The numeric value in this text box is not necessarily the current value of the setpoint. This is the numeric value that you want the set point to be. At all times, the current value of the actual setpoint is indicated under the legend block and on the graph.

Valve Position (%): This text box is only used when the Control Mode is set to Fixed.

The user must type in a numeric value in the units indicated to the left of the text box (aways %), and click ENTER.

***NOTE:** After changing the valve position value, ENTER must be clicked for the change to take effect.

***NOTE:** The numeric value in this text box is not necessarily the current value of the valve position. This is the numeric value that you want the valve position to be. At all times, the current value of the actual valve position is indicated under the legend block and on the graph.

Valve Override: The device's valve can be set to a number of modes. The normal mode is Normal. For troubleshooting, other modes may be selected. This mode "overrides" the Control mode.

***NOTE:** The mode of the device is changed as soon as this mode selection is changed.

Valve Safe State: This is the mode of the valve when the Safe State Flag is changed to Safe.

Process Gas Page: This is where the current active page of the device is viewed and changed. Here, the user may view all of the gas pages in the device, by using the drop-down list. To change the current active page of the device, expand the list and select one of the existing pages. The device's current active page is changed as soon as the selection is changed. You can't activate an empty page.

6.4 Zero Device

The Zero Device block allows a user to re-zero the flow sensor with no- flow conditions. This is not a full device calibration, However, caution should be used when deciding when to perform the device zero.

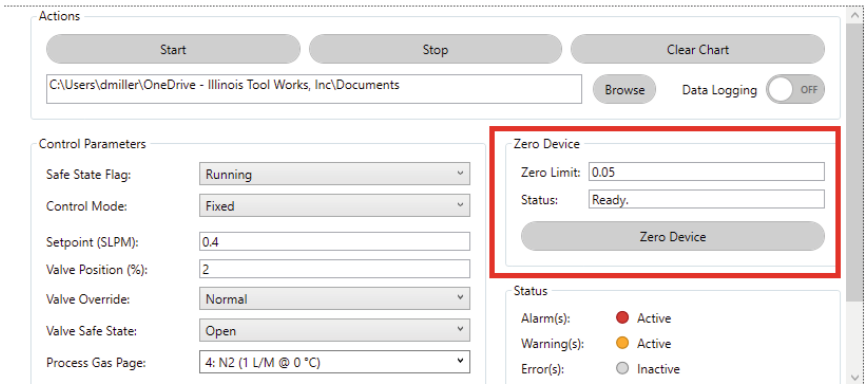


Figure 6-4 Device Zero

Follow the instructions of the device user manual when preparing the device for zero adjustment operation. This adjustment must be performed when the device is fully warmed up and with no flow of gas through the device.

The Zero Limit is the maximum flow (normalized value) through the device under which the zero operation will be allowed to succeed.

To start the zero operation, click the Zero Device button. A pop-up message will appear reminding the user to verify that the proper conditions are present for a zero operation. Click OK.

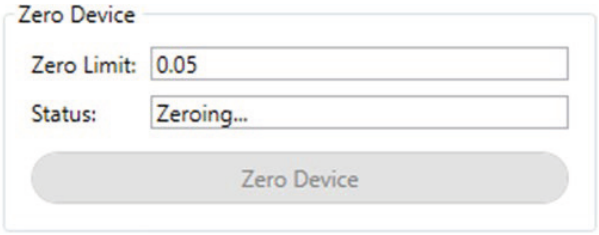


Figure 6-5 Zeroing

The zero operation will start. While it is working the Status text box will indicate that it is zeroing. Approximately 30 seconds later, the Status will indicate that the operation has completed and has passed its test.

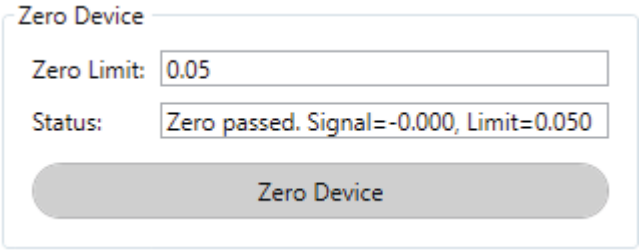


Figure 6-6 Zero Completed

6.5 Monitoring Alarms in the Dashboard

The general state of Alarms, Warnings and Errors is displayed in the Status block of the Dashboard Controls window in the Dashboard menu window. To view this, the Dashboard menu must be selected, and the Dashboard Controls window must be expanded.

In BEST 2, alarms, warnings, and error are monitored via the Dashboard window, and also in the Diagnostics bar.

(Alarms may be configured via BEST 2 – see chapter 10).

Specific details of Alarms, Warnings and Errors are displayed in the Diagnostics Bar. The Diagnostics Bar is always accessible, but it must be expanded to be visible. Panels for Alarms, Warnings, and Errors may be opened or closed as desired for more or less detail.

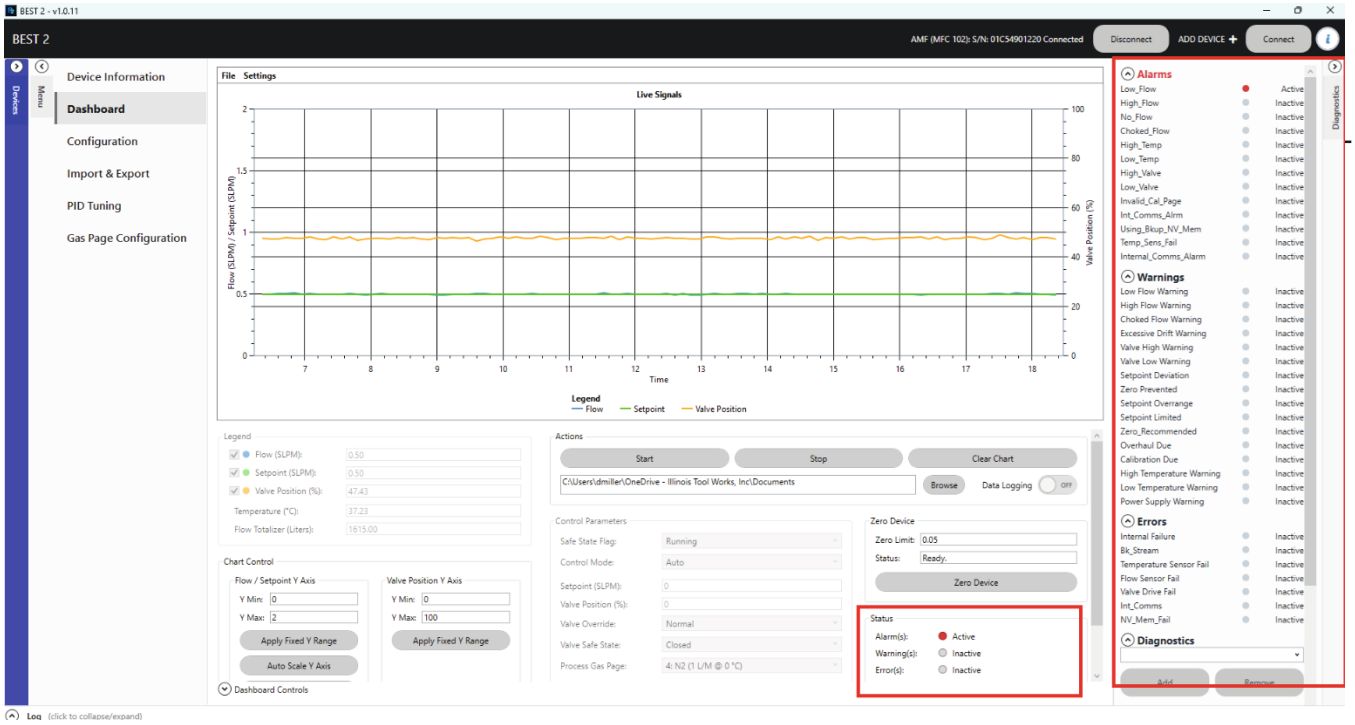


Figure 7-1 Alarms, Warnings and Errors

8.1 Diagnostics Bar

In addition to the graph parameters (Flow, Setpoint Valve Position), some other commonly used parameters can be monitored via the Diagnostics block in the Diagnostics window. Make sure the Diagnostics block is expanded by clicking the arrow next to it.

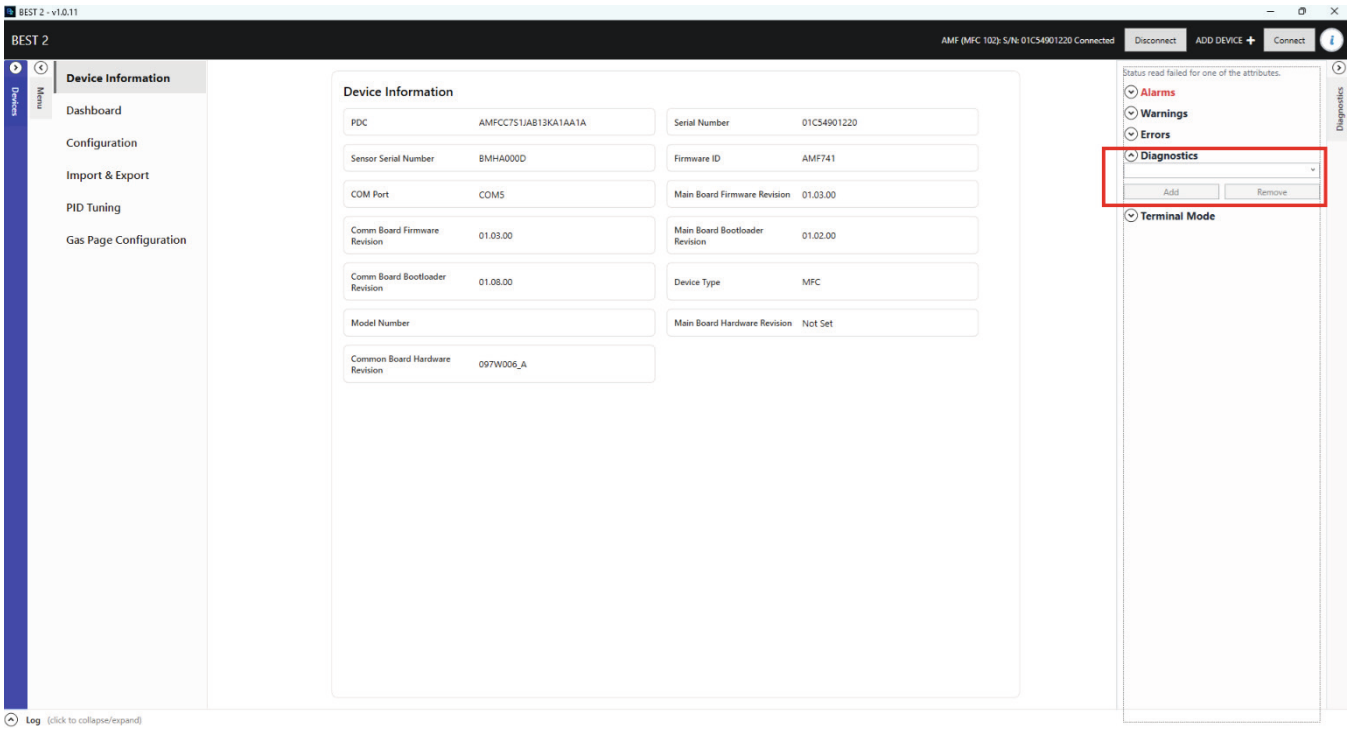


Figure 8-1 Diagnostics Block

To see the list of characteristics that can be monitored, click on the Diagnostics drop-down box. Select a parameter, then click add. That parameter will be added to a list, along with its current value. When the graph is running, that value will be updated with its “live” state.

Multiple parameters may be added. To delete a parameter, click the parameter, then click the Remove button.

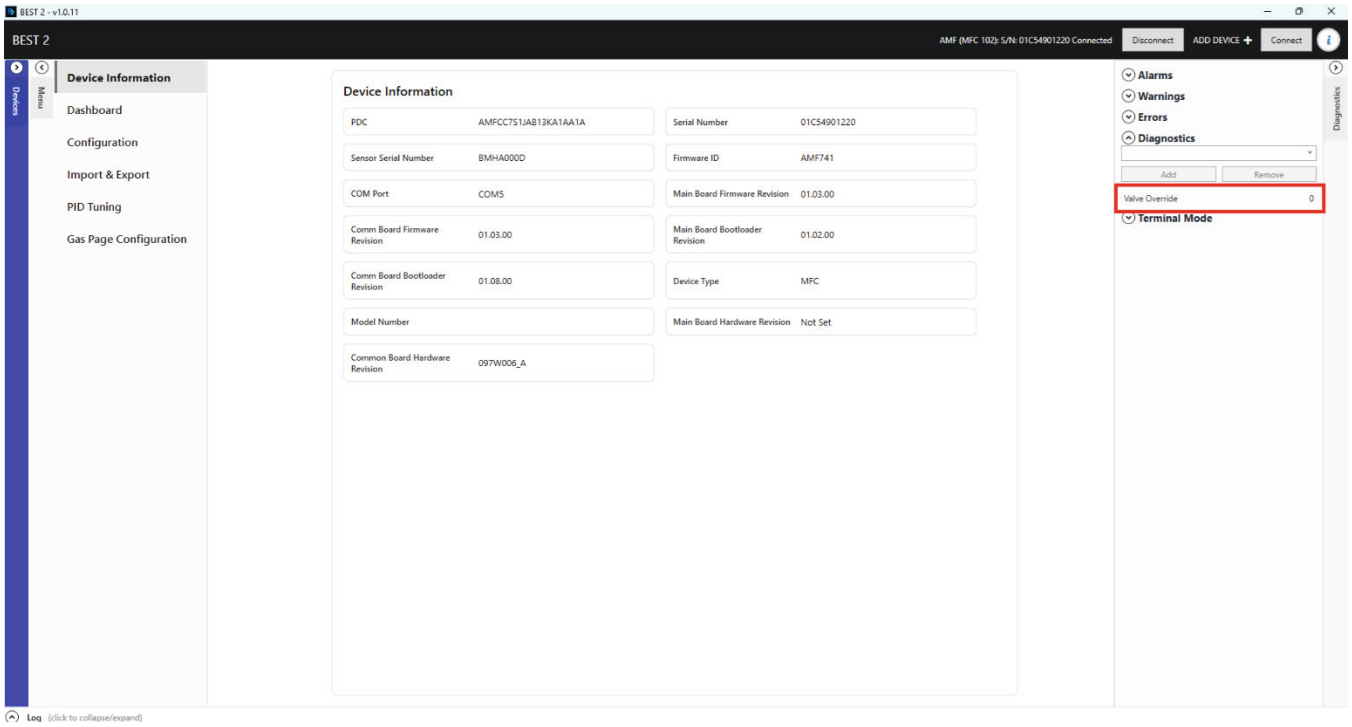


Figure 8-2 Valve Override parameter added for monitoring.

BEST 2 allows whole device configurations to be saved from and loaded to a device. Click on the Import & Export menu.

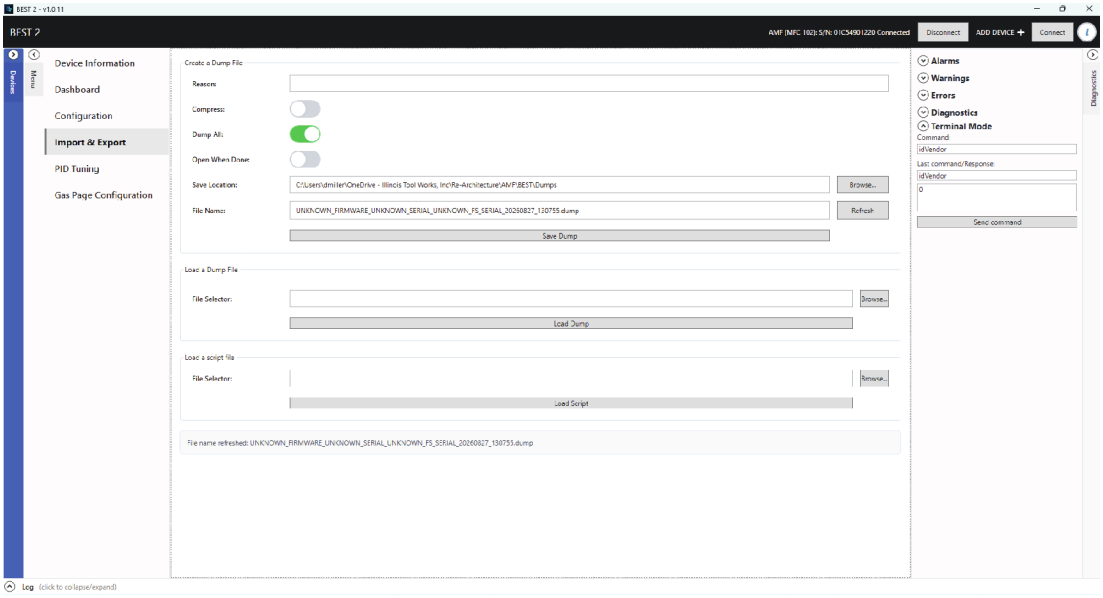


Figure 9-1 Import & Export Window

Configuration data may be saved from a device to a file and/or loaded from a file into a device. In BEST 2, configuration files are called dump file or script files.

Dump files are complete configuration files of an entire device. Dump files may also save “live” attribute values or not. When a dump file is loaded into a device, live values are not loaded into the device.

Script files contain only configuration attributes, and are not necessarily an entire set of device attributes.

To save a dump file from a device, set optional parameters. Optionally type in a custom comment in the Reason text box. Click the Compress slider if you want to file to be compressed. If a dump file is compressed, it will produce a smaller file, but the content will not be visible in a text editor, like it would if it was not compressed. Click the Open When Done slider to automatically open the created file after it is created. Select the destination file folder in the Save Location Text box or by clicking the Browse button. Generate a default file name by clicking the Refresh button. Alternatively, you may type in your own file name in the File Name text box, but the file name should have a file extension of *.dump or *.dumpall, or *.txt.

When you are ready to save a file, click Save Dump. When it is done, there will a message at the bottom of the window saying “Dump file created successfully…” The created file can be examined in any text editor (if it is not compressed) by going to the file folder listed in the Save Location text box.

To load a dump file into a device, select an existing file in the Load a Dump File block, by clicking Browse…, or typing the name into the File Selector Text box. Then click Load Dump. When it is done loading, there will a message at the bottom of the window saying “Dump file loaded successfully…”

To load a script file into a device, select an existing file in the Load a Script File block, by clicking Browse…, or typing the name into the File Selector Text box. Then click Load Script. When it is done loading, there will a message at the bottom of the window saying “Script file loaded successfully…”

The **Configuration** Menu provides functionality to help a user configure a device with many different characteristic settings such as flow units, alarm settings, and network protocol settings. Many of these settings are for the Alarms, Warnings, and Errors shown in the Diagnostics Bar on the right side of the main window.

The Configuration menu has multiple sub-menus.

For each sub-menu, when selecting the sub-menu, the values of all related parameters are shown on the BEST 2 desktop. To refresh (re-read) the attributes, click the Read button. To change a value, change the value in its text box or control, then click the Save button.

***NOTE:** You must click Save to permanently save the changes to the device.

***NOTE:** All numerical and date formats must be entered in English regional format (such as decimal point).

Some values are read-only for informational purposes.

In some sub-menus, scroll down to see more attributes.

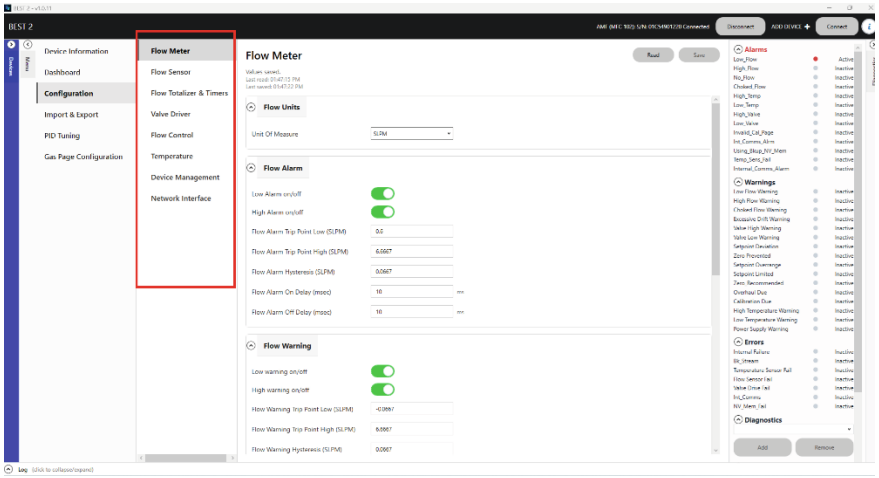


Figure 10-1 Configuration Sub Menus

10.1 Flow Meter Sub-Menu

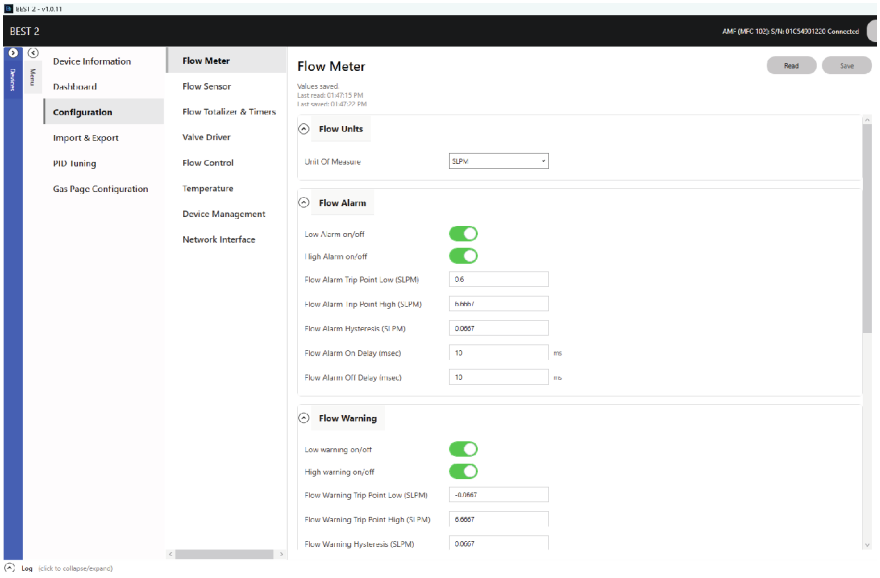


Figure 10-2 Flow Meter sub-menu

10.2 Flow Sensor Sub-Menu

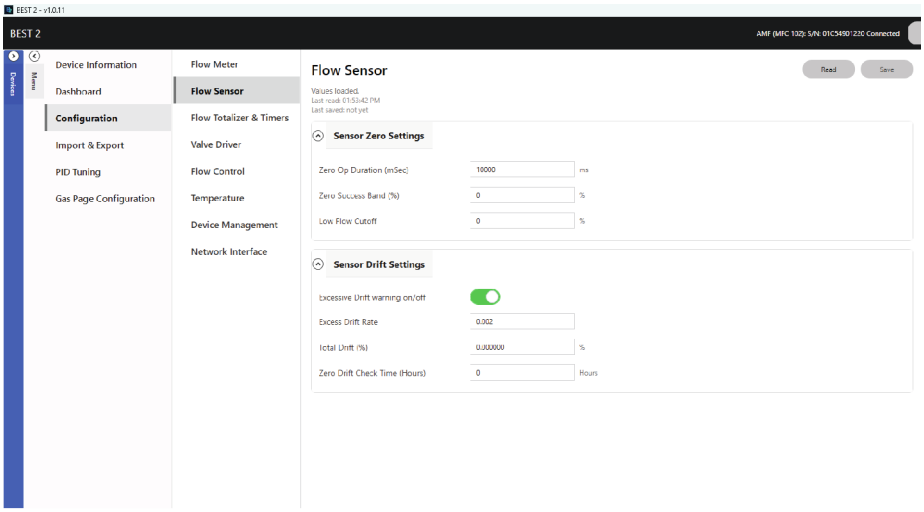


Figure 10-3 Flow Sensor sub-menu

10.3 Flow Totalizer & Timers Sub-Menu

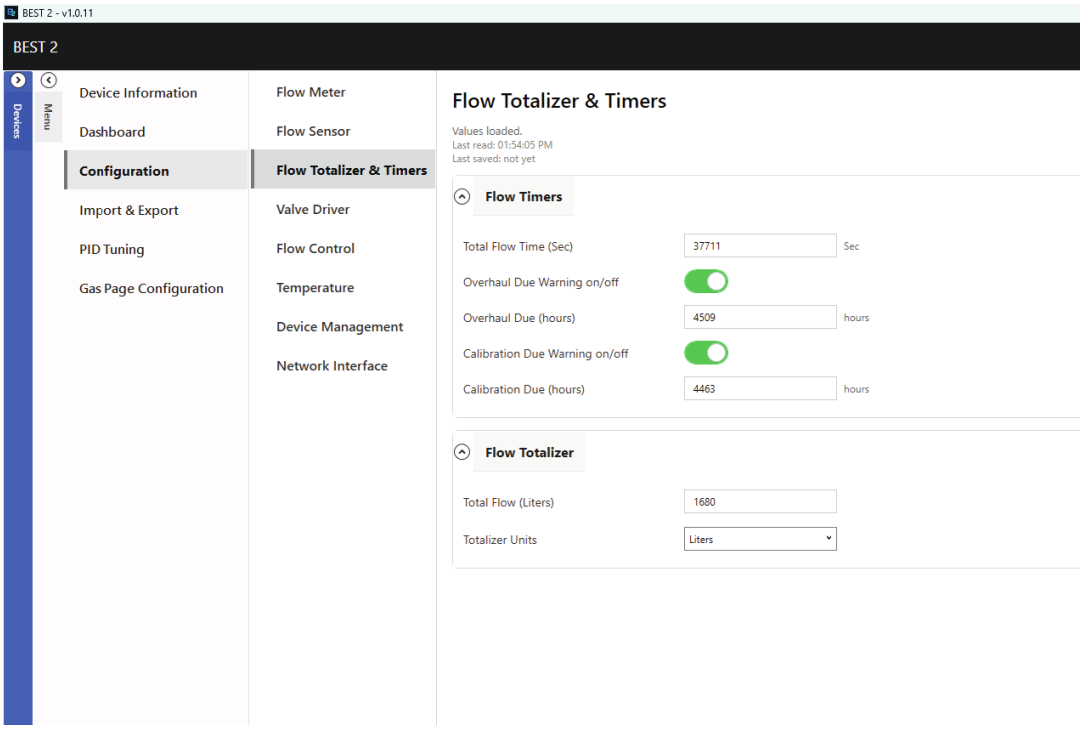


Figure 10-4 Flow Totalizer & Timers sub-menu

10.4 Valve Drive Sub-Menu

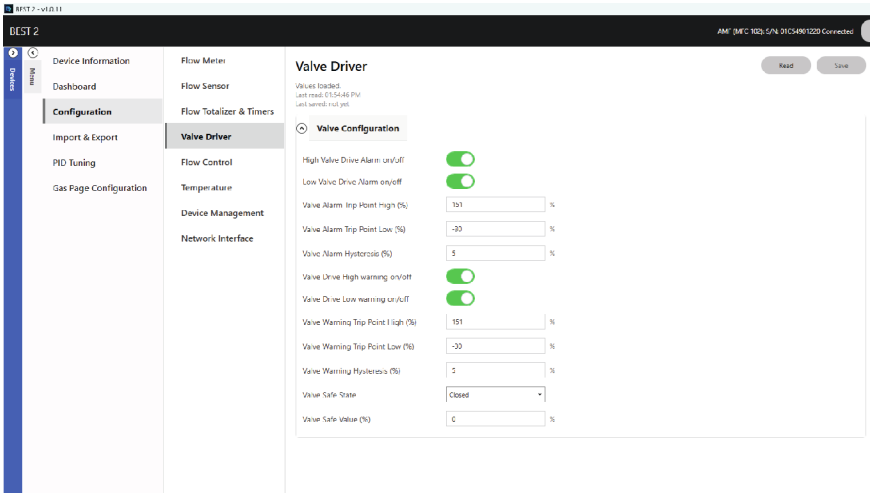


Figure 10-5 Valve Drive sub-menu

10.5 Flow Control Sub-Menu

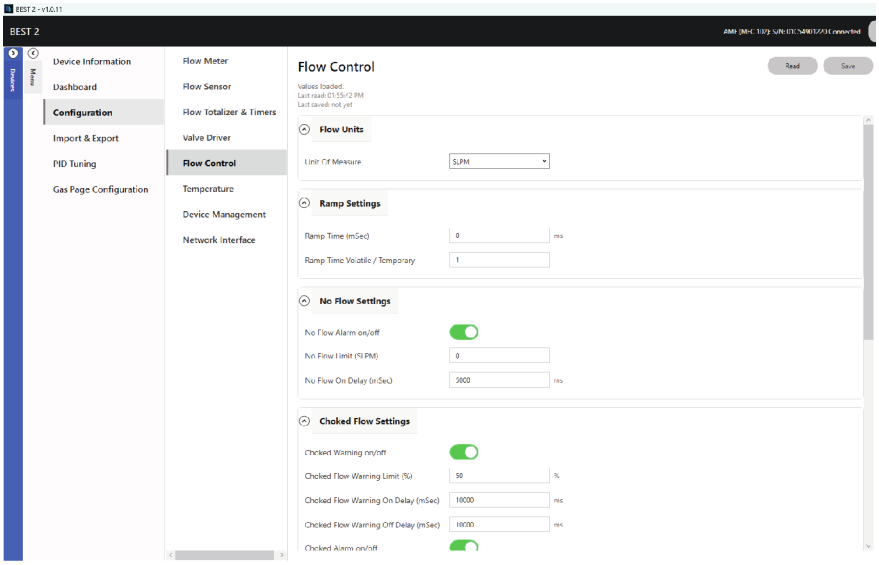


Figure 10-6 Flow Control sub-menu

10.6 Temperature Sub-Menu

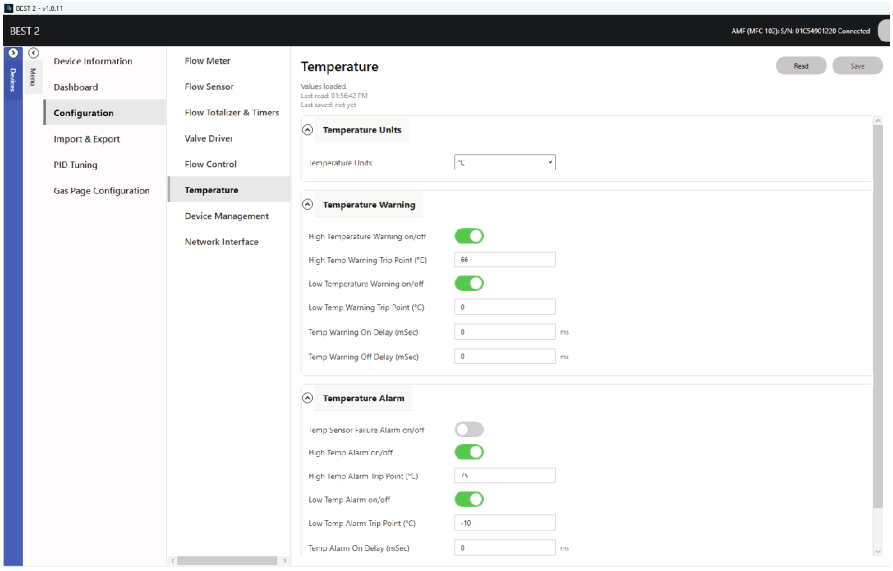


Figure 10-7 Temperature sub-menu

10.7 Device Management Sub-Menu

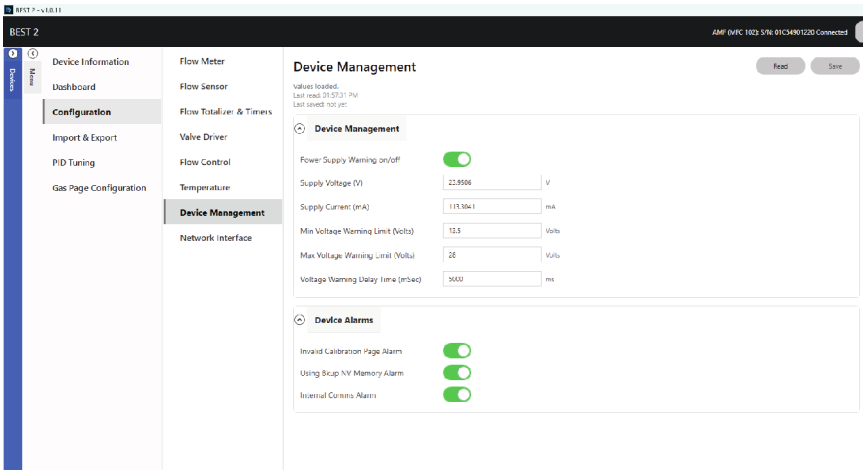


Figure 10-8 Device Management sub-menu

10.8 Network Interface Sub-Menu

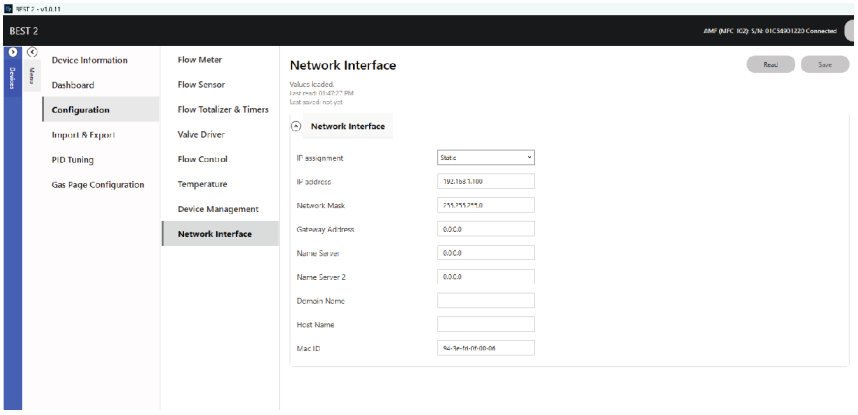


Figure 10-9 Network Interface sub-menu

***NOTE:** These are the network configuration parameters for the Ethernet IP connectors on top of the device, and not the USB network. BEST 2 does not communicate with the device via the EthernetIP connectors, but BEST 2 can configure the network parameters for those connectors.

The Gas Page Configuration menu allows the device to configure up to 6 different gases in “gas pages”. Devices may store settings for up to 6 different gases/ configurations on a single device. Each gas page can be recalled to be the active page at any time without reconfiguring or recalibrating the device.

The Gas Page Configuration menu allows the user to view the current gas pages in the device, select the current active page, and create new pages derived from the current device’s calibration.

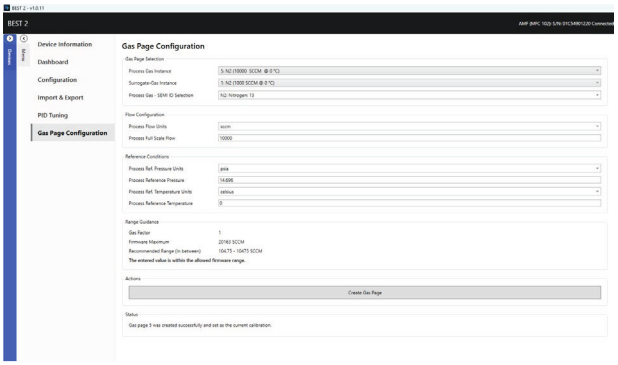


Figure 11-1 Gas Page Configuration Menu

To view the current gas pages in a device, (in the Gas Page Configuration menu) click on the Process Gas Instance drop-down box.

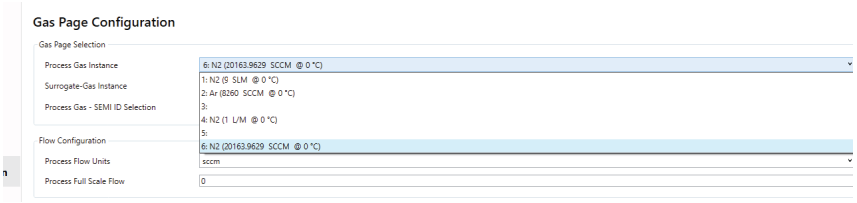


Figure 11-2 Current Gas Pages

*NOTE: This selected page number is the number of the page you want to create/modify, not the currently active page. Changing this drop-down does not change the currently active page. However, if you successfully create or modify a page in this menu, then upon creation/ modification that page will become the active page (typically, the active page is changed via the Dashboard menu.)

The drop-down list shows all the current gas pages in the device, including both configured and unconfigured pages. Unconfigured pages are shown as empty. For the configured pages, the text indicates the gas symbol, flow range, flow units, and reference temperature of each configured page.

From the Process Gas Instance drop-down, select the page you want to view or configure. Then if you want to change any of the parameters for that page, change the values below the Process Gas Instance drop-down (for the page you want to change).

The Surrogate-Gas Instance is the current device calibration. Typically, this will always be set to 1 and will not be changed.

Process gas – SEMI IDS Selection is a drop-down containing all the allowable gasses.

Process gas Flow Units are the flow units you want to use for the page you are modifying.

Process Full Scale Flow is the numeric value for the full-scale flow. This number is in the flow units selected above.

Under the Reference conditions text block, select the gas reference values desired.

When all values have been selected and verified, click Create Gas Page. If the gas page has been created/modified successfully, the message “Gas page created successfully” will appear. The device’s active page will then be changed to this page.

The PID Tuning menu provides a tool for adjusting the flow control response time for a device (also referred to as “Response Tuning”).

Response tuning optimizes the dynamic response of the device to changes in setpoint. You can use this feature to eliminate undesired undershoot and overshoot.

Customer devices are tuned from the factory. However, BEST 2 allows an advanced user to perform PID tuning of a device in the field. The user can optimize the timing response of a device under specific user conditions.

This only applies to a controller device: MFM devices do not have a valve, so response tuning is not applicable.

The tuning process typically involves cycling the flow between a low and a high setpoint value, while watching how the actual flow changes compared to the timing of the setpoint changes. Then the user manually adjusts device parameters that control the response of the valve. The objective is to minimize overshoot and undershoot.

You can perform the adjustments in BEST 2 and even save the results to a text file.

12.1 Performing PID Tuning

To perform tuning, the user will first need to set up the device under the desired gas flow conditions. This includes the desired gas, inlet pressure, and outlet pressure. Ensure any inlet and outlet valves in the setup are opened to allow for gas flow.

Then, in BEST 2, connect to a device, and click on Dashboard. Ensure the following values are selected in the Control Parameters block:

- Safe State Flag: Running
- Control Mode: Auto
- Valve Override: Normal

Click on the PID Tuning menu. Ensure that the PID Tuning Controls are visible by clicking on the PID Tuning Controls arrow at the bottom of the window.

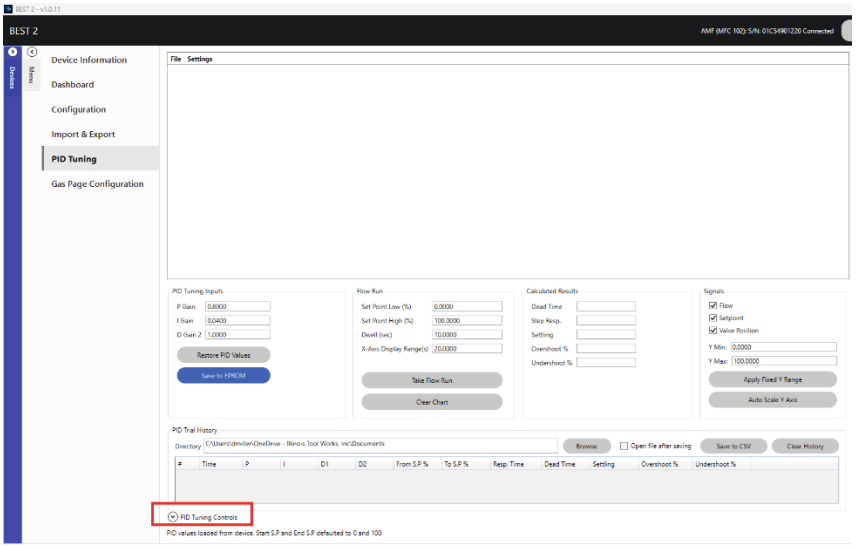


Figure 12-1 Initial PID tuning Window

Select the desired signals in the Signal block. You will need at least the Flow and Setpoint Signals, and optionally the valve position. On the graph, set the Fixed Y Range to the desired Y scale, or select Auto Y Axis scale of the graph by clicking that button.

Next, set the Flow Run parameters of the adjustment/test in the Flow Run block.

Set the Set Point Low (%) and Setpoint High (%). This is in % of full-scale flow. These are the two setpoints at which the flow cycles continuously during the adjustment operation.

Select the Dwell. This is the time (in seconds) that the signal dwells at each of the two setpoints (high and low) as it cycles between high and low.

The X-Axis Display Range is X-axis width (in seconds) of the graph as it scrolls horizontally during the adjustment operation.

Next click Clear Chart and click Clear History to clear the table.

Click Take Flow Run. This starts the graph running as it begins its cycling between high and low setpoints.

Each time the setpoint changes between high and low, a new row of measurements appears in the “PID Trial History” table at the bottom of the window. The latest row appears at the top row of the table. Various calculations are shown regarding how well the actual flow changes track the setpoint changes.

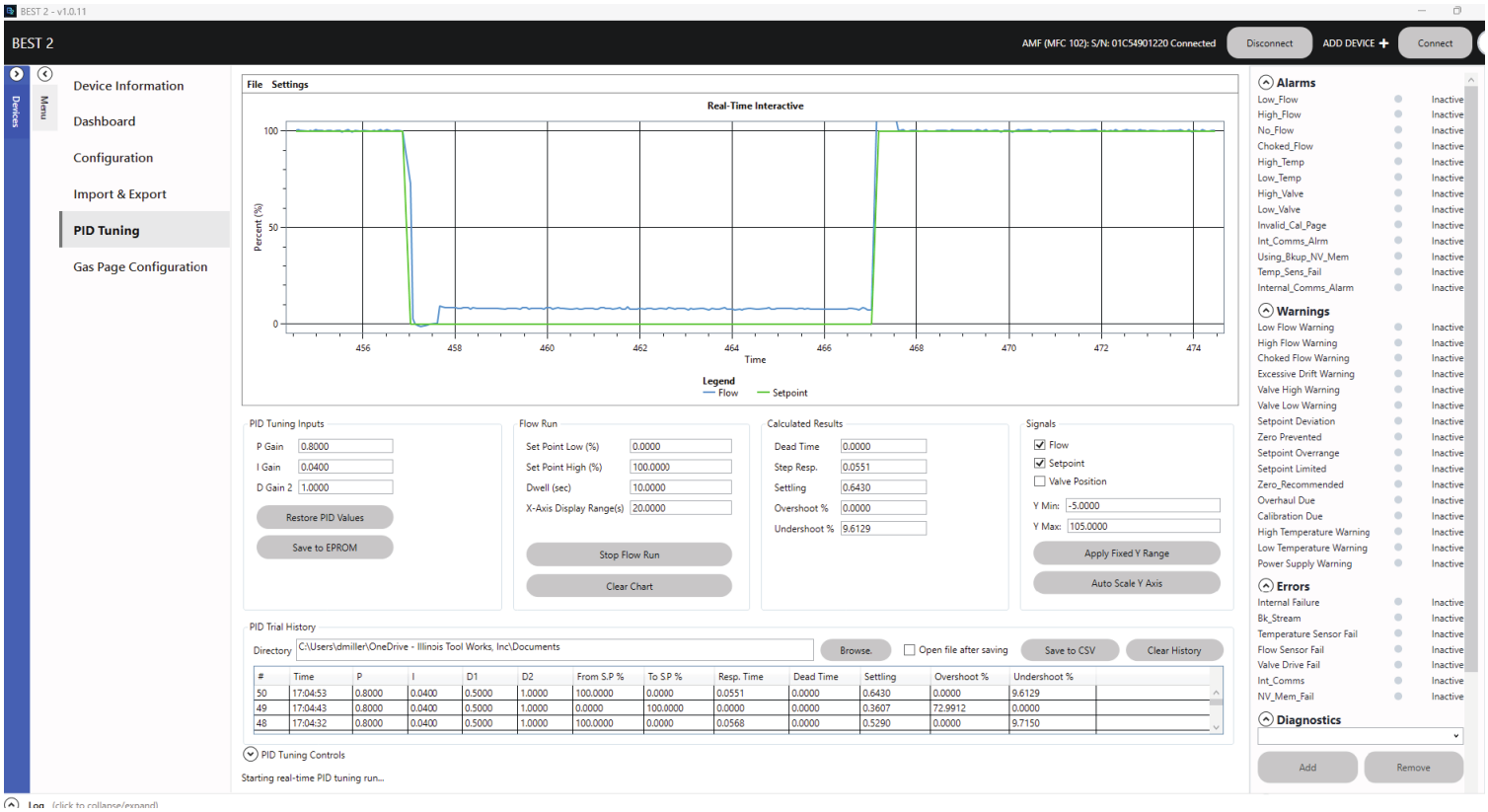


Figure 12-2 PID Tuning in Progress

If changes are needed, the values in the PID Tuning Inputs are the values that can be adjusted to improve the response performance. To change any of these values (P Gain, I Gain, and D Gain), change the numeric value in the text box and click Enter key to update.

As these values are changed, watch the performance changes in each new row of the “PID Trial History” table.

Continue to change the gain values until the desired results are achieved. If at any time you wish to revert to the original values (the values when the PID Tuning window was last updated), click the Restore PID Values button.

When the desired results have been achieved, click the Stop Flow Run button.

***NOTE:** You must click Save to EPROM for the changes to take effect in the device.

You can save the results (in the PID Trial History table) to a text file. Set the destination file directory in the Directory text box. Use the Browse button to navigate directories if desired. Check the Open file after saving to automatically open the file after it is saved. Click Save to CSV to save the table results to file.

If you wish to start another tuning session, it is recommended to clear the chart and history table first. Click Clear Chart to clear the chart area, and click Clear History to clear the history table.

If you are done with PID tuning, remember to return to the Dashboard, and set the setpoint to 0 to stop any gas flow.

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