sensia
Rockwell Automation + Schlumberger

+ NUFLO MC SYNERGY

Explosion-proof and Weatherproof Totalizer

Software Manual

50360934, Rev. 01

IMPORTANT SAFETY INFORMATION

SYMBOLS AND TERMS

DANGER
Practices or circumstances that can lead to death or catastrophic property damage or economic loss.

WARNING
Practices or circumstances that can lead to serious personal injury, property damage, or economic loss.

ELECTRICAL SHOCK WARNING
An electrical hazard which will result in personal injury if instructions are not followed.

CAUTION
A hazardous situation which can lead to minor or moderate injury, property damage, or economic loss.

Important	Non-urgent information that may impact the outcome of a process or procedure.
Note	Additional information or a tip that may help the user to work more efficiently.

DO NOT DISCARD IN TRASH CAN
Product should not be discarded as unsorted waste. It must be sent to separate collection facilities for recovery and recycling.

CONTACT SENSIA

For technical support, please refer to https://www.sensiaglobal.com/Technical-Support.

For all other inquiries, please refer to https://www.sensiaglobal.com/Customer-Care or dial 1-866-773-6742.

REVISION HISTORY

Revision	Description of Change	Issuer	Approver	Date
01	Release to production	KM	TMM	6-7-2023

PUBLISHER NOTES

DISCLAIMER

While Sensia has taken every care in the preparation of this document, it cannot accept responsibility for printing errors or omissions and does not warrant that it is correct and comprehensive in every particular instance. Equipment supplied should always be operated by persons with an appropriate level of skill and training.

Sensia shall not be liable for incidental or consequential damages resulting from the furnishing, performance or use of this material.

Sensia pursues a policy of continuous improvement, and information given herein may be updated without notice. Further, this information is proprietary to Sensia, and must not be disclosed to any third party except as may be required to operate the equipment supplied in accordance with the purposes for which it was sold by the persons properly licensed to operate it.

COPYRIGHT NOTICE

TRADEMARKS & SERVICE MARKS

An asterisk (*) is used throughout this document to designate marks of Sensia. Other company, product, and service names are the properties of their respective owners.

Sensia, the Sensia logotype, and other words or symbols used to identify the products and services described herein are either trademarks, trade names or service marks of Sensia and its licensors, or are the property of their respective owners. These marks may not be copied, imitated or used, in whole or in part, without the express prior written permission of Sensia. In addition, covers, page headers, custom graphics, icons, and other design elements may be service marks, trademarks, and/or trade names of Sensia and may not be copied, imitated, or used, in whole or in part, without the express prior written permission of Sensia.

WARRANTY

Product warranty is specified in Sensia Terms and Conditions at the time of purchase.

SECURITY NOTICE FOR SOFTWARE PRODUCTS

The software described herein is designed to operate with the minimum hardware and operating system specifications recommended by Sensia. The software should be operated in a secure environment whether operation is performed across a network, on a single system and/or on multiple systems.

The end user is responsible for configuring and maintaining networks and/or system(s) in a secure manner. The end user is also responsible for obtaining, installing, operating and maintaining all hardware, other equipment and third party software required for use of the software. Sensia is not responsible for data loss arising as a result of software use or interaction of the software with any third party software.

For more information about recommended security practices, please contact Sensia Technical Support via https://www.sensiaglobal.com/Technical-Support.

Page intentionally left blank

Table of Contents

Section 1: Getting Started

INTRODUCTION

The NUFLO* MC Synergy* Software is downloadable from the Sensia website and allows you to configure the MC Synergy, calibrate inputs, download logs, and view data.

In fact, it gives you two ways to configure a device:

1. You can upload configuration settings while your PC or laptop is actively connected to the device.
2. You can create or edit configuration settings offline without a device connection and save them to a proprietary file that can be stored on a computer and imported into devices as needed.

PC software is one of four interface options available for the MC Synergy totalizer and has the most extensive set of configurable options. Other interfaces include the local keypad menu, a Bluetooth app that can be downloaded to a smart phone or tablet, and with the purchase of an expansion board, HART communications.

COMMUNICATIONS WIRING

To connect to an MC Synergy, you will need the following cables/converters:

- An RS-485 communications converter assembly that connects to one of the MC Synergy's RS-485 ports and provides an RS-232 or USB connector on the other end
- For connecting to a PC or laptop USB port, a USB A/B communications cable is also required.

In a non-hazardous area, the converter assembly can be installed on an EXP model with the enclosure cover removed, or installed in a WP model by routing the cable through a conduit in the bottom of the enclosure. To establish a USB connection in an EXP device without removing the cover, see USB Connection for EXP Model below. Converter assemblies and USB cables are available from Sensia.

For complete installation information, see the MC Synergy EXP and WP Hardware User Manuals.

USB CONNECTION FOR EXP MODEL

The NUFLO USB Adapter allows a user to connect a computer to the MC Synergy EXP using a standard off-the-shelf USB connector cable for quick and easy downloads without opening the MC Synergy enclosure. A customer-supplied universal USB cable is required to connect the NUFLO USB adapter to a computer.

To complete the installation, you will install a required driver available from the Sensia website. See Installing a USB Adapter Driver, page 10 for details.

Instructions are also supplied in the NUFLO USB Adapter Installation Guide, which is included in the software download selections on the Sensia website.

INSTALLING SOFTWARE AND DRIVERS

The latest user interface software is available for download on the Sensia website. Use this procedure to download and install the program.

1. Download the MC Synergy Software install file as follows:
   a. Navigate to the Sensia website in your web browser: https://sensiaglobal.com/Measurement.
   b. Choose Turbine Flow Electronics tile from the product grid.
   c. Choose the NUFLO MC Synergy device.
   d. Scroll to Product Resources and click Software.
   e. Click the Download link for MC Synergy software to download install files to your computer.

Note	Before exiting the Software web page, review the contents and download any other software or drivers you may require, such as the ScanData software for viewing archive data or the USB adapter driver.

2. Browse to the “NUFLOMCSynergyInterfaceSoftware.zip” folder on your computer, right-click, select Extract All, and select a location for the extracted files. To automatically open the folder containing extracted files, check the box next to “Show extracted files when complete.”
3. Launch the Setup.msi file to initiate installation.
4. Follow the onscreen prompts, editing the program folder if desired. By default, program files will be stored at C:\Program Files (x86)\Sensia\MC Synergy Interface.
5. When the installation is complete, a MC Synergy icon (Figure 1.1) will appear on the desktop and the MC Synergy software will appear under the START menu of your PC or laptop.

Figure 1.1—MC Synergy desktop icon

INSTALLING A USB ADAPTER DRIVER

If you are using a NUFLO USB Adapter to connect to your MC SYNERGY EXP device, use the following procedure to install the required driver.

1. Disconnect the USB adapter from your computer, if connected.
2. Download the driver from the Sensia website as described in step 1 of the above software installation procedure.
3. Extract the contents of the zip file and click setup.htm.
4. Click Install USB Driver to install the NUFLO USB Adapter driver, following on-screen instructions.

Section 2: Connecting to a Device

When you connect to your MC Synergy device, you can view device status including alarm conditions, configure the device, apply calibration data from the companion flow meter, download device history, and perform necessary maintenance.

Important You do not have to be connected to a device to create or edit configuration settings. See Configuring a Device Offline, page 35 for instructions on building a configuration file offline.

CONNECTING TO THE MC SYNERGY

Before attempting to run the interface software, verify that the MC Synergy is connected to a computer with an RS-485 to USB converter or a NUFLO USB adapter. See the MC Synergy Hardware User Manual for details.

1. Open the MC Synergy software and press Connect to Device on the Home page (Figure 2.1).

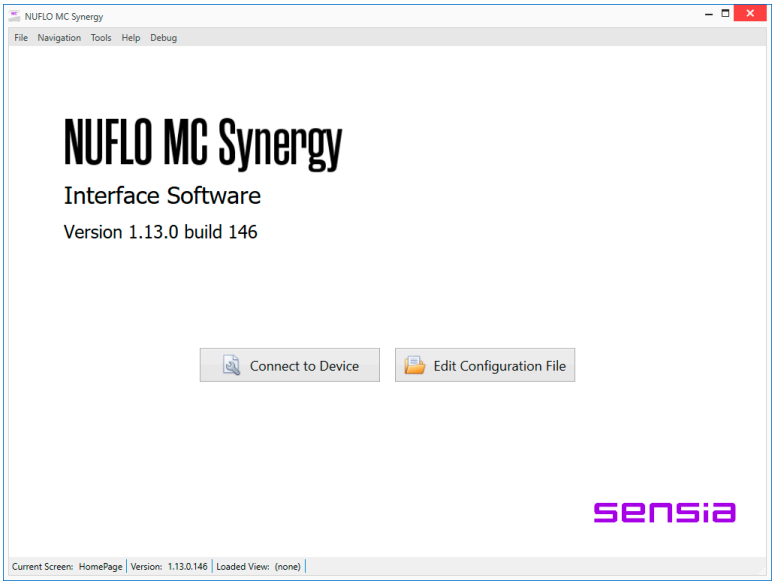


Figure 2.1—Home page

2. Choose one of three connection methods, depending on your needs:

   – **Recent Connections**. The window will list the parameters of the most recently connected devices. This is a good choice if you regularly connect to the same MC Synergy using the same COM port, baud rate, and slave address.

   – **Express Connect**. This selection scans for connected devices on the specified COM port and attempts to connect to the device. The software automatically determines the communication settings including baud rate and slave address. This connection type is best used when you are connected to only one MC Synergy device.

   – **Specify Parameters.** This selection allows you to enter custom parameters for serial communication over the COM port. This is useful when you are connected to several MC Synergy devices on a single RS-485 network. Each MC Synergy must have a unique slave address. This is a good choice for troubleshooting device connectivity while manually changing parameters on the MC Synergy keypad (see the MC Synergy Hardware User Manual for details).

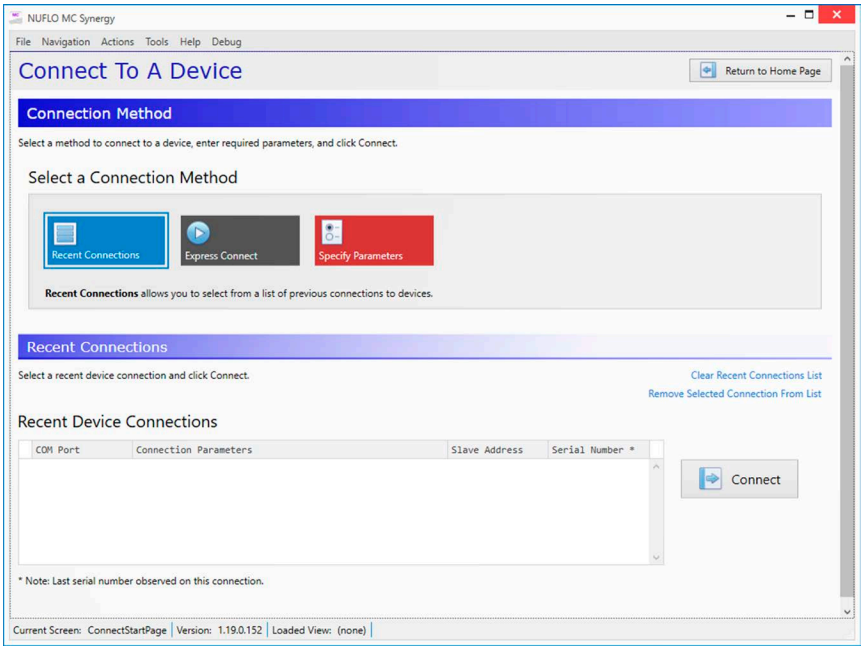


Figure 2.2—Recent Connections screen

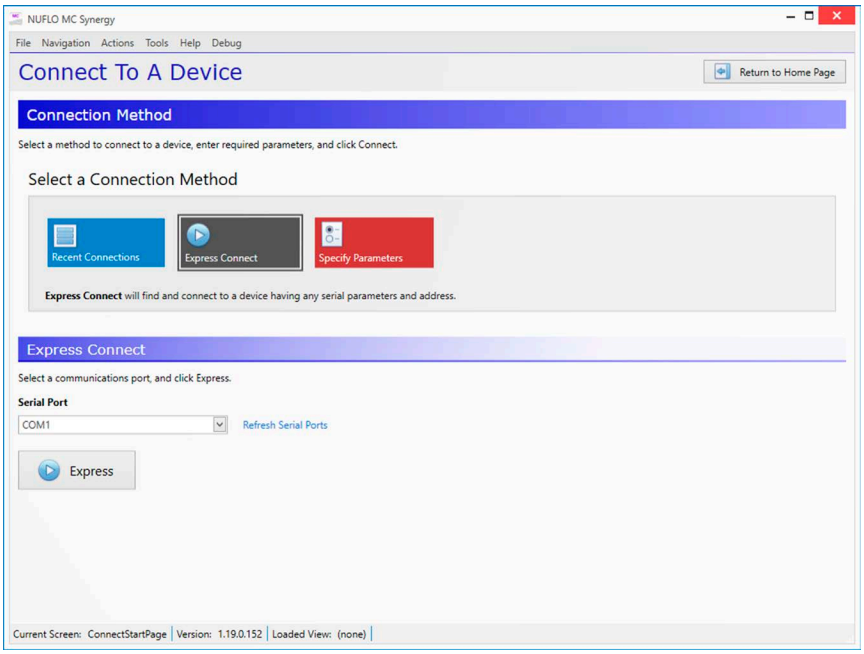


Figure 2.3—Express Connect screen

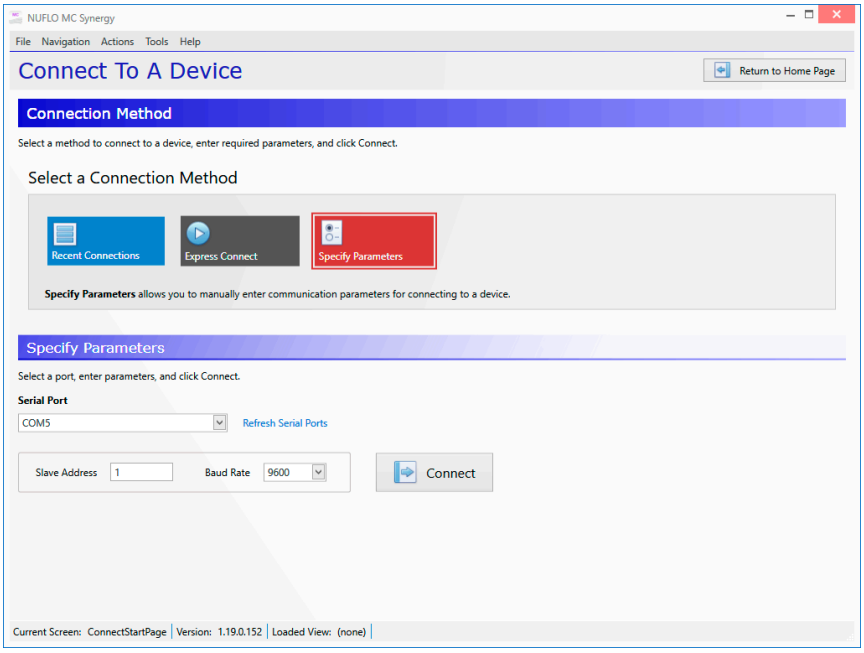


Figure 2.4—Specify Parameters screen

When the software locates the MC Synergy device and begins the connection, the main screen will appear and blue progress bars can be observed in the framed navigation window at the top of the screen and at the bottom of the screen.

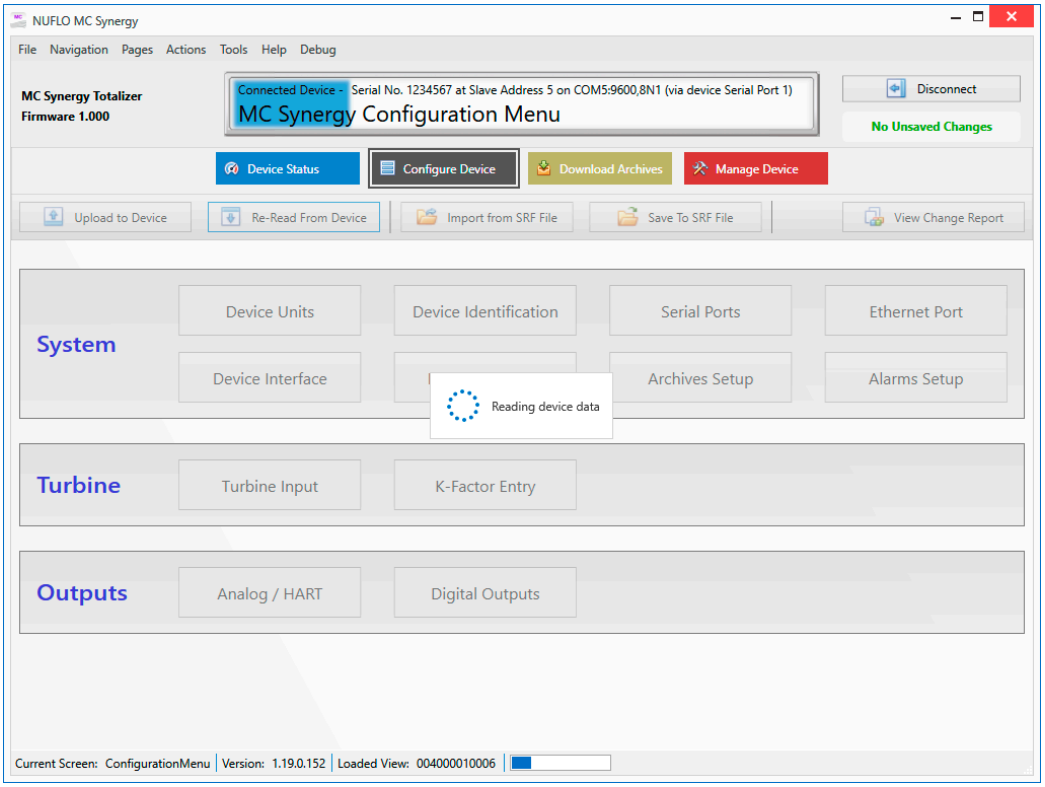


Figure 2.5—Progress bars confirm a connection in progress

CHANGING DEFAULT CONNECTION SETTINGS

If you repeatedly use a connection method other than the factory default Express Connect method, you can save steps by changing the connection default setting. See Change Default Connection Method, page 94, for details on changing this default setting.

TROUBLESHOOTING A CONNECTION FAILURE

A connection failure can be caused by a mechanical problem or incompatible software communication settings. For help in detecting and correcting a problem, please review Appendix A—Troubleshooting Serial Communications, page A-1 for a list of some of the more common connection and communication issues and solutions. If you are unsuccessful in resolving your issue with these suggestions, contact a Sensia technician for assistance using the contact information provided in the Help>About menu in the software and on page ii of this manual.

Section 3: Navigating the Software

Upon connecting with the MC Synergy, the software will display the main navigation screen shown in Figure 3.1. Using the four navigation menus that appear as brightly colored tiles at the top of the screen, you can view, configure, and maintain all of the measurement functions supported by the MC Synergy.

Immediately above the navigation menus, a framed window provides a "you are here" reference to identify your location at any given time. It also provides positive identification of your connected device by displaying serial number, slave address, communications port details.

The content in the main body of this screen changes to reflect the menu (tile) selected. Upon connecting to the device, the view defaults to the Device Status screen shown below. Click the other tiles in the navigation menu to see how the screen content changes with respect to each menu selection.

This section provides an overview of the software interface to help familiarize you with basic navigation. Sections 4 through 8 then build on this content by exploring the functionality that is specific to each of four primary navigation menus.

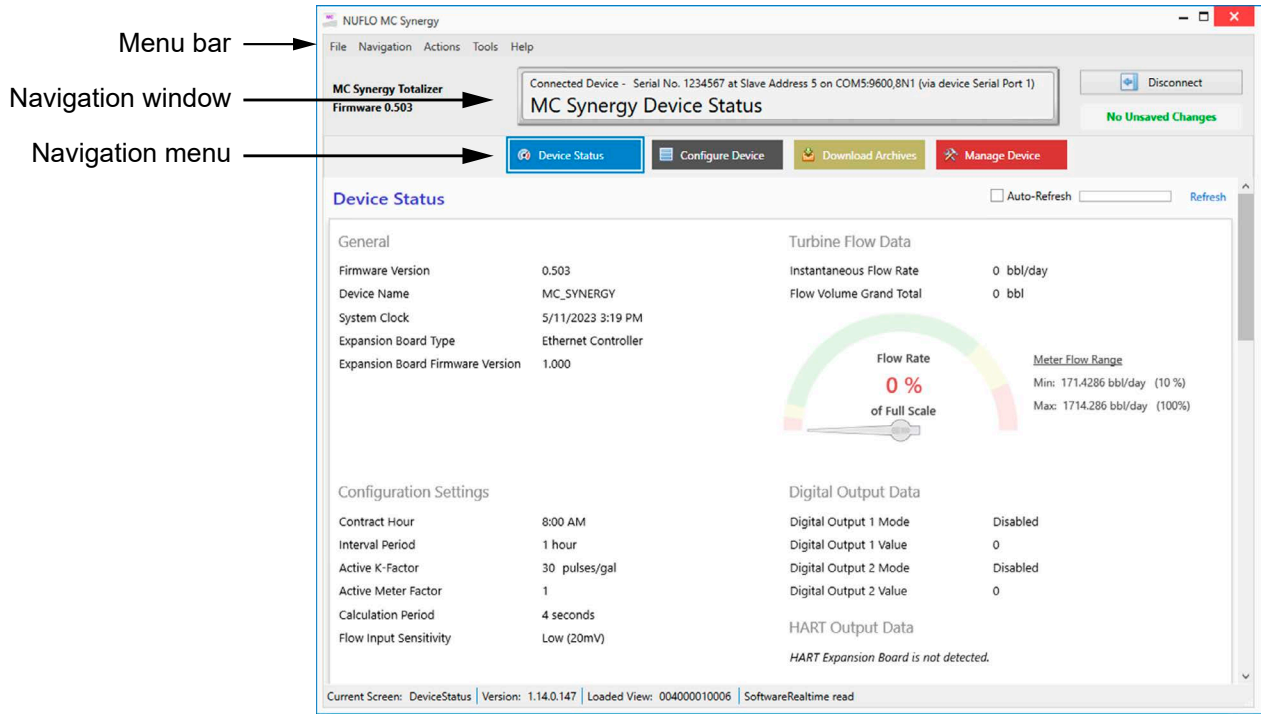


Figure 3.1—Key navigation features

The distribution of software features among four primary menus or functions allows you to instinctively choose a menu based on the feature or function you desire, navigate through related settings to configure your device, and then upload your settings to a connected device.

From any of these four main screens, you can disconnect from your device by clicking Disconnect in the upper right corner of the screen.

DEVICE STATUS

This menu provides a snapshot of current configuration settings, real time flow rate and grand total volume, real time output values where applicable, alarms status, system/archives status and network status. This

screen can give important indicators for device health to help you quickly identify necessary maintenance for the connected device or turbine meter.

Refresh the view as needed using the two Refresh options in the upper right corner of the screen. Click the Refresh link to refresh the screen on demand, or check the Auto-Refresh checkbox to enable a periodic refresh.

CONFIGURE DEVICE

When the PC software connects to an MC Synergy device, the device configuration is automatically downloaded. To edit the configuration, enter new selections into the software interface and then click the Upload to Device button (Figure 3.2) to write the new settings to the device.

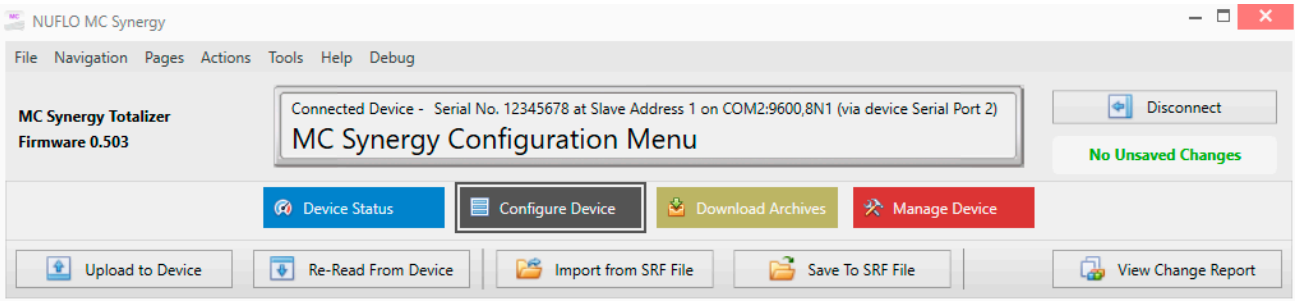


Figure 3.2—Configure Device menu

From the Configure Device screen, you can perform four primary configuration functions using the gray tabs with icons located just below the colored navigation menu:

- Upload configuration settings to a device
- Re-read configuration settings from a device
- Import configuration settings from a saved configuration (SRF) file
- Save existing configuration settings to a local configuration file (SRF) for use in configuring other devices

UPDATING YOUR DEVICE CONFIGURATION

From the Configure Device screen, you will also see a grid of submenus grouped by three configuration types: System, Turbine, and Outputs (Figure 3.3). Clicking on any one of these grids will open a screen with related settings for your selection.

See sections 5 through 7 for step-by-step instructions.

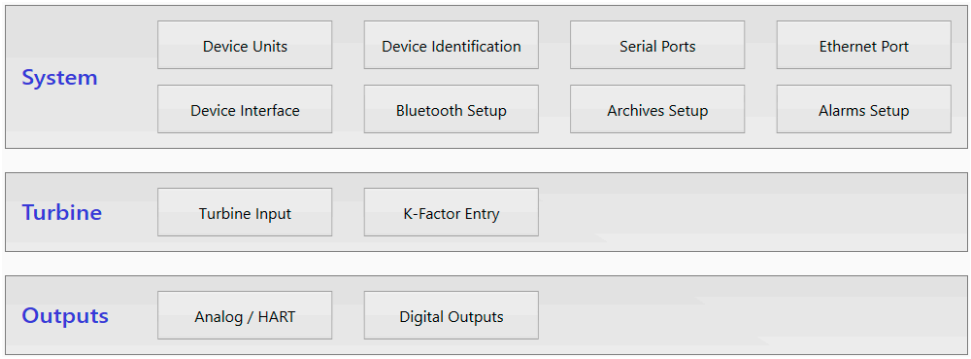


Figure 3.3—Configuration sub-menus

When you have completed your configuration, you can click Upload to Device to apply the settings immediately to a connected device.

Alternatively, you can configure device settings offline without a device connection and save the settings to a local SRF file that can be safely shared with others and used to configure field devices as needed. See Configuring a Device Offline, page 35, for detailed instructions about offline device configuration.

UNSAVED CHANGES ALERT

If you have entered configuration changes that were not uploaded them to the device, you will see a red Unsaved Changes alert in the upper right corner of the Configuration Menu screen (Figure 3.4).

You can view the unsaved changes by clicking View Change Report, located just below the alert. Inside the Change Report, click the Show Changed Fields Only link to filter the view to unsaved changes (Figure 3.5, page 18). This view exists only when there are UNSAVED changes.

Note	If unsaved changes exist and you click anywhere other than the "Upload to Device" button, an Alert dialog will appear to prompt a decision to save or discard the changes.

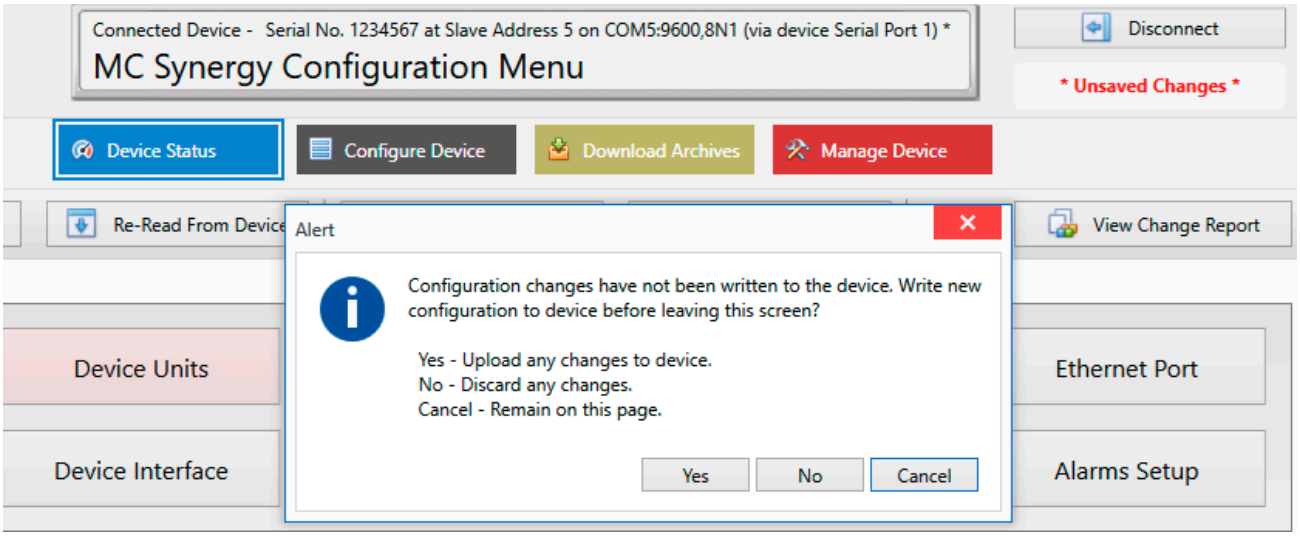


Figure 3.4—Unsaved Changes alert

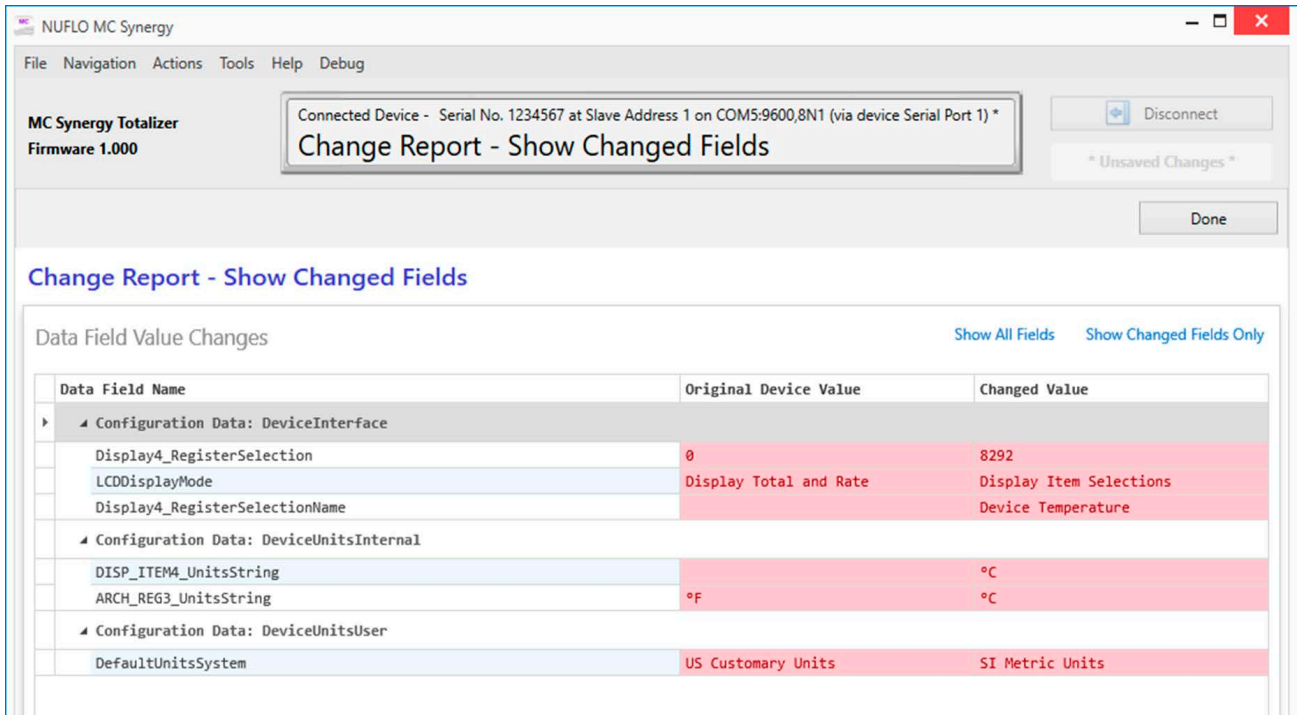


Figure 3.5—Change report filtered to show pending changes

DOWNLOAD ARCHIVES

The Download Archives menu allows you to download the stored archives from the device (Figure 3.6, page 19). Files are saved in a secure non-editable SDF format that can be opened with Sensia's data analysis software, ScanData.

Sensia offers two file naming conventions to help you manage your downloads and make them easier to retrieve. You may opt for the automated file naming scheme or arrange for a prompt to enter a custom file name after each download.

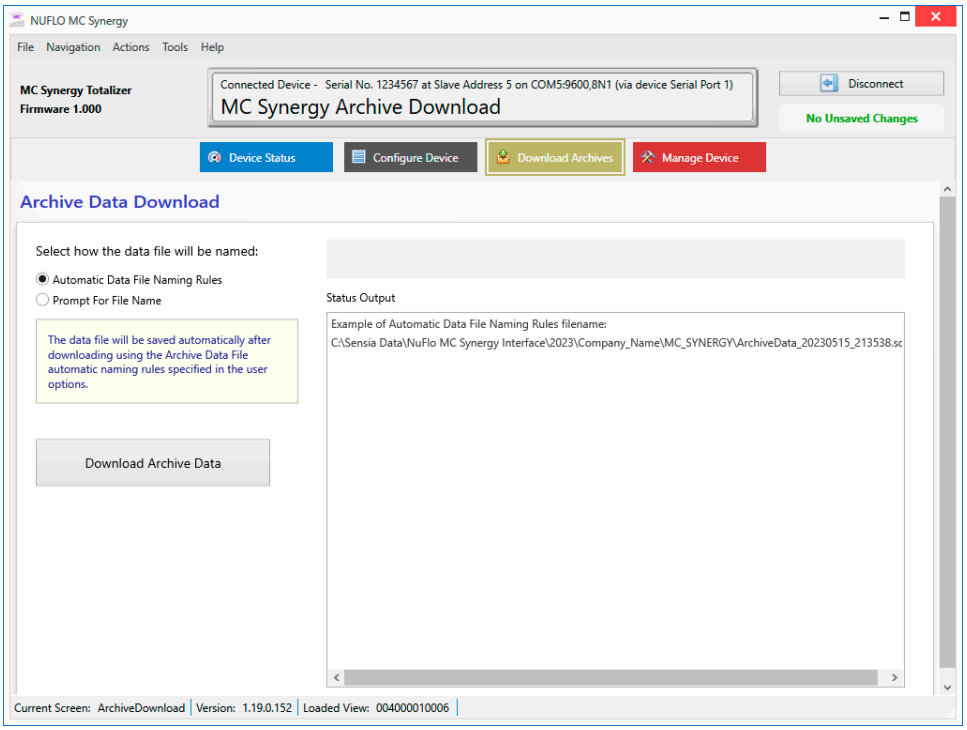


Figure 3.6—Download Archive menu

MANAGE DEVICE

The Manage Device menu contains a variety of discrete functions that can be performed to manage and maintain the MC Synergy. They are grouped into four categories:

- Configuration Upload
- Device Commands
  - Sync Device Clock
  - Sync Device Clock with Offset
  - Clear Unacknowledged Alarms
  - Reset Grand Total
  - Create Partial Records
  - Reset Port Stats (typically for debugging)
  - Load Defaults
  - Reset Meter Kit Life (improved maintenance)
- Output Calibration
  - Calibrate Analog Output (set trim offset and scale for a 4 to 20 mA output)
  - Reset Analog Output Calibration
- Device Firmware Update
  - Upload Firmware Image
  - Activate Stored Firmware (if firmware is not activated at the end of upload)

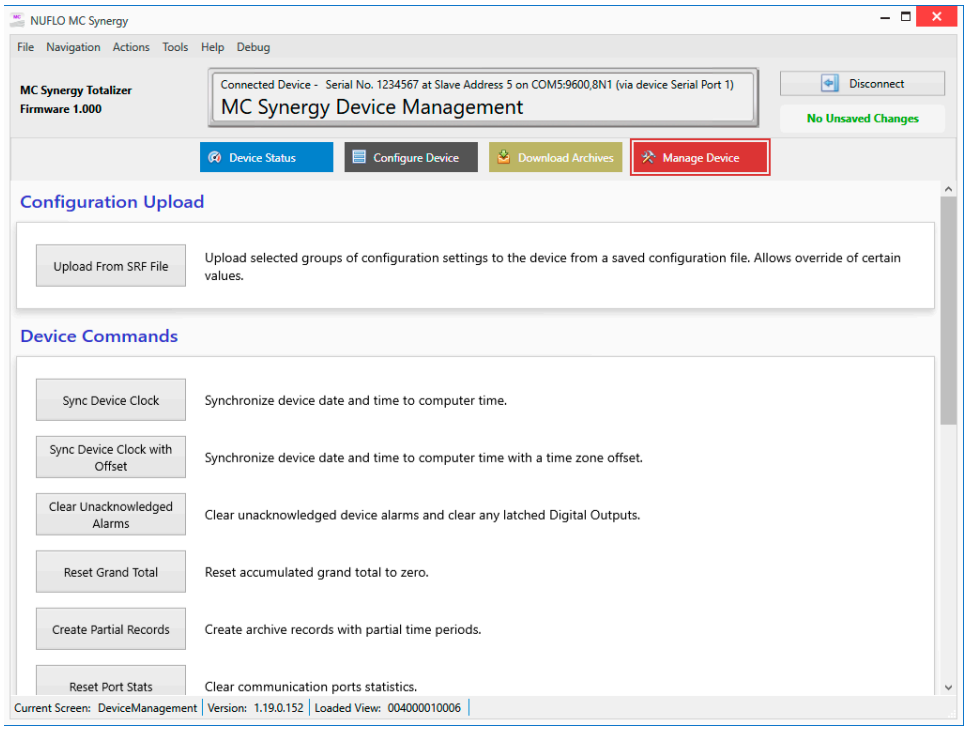
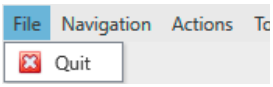
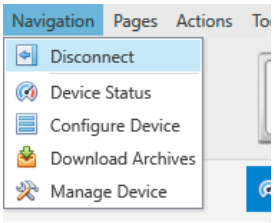
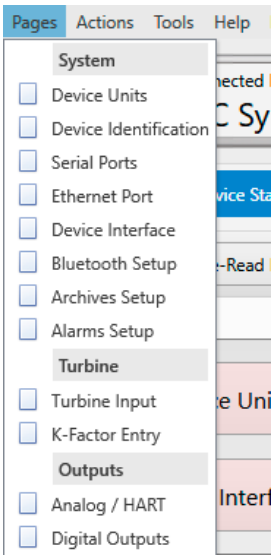
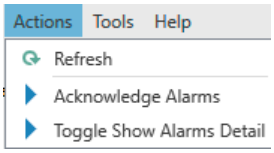
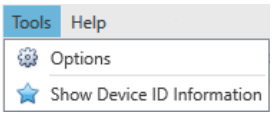
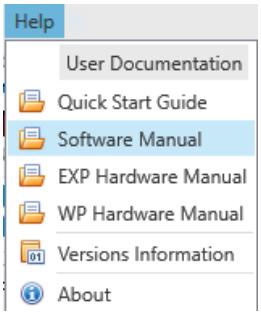


Figure 3.7—Manage Device menu

MENU BAR

A standard menu bar at the top of the interface provides an alternate access point for navigation and may be preferred in certain operating environments. It is accessible from every software screen. See Table 3.1—Menu Bar, page 21 for a detailed summary of menu options and layout.

Section 11: Interface Options, page 93, further explores settings in the Tools>Options menu for helping you to fine-tune your user experience. You can change default settings to save steps in accessing the settings you use most often, change communications settings to aid in troubleshooting, and learn to set up rules for auto-naming your archive files, for example.

TABLE 3.1—MENU BAR		
File		Exit the software from any location.
Navigation		From any of the four primary navigation menus, you can 1) disconnect from the device or 2) choose a different primary navigation menu. From submenus, you can return to a primary menu.
Pages		Appears only when the Configure Device menu is selected. Select any of the sub-menus shown to configure a specific function.
Actions		Available actions vary, depending on your location in the interface.
Tools		Access advanced optional settings for device connection, communication and data archival. Access a snapshot of device ID information including hexadecimals, which may be of use in troubleshooting issues.
Help		Access instructional manuals. Verify the version of software components loaded (useful for troubleshooting). Click About for technical support contact info or to view the Sensia license agreement.

Page intentionally left blank

Section 4: Device Status

The MC Synergy Device Status screen (Figure 4.1) provides a snapshot of the Device Status, Alarms Status, System and Archives Status, and Network Status. This top-level view gives indicators for device health and helps you quickly identify maintenance needs for the connected device or turbine meter.

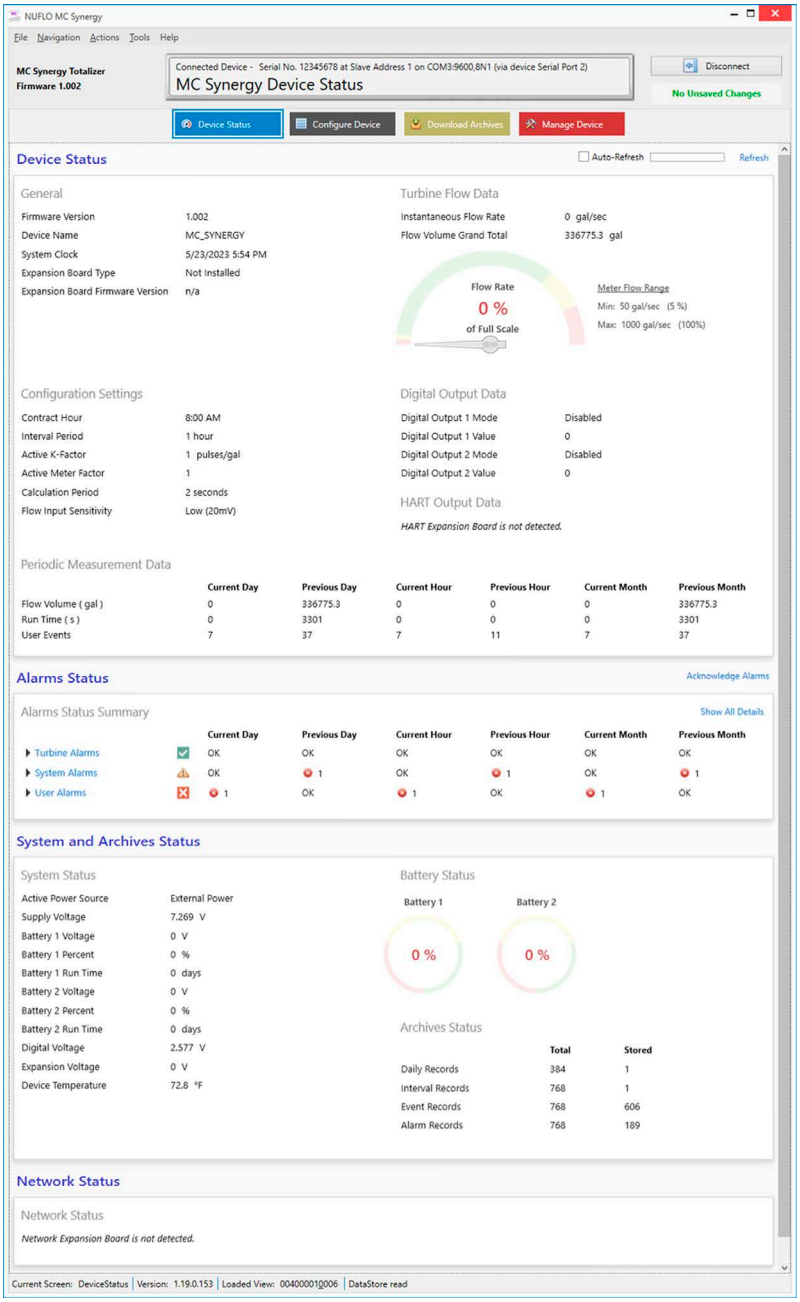


Figure 4.1—Status screen

Important To force an update to your real-time device status data, use the two Refresh options at the top of the screen. Click the blue Refresh Link to refresh the screen on demand or check the Auto-Refresh checkbox to enable a periodic refresh.

DEVICE STATUS

The Device Status screen (Figure 4.2) helps you to ensure that your connected device is up to date, the time is synced correctly, an expansion board (if present) is detected and operating as expected, the basic configuration and input and output data is as expected, and periodic measurements are tracking properly.

For more detailed information, download and view archive data (see Section 9: Download Archives, page 81).

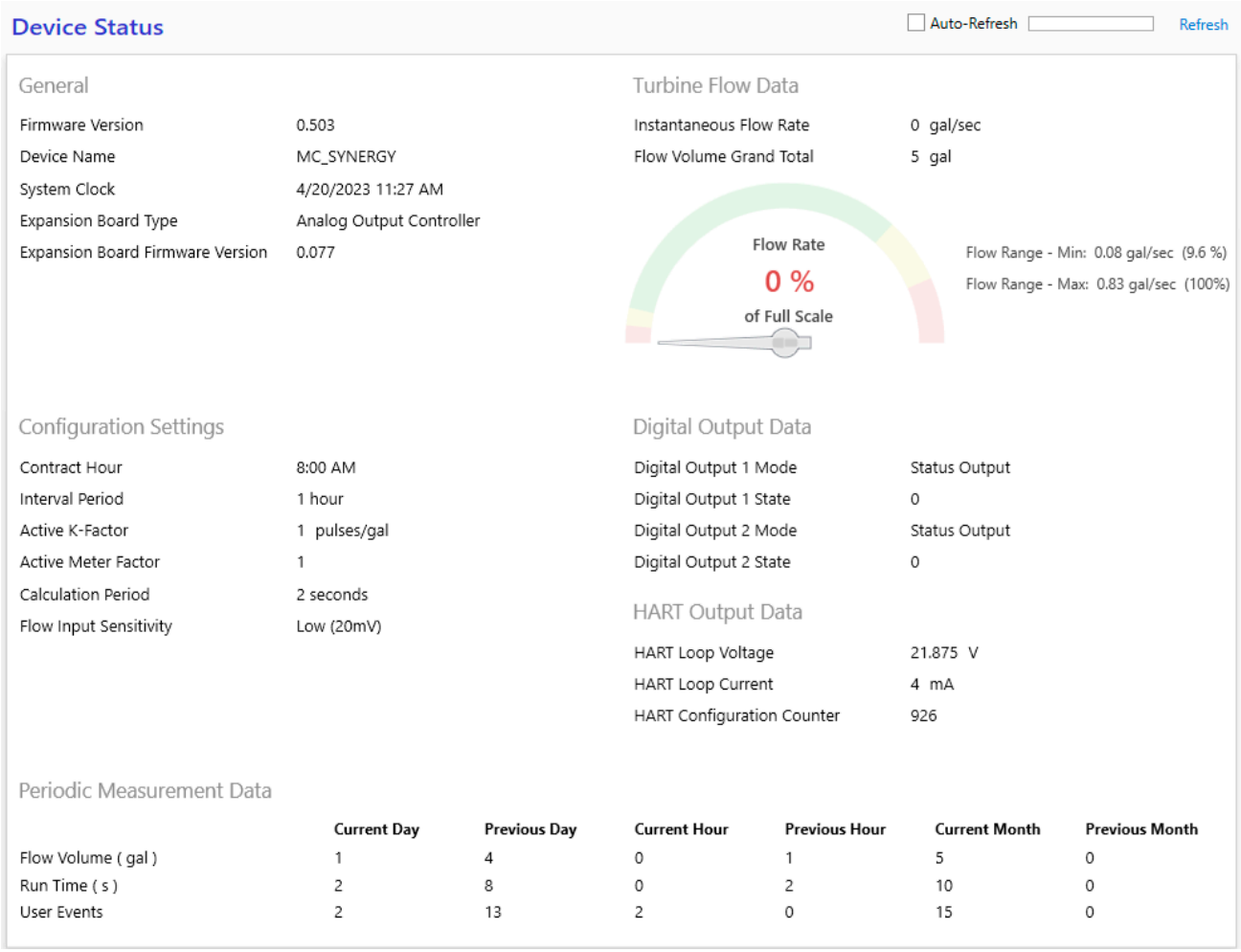


Figure 4.2—Device Status

- General. Shows firmware versions, device time and date (which attempts to synchronize with the computer time and date upon device connection), and acknowledgment of an expansion board if installed.
- Turbine Flow Data. Shows device operation details. The flow rate, displayed as percentage of full scale in a speedometer type gauge, is calculated from the K-factor and meter factor (if configured). The flow rate and grand total units may be selected in the Configure Device tab (see Device Units, page 43).
- Configuration Settings. Shows the basic configuration present on the device. The active K-factor may be an interpolated value that is dependent on the input signal frequency from the turbine meter.
- Digital Output Data. Shows the configured output mode and an associated "state" or "value."
  - When the output is a status output, the state of the output will display as a 1 (Activated/On) or 0 (Deactivated/Off).

  - When the output is operating as a pulse output, the value represents the number of pulses remaining to be transmitted. A value of zero means that there are no pending pulses to be transmitted. Non-zero values occur when the pulses are being sent out, but the flowing conditions, scale factor, and pulse duration have exceeded the time allotted between flow calculations. The MC Synergy caches these pulses to be transmitted. If the output cache value is large and not approaching zero, consider adjusting the pulse output scale factor and/or the pulse duration.
  - When the output is operating as Amplified Raw Output, the value will always show 0, which should be interpreted as "not applicable."
- HART Output Data. Shows the current output values and variables being outputted from the device. The HART values will be zeroed if the HART expansion board is not installed, or if HART is not enabled.
- Periodic Measurement Data. Shows hourly, daily, and monthly trends for volume, run time, and user events.

ALARMS STATUS

The Alarms Status (Figure 4.3) gives a synopsis of the state of the current turbine, system, and user alarms that are enabled. To view the state of all alarms in a specific category, simply click the triangle icon next to the category (Turbine Alarms, System Alarms, or User Alarms) to expand the list, or click “Show All Details” at the right of the screen to expand all three alarm categories.

ALARM INDICATORS

The following graphical indicators are used to show alarm status.

General Health

The unlabeled column of symbols highlighted in Figure 4.3 is an indicator of general health that is viewable when the turbine, system, and user alarm lists are collapsed.

An active alarm is present.

An alarm is unacknowledged.

Good health (no active alarms are present).

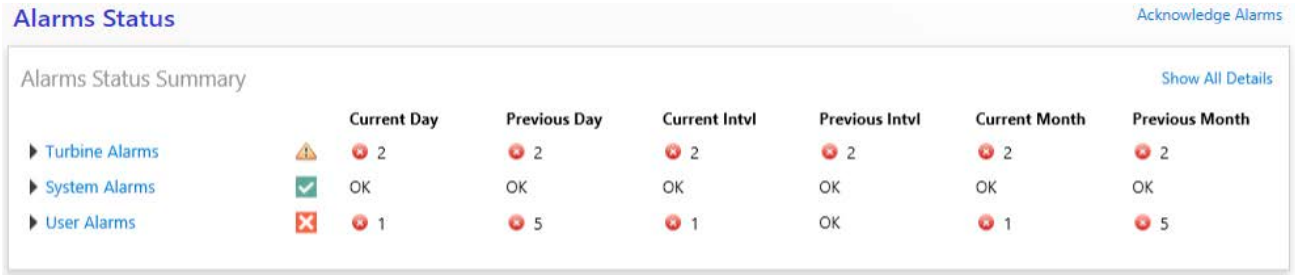


Figure 4.3—Alarms status, collapsed view

Detailed Alarm Status

When an alarm list is expanded (Figure 4.4), the following indicators are used to show the status of individual alarm conditions.

An active alarm is present.

An alarm is unacknowledged.

Good health (no active alarms are present).

System Alarms Detail

	Status	Current Valu	Inst		Unack	Current Day	Previous Day	Current Hour	Previous Hour	Current Month	Previous Month
Time Not Set	✓	0	-		-	-	-	-	-	-	-
Supply Voltage	⊗	27.848 V	⊗		⚠	⊗	-	⊗	-	⊗	-
Expansion Voltage	✓	13.724 V	-		-	-	-	-	-	-	-
BAT1 Voltage	⚠	0 V	-		⚠	⊗	-	⊗	-	⊗	-
BAT1 Percent	✓	99.995 %	-		-	-	-	-	-	-	-
BAT2 Voltage	✓	0 V	-		-	-	-	-	-	-	-
BAT2 Percent	✓	0 %	-		-	-	-	-	-	-	-

Figure 4.4—Alarms status, expanded view

Acknowledging an Alarm

The Status column shows the current status of all configured alarms. When an alarm condition occurs, an alarm indicator will appear in the Status column and an Unacknowledged symbol ⚠ will appear in the Unack column. When the alarm condition has been serviced, click Acknowledge Alarms (Figure 4.3, page 25, upper right corner) to reset the status of the alarm. This will remove any Unacknowledged symbols associated with the parameter if no alarm conditions are present. If alarm conditions persist, the respective alarms will reactivate.

If the current Status is showing an Unacknowledged symbol ⚠, as in the example of BAT1 Voltage in Figure 4.4, this is an indication that the parameter was in alarm previously but has returned to normal status without the alarm being acknowledged. In this case, the Unacknowledged symbol will be displayed in both the Status and Unack columns. Clicking Acknowledge Alarms should clear both symbols.

To clear all unacknowledged alarms in one step, go to the Manage Device tab (see Section 10: Manage Device, page 85) and click Clear Unacknowledged Alarms. This action is useful when working with a technician to verify an alarm condition is no longer present.

Note	Bent Blade, Missing Blade and Erratic Signal will not display the yellow Unacknowledged Alarm symbol in the Status column following detection of an alarm condition. Once the alarm is triggered, the red Alarm symbol will be displayed in the Status column and the "Inst" (Instantaneous) column, and the Unacknowledged Alarm symbol will be displayed in the "Unack" column. The Alarm and Unack symbols will clear once the alarm is acknowledged.

Suppressing Alarms

Important	From the PC software, you can suppress the display of system, turbine, and user alarms in the local device display to minimize interruptions in the readout. This will not affect the way alarms are displayed in the software, in alarm logs, or in Enron reports. See LCD Display Settings, page 52, for configuration information.

TURBINE ALARMS

The Turbine Alarms status display gives you current status information for the connected turbine and a brief history of the turbine health over the current and previous interval, day, and month. This will either show “OK”, or indicate the number of alarms that have activated within the designated time period (hour, day, and month). To see the individual alarms activated, click the triangle icon to expand the Turbine Alarms view (Figure 4.5).

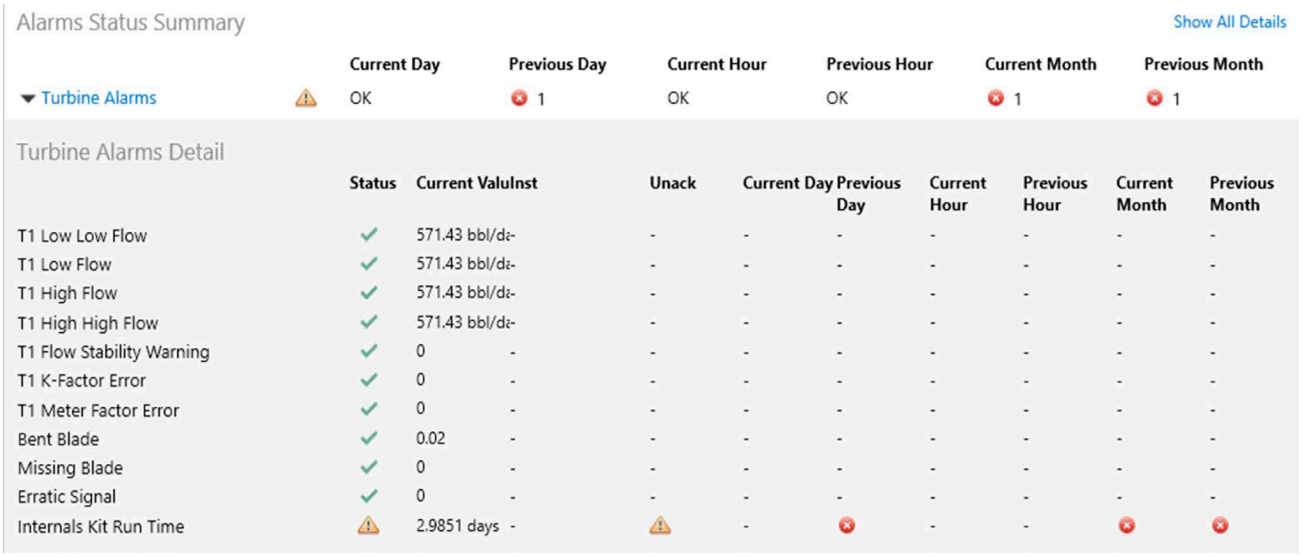


Figure 4.5—Turbine Alarms status

By default, the MC Synergy detects the following turbine alarm conditions. For a more detailed definition of these alarm setpoints, see the NUFLO MC Synergy EXP and WP hardware manuals. See also Turbine Meter Information, page 64.

- T1 Low-Low Flow. Flow rate is significantly lower than the configured low flow range for the turbine meter.
- T1 Low Flow. Flow rate is below the configured low flow range for the turbine meter.
- T1 High Flow. Flow rate is above the configured high flow range for the turbine meter.
- T1 High-High Flow. Flow rate is significantly higher than the configured high flow range for the turbine meter.

CAUTION
High-High Flow Alert. Continuing in a critically high flow state may cause permanent damage to the turbine.

- T1 K-Factor Error. The entered K-factor calibration is invalid. See K-Factor Settings, page 66, to recalibrate.
- T1 Flow Stability Warning. The device has detected high fluctuations in the flow rate over an extended period of time (more than 10 seconds).
- T1 Meter Factor Error. The entered Meter Factor calibration is invalid. See Meter Factor Settings, page 67, to recalibrate.
- Bent Blade. The device has measured a deflection greater than 2° from the turbine input signal. Ensure that the configured blade number is accurate, and check blade configuration before servicing the turbine meter.

- Missing Blade. The device has detected a blade that is severely bent, washed out, or broken off. Ensure that the configured blade number is accurate and check blade configuration before servicing the turbine meter.
- Erratic Signal. The device has detected a signal that appears to be intermittent, noisy, or outside of expected parameters. An erratic signal may be due to damaged, loose, or faulty wiring, a damaged, loose, or faulty pick-up, or line noise. Increase the input threshold configuration if line noise is suspected. If this is ineffective, check for damaged, loose, or faulty wiring or pickup connection.
- Internals Kit Run Time. When the flow time of the turbine meter has reached the configured kit life, replacement of the kit is recommended. Replace the meter and reset the alarm by activating the Reset Meter Kit Life button in the Manage Device menu or selecting Replace Meter Kit in the turbine input menu of the local display menu. See the MC Synergy Hardware Manual for more information. The MC Synergy will respond by automatically setting the turbine meter life to the elapsed flow time recorded for the replaced turbine meter.

Note	If you do not configure the expected kit life for a connected turbine meter, the meter kit life alarm will activate after 2 years of use. The configurable range for expected meter kit life (flow time) is 1 to 3650 days.

SYSTEM ALARMS

The MC Synergy is designed with system alarms to alert you to conditions that could put the totalizer or a connected turbine meter at operational risk. System alarms trigger when the time has not been synced, or if the device is at risk of losing power. This display also provides a brief history of the MC Synergy over the current and previous hour, day, and month. This will either show “OK”, or will indicate the number of alarms that have activated within the time period (hour, day, and month). To see the specific alarms activated, click the triangle icon to expand the System Alarms view (Figure 4.6).

System Alarms Detail

	Status	Current Value	Inst	Unack	Current Day	Previous Day	Current Hour	Previous Hour	Current Month	Previous Month
Time Not Set	✓	0	-	-	-	-	-	-	-	-
Supply Voltage	⊗	27.848 V	⊗	⚠	⊗	-	⊗	-	⊗	-
Expansion Voltage	✓	13.724 V	-	-	-	-	-	-	-	-
BAT1 Voltage	⚠	0 V	-	⚠	⊗	-	⊗	-	⊗	-
BAT1 Percent	✓	99.995 %	-	-	-	-	-	-	-	-
BAT2 Voltage	✓	0 V	-	-	-	-	-	-	-	-
BAT2 Percent	✓	0 %	-	-	-	-	-	-	-	-

Figure 4.6—System Alarms status

- Time Not Set. The clock battery has expired and the device has lost power, or the time on the device has not been set. When a connection is established with an MC Synergy device, the software will automatically sync the device time to the computer, unless you decline the prompt. To manually set the time using the keypad, refer to the MC Synergy Hardware Manual. If the time is set, the current value will show “0”.
- Supply Voltage. The supply voltage is below 6V or above 27V for at least 5 seconds. The alarm condition will persist until a low input voltage rises above 6.7V, or a high input voltage drops below 26.3V. If not in alarm, the current value will be shown. A high-high alarm will trigger at 33V and a low-low alarm will trigger at 5V.

- Expansion Voltage. The Ethernet expansion board voltage is below 4V or above 16V for at least 5 seconds. The alarm condition will persist until a low input voltage rises above 4.7V, or a high input voltage drops below 15.3V. If not in alarm, the current value will be shown.
- BAT1/BAT2 Voltage. Battery voltage is over 5V for at least 5 seconds. The alarm condition will persist until the battery voltage drops below 4.8V. If not in alarm, the current value will be shown. A high-high alarm will trigger at 6V.
- BAT1/BAT2 Percent. A low alarm will trigger when the battery life is less than 20% for at least 10 seconds. A low-low alarm will trigger when battery life is depleted to 10%. The device displays the percent reading using the automatic coulomb counter feature on the MC Synergy.

USER ALARMS

The MC Synergy includes eight user-configurable alarms which may be set to trigger an alarm based on a list of registers (see Alarms Setup, page 58 for configuration and additional information). The Alarms Status display (Figure 4.3, page 25) gives a synopsis of the user alarms that are enabled, including current status information and a brief history of the MC Synergy over the current and previous hour, day, and month. This will either show “OK”, or indicate the number of alarms that have activated within the time period (hour, day, and month).

To see the specific alarms enabled, and which enabled alarms have been activated, click the triangle icon to expand the User Alarms view (Figure 4.7).

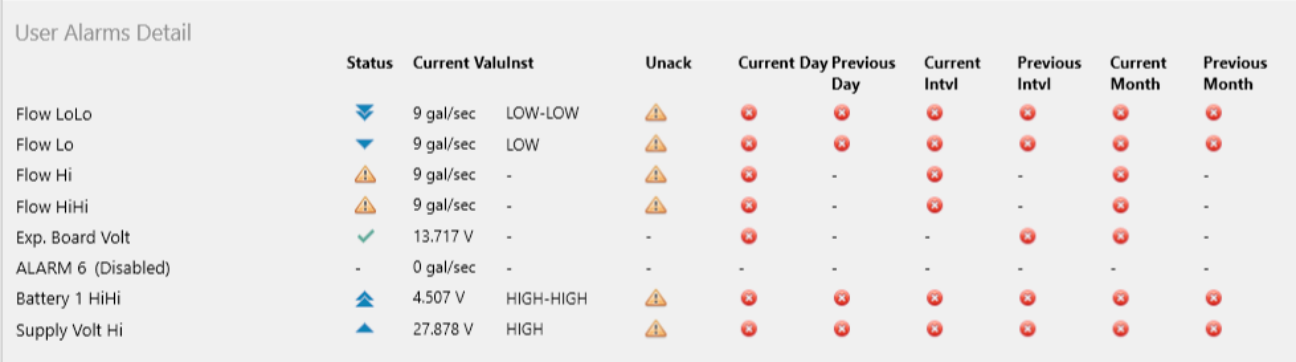


Figure 4.7—User Alarms status

Detailed User Alarm Status

When a user alarm list is expanded (Figure 4.7), the following indicators are used to show the status of individual alarm conditions.

An active alarm is present.

An alarm is unacknowledged.

Good health (no active alarms are present).

(Lo) The value of the configured item has dropped below the user-specified setpoint.

(LoLo) The value of the configured item has progressed beyond the primary low setpoint and dropped below a secondary user-specified setpoint.

(Hi) The value of the configured item exceeds the user-specified setpoint.

(HiHi) The value of the configured item has progressed beyond the primary high setpoint and exceeds a secondary user-specified setpoint.

SYSTEM AND ARCHIVES STATUS

The System and Archives Status (Figure 4.8) shows a snapshot of the device health and gives a summary of the memory usage for storing the daily, interval, event, and alarm records. This display may help explain why a device is not operating as expected, if a battery needs to be replaced, or if records need to be downloaded and cleared from a device in order to make room for more records.

If an archive reaches maximum capacity, older records will be overwritten by newer records. To preserve all records, you should periodically download the archived records from the device.

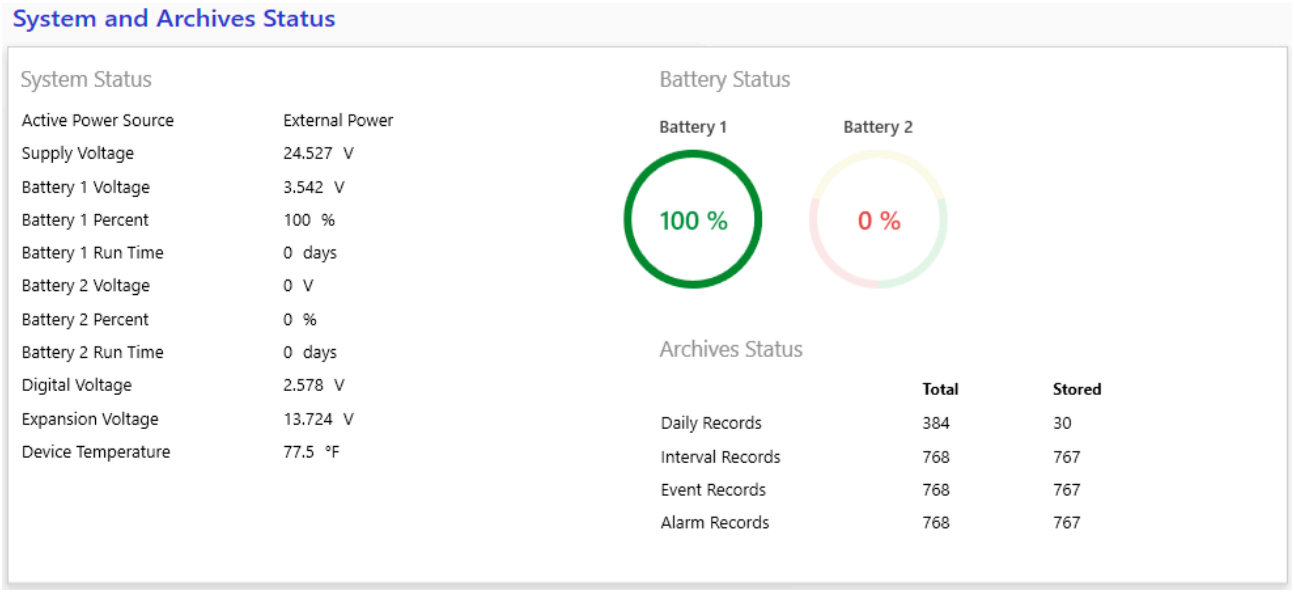


Figure 4.8—System and Archives status

SYSTEM STATUS

System Status provides a brief synopsis of device health. Note the power source indicated as the Active Power Source and verify it is correct. This is especially important if the device is to be externally powered and this display indicates that the active power source is Battery.

When a lithium battery is installed, the MC Synergy starts the automatic coulomb counter and begins tracking battery health. A low alarm will trigger when the battery life is less than 20% for at least 10 seconds. A low-low alarm will trigger when battery life is depleted to 10%, alerting you to replace the batteries. Total power loss to the device may cause the totals to be lost (except from the most recently archived record). Refer to the MC Synergy Hardware User Manual for detailed battery replacement instructions.

You may also use the System Status display to verify that the digital voltage is not grounded (i.e. it reads approx. 2.5 V).

When an option board is present, the MC Synergy provides a measurement of internal power supply called Expansion Voltage. When the Ethernet option board is installed and customer power is applied to the Ether-

net board, the system will measure approximately 5.1 VDC. When the HART/Analog output board is installed and the customer loop-power is applied, the system will measure 9 to 14 VDC.

ARCHIVES STATUS

Archives Status shows the number of daily, interval, event, and alarm records stored in the device so you can assess remaining capacity before data becomes overwritten. Up to 384 daily records, 768 interval records, 768 event records, and 768 alarm records can be archived before the oldest data is overwritten.

NETWORK STATUS

The Network Status (Figure 4.9) shows information pertaining to the Ethernet expansion board (if installed). This information will help you detect, connect to, and communicate with the device remotely, while retaining the use of the serial ports for other applications. The Ethernet port may be used to communicate with the device via Modbus-TCP or Modbus Over TCP. There are no advantages of one protocol over the other, and so determining which protocol to use will usually be dictated by the application. Most slave devices (or “servers” in Modbus-TCP) only support one protocol or the other.

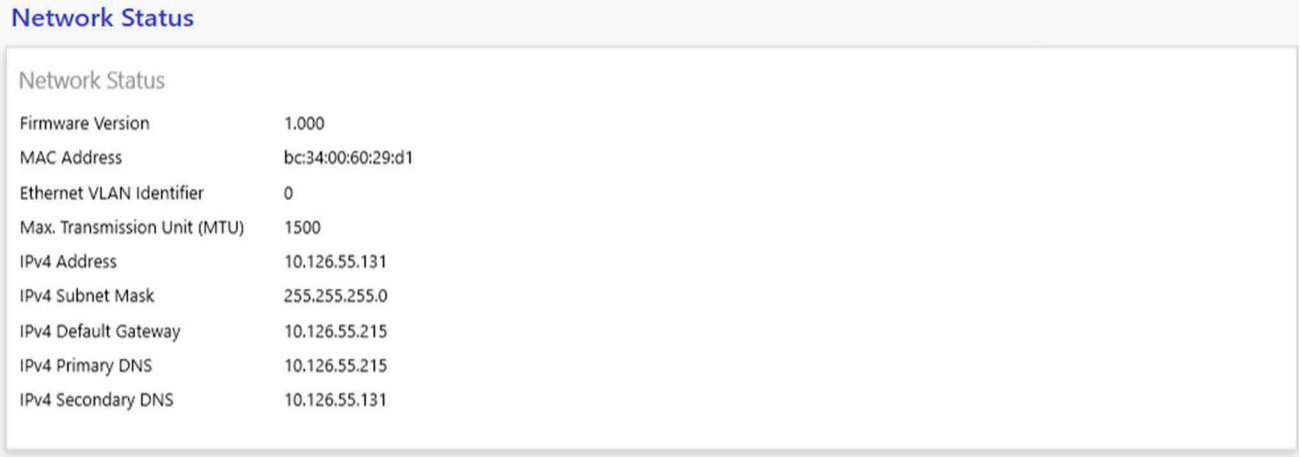


Figure 4.9—Network status

Modbus-TCP is a simple, vendor-neutral communication protocol intended for supervision and control of automation equipment. Specifically, it covers the use of Modbus messaging in an ‘Intranet’ or ‘Internet’ environment using the TCP/IP protocols. Some common uses are Ethernet attachment of PLC’s, I/O modules, and ‘gateways’ to other simple field buses or I/O networks.

Modbus Over TCP is typically used by serial servers supporting Modbus Ethernet client communications with multiple Modbus RTU-RS485 slaves. The serial server strips off the Ethernet section, and forwards the Modbus RTU message on to the serial port(s).

For additional information refer to Ethernet Port, page 48.

Note	Network settings will be populated on the Device Status screen even when power is not being applied to the Ethernet board. Don't confuse this with validation of a network connection. For tips on validating a network connection, see Verification of Ethernet Connection, page 32 below.

VERIFICATION OF ETHERNET CONNECTION

To verify the Ethernet board is operating as expected, enter the IP Address of the board into a browser address bar. A web page will verify the Ethernet connection (Figure 4.10).

To identify the IP address, look for the IPv4 address in the software Network Status display. Alternatively, you can tap the INC button on the MC Synergy keypad. The display will cycle through settings including the IP address of the Ethernet board.

A valid Ethernet connection will generate the web page verification shown below.

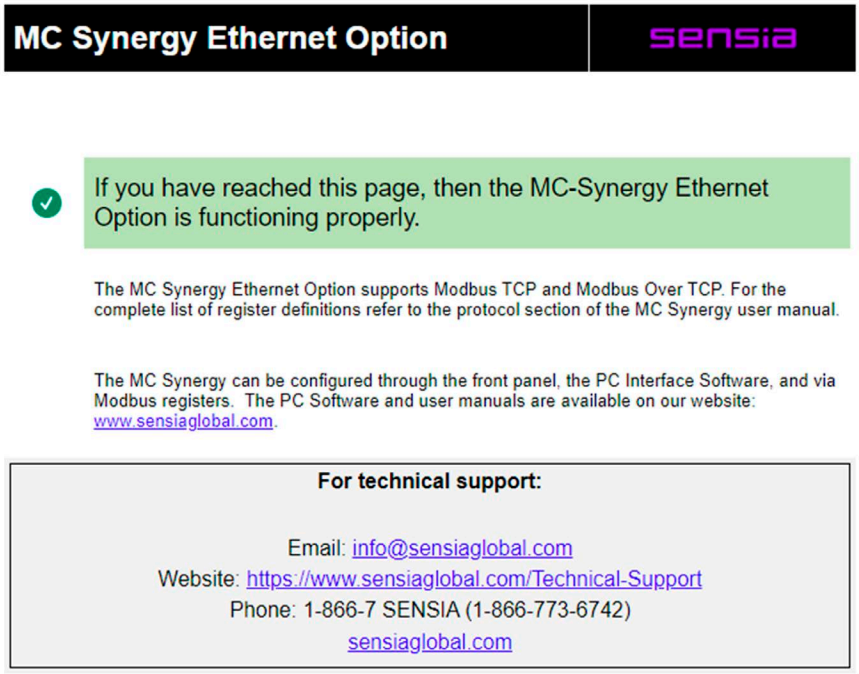


Figure 4.10—Ethernet connection verification

Section 5: Configuration Basics

Before you make changes to your device's configurable settings, it is important to understand how configuration files are created, edited, uploaded, and saved. That is the purpose of this section.

Sections 6, 7 and 8 will expand on this information, providing step-by-step instructions for configuring system, turbine and outputs settings.

There are two ways to configure an MC Synergy device via the PC software:

1. Upload configuration settings to a connected device.
2. Build a configuration file offline when your computer is disconnected from a device.

Procedures for both configuration methods are provided below.

CONFIGURATION FILE MANAGEMENT

MC Synergy configuration is essentially a two-step process involving editing settings in the software interface and uploading the changes to a device (or saving them to a file for uploading at a later date).

Configuration settings are stored in the MC Synergy and downloaded each time you connect to an MC Synergy via PC software. However, these settings can also be saved to a file using a proprietary .srf format (Figure 5.1). SRF files can be saved to a computer and imported into one or multiple field devices as needed.

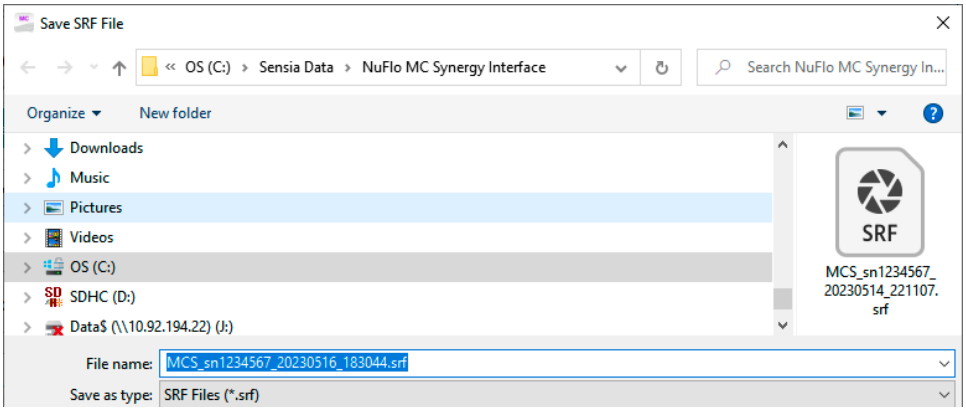


Figure 5.1—SRF configuration file format

The PC software interface gives you multiple ways of creating, changing, saving, and deploying configuration settings. Click the Configure Device tile from the navigation menu to observe four configuration functions accessible from this menu (identified by gray buttons with icons below the navigation menu):

- Upload to Device - saves new selections and changed selections to the connected MC Synergy device
- Re-Read From Device - discards unsaved configuration selections and restores configuration to the settings last saved to the connected MC Synergy device
- Import from SRF File - imports user-selected configuration settings from another configuration file and highlights affected setting groups to prompt you to verify these changes
- Save to SRF File - saves a copy of the current configuration selections to a configuration file that can be stored on a computer and used to reconfigure other devices
- View Change Report - provides a preview of unsaved changes

If you have a need to upload a configuration to many units, you should also consider the wizard-based Upload From SRF File operation in the Manage Device menu. It is similar to the Import from SRF File operation, but

allows you to make all changes from a condensed set of dialogs and execute the upload without returning to the configuration menu. See Configuration Upload, page 86 for details.

CONFIGURING A CONNECTED DEVICE

Before attempting to configure your device using this method, review the instructions in Section 2: Connecting to a Device, page 11 to ensure you are properly connected to your MC Synergy.

SAVING AND UPLOADING CHANGES TO A DEVICE

To configure a connected device, proceed with these steps:

1. Select the Configure Device tile from the navigation menu (Figure 5.2).

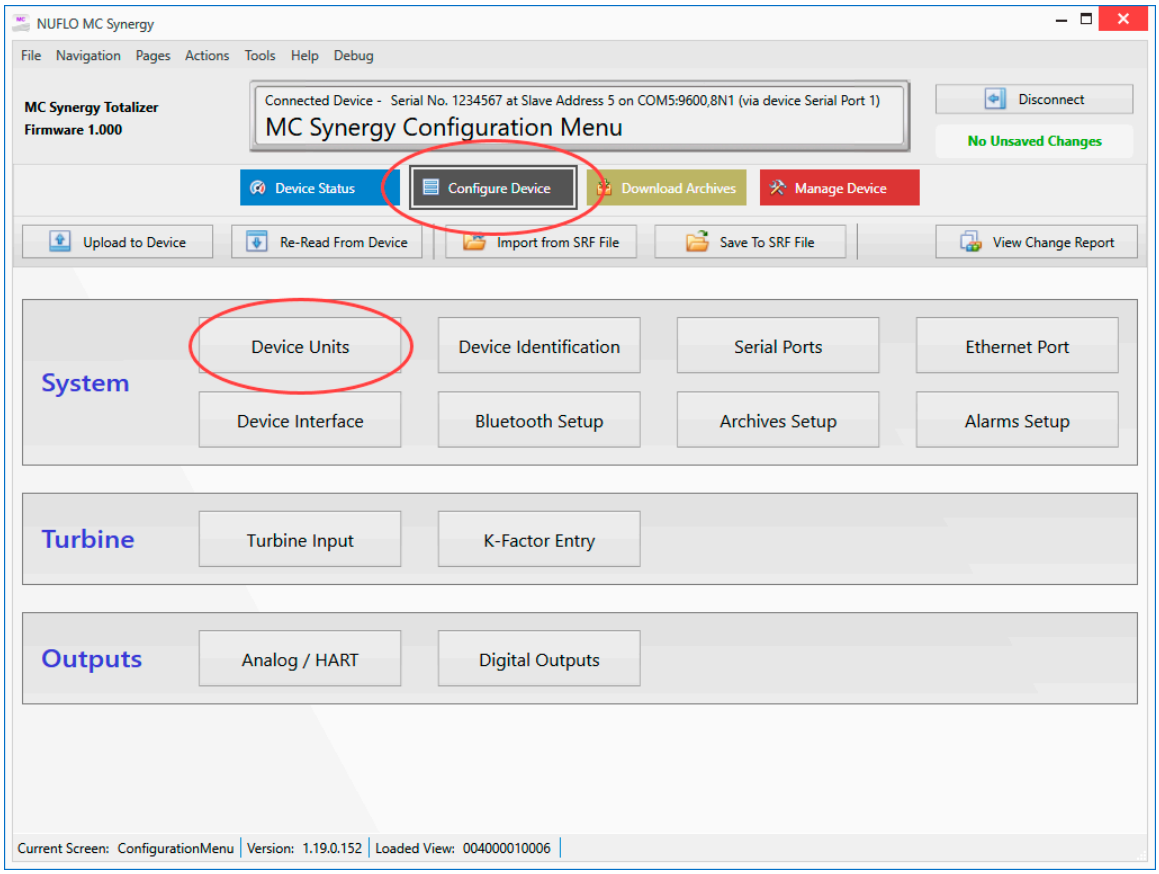


Figure 5.2—Configure Device menu tile

2. Select an item from the grid of System, Turbine, and Outputs submenus.
3. Update the configurable fields as necessary using the guidelines provided in sections 6, 7, and 8.
4. Click OK to save the changes entered on each configuration screen.
5. Repeat steps 2 through 4 for all submenu settings that are applicable to your installation.
6. When your configuration selections are complete and saved, return to the main Configure Device screen and click Upload to Device (Figure 5.3, page 35) to save and apply the changes to the connected device.

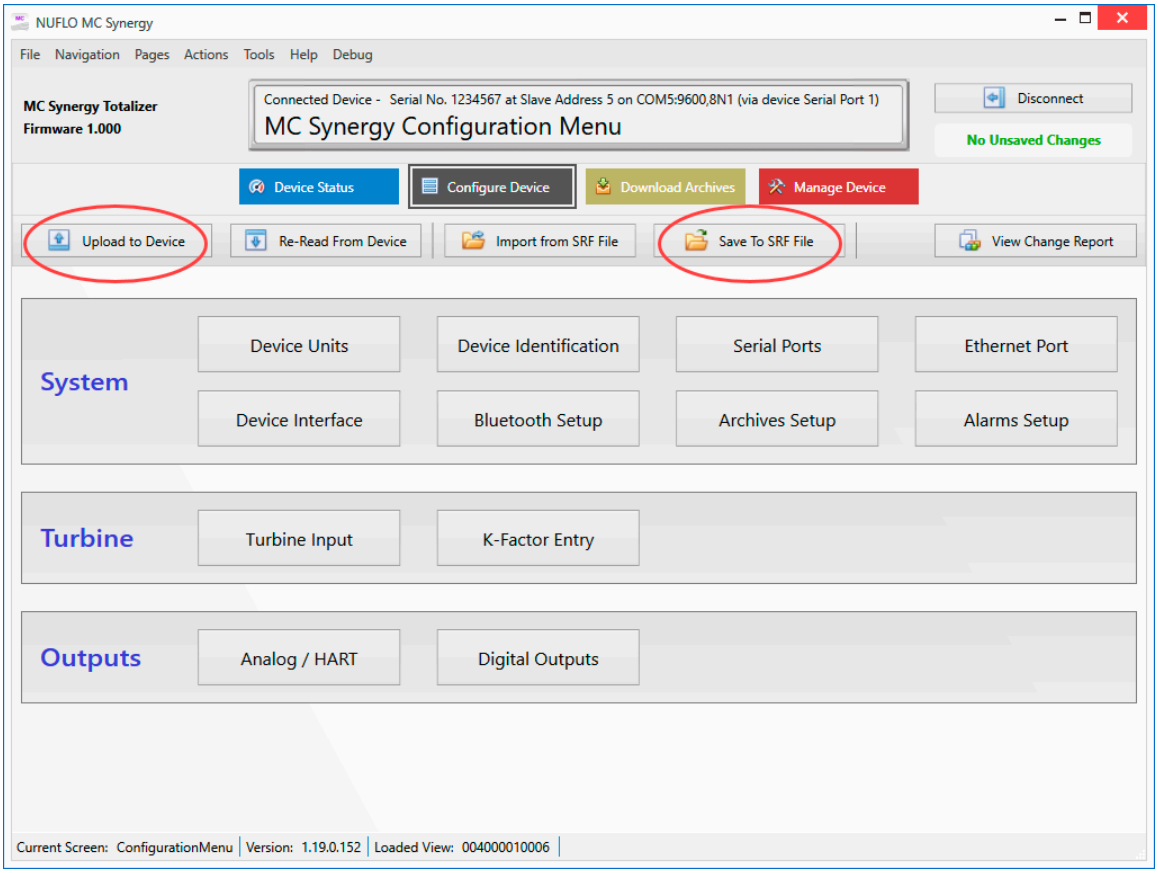


Figure 5.3—Buttons for uploading a configuration to a device or saving a configuration file to your computer

SAVING A CONFIGURATION FILE (SRF)

To store the configuration in an SRF file on your local computer to be uploaded to a device at a later time, click Save to SRF File (Figure 5.3).

By default, your SRF file will be saved to your hard drive: C:\Sensia Data\NuFlo MC Synergy Interface. The default filename comprises the prefix MCS, the serial number of your device, and a date and time stamp (for example, MCS_sn1234567_20230516_181055.srf).

However, both the file path and the filename are user-configurable. If you use offline configuration frequently, you can save steps by changing the default file path. This is easily achieved through the Tools menu. See Section 11: Interface Options, page 93 for instructions.

CONFIGURING A DEVICE OFFLINE

This configuration method allows you to build a configuration without a device connection by creating a new SRF file or editing the settings in an existing SRF file. You can edit the settings, and save the new configuration as a local file on the computer. See sections 6 through 8 for information on individual configuration settings.

To ensure compatibility of the configuration file and the device it will be loaded into, verify that any existing file that you are using as the basis for configuration edits was created for the firmware version installed on your MC Synergy device. If you cannot confirm a match, you should create a new configuration file targeted to the desired device platform (firmware version).

To create or edit a configuration file offline, proceed with these steps:

1. Press the Edit Configuration File button on the Home page (Figure 5.4).
2. From the Edit a Configuration File screen (Figure 5.5, page 37), select a file access method: open a recent file, choose an existing file from the computer, or create a new file.

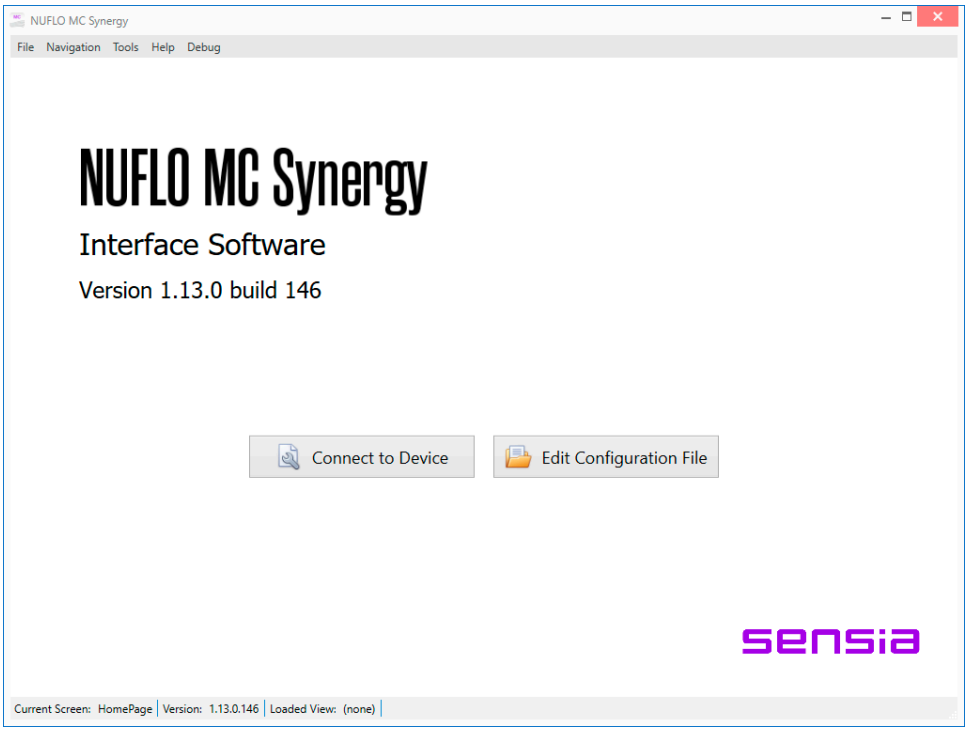


Figure 5.4—Home page

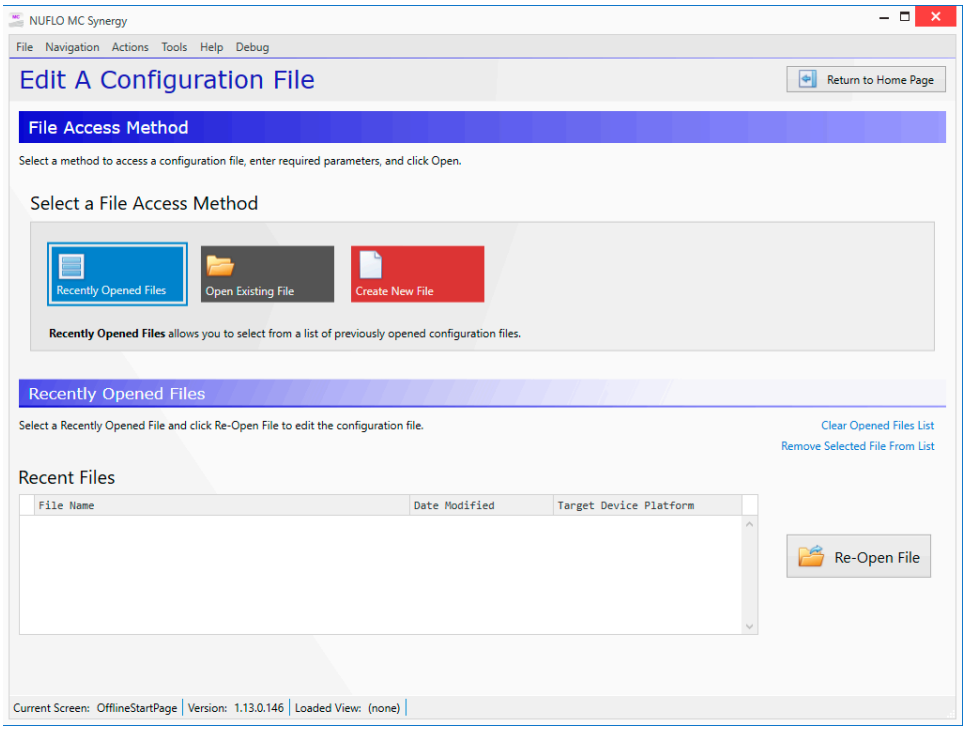


Figure 5.5—Edit a Configuration File screen

3. To create a new configuration file, choose a target device platform from the Edit a Configuration File screen (Figure 5.6) that corresponds with the firmware loaded onto the device that is being configured. At the time of product release, the MC Synergy Totalizer | Register Table 6 was the only target device platform available. If you are presented with other register table versions, contact the factory to confirm compatible firmware versions.

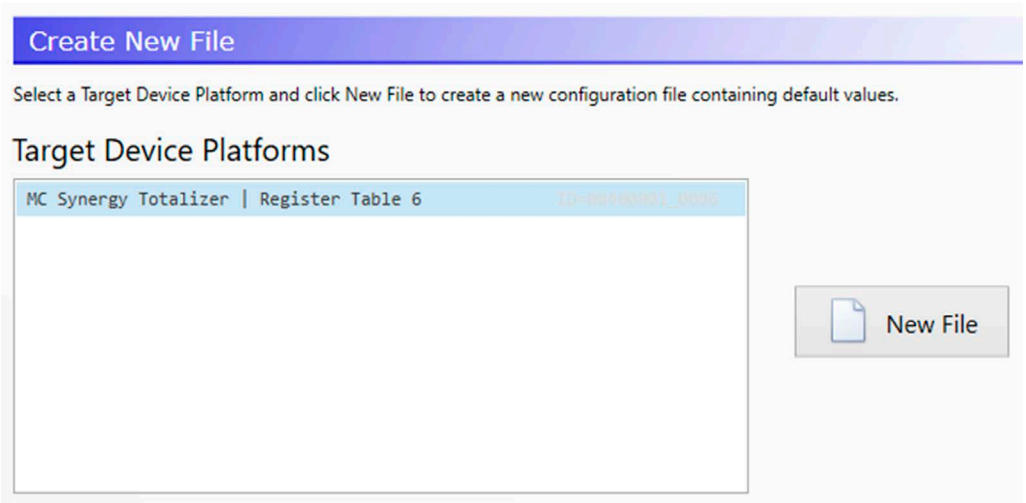


Figure 5.6—Target Device Platform selection for new configuration files

4. From the Offline Configuration Menu (Figure 5.7, page 38), select an item from the grid of System, Turbine, and Outputs submenus.

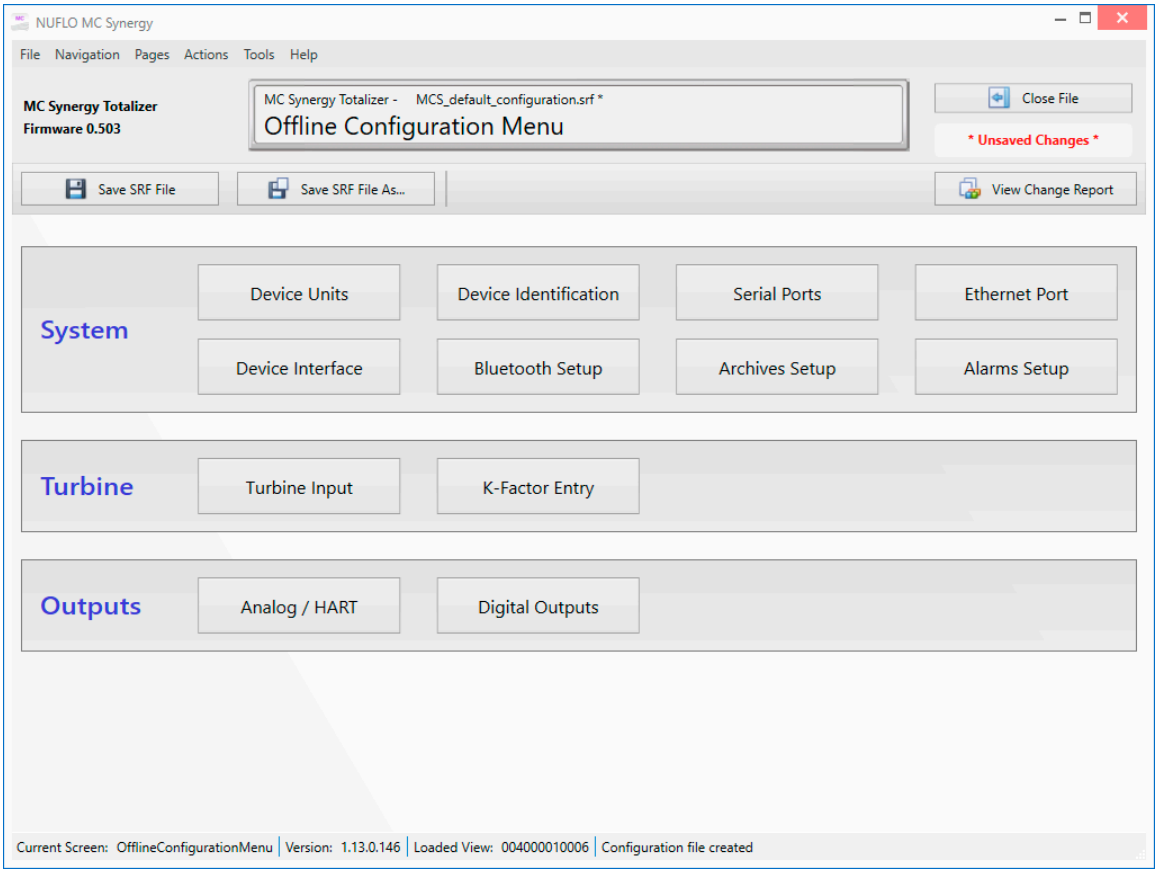


Figure 5.7—Offline Configuration menu

5. Update the configurable fields as necessary using the guidelines provided in sections 6, 7, and 8.
6. Click OK to save the changes entered on each configuration screen.
7. Repeat steps 4 through 6 for all submenu settings that are applicable to your installation.
8. When your configuration selections are complete and saved, return to the main Offline Configuration Menu screen and click one of the Save SRF File buttons in the top left corner of the screen (Figure 5.7).
   - Save SRF File. Saves the current configuration to the opened SRF file.
   - Save SRF File As. Opens a window and prompts the user to select a file name and location for the SRF file.
9. Click the Close File button in the top right corner of the Offline Configuration Menu screen to close the SRF file.
   - If unsaved changes are detected, you will be prompted to save them.
   - If you opt to not save them, the changes will be deleted and the SRF file will close, preserving its unedited content.

CHANGING DEFAULT FILE ACCESS

If you create or edit configuration files offline regularly, you may wish to change the default file access setting in the software. Simply choose Tools>Options from the menu bar at the top of the screen, and select a new default file access method from the General option group screen. See General Settings, page 94 for more information. Changes will take effect with the next connection to the device.

CHANGE REPORT

Before saving changes to an SRF file or uploading changes to a connected device, you can inspect your changes by clicking the View Change Report button located to the right of the navigation menu tiles (Figure 5.8).

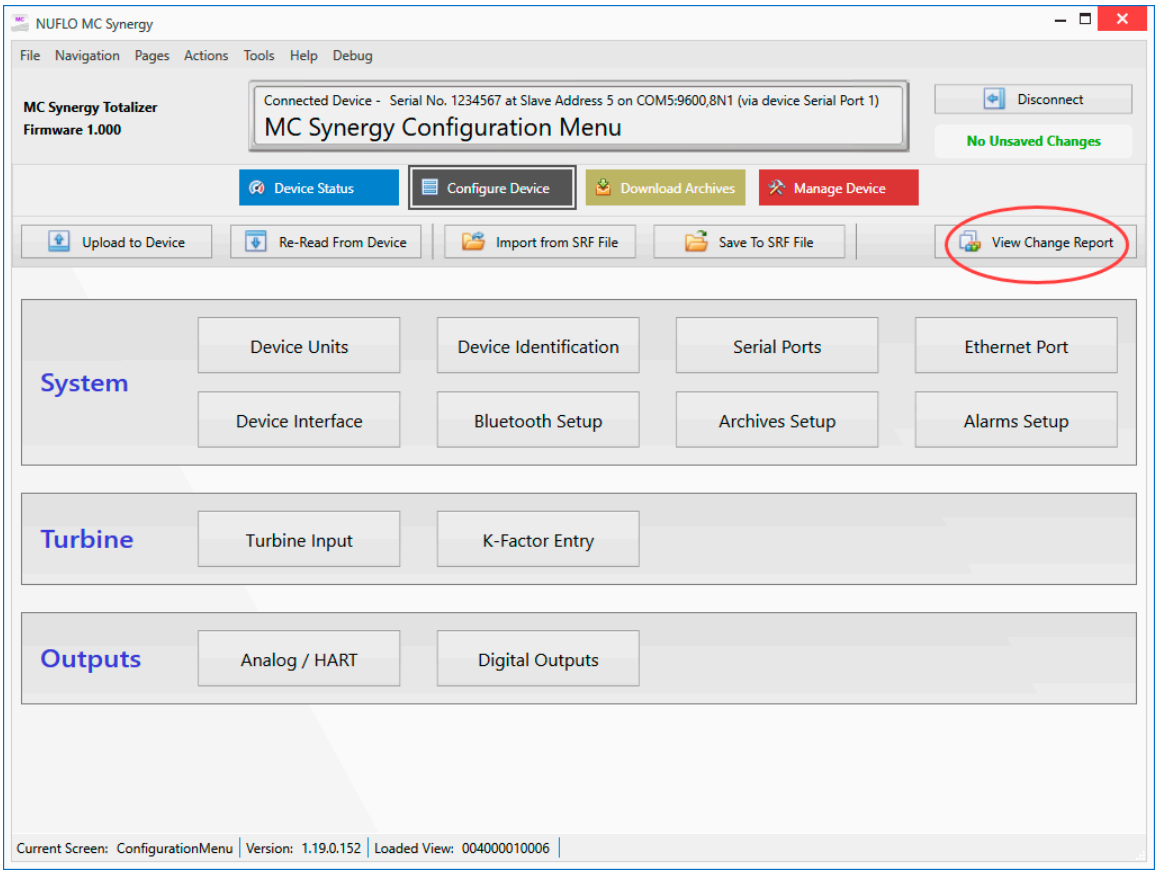
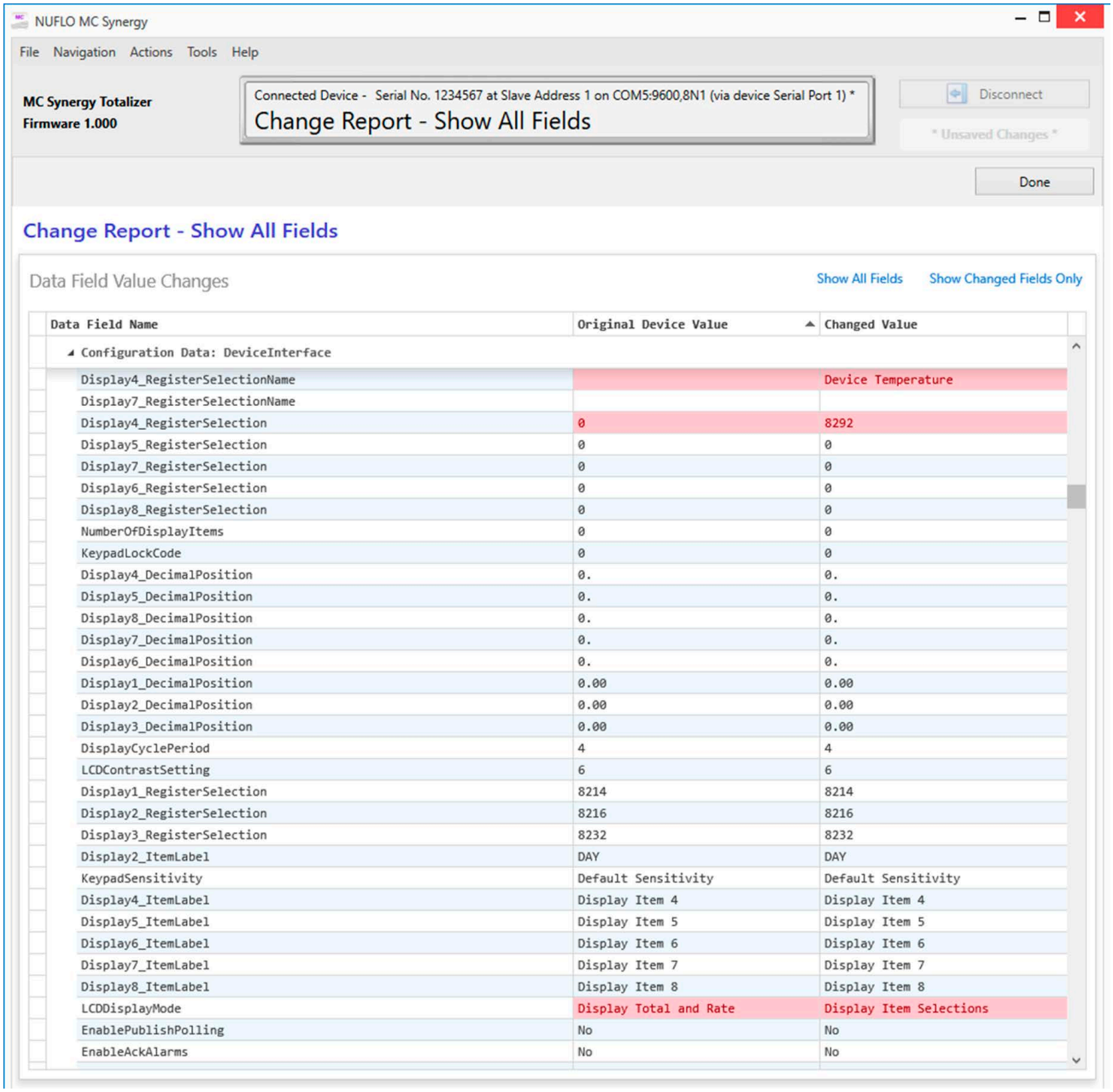


Figure 5.8—Report for inspecting changes before saving to SRF or uploading them to a connected device

The Change Report (Figure 5.9, page 40) contains two columns for comparing values from the last successful save/upload (Original File Value) and the unsaved changes you just made (Changed Value). Changed settings are highlighted in red for easier viewing.

Click the Show Changed Fields Only link to filter the view to unsaved changes. This view exists only when there are UNSAVED changes. Once the new changes are uploaded or saved to an SRF file, the content of the two columns will be identical and no red highlights will remain.



Data Field Name	Original Device Value	Changed Value
Configuration Data: DeviceInterface		
Display4_RegisterSelectionName		Device Temperature
Display7_RegisterSelectionName		
Display4_RegisterSelection	0	8292
Display5_RegisterSelection	0	0
Display7_RegisterSelection	0	0
Display6_RegisterSelection	0	0
Display8_RegisterSelection	0	0
NumberOfDisplayItems	0	0
KeypadLockCode	0	0
Display4_DecimalPosition	0.	0.
Display5_DecimalPosition	0.	0.
Display8_DecimalPosition	0.	0.
Display7_DecimalPosition	0.	0.
Display6_DecimalPosition	0.	0.
Display1_DecimalPosition	0.00	0.00
Display2_DecimalPosition	0.00	0.00
Display3_DecimalPosition	0.00	0.00
DisplayCyclePeriod	4	4
LCDContrastSetting	6	6
Display1_RegisterSelection	8214	8214
Display2_RegisterSelection	8216	8216
Display3_RegisterSelection	8232	8232
Display2_ItemLabel	DAY	DAY
KeypadSensitivity	Default Sensitivity	Default Sensitivity
Display4_ItemLabel	Display Item 4	Display Item 4
Display5_ItemLabel	Display Item 5	Display Item 5
Display6_ItemLabel	Display Item 6	Display Item 6
Display7_ItemLabel	Display Item 7	Display Item 7
Display8_ItemLabel	Display Item 8	Display Item 8
LCDDisplayMode	Display Total and Rate	Display Item Selections
EnablePublishPolling	No	No
EnableAckAlarms	No	No

Figure 5.9—Configuration Change Report

UNSAVED CHANGES ALERT

If you have entered configuration changes but have not uploaded them to the device, a red Unsaved Changes alert will appear in the upper right corner of the Configuration Menu screen (Figure 5.10, page 41). To view the changes, click View Change Report.

By contrast, when there are no unsaved changes, the alert space will display "No Unsaved Changes" in green text.

If unsaved changes exist when you attempt to exit the Configure Device menu, an Alert dialog will appear to prompt a save or discard decision.

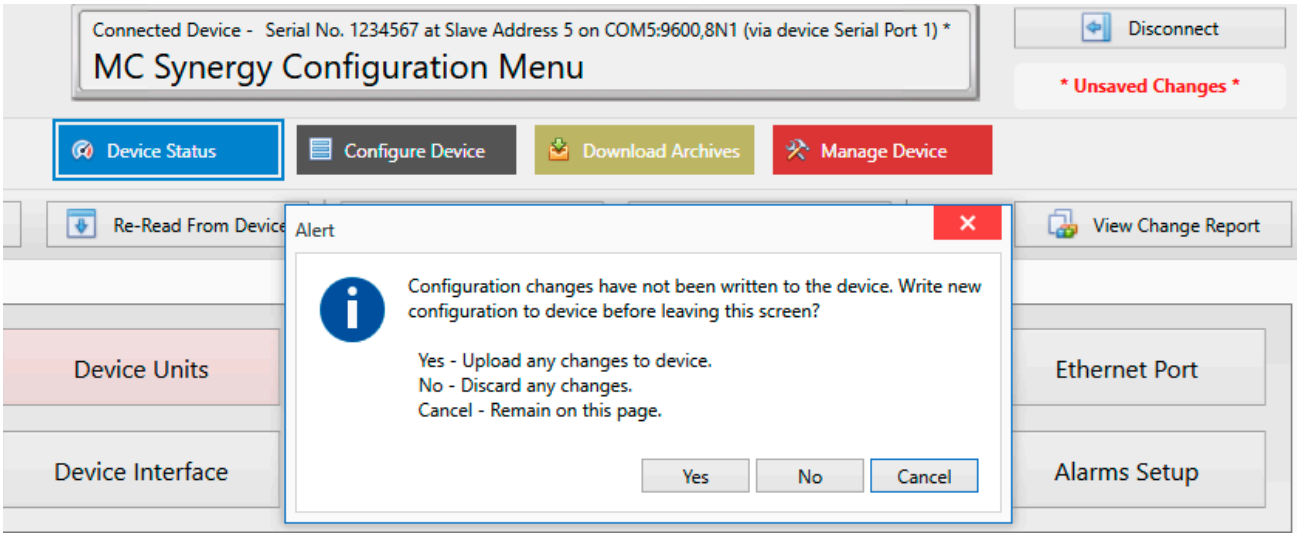


Figure 5.10—Unsaved Changes alert

CONFIGURABLE SETTING SUMMARY

See the following tables for a summary of configurable parameters described in Sections 6 through 8.

TABLE 5.1—SYSTEM PARAMETERS (SECTION 6)	
Device Units (page 43)	Choose measurement units for each MC Synergy parameter. Configure all the units to either US customary units or SI metric units or configure units for each parameter individually.
Device Identification (page 46)	Store information about the MC Synergy. This information differentiates your connected MC Synergy device from other networked devices.
Serial Ports (page 47)	Choose serial port settings for Modbus communication with other devices.
Ethernet Port (page 48)	Available only with the installation of an Ethernet expansion board. Choose Ethernet settings to connect the MC Synergy to a LAN network. The MC Synergy supports Ethernet communication via Modbus-TCP and Modbus over TCP.
Device Interface (page 51)	Choose LCD settings, reset input settings, keypad lock and display settings for the device.
Bluetooth Setup (page 54)	Built-in Bluetooth communications on the device may be used to configure and communicate with the device using a free Bluetooth mobile application installed on your smart phone or tablet. Depending on the operations to be performed via Bluetooth, the Bluetooth session period may need to be lengthened (to remain paired through an anticipated idle period) or shortened (to reduce the power draw).
Archives Setup (page 56)	Change the contract hour and the interval at which the connected MC Synergy will record and log selected data.
Alarms Setup (page 58)	Create up to eight user-configurable alarms for a connected MC Synergy.

TABLE 5.2—TURBINE PARAMETERS (SECTION 7)	
Turbine Input (page 61)	Enter the turbine meter's input parameters, which can be done through the Turbine Input screen.
K-Factor Entry (page 64)	Enter information supplied with a NUFLO turbine meter to monitor its health and calibrate the MC Synergy with the appropriate K-factor(s) and, if applicable, meter factor(s).

TABLE 5.3—OUTPUT PARAMETERS (SECTION 8)	
Analog / HART (page 69)	Available only with the installation of an analog/HART expansion board. Configure a traditional 4 to 20 mA analog output or configure HART communication between HART compliant devices through bi-directional communication. The HART Interface can be configured in either of two modes: Multidrop, or 4 to 20 mA Loop (also referred to as Point-To-Point).
Digital Outputs (page 74)	Configure either or both of two MC Synergy digital outputs. Outputs can be configured to trigger on alarm status, turbine input, flow volume, Specified Precision Pulse Output, Scaled Pulse Output, Status Output, Amplified Raw Output, or to remotely activate an output from the MC Synergy via Modbus. By default, digital outputs are disabled.

Section 6: Configure System Settings

This section provides step-by-step instructions for configuring system parameters (Figure 6.1).

If you are new to the MC Synergy interface, review Section 5: Configuration Basics, page 33 for an overview of configuration menus and methods. See also Section 7: Configure Turbine Settings, page 61 and Section 8: Configure Outputs Settings, page 69.

System configuration includes defining device units for calculation, system information, remote communication, local display, alarming, and data storage and retrieval.

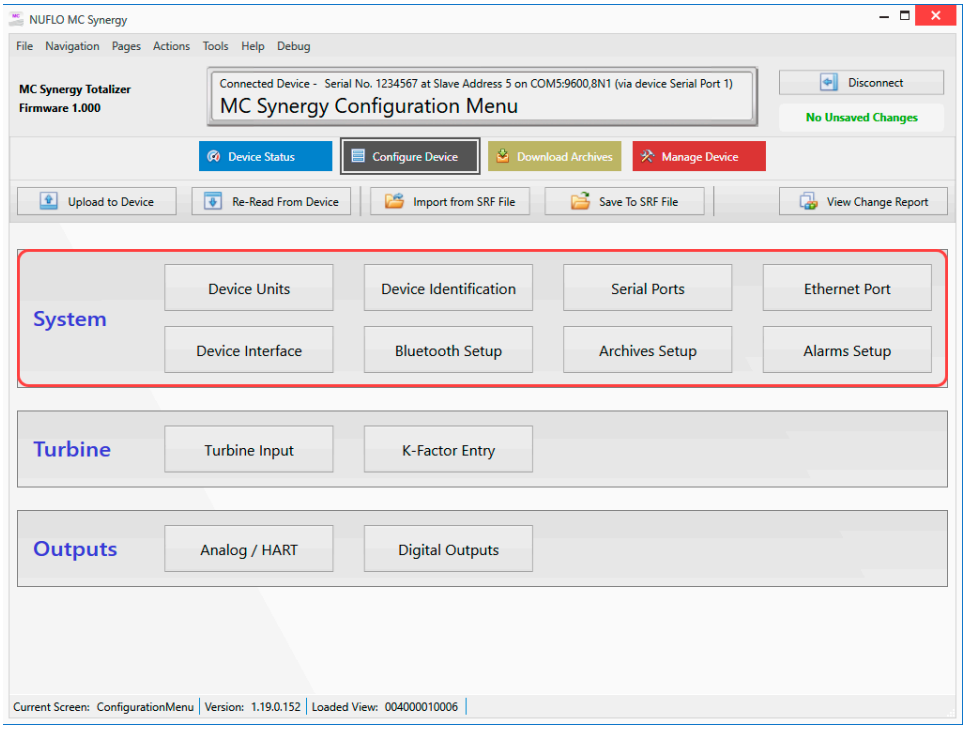


Figure 6.1—System configuration menus

DEVICE UNITS

The Device Units screen (Figure 6.2, page 44) supports configuration of measurement units for each MC Synergy parameter.

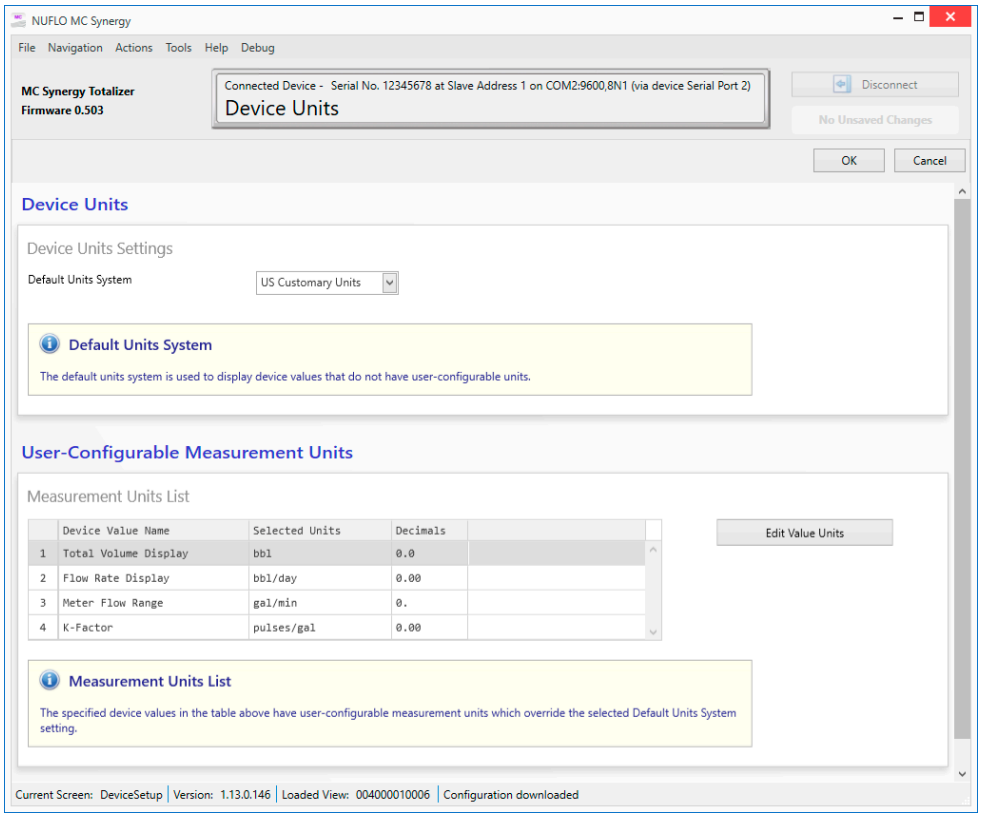
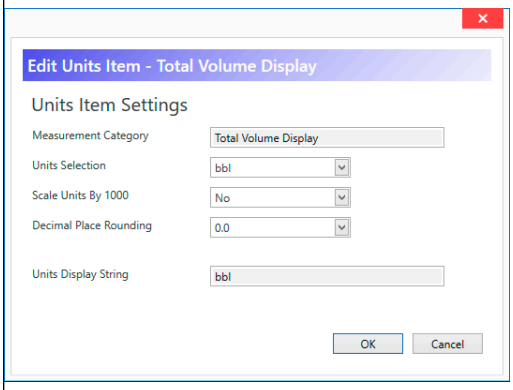


Figure 6.2—Device Units screen

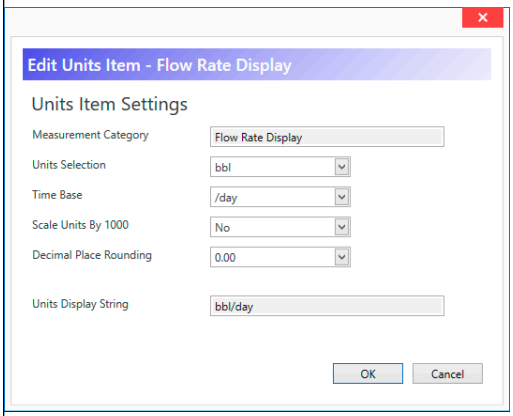
1. Select a Default Units system, which is typically the unit system used by the country or region where the device will be installed. This selection will be used to display values that do not have user-configurable units.
   - US Customary Units applies to countries including U.S., Liberia, and Myanmar.
   - SI (System of International) Metric Units applies to most other countries.
2. Configure individual measurement units from the Measurement Units List as described in Table 6.1—Measurement Units, page 45. These units will override the settings applied by the Default Units System selection.
3. Click OK in the top right corner of the screen to save changes.

TABLE 6.1—MEASUREMENT UNITS



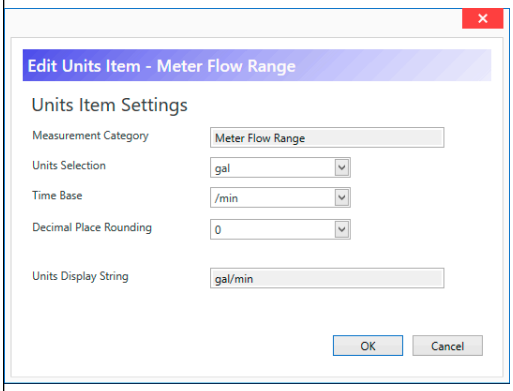
Total Volume Display

- Units Selection. Sets the units of the totals measured. Set for m3, ft3, l, gal, or bbl.
- Scale Units By 1000. If selected, a “x1000” will be added, and the decimal place of the most significant digit will be reduced by 3 places.
- Decimal Place Rounding. Sets the measurement precision for total.



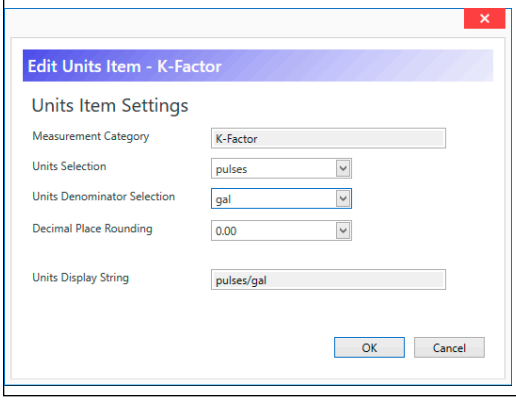
Flow Rate Display

- Units Selection. Sets the units of the volume flowing through the pipe. Set for m3, ft3, l, gal, or bbl.
- Time Base. Sets the time over which the selected volume will be measured. Set for sec, min, hr, or day.
- Scale Units By 1000. If selected, a “x1000” will be added, and the decimal place of the most significant digit will be reduced by 3 places.
- Decimal Place Rounding. Sets the measurement precision for the flow rate.



Meter Flow Range

- Units Selection. Sets the units of the volume flowing through the meter. Set for m3, ft3, l, gal, or bbl.
- Time Base. Sets the time over which the volume will be measured. Set for sec, min, hr, or day.
- Decimal Place Rounding. Sets the measurement precision for the turbine meter flow range.



K-Factor

- Units Selection. The volume is incremented from turbine meter calibration per pulse registered. No other units are selectable.
- Units Denominator Selection. Sets the units of the volume flowing through the meter. Set for m3, ft3, l, gal, or bbl.
- Decimal Place Rounding. Sets the measurement precision for the turbine meter K-factor.

DEVICE IDENTIFICATION

The Device Identification screen (Figure 6.3) allows you to store information about the MC Synergy to differentiate it from other networked devices.

1. Enter settings as desired for the information you wish you use to identify your meter.
2. Click OK in the top right corner of the screen to save the changes.

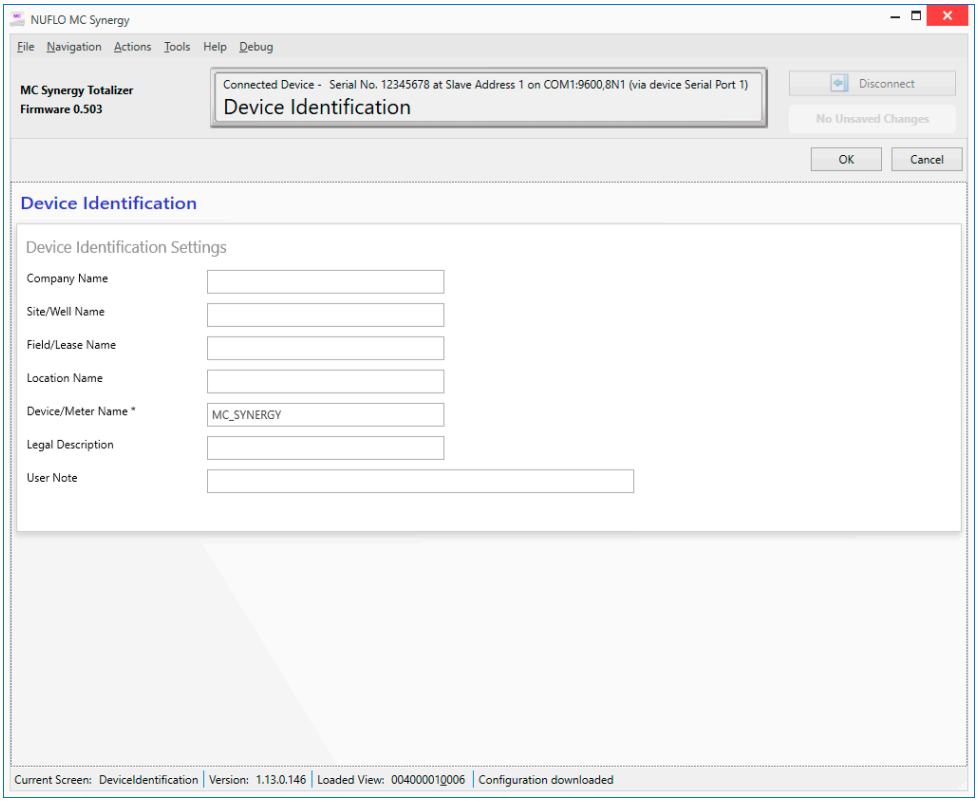


Figure 6.3—Device Identification screen

Configurable settings include:

- Company Name. Maximum 20 characters. This is the name of the company managing the site/well.
- Site/Well Name. Maximum 20 characters. This is the site name/number or well name/number where the MC Synergy is installed.
- Field/Lease Name. Maximum 20 characters. This is the field or lease name/number in which the site/well resides.
- Location Name. Maximum 20 characters. This is a description of the MC Synergy's location. It can be a name, GPS coordinates (DMM or DD), etc.
- Device/Meter Name. Maximum 10 characters. This is a unique identifier for the MC Synergy that differentiates it from other network devices.
- Legal Description. Maximum 34 characters. This is the legal land description.
- User Note. Maximum 64 characters. This can be used for any additional information regarding the MC Synergy installation.

SERIAL PORTS

The Serial Ports screen (Figure 6.4) allows you to configure each serial port's settings for communication with other devices via Modbus.

1. Enter settings as desired for serial port communication, using the bulleted references below as needed.
2. Click OK in the top right corner of the screen to save the changes.

Note	When a connection is established with an MC Synergy, the software detects the port that is connected and displays the connection status in the framed navigation window at the top of the screen.

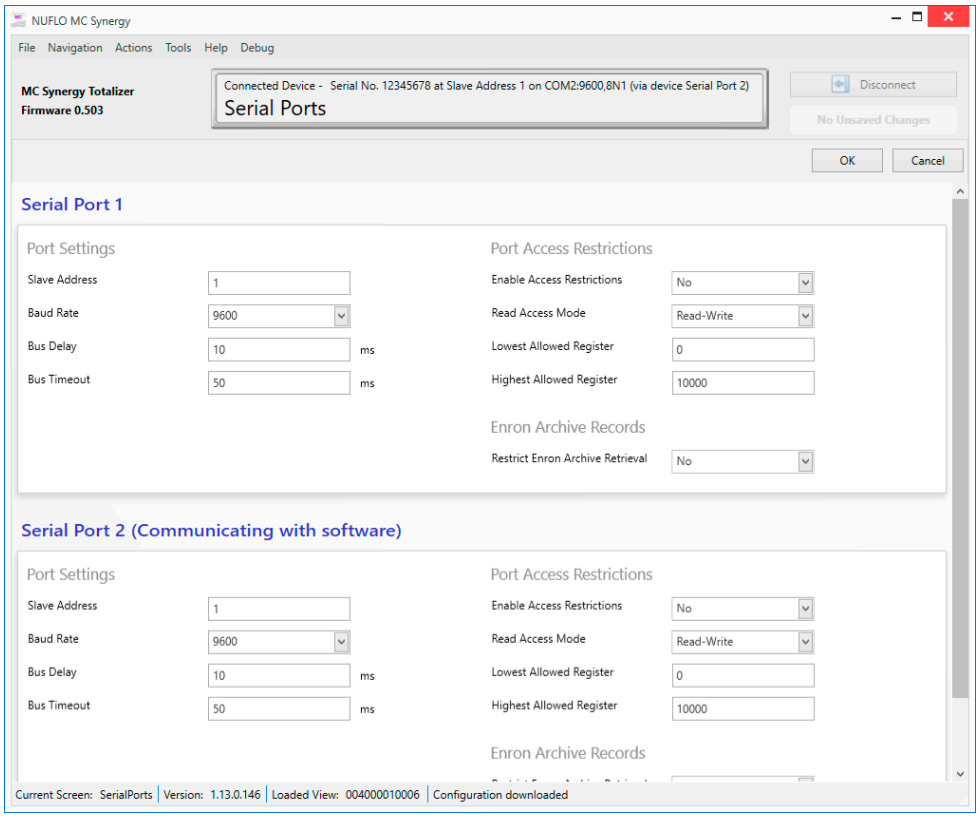


Figure 6.4—Serial Ports screen

PORT SETTINGS

Configurable settings include:

- Slave Address. Default is 1. The slave address allows the MC Synergy to communicate with other devices via Modbus.

Note	Standard Modbus queries require the slave addresses to be between 1-255. The MC Synergy also supports extended addressing for addresses between 255-65535.

- Baud Rate. Default is 9600. The baud rate is the speed at which data is transmitted or received via the serial port. Available baud rate selections include: 300, 1.2k, 2.4k, 4.8k, 9.6k (low power), 9.6k, 19.2k, 34.8k, and 57.6k. The low power mode is for compatibility with the Sensia MC-III totalizer only. For the MC Synergy, all baud rates are low energy, and so any baud rate selected will operate in low energy mode.
- Bus Delay. Default is 10 msec (must be set in 10-msec increments). The bus delay is the amount of time (in milliseconds) that passes before the MC Synergy attempts to take control of the RS-485 bus and transmit a message back to the requesting device. This delay may be lengthened if the MC Synergy is connected to a slow acting flow control, which requires time for the client device to switch back to receive mode after transmitting.
- Bus Timeout. Default is 50 msec (must be set in 10-msec increments). The bus time is the number of milliseconds that must pass to cause the MC Synergy to reset its internal Modbus message handler. You may lengthen the timeout for a client device that has gaps or pauses in transmission.

PORT ACCESS RESTRICTIONS

The Serial Port Access Restrictions may be used to restrict interactions with the MC Synergy device over Modbus through the serial port. Enter the following to set up the desired Modbus restrictions:

- Enable Access Restrictions. Use this setting to specify restricted or unrestricted access through serial port to the MC Synergy registers. If Serial Port 1 is the master port, you may choose to allow unrestricted access.
- Read Access Mode. The access mode may be changed to Read only if access will be given to obtain values from registers, and it is necessary to protect settings or readings from being overwritten via the specified serial port.
- Lowest Allowed Register. Use this setting to prevent access to registers below a specified address.
- Highest Allowed Register. Use this setting to prevent access to registers above a specified address.

Enron Access Restrictions

Enron archive records are historical daily, interval, event, and alarm records that are logged based on the Archives Setup, page 56.

By default, access to these records is unrestricted.

To restrict access, change the setting for Restrict Enron Archive Retrieval to "No." This may be a consideration if the port will not be used explicitly for MC Synergy communications.

ETHERNET PORT

The Ethernet Port screen (Figure 6.5, page 49) allows you to configure Ethernet settings to connect the MC Synergy to an LAN network. The MC Synergy supports Ethernet communication via Modbus-TCP and Modbus over TCP.

1. Enter settings as desired to configure Ethernet communications.
2. Click OK in the top right corner of the screen to save the changes. To verify the Ethernet connection, see Verification of Ethernet Connection, page 32.

The Ethernet port may be used to communicate with the device via Modbus-TCP or Modbus Over TCP. There are no advantages of one protocol over the other, and so determining which protocol to use is usually determined by the application. Most slave devices (or “servers” in Modbus-TCP) support only one of these protocols.

Modbus-TCP is a simple, vendor-neutral communication protocol intended for supervision and control of automation equipment. Specifically, it covers the use of Modbus messaging in an ‘Intranet’ or ‘Internet’ envi-

ronment using the TCP/IP protocols. Some common uses of the protocols at this time are for Ethernet attachment of PLC's, I/O modules, and 'gateways' to other simple field buses or I/O networks.

Modbus Over TCP is typically used by serial servers where a Modbus Ethernet client communicates with multiple Modbus RTU-RS485 slaves via a serial server. The serial server strips off the Ethernet section and forwards the Modbus RTU message on to the serial port(s).

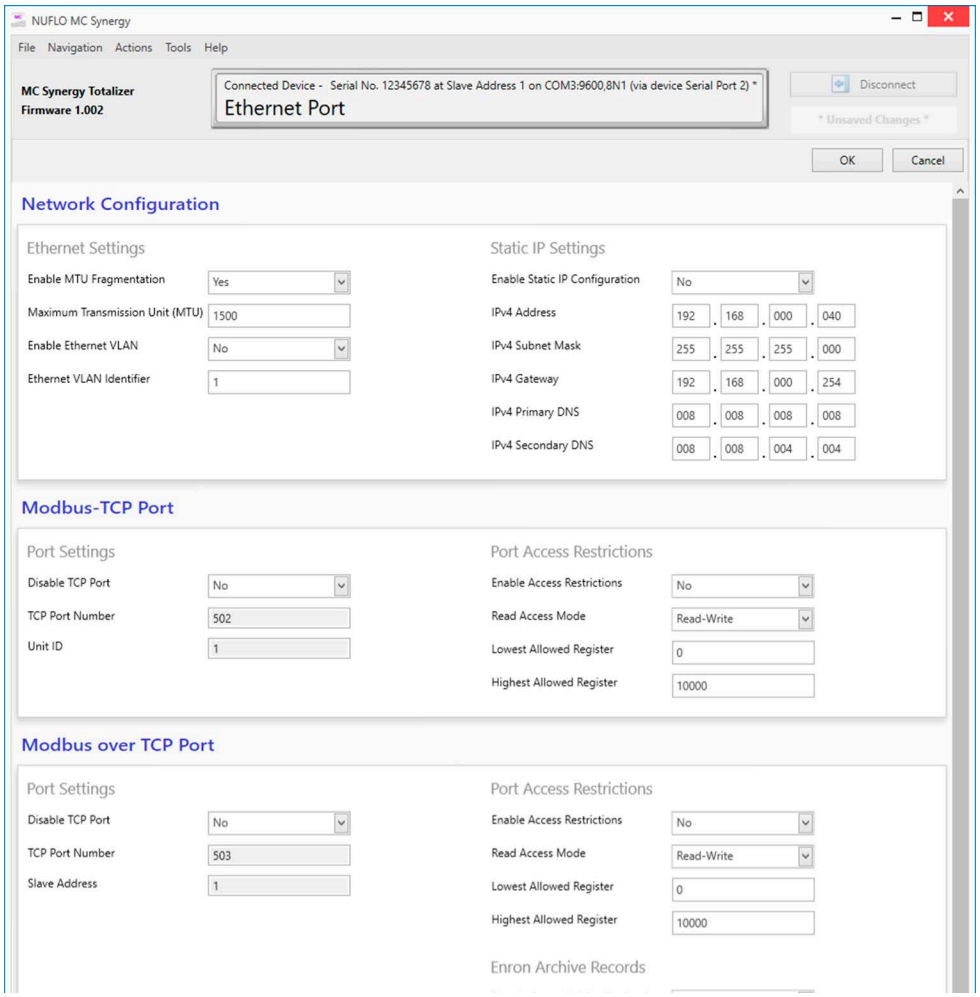


Figure 6.5—Ethernet Port screen

NETWORK CONFIGURATION

Ethernet Settings

The Ethernet settings should be supplied by the network administrator to ensure proper connection and prevent collision between devices on the network. The settings will depend upon the configuration of the network and the maximum transmission unit (MTU) for the connected devices. When an Ethernet expansion board is connected to the MC Synergy, these settings may automatically populate.

- Enable MTU Fragmentation. Breaks the Ethernet packets into the desired "fragments" to match the MTU size.
- Maximum Transmission Unit (MTU). The maximum receivable packet size over the Ethernet connection.

- Enable Ethernet VLAN. Activates a virtual LAN connection to communicate with other devices virtually, but not necessarily physically connected devices.
- Ethernet VLAN Identifier. This setting may be any value between 1 and 4093 to uniquely identify the device on the VLAN.

Static IP Settings

Static IP settings should be supplied by the network administrator to ensure proper connection and to prevent collision between devices on the network. If static IP configuration is disabled, the device will have a dynamic IP configuration.

MODBUS-TCP PORT

Port Settings

The MC Synergy supports Modbus TCP protocol by transmitting a Modbus TCP message inside a TCP packet. This protocol should not be confused with Modbus Over TCP. If you are unsure if your device will be using Modbus-TCP or Modbus Over TCP, contact your network administrator.

Note	The TCP Port Number is fixed to 502, and the Unit ID is fixed to 1. These settings are not editable. Modbus-TCP may have up to 16 active queries. If the number of active queries exceeds 16, the MC Synergy will respond with a “Device Busy” (0x06) message.

Port Access Restrictions

Modbus-TCP Port Access Restrictions may be used to restrict interaction with the MC Synergy device over Modbus through the serial port. Enter the following to set up the desired Modbus restrictions:

- Enable Access Restrictions. Use this setting to specify restricted or unrestricted access to the MC Synergy registers.
- Read Access Mode. Change the access mode to Read only if access will be given to obtain values from registers, and it is necessary to protect settings or readings from being overwritten.
- Lowest Allowed Register. Use this setting to prevent access to registers below a specified address.
- Highest Allowed Register. Use this setting to prevent access to registers above a specified address.

MODBUS OVER TCP PORT

Port Settings

The MC Synergy supports Modbus Over TCP protocol by transmitting a Modbus RTU message inside a TCP packet. This protocol should not be confused with Modbus TCP. Modbus Over TCP supports the Enron extension of Modbus. If you are unsure if this device will be using Modbus-TCP or Modbus Over TCP, contact your network administrator.

Note	The TCP Port Number is fixed to 503, and the Slave Address is fixed to 1. These settings are not editable. Modbus over TCP may have only 1 active query. If there are multiple active queries, the MC Synergy will respond with a “Device Busy” (0x06) message.

Port Access Restrictions

The Modbus over TCP Port Access Restrictions may be used to restrict interaction with the MC Synergy device over Modbus through the serial port. Enter the following to set up the desired Modbus restrictions:

- Enable Access Restrictions. Use this setting to specify restricted or unrestricted access to the MC Synergy registers.
- Read Access Mode. Change the access mode to Read only if access will be given to obtain values from registers, and it is necessary to protect settings or readings from being overwritten.
- Lowest Allowed Register. Use this setting to prevent access to registers below a specified address.
- Highest Allowed Register. Use this setting to prevent access to registers above a specified address.

Enron Archive Records

Enron Archive records are the historical daily, interval, event, and alarm records logged based on the archive settings configured for a connected device (see Archives Setup, page 56).

By default, access to these records is unrestricted.

To restrict access, change the setting for Restrict Enron Archive Retrieval to "No." This may be a consideration if the port will not be used explicitly for MC Synergy communications.

DEVICE INTERFACE

The Device Interface screen (Figure 6.6, page 52) allows you to configure LCD display, keypad, and reset input settings and choose the items to be displayed in real time.

1. Enter device interface settings as desired.
2. Click OK in the top right corner of the screen to save the changes.

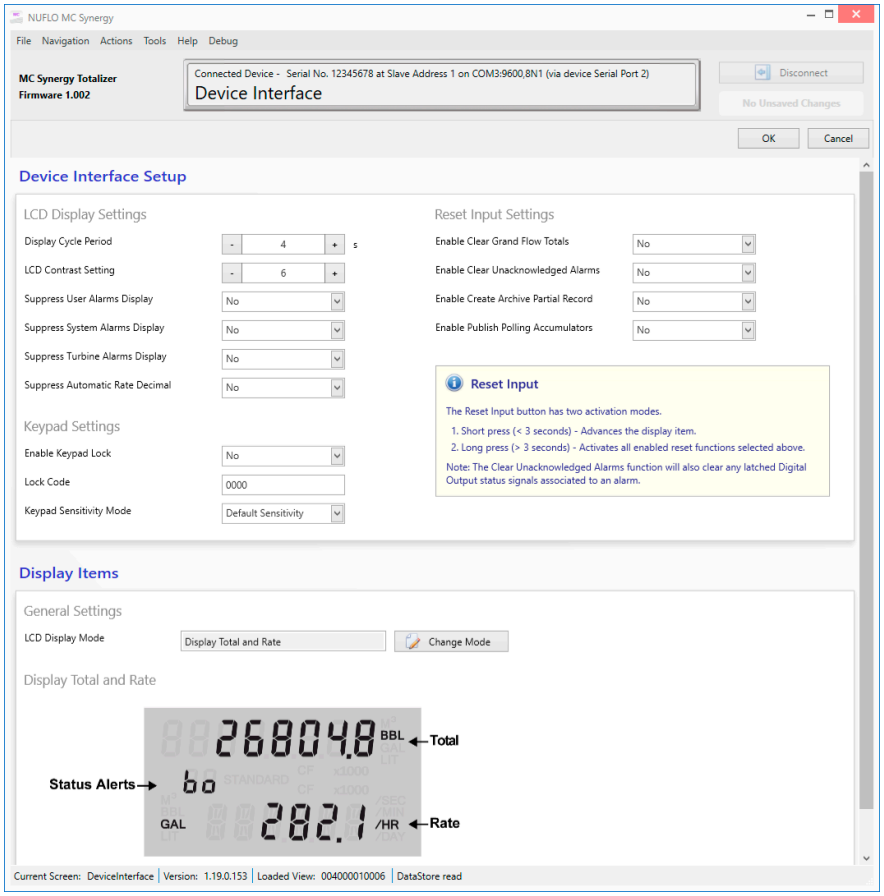


Figure 6.6—Device Interface screen

DEVICE INTERFACE SETUP

LCD Display Settings

You can configure the following LCD display settings from the PC software:

- Display Cycle Period. Specifies the update frequency of the LCD. The display will refresh (if in Display Total and Rate mode) or go to the next display item (if in Display Item Selections mode). You can enter a cycle time between 1 and 300 seconds. This is not related to the period over which the device will calculate totals and flow rate.
- LCD Contrast Setting. You can adjust the contrast on the LCD from 0 to 31 to optimize the display readability.
- Suppress User, System, or Turbine Alarms Display. By default, the device will flash active alarms on the display while they are active. You can hide the alarms status of one or more alarms to keep the display static. This is particularly useful if the alarms are being monitored remotely, or are set to trigger a local or remote alarm response when activated. Thus, the display is only required to indicate the total, rate, and non-alarm status alerts. Suppressing these alarm displays will not affect the alarm output.
- Suppress Automatic Rate Decimal. The rate decimal may be fixed, such that screens being recorded may be done so without attention needing to be paid to the place of the decimal on the rate.

Keypad Settings

You can enable a keypad lock with a four-digit lock code to restrict access to the device via the local user interface. When the keypad lock is enabled, you will be prompted to enter the lock code when you attempt to enter a configuration menu.

You can also reduce keypad sensitivity or turn off keypad sensing to improve battery life or if the local user interface is not required.

Reset Input Settings

The reset input settings apply only to EXP models with an optional reset switch installed. A short press of the switch will advance the display item, and a long press can be configured to perform any of four additional tasks. These configurable functions include clear grand flow totals, clear unacknowledged alarms (and reset latched digital outputs), create an archive partial record, or publish polling accumulators (commonly used in batch applications). See Device Commands, page 89, for more information.

The MC Synergy using polling accumulators to store the volume accumulated since the last polling sequence in the Polling Total. When you initiate a new polling sequence, the current polling total is transferred to the previous polling total, while resetting the current polling total to zero. For more information, see "Polling Registers" in Appendix C—Modbus Protocol in the MC Synergy hardware manuals.

Note	If the reset input switch is configured to acknowledge active alarms, and the device is in an alarm condition when the switch is pressed, the alarms will not be acknowledged, and the alarm will remain active. If a reset input switch is configured to clear unacknowledged alarms, a press of the switch will also clear any latched Digital Output status signals associated with an alarm.

DISPLAY ITEMS

By default, the LCD is configured to display total and rate, but you can edit the configuration to display up to eight user-selected items.

Display Total and Rate

This factory default setting will display the grand total, flow rate, and status alerts (Figure 6.7). Active alarms will also display, if they are not suppressed.

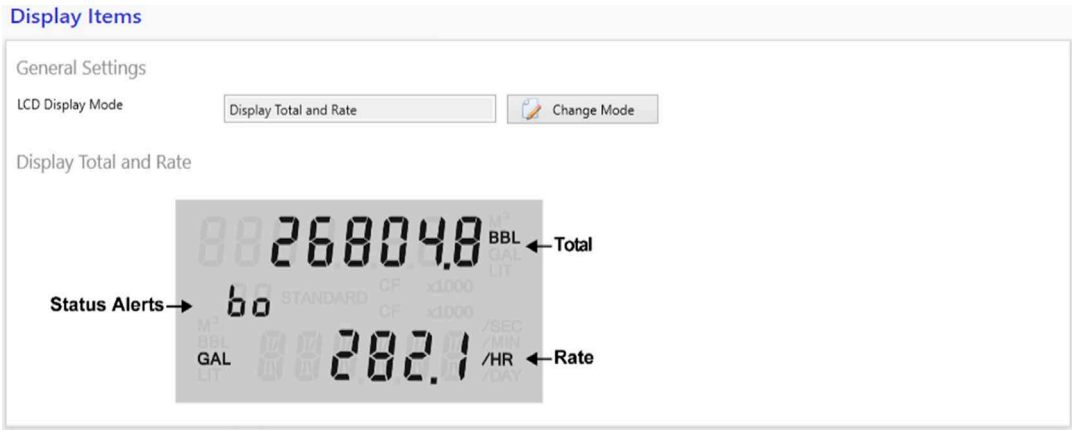
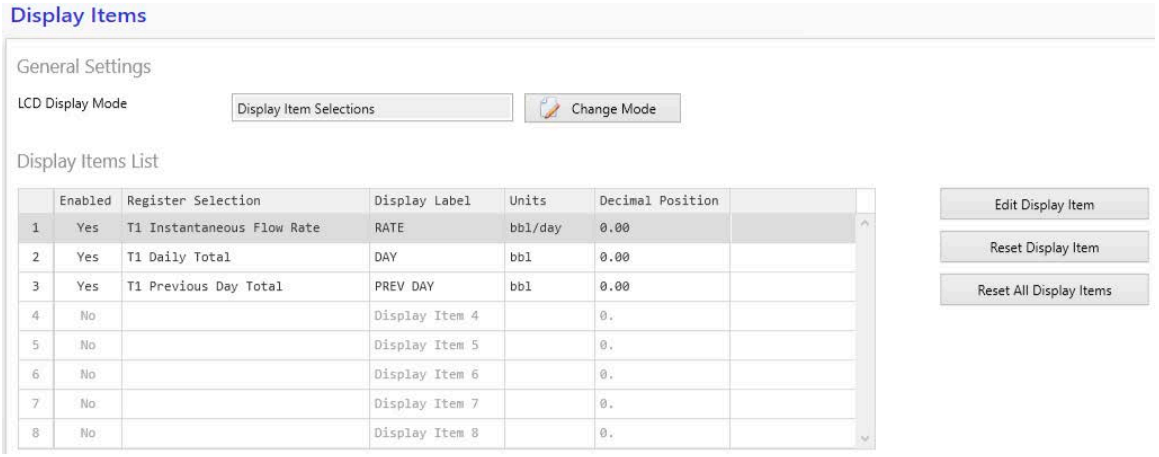


Figure 6.7—Display Items (default)

Display Item Selections

You may configure up to eight custom display items to cycle through the display during operation. By default, instantaneous flow rate, daily total, and previous day total are displayed (Figure 6.8). Click Edit Display Item to add or edit an item.



	Enabled	Register Selection	Display Label	Units	Decimal Position
1	Yes	T1 Instantaneous Flow Rate	RATE	bbl/day	0.00
2	Yes	T1 Daily Total	DAY	bbl	0.00
3	Yes	T1 Previous Day Total	PREV DAY	bbl	0.00
4	No		Display Item 4		0.
5	No		Display Item 5		0.
6	No		Display Item 6		0.
7	No		Display Item 7		0.
8	No		Display Item 8		0.

Figure 6.8—Display Items (custom user selections)

Here are the settings you can specify for a display item:

- Enabled. Select YES to display the item. Select NO to prevent the item from displaying.
- Register Selection. Select the item you wish to display from a list of registers.
- Selection Units. The unit that is preconfigured for your selection will appear in uneditable form. To change the units for totals and flow rate, see Device Units, page 43.
- Display Label. Enter a custom display label. It is recommended that this be configured to match the nomenclature defined for the site.
- Decimal Position. Select the precision level that you want used for the display of your selected item. This entry will not affect measurement precision for totals and flow rates. See Device Units, page 43, for more information on measurement precision.

BLUETOOTH SETUP

If you wish to check meter status or configure MC Synergy settings from your smart phone or tablet using the Sensia Digital Data Plate app, you can enable Bluetooth communications within the MC Synergy with these settings (Figure 6.9, page 55).

1. Select YES in the Enable Bluetooth dropdown menu.
2. Adjust the session period if desired. This is the length of time a connection will be retained once your mobile device is successfully paired with the MC Synergy device.
3. If you wish to password protect your equipment from unauthorized use, enter a user-specified pair code. This setting is optional.
4. Click OK in the top right corner of the screen to save the changes.

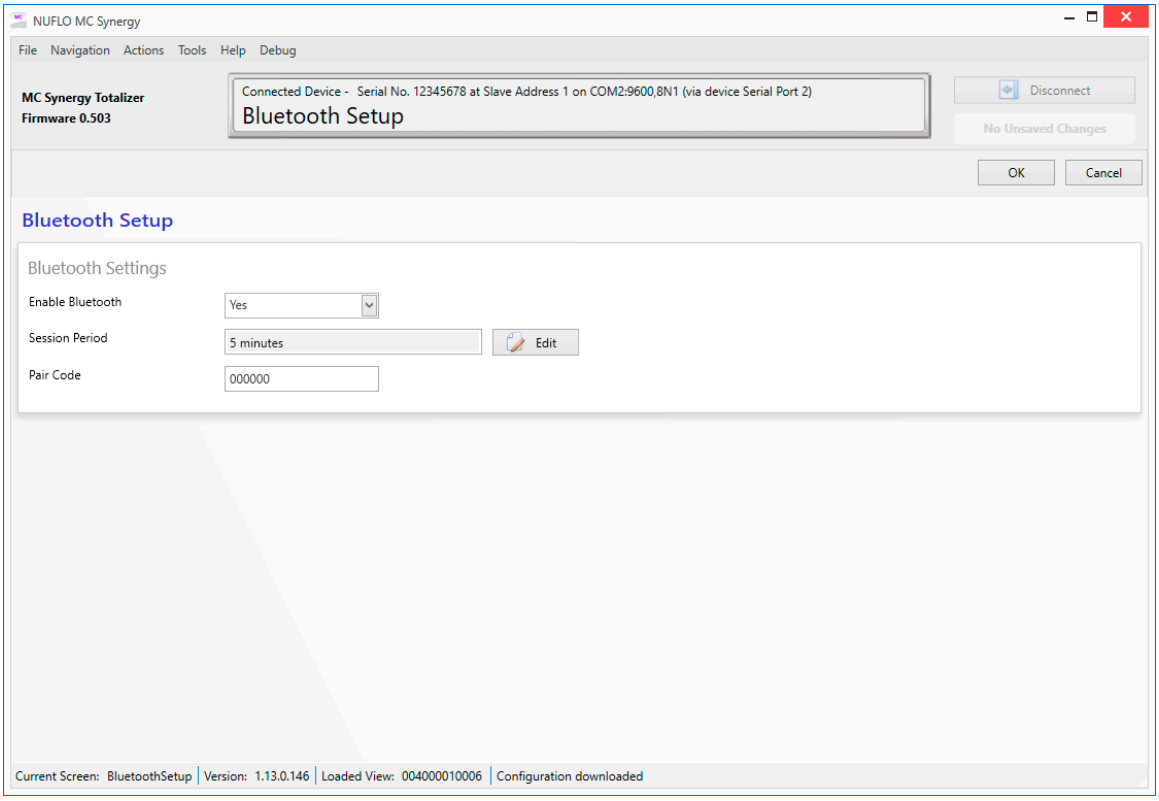


Figure 6.9—Bluetooth Setup screen

Depending on the operations you will perform via Bluetooth, the 5-minute default session period may need to be lengthened or shortened. For example, a longer session may be required to stay connected through an anticipated idle period, or a shorter period may be desired to reduce the power draw.

A pair code is an optional passcode setting that can help reduce the risk of unauthorized access to the device. When enabled, you will be prompted to enter it when attempting a Bluetooth connection with the device. Choose a pair code that is 6 digits or fewer. Use only numbers; letters and symbols are not supported. To disable the pair code, enter the default code 000000.

For instructions on making a Bluetooth connection with the device and navigating the app, see the MC Synergy hardware manuals and quick-start guide.

Note	To minimize the risk for communication interference, terminate your PC connection to an MC Synergy device before connecting to the same device with the mobile app.

ARCHIVES SETUP

The Archives Setup screen (Figure 6.10) allows you to control which parameters are logged by the MC Synergy, and the frequency of those logs. The MC Synergy will hold up to 384 daily records, 768 interval records (configured from 1 minutes to 12 hours), 768 event records, and 768 alarm records. Once the archive items list is full, the oldest records will be overwritten by the newest records.

CAUTION
Before changing the selected parameters in the Archive Item list, download the archives to prevent an inadvertent loss of data. ScanData, the PC software used to view archive data, will validate and present records that match the currently configured list of parameters. ScanData will not show archive records from previously configured items.

1. Enter archive settings as desired.
2. Click OK in the top right corner of the screen to save the changes.

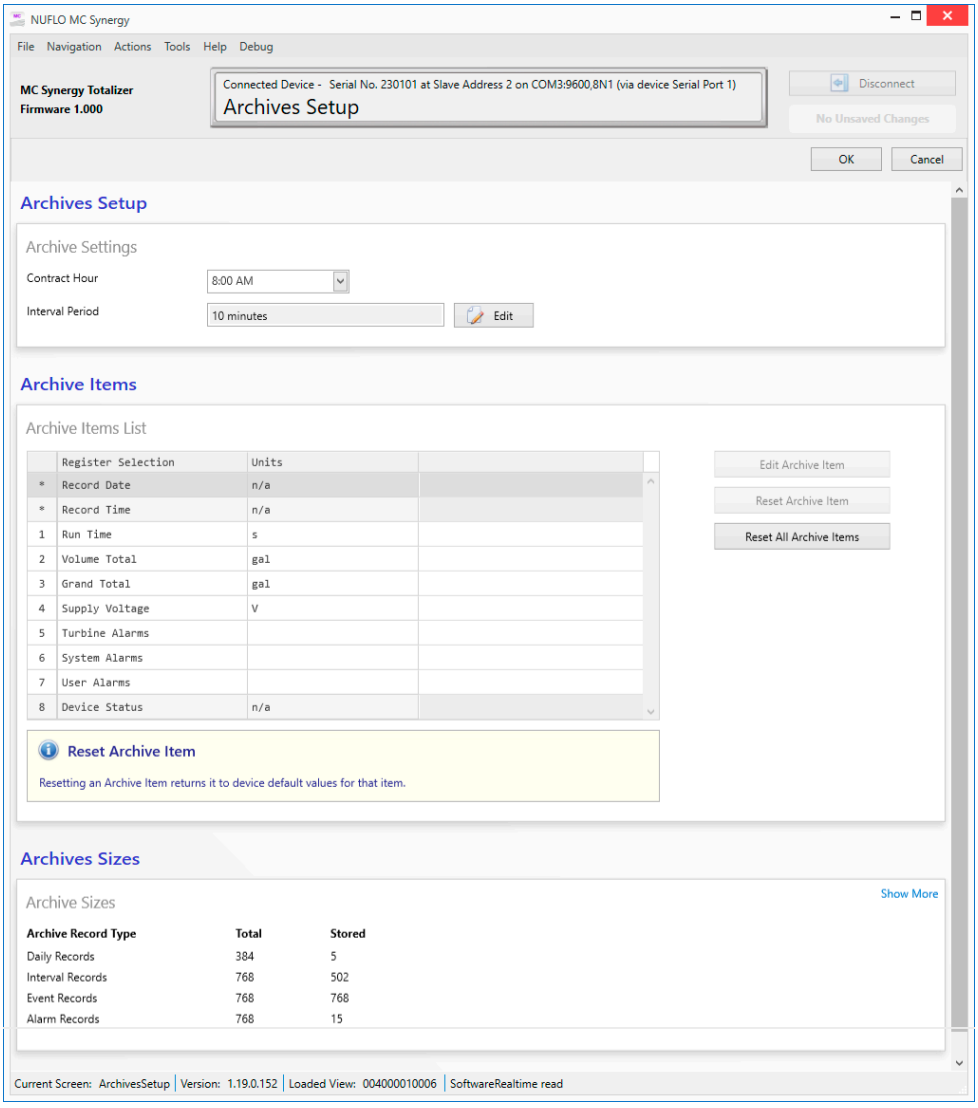


Figure 6.10—Archives Setup screen

GENERAL SETUP

At the top of the screen, select the contract hour and the interval at which the connected MC Synergy will record and log selected data.

- Contract Hour. This is the time of day all records from the previous 24 hours are gathered and stored. Ensure the time on the device has been synchronized/set so that the selected contract time is correct.
- Interval Period. By default, interval logs are recorded hourly. Click Edit to change the interval period. You may configure this setting in hours, minutes, or seconds. For example, you can enter "10" and "minutes" to log flow data every 10 minutes (Figure 6.11).

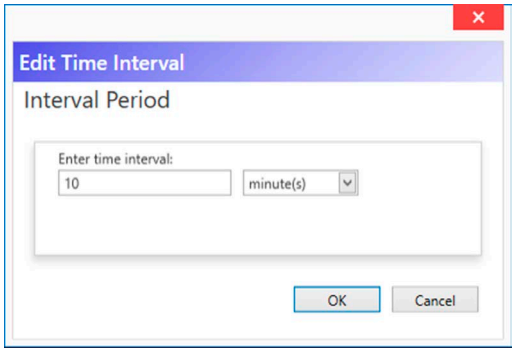


Figure 6.11—Edit Time Interval dialog

ARCHIVE ITEMS

Date, time, and device status is captured with every log entry.

You may edit archive items 1 through 7 from a list of pre-defined registers to be stored at the user-specified intervals, and published at the user-specified contract hour. The Edit Archive Item dialog (Figure 6.12) shows the units in which the selected archive item will be stored. Units are not editable from the Archive Setup menu. The K-factor, meter factor, totals, and flow rate units may be configured in the Device Units menu.

You can reset a selected archive item to its default configuration. Or, to reset all archive items to their default configurations, click Reset All Archive Items in the Archives Setup screen.

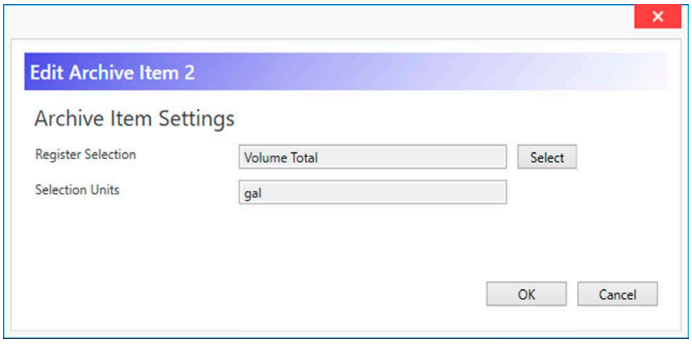


Figure 6.12—Archive register selection

ARCHIVE SIZES

The MC Synergy will hold up to 384 daily records, 768 interval records (configured from 1 minutes to 12 hours), 768 event records, and 768 alarm records, as shown in (Figure 6.10, page 56). The Total column shows the archive capacity, and the Stored column shows the number of records stored.

Once the number of stored archive records reaches full capacity, the oldest records will be overwritten by the newest records.

To preserve archived records, download the archive before it reaches full capacity. Interval records have the highest likelihood of being overwritten due to the frequency of their creation. For example, if the interval period is 1 hour (default), the interval archive will reach full capacity in 32 days.

Note	Downloading the archive records will not reset the Stored value. When the Stored archive reaches capacity, the oldest records will begin to be overwritten by the newest archive records, but the total number of archives in storage will remain the same.

See Section 9: Download Archives, page 81, for more information.

ALARMS SETUP

The Alarms Setup screen (Figure 6.13, page 59) allows you to configure up to eight user alarms per connected device.

1. Enter alarm settings as desired.
2. Click OK in the top right corner of the screen to save the changes.

To see the status and history of alarms, see Alarms Status, page 25.

When an alarm is active, it will be recorded in the alarm log and transmitted as an Enron event. If the alarm condition is configured as a status output, a digital output will be activated. (See Status Output, page 77 to configure a digital output).

In addition to configuring alarms, you can reset a selected alarm item (clearing alarm configuration for that item), or reset all alarm items to their default configurations (no alarms configured) using the Reset buttons provided.

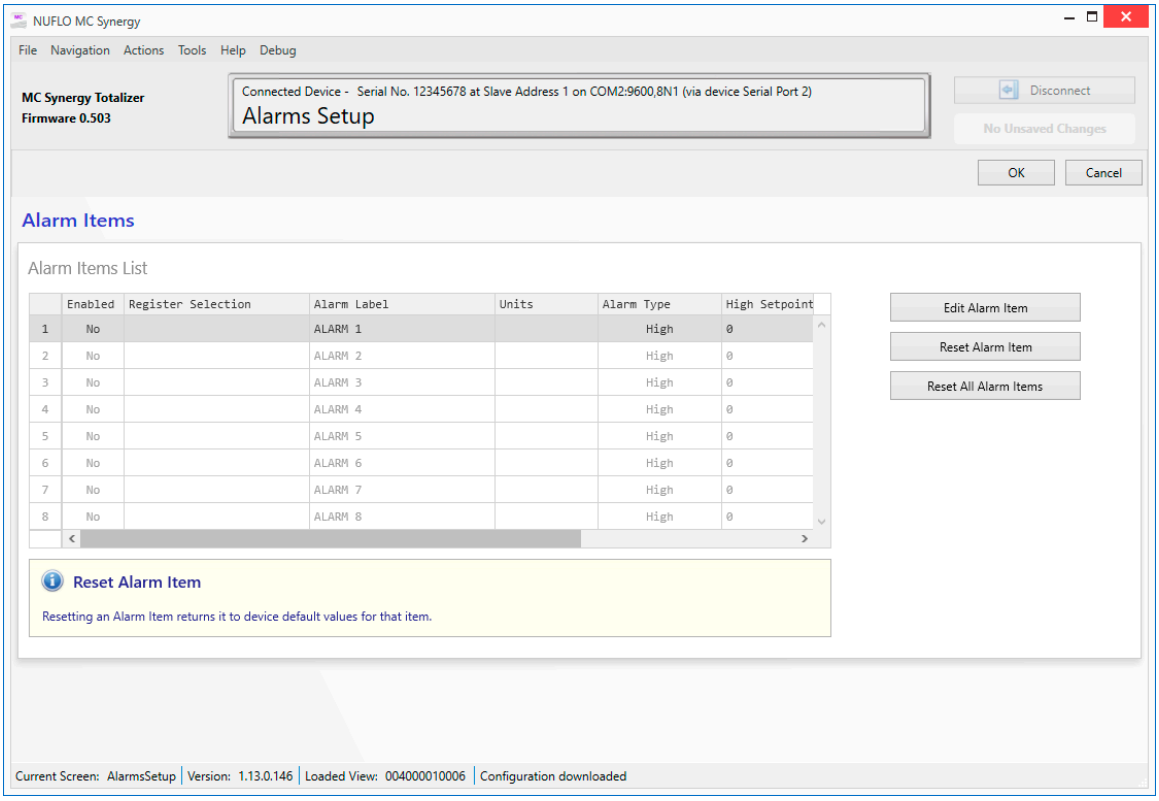


Figure 6.13—Alarm Setup screen

To configure an alarm, click an unused row in the Alarm Items List and click Edit Alarm Item (Figure 6.14).

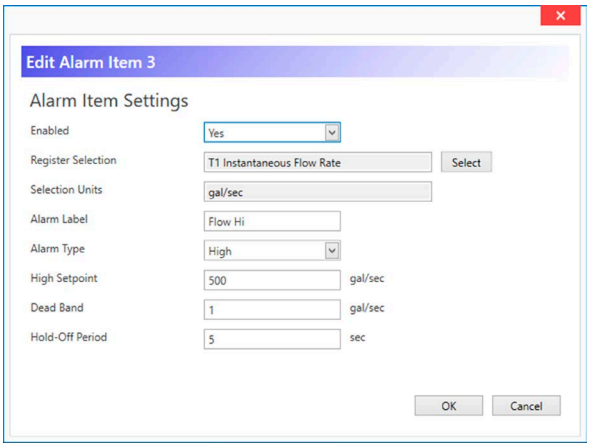


Figure 6.14—Edit Alarm Item dialog

Here are the settings you can specify for an alarm item:

- Enabled. While you will typically choose Yes to enable a new alarm configuration, you may also use this setting to temporarily disable an alarm to verify wiring upon installation, to test the alarm, or to debug an alarm.
- Register Selection. Select the item you wish to alarm on from a list of registers. An alarm can be assigned to only one register at a time.

- Selection Units. The unit that is preconfigured for your selection will appear in uneditable form. To change the units for K-factor, meter factor, totals, and flow rate, see Device Units, page 43.
- Alarm Label. This is a unique identifier of the turbine meter, flow line, etc. being monitored for an alarm condition. This label may be transmitted via a serial or Ethernet connection for a monitoring system to identify the alarm condition and notify you.
- Alarm Type. This setting defines the type of setpoint associated with the alarm condition. Alarms can be configured to trigger based on a high setpoint, a low setpoint, or on both high and low setpoints. You may establish a two-level alarm by assigning a high/low alarm and a high-high/low-low alarm to the same register. Each alarm can only be assigned to one register at a time. Therefore, if a two-level alarm is desired, two alarms must be entered for the same register—one to assign a high/low alarm, and one to assign a high-high/low-low alarm.
  - High Setpoint. The alarm will activate when the value of the configured item exceeds the user-specified setpoint.
  - Low Setpoint. The alarm will activate when the value of the configured item drops below the user-specified setpoint.

Note	A High-High, Low-Low, or windowed High-High/Low-Low alarm is configured to alert the user via Enron, as well as via software, local user interface, alarm logs (and digital output, if configured to output status). See Status Output, page 77 for more information).

- Deadband. This setting is the value by which the item in alarm must drop below the alarm point to deactivate. This helps prevent alarm chatter while an alarm value hovers around the alarm condition and ensures that the alarm does not deactivate until the value is within a safe range from the trigger point.
- Hold-Off Period. This setting will delay an alarm activation by the specified number of seconds entered. If a value temporarily enters an alarm condition, this hold-off period allows time for the value to move back into a non-alarm condition rather than instantaneously triggering an alarm.

Section 7: Configure Turbine Settings

To configure turbine settings for an MC Synergy, select the Configure Device tile from the navigation menu and locate the Turbine settings in the submenu grid (Figure 7.1).

If you are new to the MC Synergy interface, review Section 5: Configuration Basics, page 33 for an overview of configuration menus and methods. See also Section 6: Configure System Settings, page 43 and Section 8: Configure Outputs Settings, page 69.

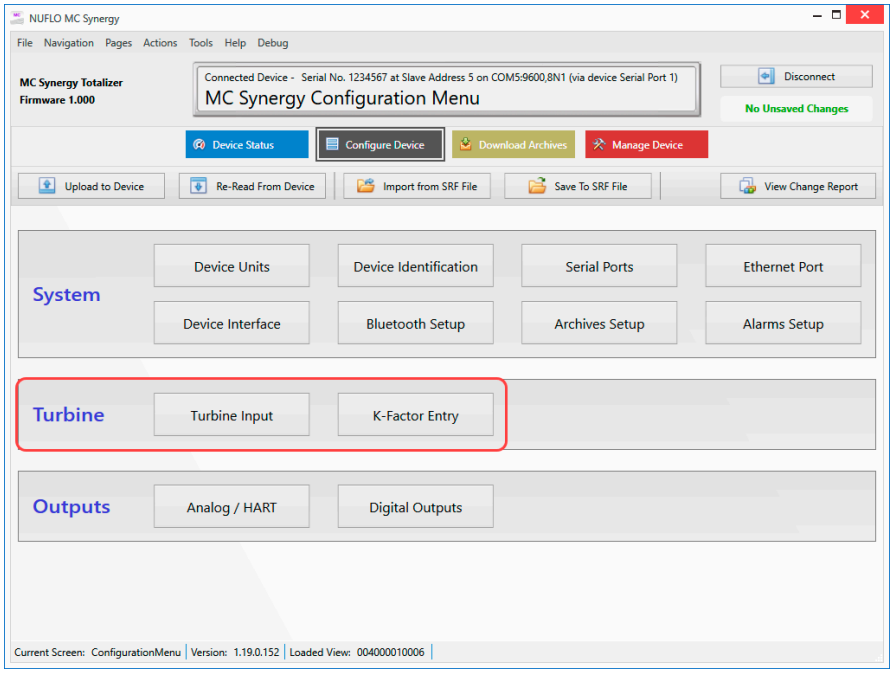


Figure 7.1—Turbine configuration menus

Turbine settings are presented as two menus in the MC Synergy software. The Turbine Input menu contains the settings for defining the input signal from the turbine meter that will be brought into the device. The K-Factor Entry menu contains calibration information for the connected turbine meter.

TURBINE INPUT

Configuring a turbine meter begins with configuring the turbine meter's input parameters, which can be done through the Turbine Input screen (Figure 7.2, page 62).

1. Enter turbine input settings as desired.
2. Click OK in the top right corner of the screen to save the changes.

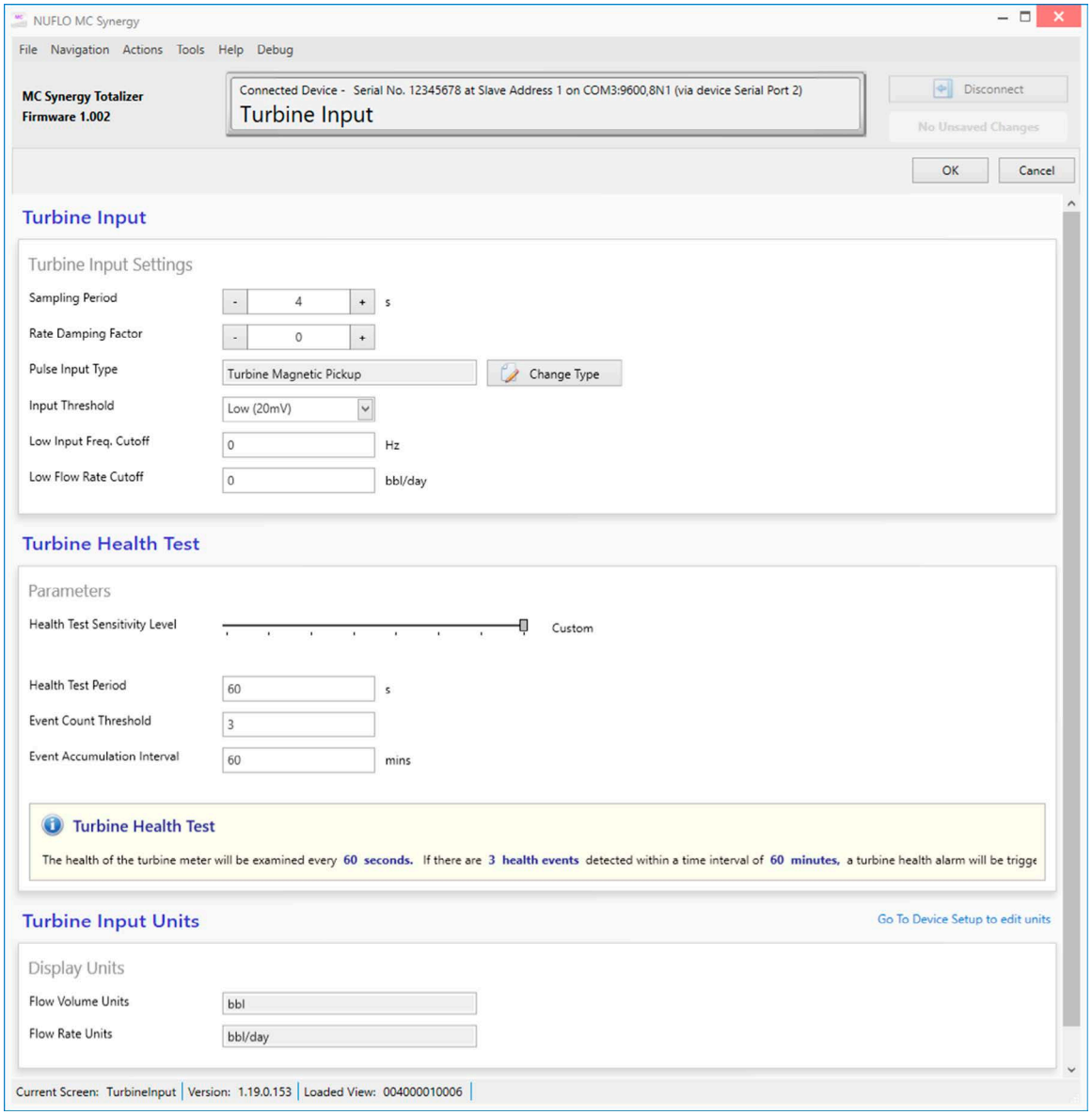


Figure 7.2—Turbine Input screen

TURBINE INPUT SETTINGS

- Sampling Period. This is the length of time (in seconds) that MC Synergy samples the pulses from the turbine before updating the data.
- Rate Damping Factor (Future)
- Pulse Input Type. The type of input coming in which will be specified on the turbine meter connected to the MC Synergy (Figure 7.3, page 63).
  - Digital Pulse Input. The turbine meter will send a square wave to the turbine input. For this input it is necessary that the signal is energized. If the MC Synergy is not receiving a signal, check the input voltage. Refer to the MC Synergy Hardware User Manual for wiring instructions.

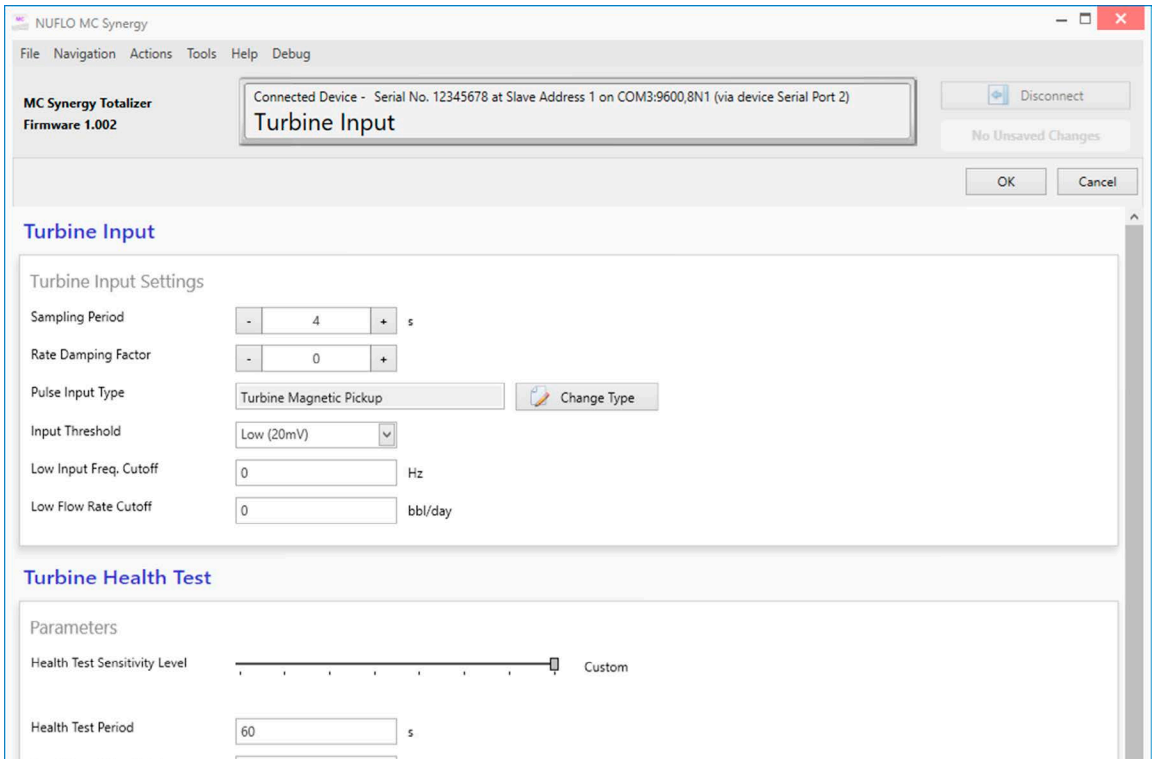


Figure 7.3—Change Turbine Input dialog

  - Turbine Magnetic Pickup. Select this input type when the MC Synergy is connected to a magnetic pickup from a turbine meter. In this configuration, the MC Synergy is expecting a low-level sine-wave signal whose frequency and amplitude is proportional to the rotational velocity of the turbine meter's rotor.
  - Closed Contact Input. A normally closed contact, usually via a reed switch, provides an input with internal pull-up resistor to approximately 3 VDC.
- Input Threshold. Only for Turbine Magnetic Pickup input type. The minimum acceptable voltage required for pulses to register. The threshold selected will depend upon the potential signal noise that may be present during operation (i.e. vibration may cause one strong signal to be accompanied by smaller signals).
- Low Input Freq. Cutoff. The MC Synergy will ignore pulses if the pulse frequency drops below this cutoff value.
- Low Flow Rate Cutoff. The MC Synergy will cease accumulation of flow time in the hourly and daily records if the turbine flow rate drops below this cutoff value.

TURBINE HEALTH TEST

- Health Test Sensitivity Level. Permits the user to select a pre-configured turbine health testing setup, or to make a custom configuration, based upon the needs of the installation. These three parameters help the user to identify the validity of an error, and to ensure that small mechanical or electrical anomalies do not cause an error to unduly trigger a turbine alarm.
- Health Test Period. Represents the time over which the health of the meter will be analyzed. If signals are present that represent an error in the meter, then the appropriate turbine alarm will be activated. These may include, a bent blade, missing blade, erratic signal, replace kit, or an error with a blade angle.

- Event Count Threshold. The value will determine how many times an error event may be detected before it is considered to be valid, and will trigger an alarm.
- Event Accumulation Interval. This sets a boundary on the length of time the device will count the error events before resetting the error event count.

TURBINE INPUT UNITS

The bottom section of the Turbine Input screen displays the volume and flow rate units that are currently configured on the device. Go to Device Setup to edit these units. See Device Units, page 43 for more information.

K-FACTOR ENTRY

The K-Factor Entry screen (Figure 7.4, page 65) allows you to enter information supplied with the turbine meter for use in monitoring meter health and calibrating the MC Synergy with the appropriate K-factor(s) and/or meter factor(s).

Every NUFLO turbine meter and internals kit is packaged with a QR tag that contains calibration details and other information specific to the meter or internals kit. This record may be downloaded to a phone or tablet via a scan of the QR code, and then uploaded to the MC Synergy using the Sensia Digital Data Plate app. This process automatically populates this information in the K-Factor Entry settings in seconds and without the risk of human error that is ever-present with manual data entry.

However, if you prefer manual entry, you can enter the selections based on the calibration report supplied with your NUFLO turbine meter or internals kit.

1. Enter the K-factor turbine meter, K-factor, and meter factor settings as applicable.
2. Click OK in the top right corner of the screen to save the changes.

TURBINE METER INFORMATION

Turbine meter information allows you to track the health of a specific turbine meter. Using this data, the MC Synergy monitors the flow signals and issues an alarm if it detects a bent blade, missing blade, erratic signal, and alerts you when the meter's internals are nearing the end of their expected functional life and are in need of replacement.

Note	Uploading meter information to the MC Synergy via a phone scan of a turbine QR tag, facilitated by the Digital Data Plate app is the best way of preserving the accuracy of this information. However, if you are entering this information manually, take a few minutes to verify the following data to ensure its accuracy.

- Meter Part Number. The factory-issued number used to identify a specific group of design specifications.
- Internals Part Number. The factory-issued number used to identify the turbine internals kit that is periodically replaced to extend the functional life of a turbine meter.
- Brand. The commercial name used to uniquely identify the meter in the marketplace. "NUFLO" for example.
- Meter Serial Number. A traceable number issued at the time of manufacture to uniquely identify each meter certified by testers to meet minimum required specifications.
- Meter Range Units. Displays the units corresponding to the turbine meter range of values. To update, see Device Units, page 43.
- Flow Range - Min. Meter Range Low is the flow rate representing the minimum operating range of the meter. Values below this range will be outside the specified range of the meter and may not meet linearity

specifications. If the flow rate drops below this value for 2 minutes, a low flow warning will appear (see Suppressing Alarms, page 26).

- Flow Range - Max. Meter Range High is the flow rate representing the maximum operating range of the meter. Values above this range will be outside of the specified range of the meter and may not meet linearity specifications. Operating the meter above this value for extended periods may reduce the meter's life. If the flow rate rises above this value for 2 minutes, a high flow warning will appear (see Suppressing Alarms, page 26).
- Number of Blades. The number of blades in the turbine meter rotor. The device uses this parameter for monitoring turbine health. If the number of blades is entered in error, alarms will be triggered inadvertently (see Suppressing Alarms, page 26). Meter rotors may have 2, 3, 4, 6, 8, or 12 blades, depending on meter size and model.
- Meter Body Diameter. Inside diameter of the turbine meter, measured in inches.
- Meter Kit Life. The time that will elapse before the turbine meter kit will need to be replaced, measured in days. When this user-specified period has elapsed, an alarm will trigger to alert you to replace the kit (see Suppressing Alarms, page 26). When you have replaced the meter kit, press the Reset Meter Kit Life button to use the elapsed flow time for the previous kit as the replacement alarm trigger for the newly installed kit.

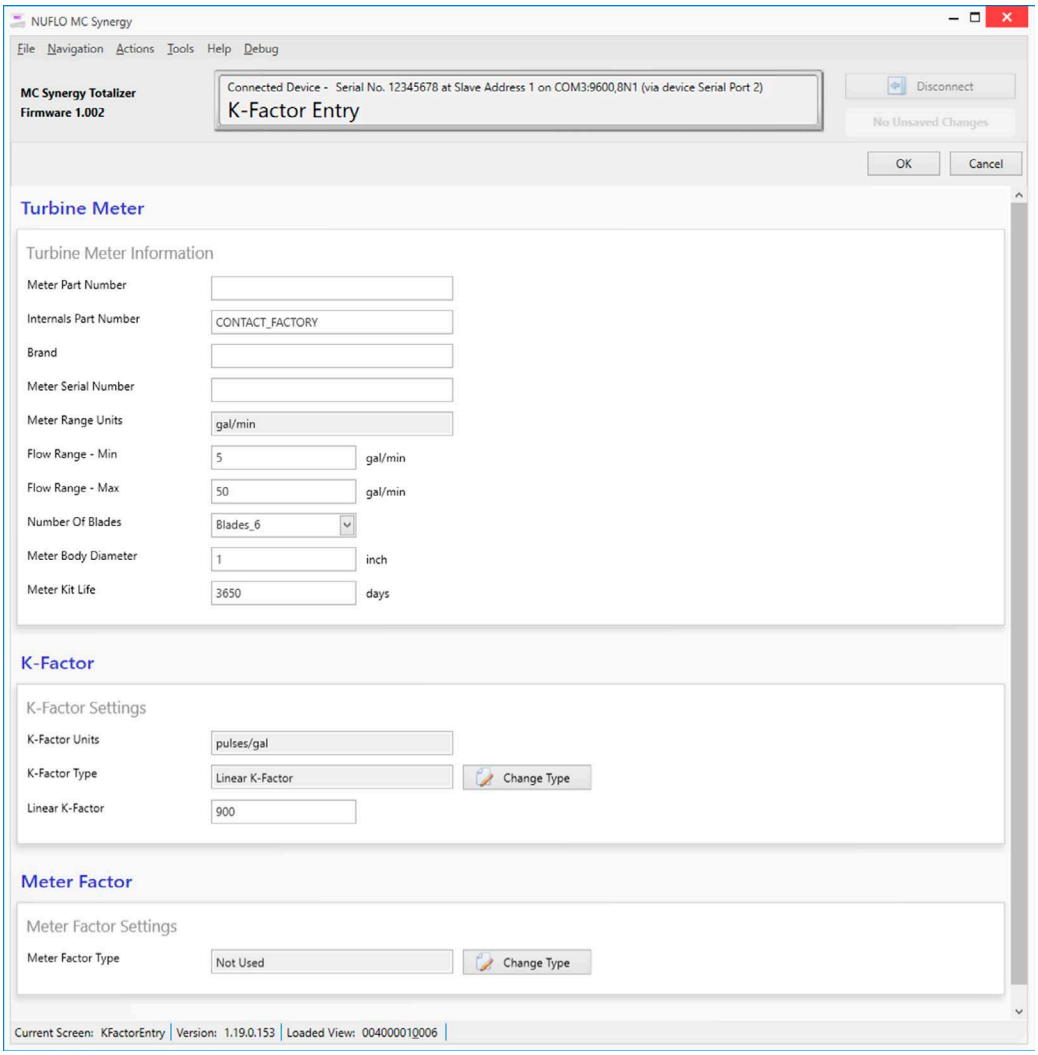


Figure 7.4—K-Factor Entry screen

K-FACTOR SETTINGS

Use the calibration information provided with the turbine meter to enter the K-factor calibration. The default K-factor is a linear K-factor set at 900 pulses per gallon. NuFlo meters are supplied with QR tags containing the calibration details. Alternatively, a calibration report (pdf) can be obtained from Sensia on request.

- K-Factor Units. Not Editable. Displays the units configured in Device Units, page 43.
- K-Factor Type. Linear or Multipoint. For each installed turbine meter, a factory calibration record specifies the K-factor for tested flow rate ranges or a uniform K-factor with a percent accuracy for a specified flow rate range.
  - Linear K-Factor. A single value which represents the volume that passes through the turbine meter for each pulse (Figure 7.5).
  - Multipoint K-Factor. Configurable as 2 points to 12 points (Figure 7.6). A number of points configured to represent the volume that passes through the turbine meter for each specified frequency. The MC Synergy will automatically interpolate for frequencies between configured points.
    - Add Point. Presents a dialog for defining the K-factor at a specified frequency (Figure 7.7, page 67).
    - Edit Point. Presents a dialog for changing the selected K-factor point (Figure 7.8, page 67).
    - You may also clear all K-factor points or delete a selected K-factor point from this dialog.
    - Sort Points. After entering the points, you can choose Sort Points to verify calibration. However, the points will be sorted automatically when the K-factor entry is saved.

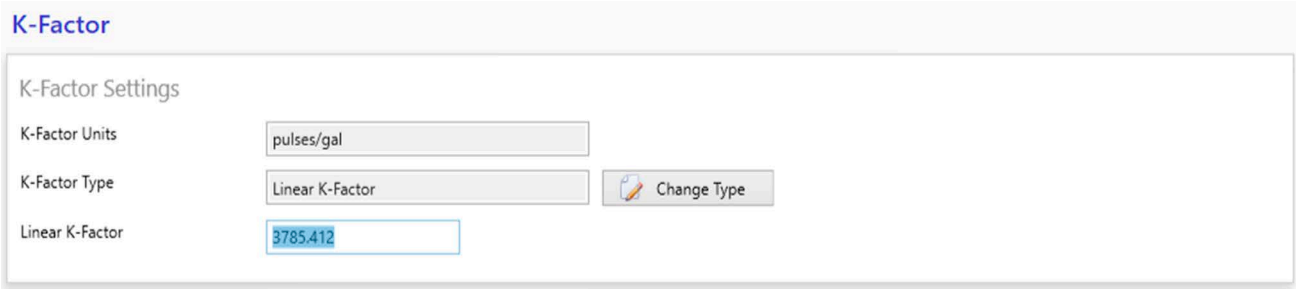


Figure 7.5—Linear K-Factor

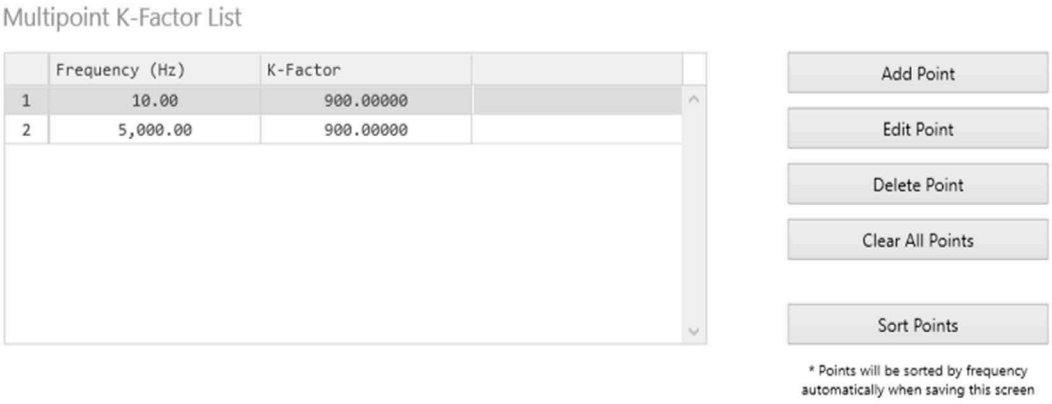


Figure 7.6—Multipoint K-Factor

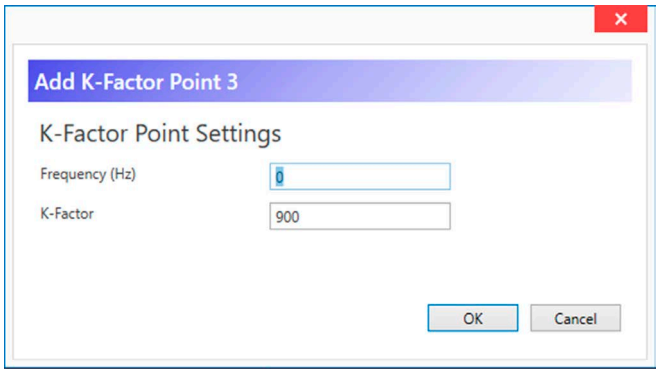


Figure 7.7—Add K-Factor Point dialog

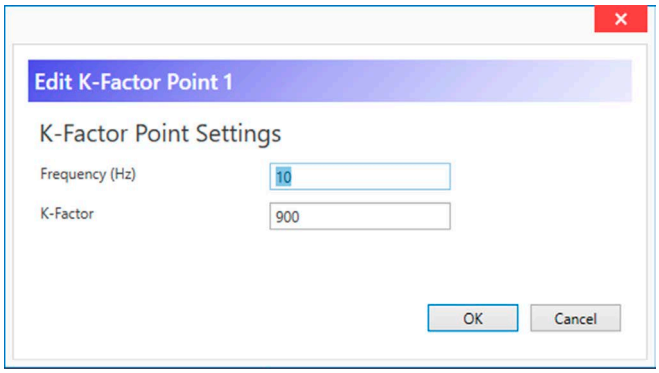


Figure 7.8—Edit K-Factor Point dialog

METER FACTOR SETTINGS

As the turbine meter ages and its blades become worn, you may need to re-calibrate the MC Synergy to maintain the desired measurement accuracy. Instead of changing the K-factor, you may enter a meter factor. This should not be necessary with a new turbine meter, and so the meter factor is disabled by default.

Meter Factor Type. Linear or Multipoint Meter Factor. The meter factor is calculated by dividing the volume indicated by a standard reference (from the calibrated K-factor) by the Indicated volume (measured) of the meter. To determine if a multipoint meter factor is required, meter testing at varying frequencies may be required.

- Linear Meter Factor. A value which, when multiplied by the K-factor, equals the volume that passes through the turbine meter for each pulse.

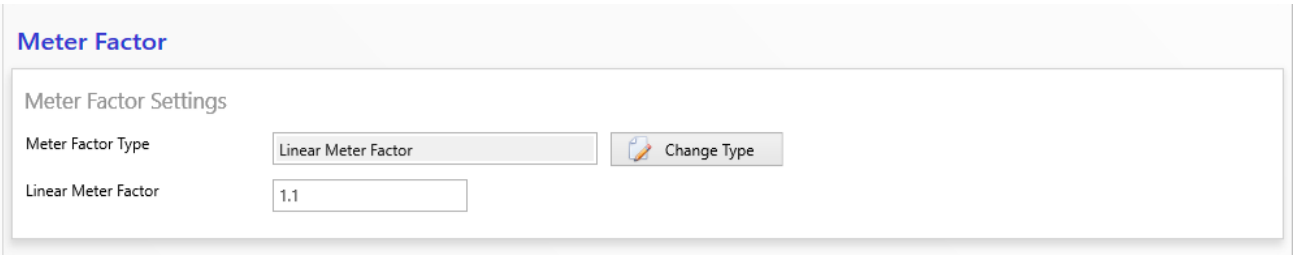


Figure 7.9—Linear Meter Factor

- Multipoint Meter Factor. Configurable as 2 points to 12 points (Figure 7.10). A number of points configured to be multiplied by the K-factor, resulting in the volume that passes through the turbine meter for each pulse at each specified frequency. The MC Synergy will automatically interpolate for frequencies between configured points.
  - Add Point. Presents a dialog for entering the Meter Factor at a specified frequency (Figure 7.11).
  - Edit Point. Presents a dialog for changing the selected Meter Factor point (Figure 7.12).
  - You may also clear all meter factor points or delete a selected meter factor point from this dialog.
  - Sort Points. After entering the points, you can choose Sort Points to verify calibration. However, the points will be sorted automatically when the meter factor entry is saved.

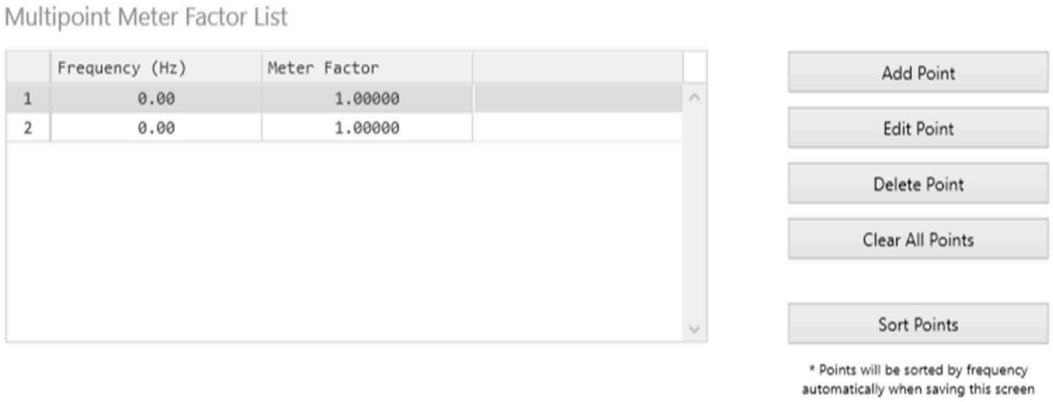


Figure 7.10—Multipoint Meter Factor

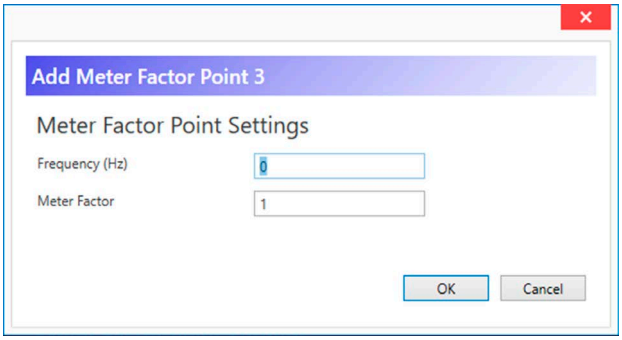


Figure 7.11—Add Meter Factor Point dialog

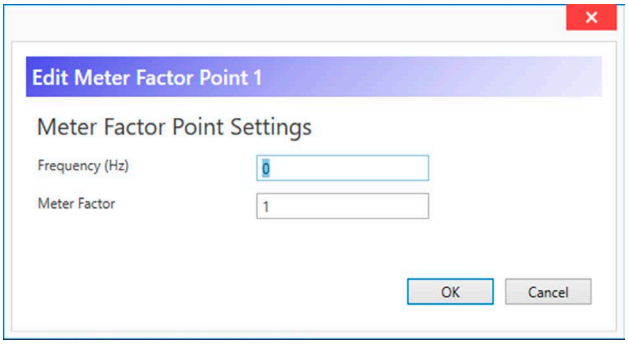


Figure 7.12—Edit Meter Factor Point dialog

Section 8: Configure Outputs Settings

To configure output settings for an MC Synergy, select the Configure Device tile from the navigation menu and locate the Outputs settings in the submenu grid (Figure 8.1).

If you are new to the MC Synergy interface, review Section 5: Configuration Basics, page 33 for an overview of configuration menus and methods. See also Section 6: Configure System Settings, page 43 and Section 7: Configure Turbine Settings, page 61.

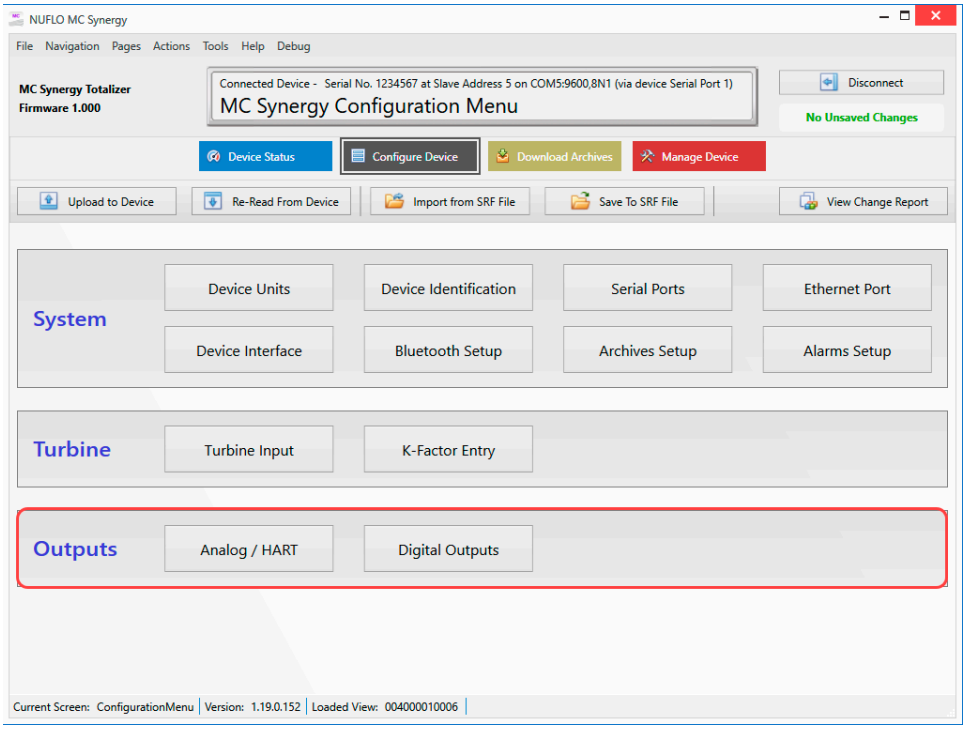


Figure 8.1—Outputs configuration menus

ANALOG/HART OUTPUTS

These configuration settings allow you to set up a traditional 4 to 20 mA output or a HART protocol output. Both outputs require the installation of an Analog Output/HART expansion board.

TRADITIONAL ANALOG OUTPUT

The settings in the Analog Output/HART screen can be used to configure a traditional 4 to 20 mA output even without HART communications. Simply make sure the HART Node selection is set to 4 to 20 mA Loop, and then jump to the Analog Output Settings in the middle of the screen to configure the low and high setpoints. See Analog Output Settings (4 to 20 mA Loop/Point-to-Point Only), page 73, for additional information.

HART OUTPUT

HART (Highway Addressable Remote Transducer) is a communication protocol that allows bi-directional communication between HART-compliant devices. HART provides digital communication channels over a 4 to 20 mA current loop.

The HART interface can be configured for either of two modes: Multidrop (Figure 8.2), or 4 to 20 mA Loop, also referred to as Point-To-Point (Figure 8.3, page 71).

- If multiple HART devices will be added to the network, Multidrop must be selected. In Multidrop mode, the 4 to 20 mA loop will be fixed at 4 mA.
- If there is only one HART device on the network, the 4 to 20 mA Loop (Point-To-Point) may be chosen, and the user may retrieve the flow rate using an analog readout unit.

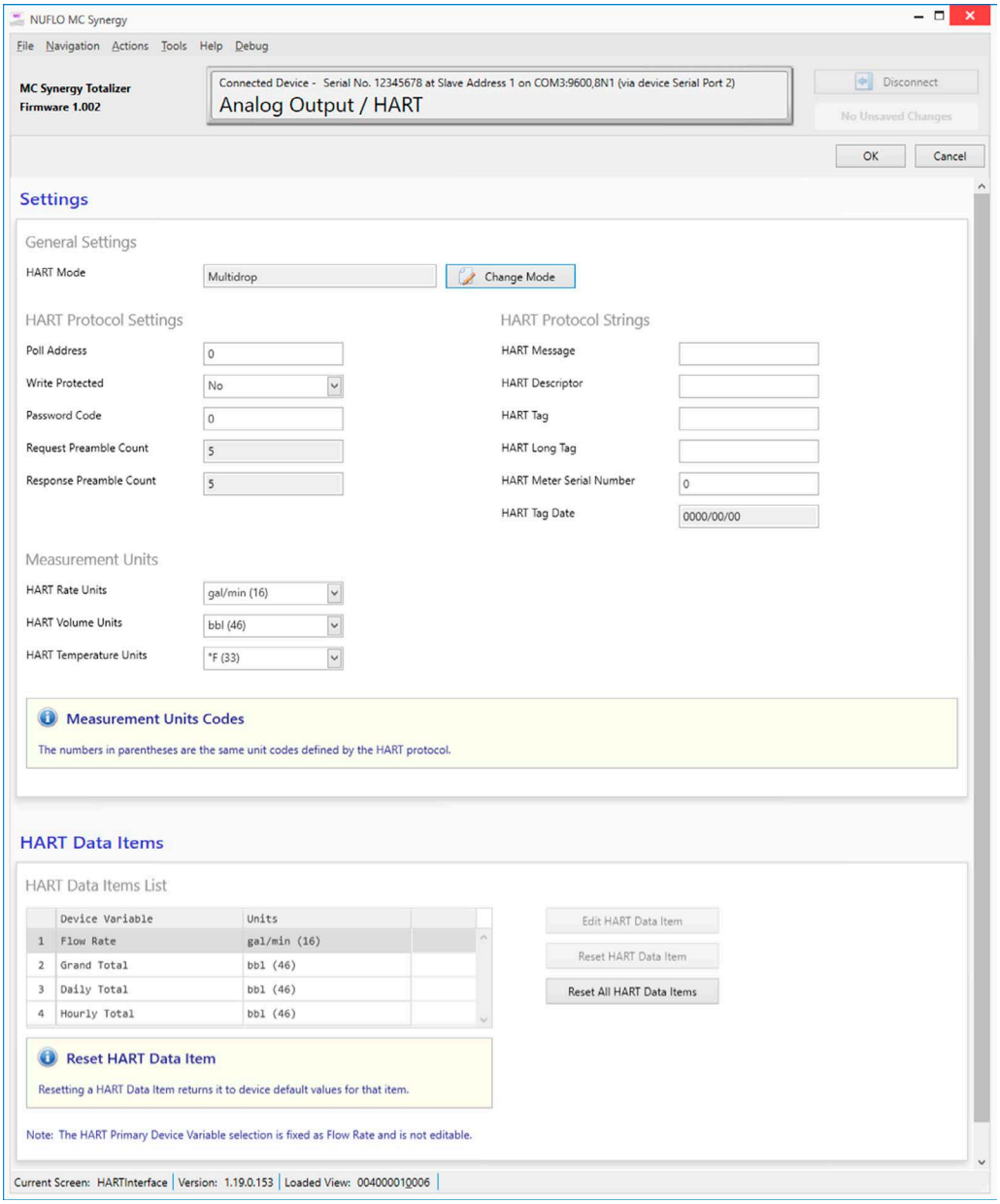


Figure 8.2—HART Interface screen (Multidrop)

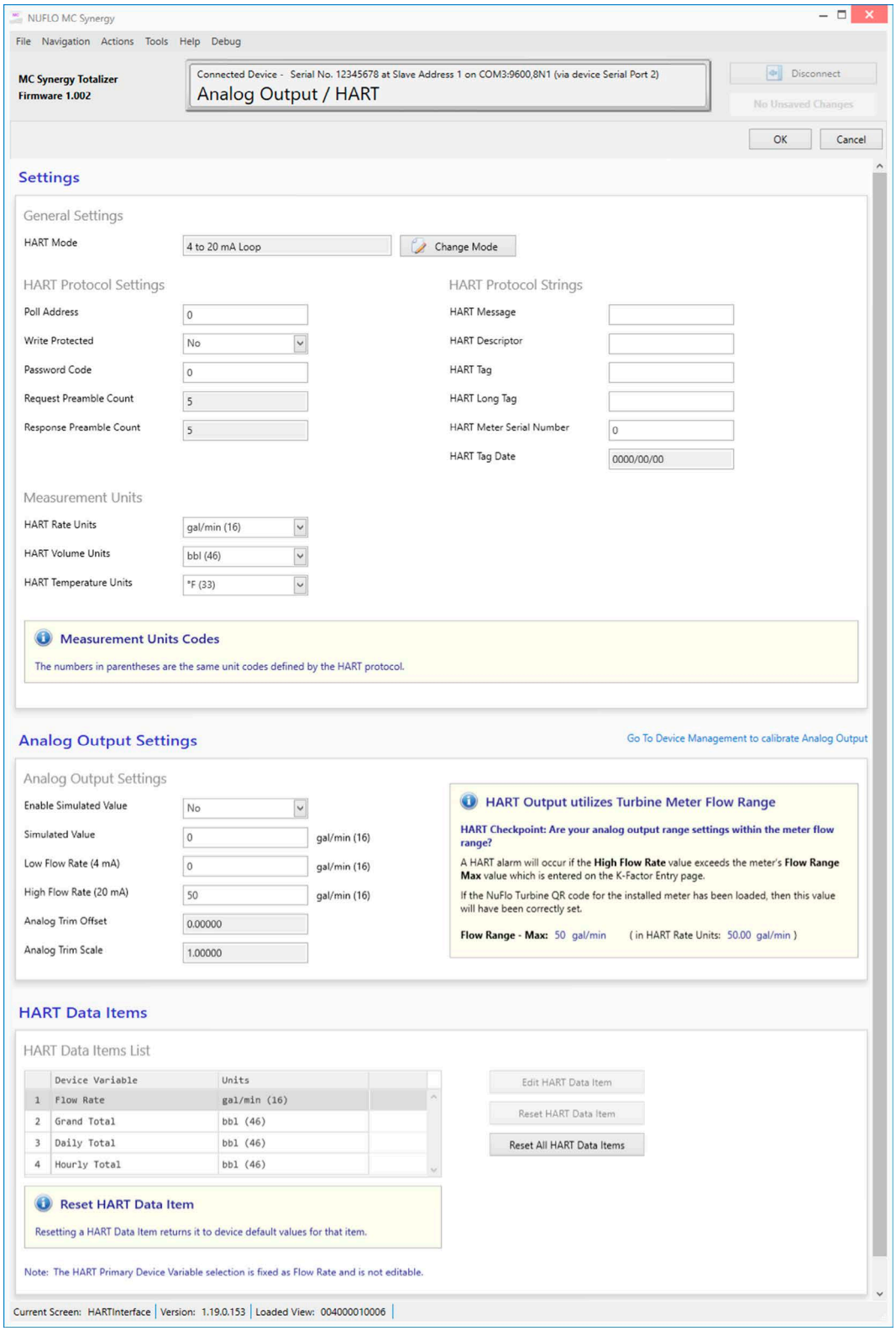


Figure 8.3—HART Interface screen (4 to 20 mA Loop)

HART Protocol Settings and Strings

The protocol settings and strings will vary, depending on the application, settings on the receiving device (i.e. handheld or modem), and established naming schemes. Contact your network administrator to ensure conformity.

- Polling Address. Between 1 to 65535. The polling address is the destination address following the 38-bit scheme.
- Write Protected. Makes the configuration and information seen through HART “Read Only”.
- Password Code. A code containing 1 to 5 digits that is required to start receiving the data from the device.
- Request Preamble Count. 5 to 20 bytes. The number of bytes the receiving device is required to send for a command request.
- Response Preamble Count. 5 to 20 bytes. The number of bytes the MC Synergy is required to respond with to the receiving device.
- HART Message. Number of characters, up to 32.
- HART Descriptor. Number of characters, up to 16.
- HART Tag. A 16-character numbered tag for the specific device.
- HART Long Tag. A 16-character tag to describe the device.
- HART Meter Serial Number. The turbine meter serial number (7 digits).
- HART Tag Date. Numerical representation of the date of commissioning.

HART Measurement Units

The selected measurement units will be transmitted from the device to a HART handheld device or modem. These units are separate from the configured measurement and display units on the MC Synergy. Within the HART interface menu, the user may override the configured display units on the MC Synergy with the selected HART measurement units.

- HART Rate Units. Flow rate units that are sent to the HART handheld device or modem via a unique code identifier. The selection includes the flow rate units and the unique code. This does not affect the settings on the MC Synergy for display or calculation. Options include:
  - gal/sec (22), gal/min (16), gal/hr (136), gal/day (235)
  - bbl/sec (132), bbl/min (133), bbl/hr (134), bbl/day (135)
  - m3/sec (28), m3/min (131), m3/hr (19), m3/day (29)
  - cf/sec (26), cf/min (15), cf/hr (130), cf/day (27)
  - L/sec (24), L/min (17), L/hr (138), L/day (240)
- HART Volume Units. Volume units that are sent to the HART handheld device or modem via a unique code identifier. The selection includes the volume units and the unique code. This does not affect the settings on the MC Synergy for display or calculation. Options include:
  - gal (40)
  - bbl (46)
  - m3 (43)
  - cf (112)
  - L (41)
- HART Temperature Units. Temperature units that are sent to the HART handheld device or modem via a unique code identifier. The selection includes the temperature units and the unique code. This does not

affect the settings on the MC Synergy for display or calculation. Options include: °C (32), °F (33), K (35), and °R (34)

Analog Output Settings (4 to 20 mA Loop/Point-to-Point Only)

These settings are used to calibrate the analog output of the MC Synergy for sending the flow rate over the 4 to 20 mA wiring. First, set the bounds of the high and low calibrations of the flow rate. Then, using the simulated value and the zero and full scale adjustment, you can “tune” the output to ensure that at the high flow rate, 20 mA is being seen, and at the low flow rate, 4 mA is being seen.

- Enable Simulated Value. Turn the 4 to 20 mA simulated mode on or off.
- Simulated Value. This value is used under the simulated mode when it is enabled.
- Low Flow Rate (4 mA). This is the minimum flow rate for the process variable’s analog measurement.
- High Flow Rate (20 mA). This is the maximum flow rate for the process variable’s analog measurement.

Note	The rate units in parentheses next to the units for Simulated Value, Low Flow Rate, and High Flow Rate are the unit codes defined by the HART protocol.

- Analog Trim Offset. Not Editable. This is a product of the Calibrate Analog Output function in the Manage Device menu.
- Analog Trim Scale. Not Editable. This is a product of the Calibrate Analog Output function in the Manage Device menu.

HART Data Items

Use this list to select device variables to transmit over the wiring to the HART handheld unit or modem. Flow rate is fixed as the primary variable (PV) and this variable is not editable. You can choose three additional variables to transmit, which will be other totals that the device has logged. SV is item 2, TV is item 3, and QV is item 4.

To edit a Data item, click Edit HART Data Item and select a new total in the Device Variable Selection field (Figure 8.4, page 74). The options include: Grand Total, Daily Total, Hourly Total, Previous Day Total, Previous Hour Total, or Previous Polling Total.

Note	The rate units displayed in parentheses in the Units column are the unit codes defined by the HART protocol.

You can also perform a reset as described below:

- Reset HART Data Item. Returns any variable other than flow rate (PV) to its default setting. By default,
  - SV (item 2) is Grand Total
  - TV (item 3) is Daily Total
  - QV (item 4) is Hourly Total
- Reset All HART Data Items. Returns all variables other than flow rate (PV) to their default settings.

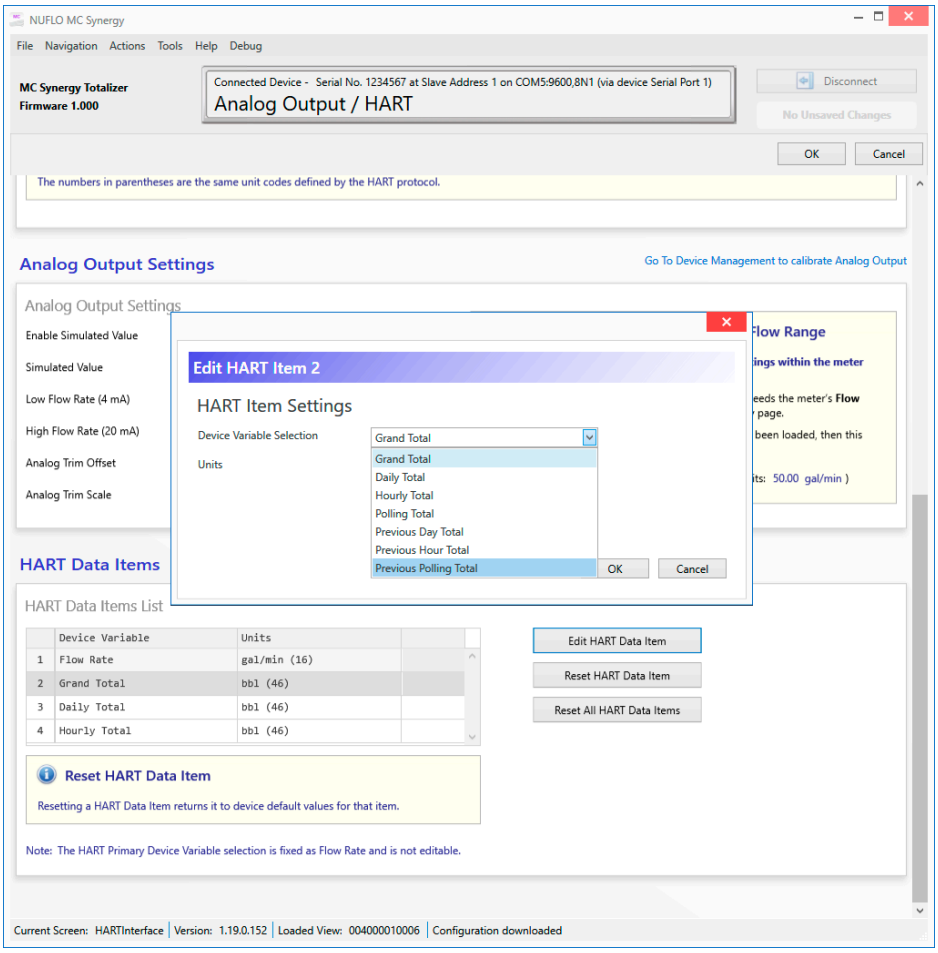


Figure 8.4— Edit HART Data Item

DIGITAL OUTPUTS

The Digital Outputs screen (Figure 8.5, page 75) allows configuration of the two MC Synergy digital outputs. By default, each digital output is disabled.

The user may configure each digital output as one of the following:

- Disabled.
- Specified Precision Pulse Output (MC-III Compatible). (Figure 8.6, page 75) Each pulse represents a specified increment of volume in the units selected for Total Volume Display in Device Units.
- Scaled Pulse Output. (Figure 8.7, page 76) Each pulse represents a user-configured volume in the user-selected units.
- Status Output. (Figure 8.8, page 77) This setting logs an output each time an alarm trigger condition occurs.
- Amplified Raw Output. (Figure 8.9, page 78) This setting gives an amplified square wave representation of the raw incoming turbine meter signal received by the MC Synergy.
- Modbus Register Control. (Figure 8.10, page 79) This setting allows the digital output to be controlled via Modbus, where a value of “0” will give the normal output state, and “1” will give the activated state
  - For NC, “0” is closed, and “1” is open.

– For NO, “0” is open, and “1” is closed.

You can use Modbus register 4108 to control Digital Output 1, and Modbus register 4121 to control Digital Output 2.

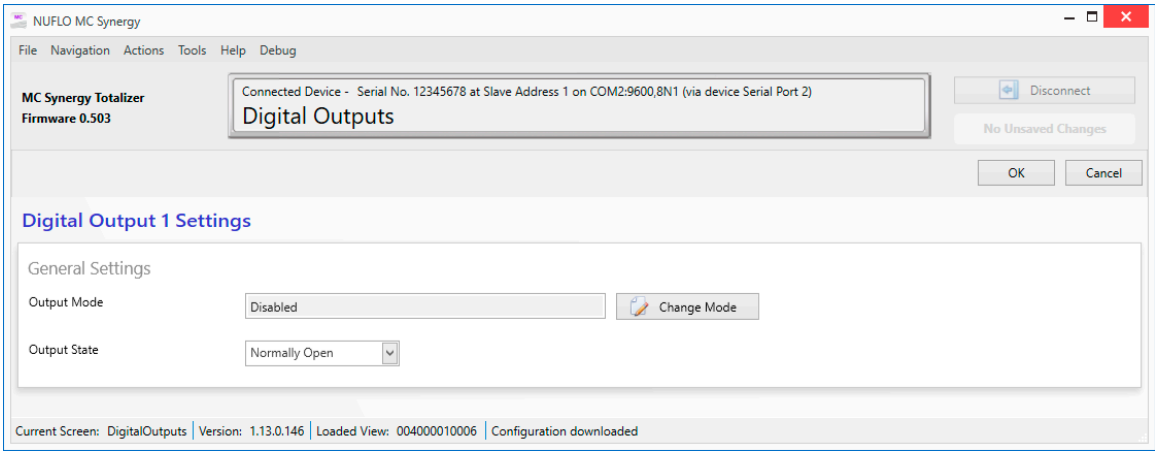


Figure 8.5—Digital Outputs screen (outputs disabled)

SPECIFIED PRECISION PULSE OUTPUT (MC-III COMPATIBLE)

This output sends the defined signals to represent increments in volume. The number of pulses in the output is proportional to the volume accumulated from the incoming turbine signal. Each pulse represents a specified increment of volume in the units selected for Total Turbine Volume.

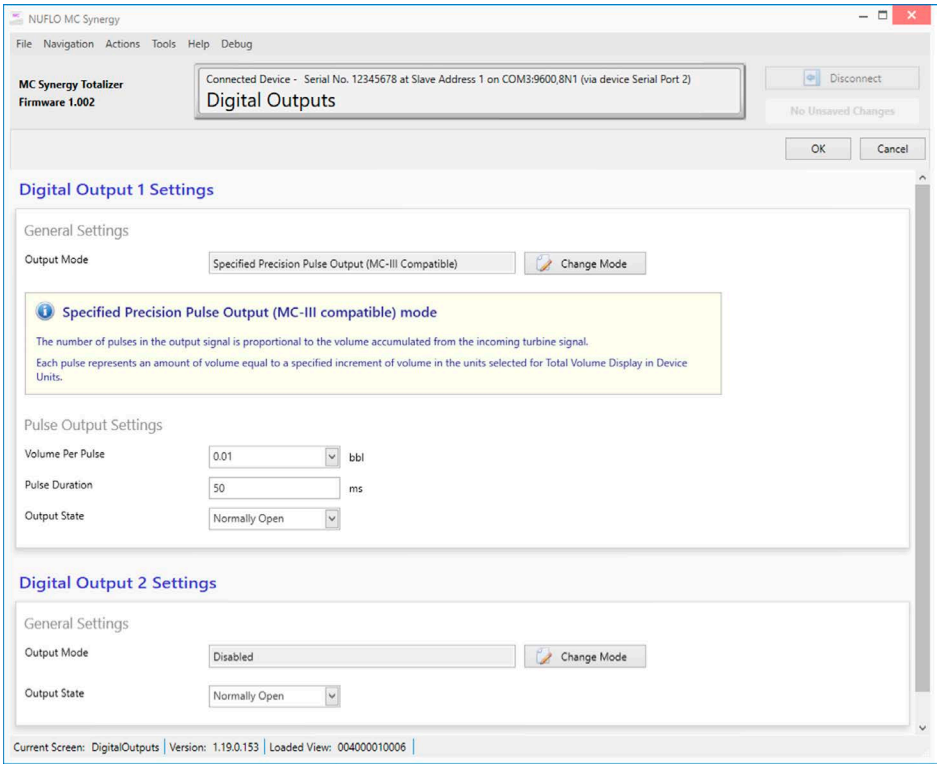


Figure 8.6—Specified Precision Pulse Output screen

- Volume Per Pulse. The volume that passes through the meter for each pulse generated. To configure the volume unit, see Device Units, page 43.
- Pulse Duration. In the Pulse Duration field, enter a value in multiples of 10 milliseconds. The Pulse Duration determines the length of the active portion of each output pulse.
- Output State. The pulse output can be either Normally Open or Normally Closed. The output state of a digital output is reported as Active or Not Active. When not active, the output switch is in the user-configured normal position (i.e. Normally Open or Normally Closed).
- Normally Open. The output will close on each pulse for the duration specified in the Pulse Duration field.
- Normally Closed. The output will open on each pulse for the duration specified in the Pulse Duration field.

SCALED PULSE OUTPUT

This output sends one pulse for each whole number derived from taking the value of the selected register and dividing it by the scale factor. The number of pulses in the output is proportional to the volume accumulated from the incoming turbine signal. Each pulse represents a user-configured amount of volume, and the unit of the volume is user-defined from the software.

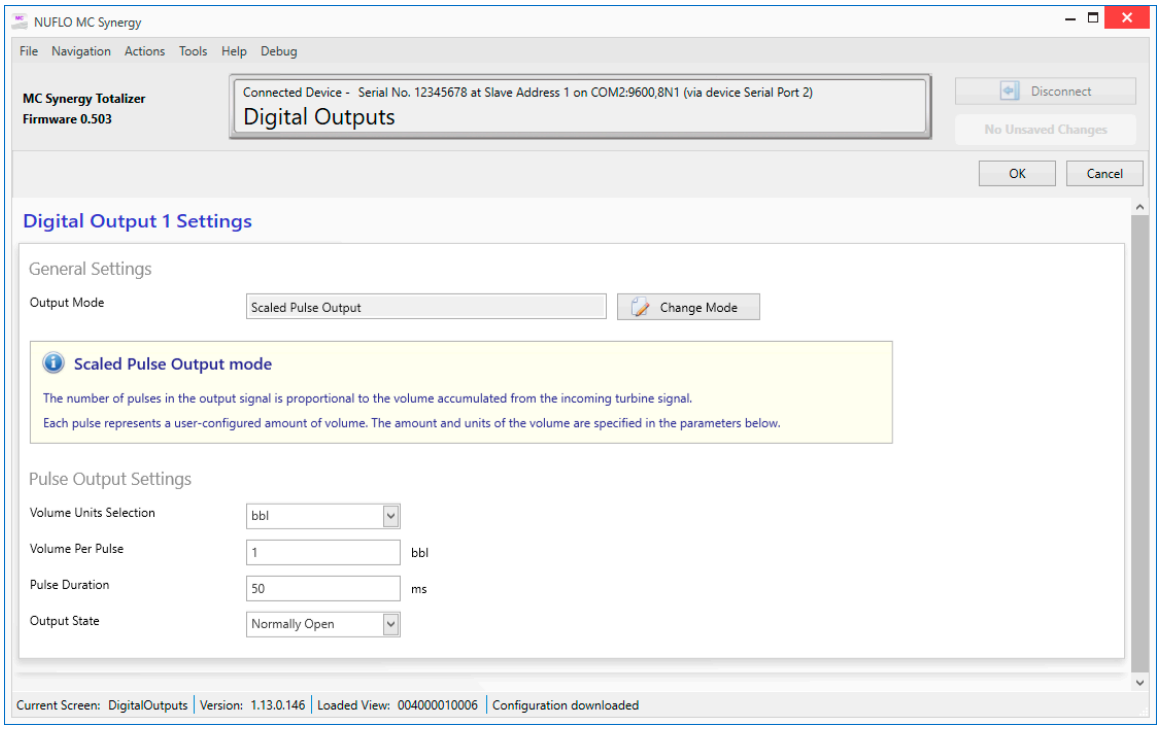


Figure 8.7—Scaled Pulse Output screen

- Volume Units. The volume units for which the meter has been calibrated.
- Volume Per Pulse. The volume that passes through the meter for each pulse generated.
- Pulse Duration. In the Pulse Duration field, enter a value in milliseconds. The Pulse Duration determines the length of the active portion of each output pulse.
- Output State. The pulse output can be either Normally Open or Normally Closed. The output state of a digital output is reported as Active or Not Active. When not active, the output switch is in the user-configured normal position (i.e. Normally Open or Normally Closed).

- Normally Open. The output will close on each pulse for the duration specified in the Pulse Duration field.
- Normally Closed. The output will open on each pulse for the duration specified in the Pulse Duration field.

STATUS OUTPUT

This setting logs an output each time an alarm trigger condition occurs.

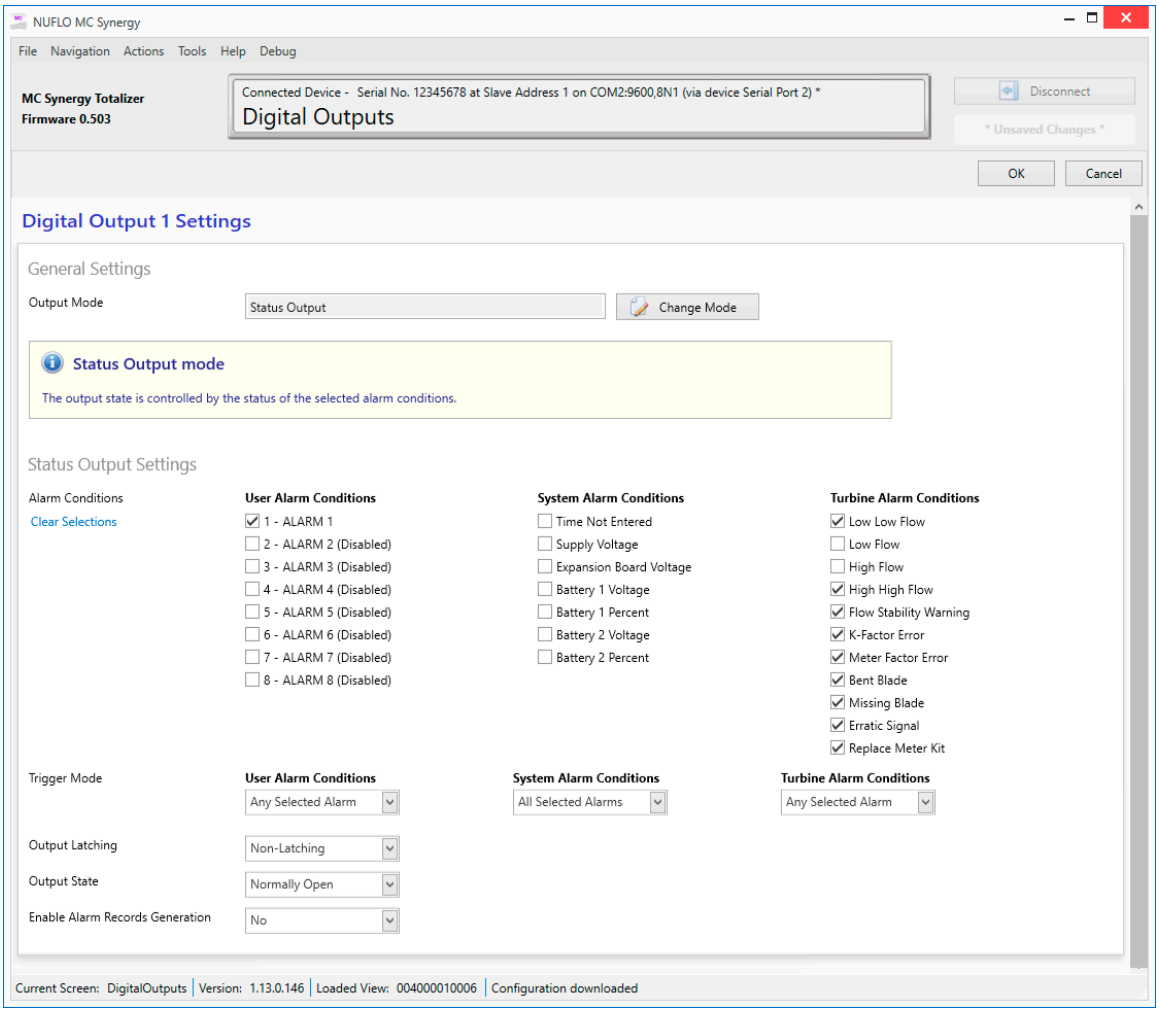


Figure 8.8—Status Output screen

- Alarm Conditions. For each alarm, select all the alarms that will require the digital output. For example, one alarm may be set to alert you via a light or audible device, and the other may be wired for an emergency shutdown if one or more catastrophic conditions are detected.
- Trigger Mode. Configure the output to activate for each alarm, or only when all the selected alarms in Alarm Conditions are activated.
  - Any Selected Alarm. The pulse output will activate if any of the selected alarms being triggered.
  - All Selected Alarms. The pulse output will only activate when every selected alarm has been triggered.

- Output Latching. Configure the status output to either activate/deactivate based upon the combination of the Alarm Conditions and Trigger Mode, or to activate and remain activated when the status pulse output is activated.
  - Non-Latching. The output will return to an inactive state when the assigned register value returns to a normal range (and the selected alarms are no longer triggered) without intervention from the operator.
  - Latching. The output will remain in an active state once it is activated, even if the assigned register value returns to a normal range (and the selected alarms are no longer triggered).

Note	If the digital output is being used for a turbine health alarm, a latched output is recommended.

- Output State. The output state of a digital output is reported as Active or Not Active. When not active, the output switch is in the user-configured normal position (Normally Open or Normally Closed).
  - Normally Open. The output will close on each pulse for the duration specified in the Pulse Duration field.
  - Normally Closed. The output will open on each pulse for the duration specified in the Pulse Duration field.
- Enable Alarm Records Generation. Configure a status output to also trigger an alarm archive record to be generated for the selected alarms.

AMPLIFIED RAW OUTPUT

This output gives an amplified square wave representation of the raw incoming turbine meter signal received by the MC Synergy.

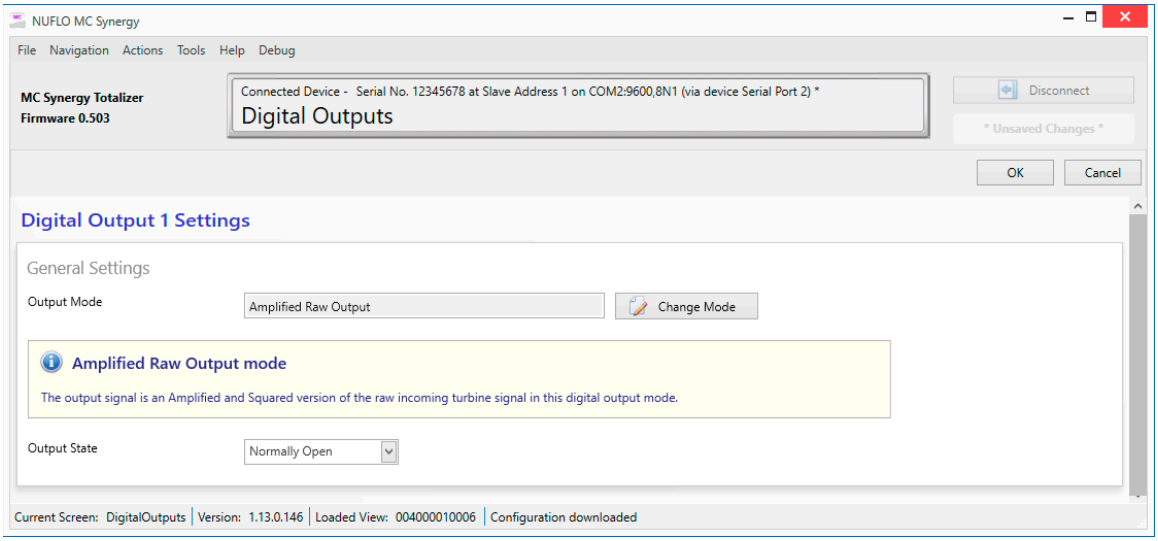


Figure 8.9—Amplified Raw Output screen

The Amplified raw output signal can be set for a Normally Open or Normally Closed State.

- Normally Open. The output will close on each pulse.
- Normally Closed. The output will open on each pulse.

MODBUS REGISTER CONTROL OUTPUT

This output allows the digital output to be controlled via Modbus, where a value of “0” will give the normal output state, and “1” will give the activated state. For example:

- For NC-Normally Closed, “0” is closed, and “1” is open.
- For NO-Normally Open, “0” is open, and “1” is closed.

You can use Modbus register 4108 to control Digital Output 1, and Modbus register 4121 to control Digital Output 2.

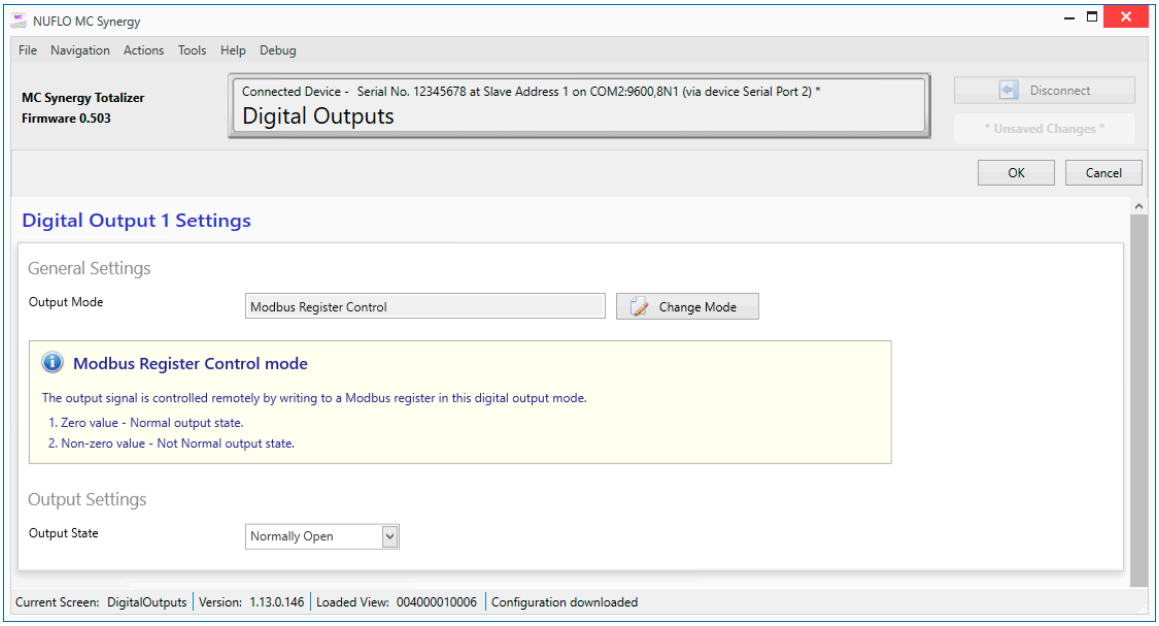


Figure 8.10—Modbus Register Control screen

- Output State. The pulse output can be either Normally Open or Normally Closed. The Output State of a digital output is reported as Active or Not Active. When not active, the output switch is in the user-configured normal position (i.e. Normally Open or Normally Closed).
  - Normally Open. The output will close on each pulse for the duration specified in the Pulse Duration field.
  - Normally Closed. The output will open on each pulse for the duration specified in the Pulse Duration field.

Page intentionally left blank

Section 9: Download Archives

The Download Archives menu (Figure 9.1) allows you to download archive records stored in the device. You can customize the download process using configurable settings in the Download Archives menu and in the Options dialogs accessed via the Tools menu at the top of the screen. You may choose to automate the file naming scheme for each archive download, or have the program prompt you for a file name after each download.

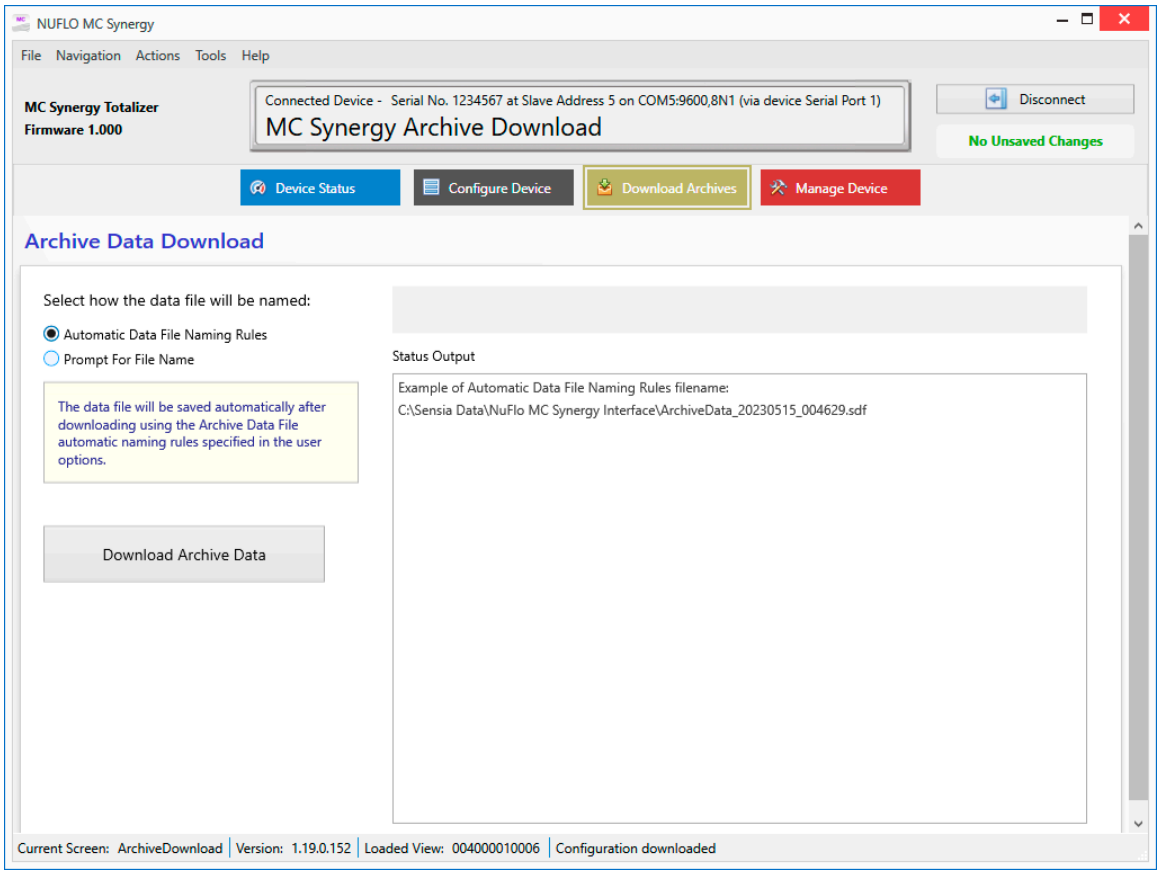


Figure 9.1—Download Archives screen

FILE NAME AND FILE PATH CONFIGURATION

By default, the MC Synergy stores archive download files in this location on your hard drive: C:\Sensia Data\NuFlo MC Synergy Interface. The Tools>Options menu gives you the tools to change and/or append this file path to group your downloads in subfolders that are most meaningful to you.

To take advantage of automatic file names, you will first need to establish the rules to be applied in defining the information you want to capture in your archive filenames using the Tools>Options dialogs. Complete instructions are provided in Section 11: Interface Options, page 93.

Once the rules are established, choose Automatic Data File Naming Rules from the Download Archives screen to apply this feature. The space on the right side of your screen will show a preview of your automated file path and filename (Figure 9.1).

If you prefer to enter your own file path and filename for a download, choose Prompt For File Name. When the download completes, a dialog will appear prompting you for a file name and storage location (Figure 9.2).

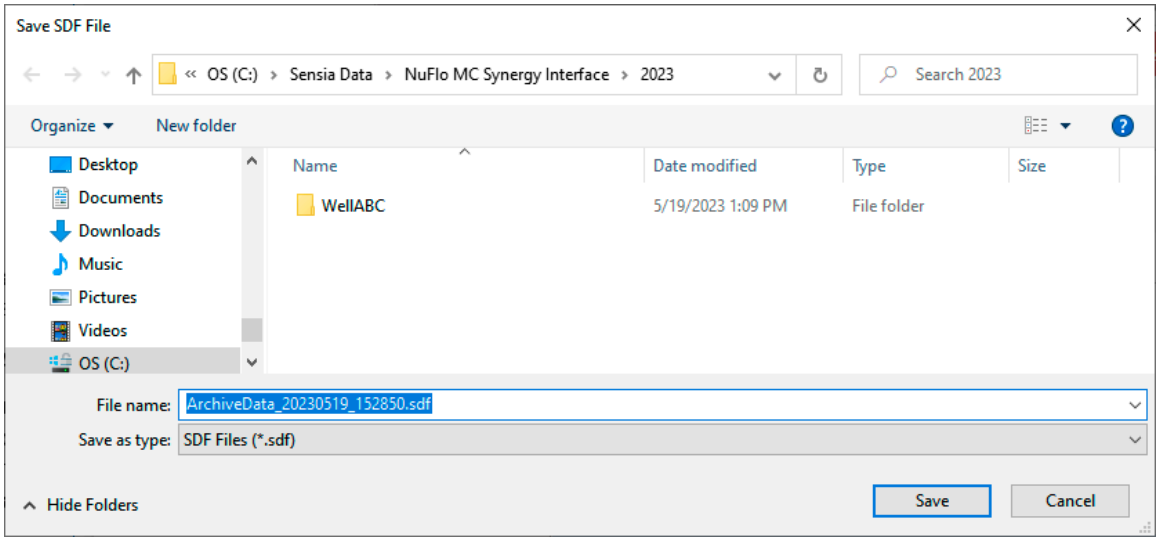


Figure 9.2—File name prompt option for archive downloads

INITIATE A DOWNLOAD

To initiate the archive download,

1. Click Download Archive Data. The download will take several seconds to complete. A progress bar will display both in the navigation window at the top of the screen and in the footer of the screen, and a text notification will appear on screen to provide a real time indication of the percentage of data read (Figure 9.3, page 83).
2. Click OK to acknowledge the confirmation dialog upon completion of the archive data transfer (Figure 9.4, page 83). The resulting file will have a proprietary .sdf format, readable only with Sensia ScanData software.

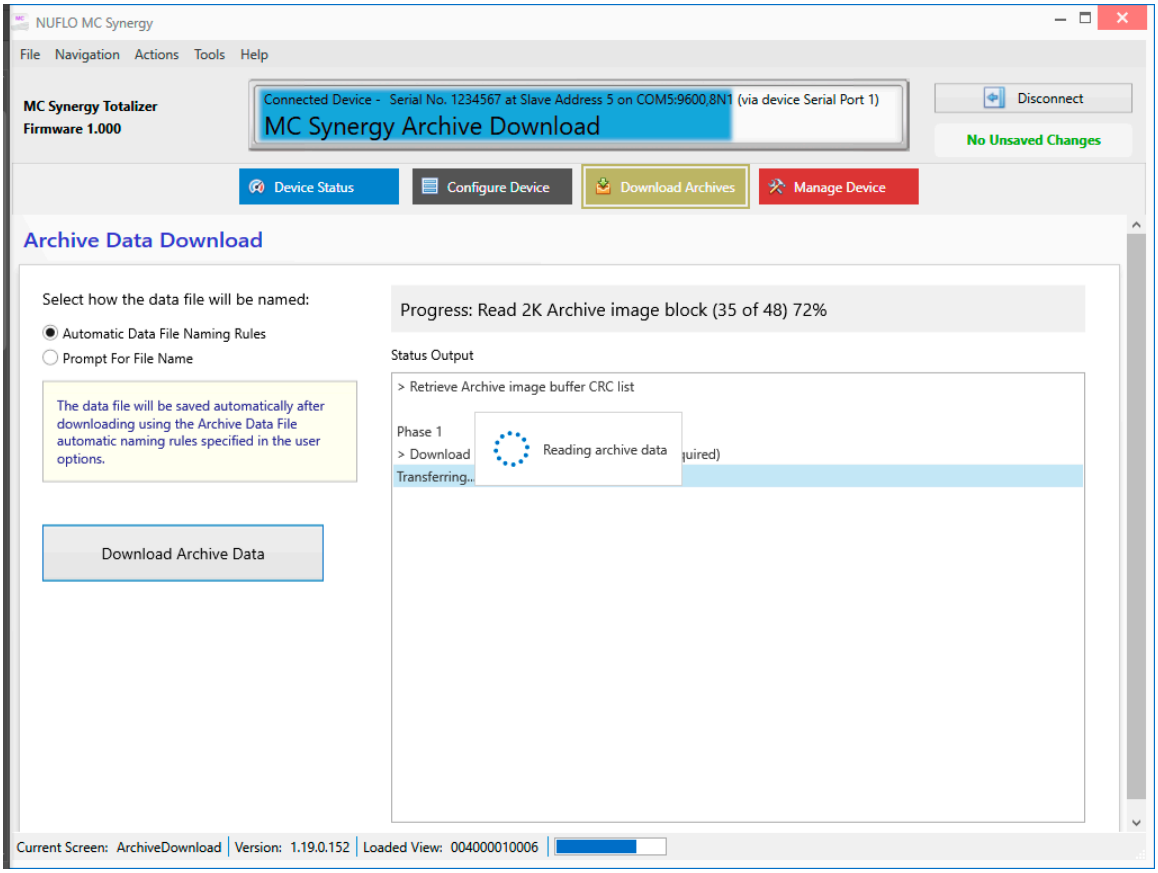


Figure 9.3—Download progress display

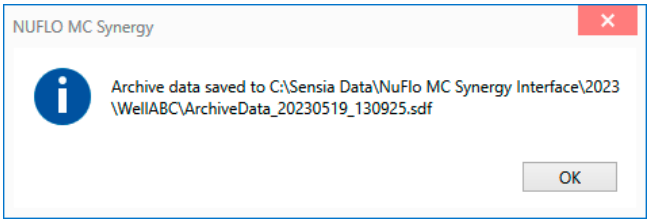


Figure 9.4—Downloaded archive file (SDF)

ANALYZING ARCHIVE DATA

ScanData, a complimentary Sensia software program, allows you to view archive data in a tabular format (Figure 9.5, page 84) or graphical (trend) format (Figure 9.6, page 84). Device configuration, current flow conditions, alarms, events, and calibration data can all be viewed, analyzed, and exported in a read-only format for sharing with others.

To open an archive download (SDF) file, download the ScanData software from the Sensia website and install the software on your PC or laptop. Reference the ScanData User Manual (embedded in the Help menu) to open and configure the software to your viewing preferences.

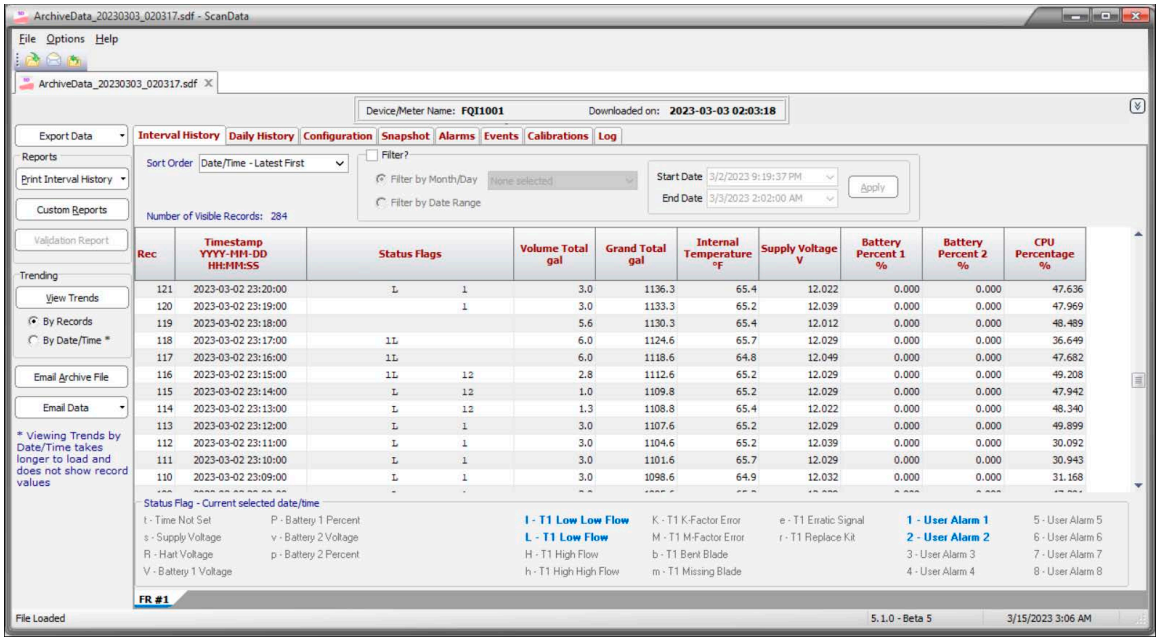


Figure 9.5—ScanData tabular view of MC Synergy archive data

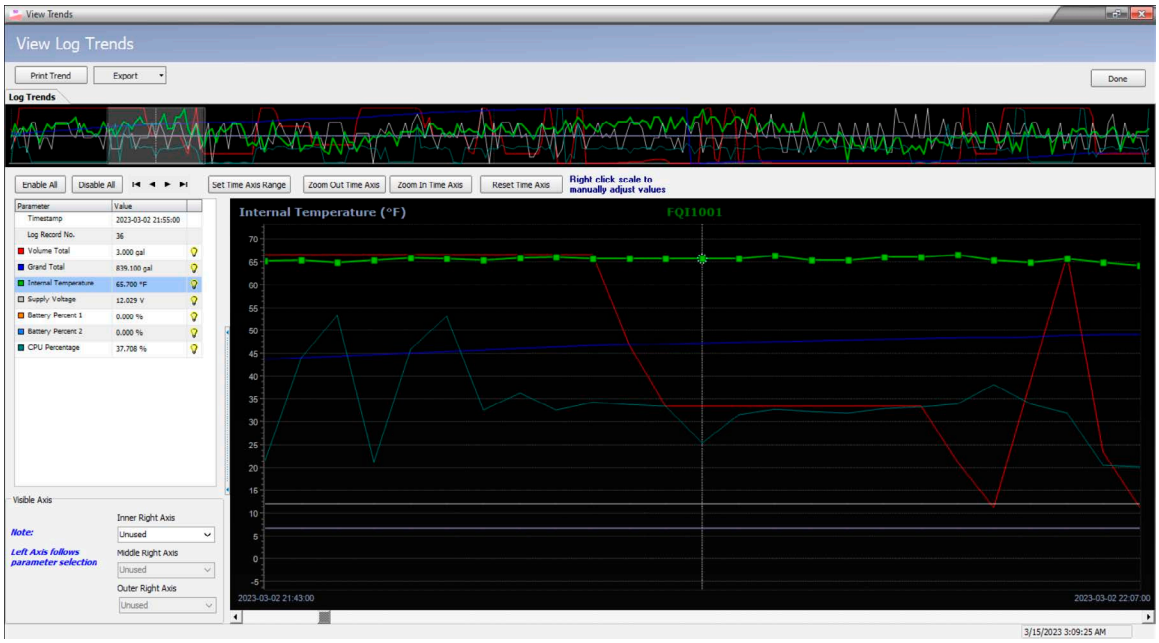


Figure 9.6—ScanData trend view of MC Synergy archive data

Section 10: Manage Device

The Manage Device menu (Figure 10.1) provides access to a variety of discrete operations that can be performed on the MC Synergy in addition to the configuration procedures described in previous sections.

Important If your device has been configured previously, it is advised to save the configuration before performing any new operation that could change the configuration unexpectedly. See Configuring a Connected Device, page 34 and Configuring a Device Offline, page 35 for details.

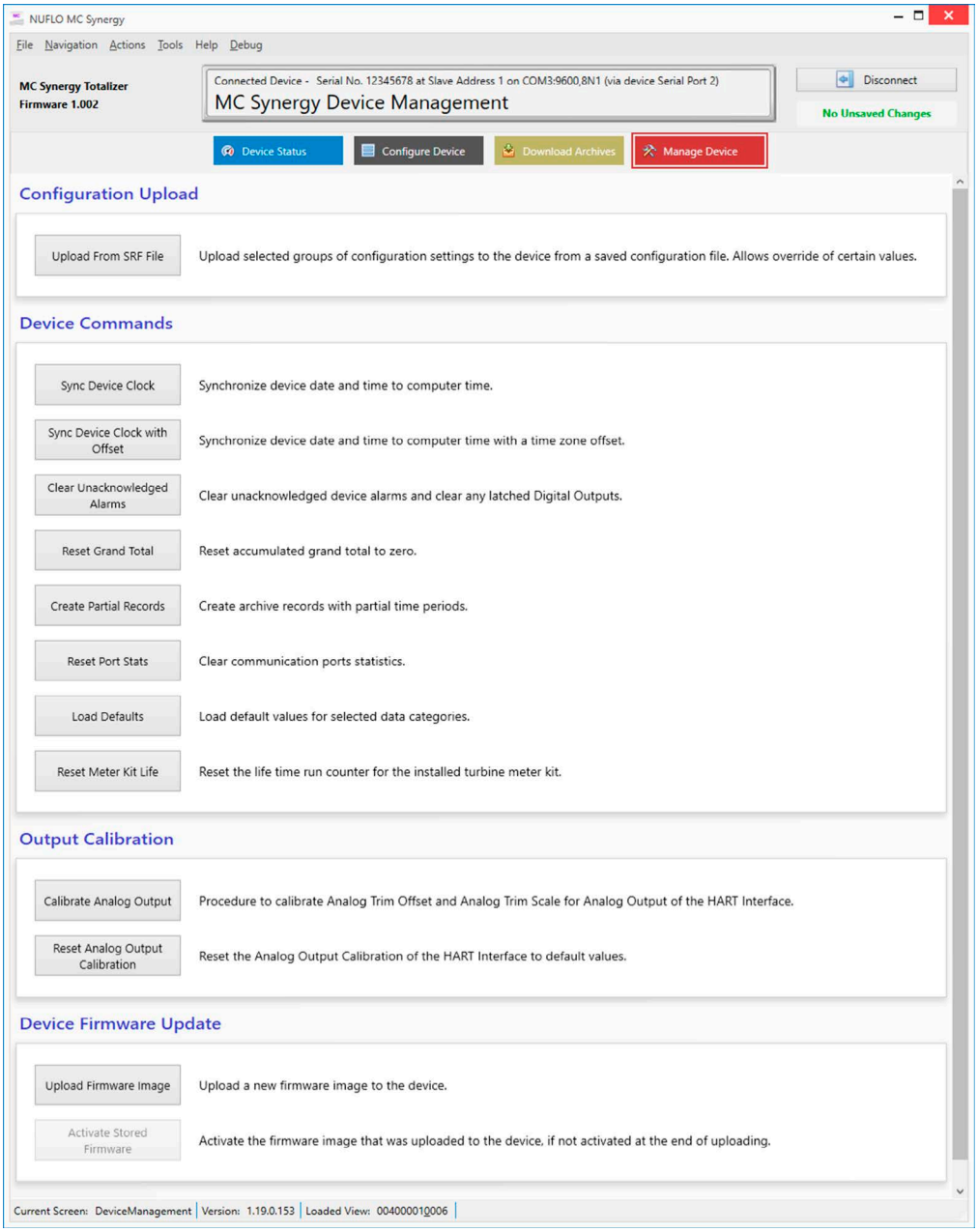


Figure 10.1—Manage Device screen

CONFIGURATION UPLOAD

The Upload From SRF File button on the Manage Device screen allows you to load a previously saved configuration (SRF) into your MC Synergy.

This function differs from the Import from SRF File option in the Configure Device menu as follows:

- The Import from SRF File function adds selected data sections to your working configuration file.
- The Upload from SRF File function behaves more like a configuration wizard, allowing you to upload selected data sections from a saved configuration file, and override settings where applicable to customize the configuration to a specific device. This method is ideal for uploading a configuration to multiple devices. Setting types available for override include:
  - Device identification overrides
  - Ethernet overrides
  - Serial port overrides

  The software will present a snapshot of your selections for your review before you execute the upload. On execution, the PC software will disconnect from your device and prompt you to reconnect to put the new settings into effect.

Note	Always save the current configuration before loading a new configuration from an SRF File. If you do not, your original settings, configuration, and calibration will be lost.

To upload configuration settings from an SRF file:

1. Click the Upload From SRF File button (Figure 10.1, page 85) and select an SRF file from the dialog supplied (Figure 10.2, page 87).
2. Select individual data sections to include in the upload, or click the Select All link in the top right corner to upload the entire content of the SRF configuration file (Figure 10.3, page 87).
3. Review and edit the override settings in subsequent screens.
4. Verify your selections in the final Review summary and click OK to execute the upload (Figure 10.4, page 88).
5. The PC software will temporarily disconnect from the device and prompt you to reconnect to load the new uploaded configuration.

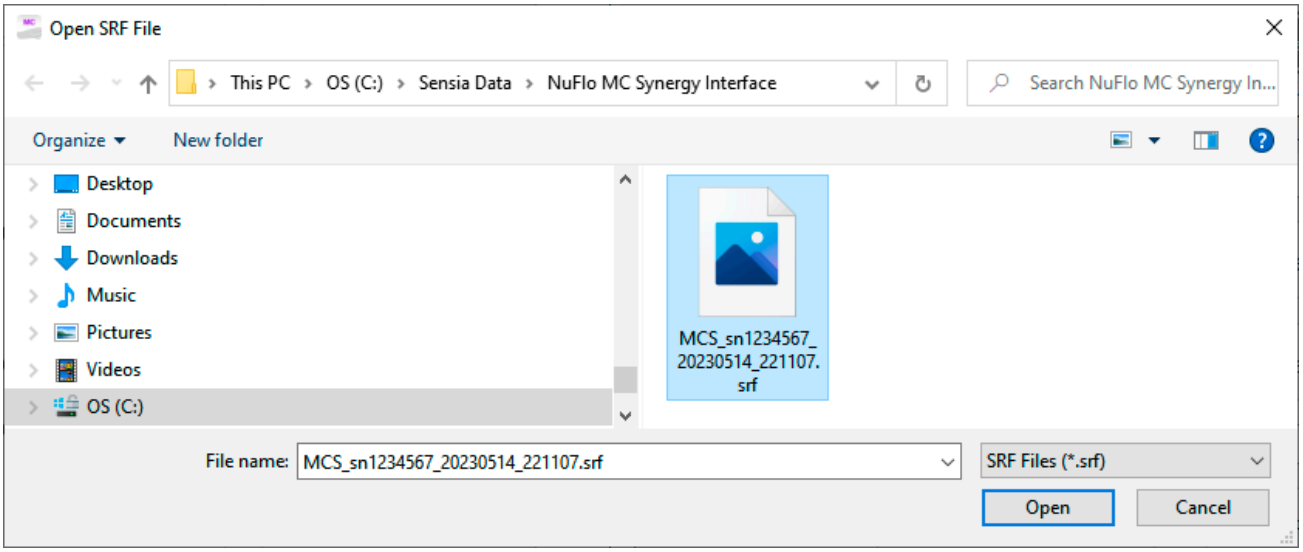


Figure 10.2—Upload file selection

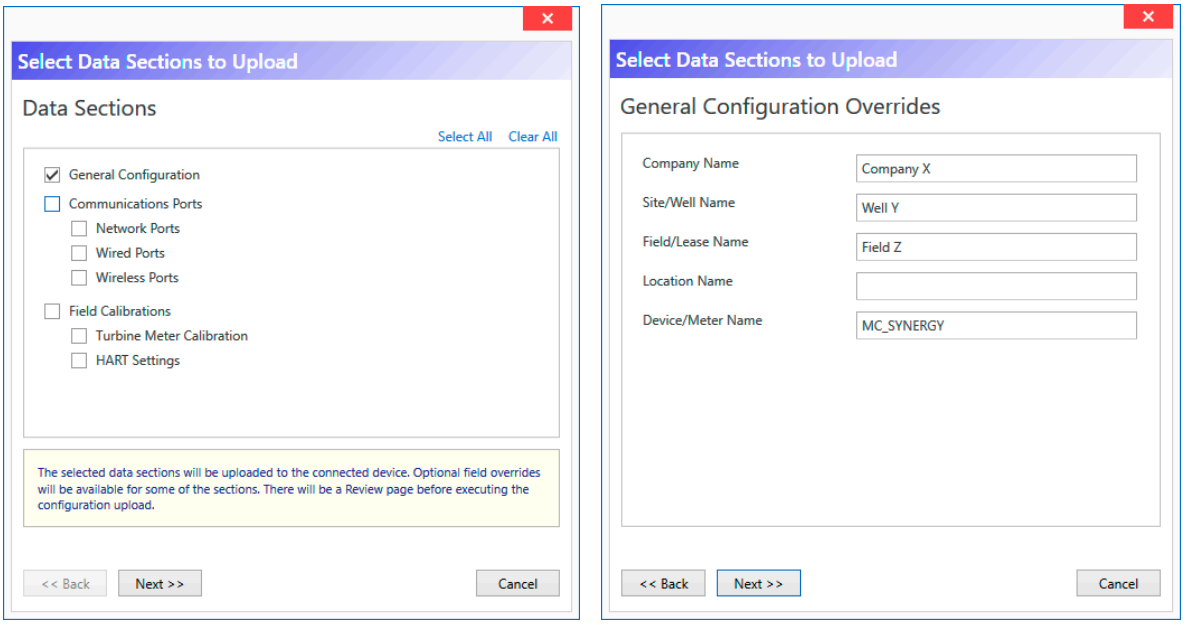


Figure 10.3—Selection of data sections and overrides to be included in upload

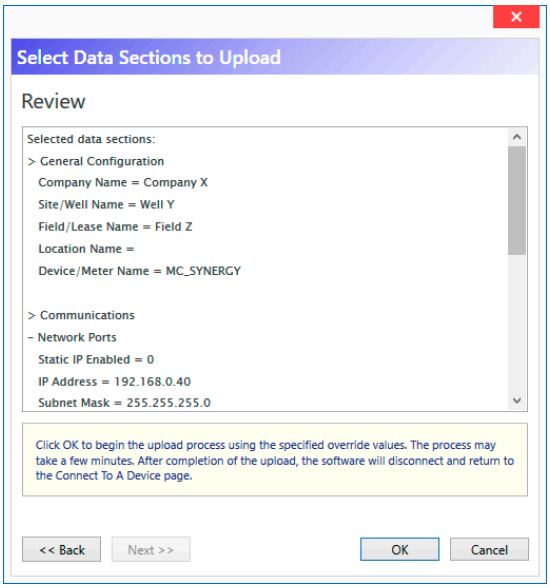


Figure 10.4—Review summary for verification before upload is executed

DEVICE COMMANDS

Device commands (Figure 10.5) allow you to perform a variety of operations on the MC Synergy. These operations may also be performed over Modbus via the command registers presented in the MC Synergy Hardware User Manual.

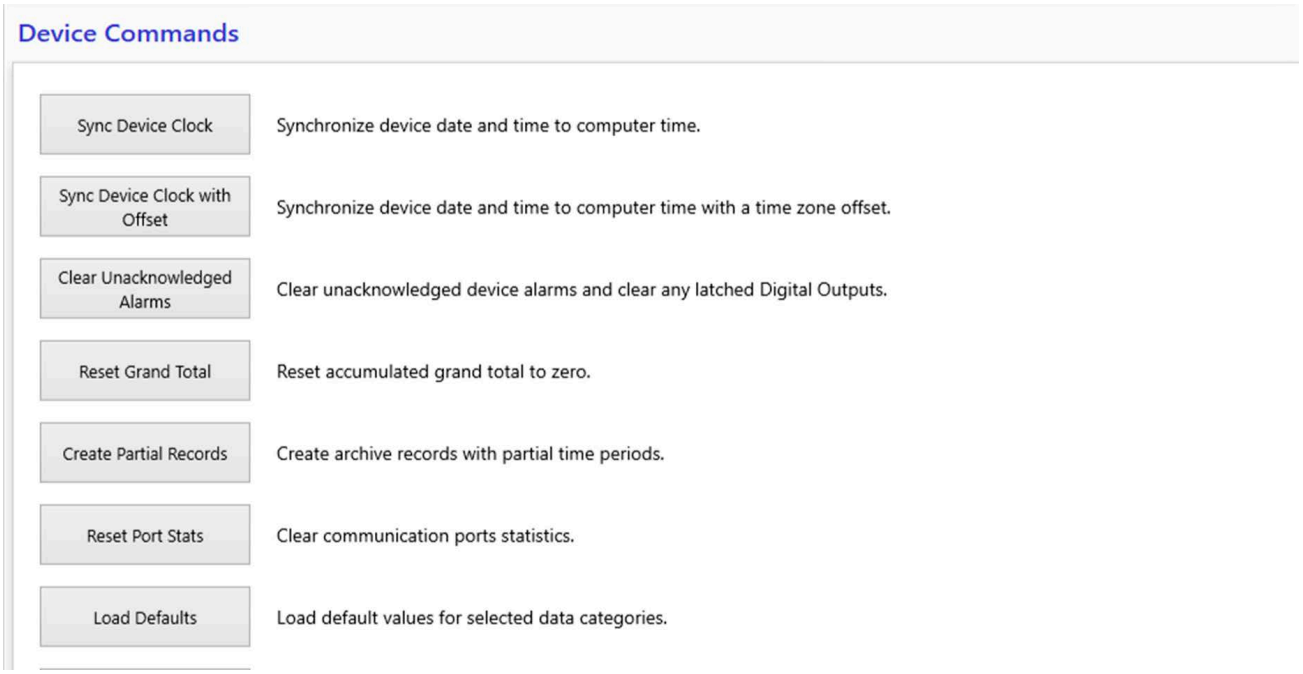


Figure 10.5—Device Commands

Operations supported by this menu include:

- Sync Device Clock. Sets the MC Synergy to the same date and time as the connected computer. It is important to ensure that the computer date is correct, and the computer time has been set to the correct time zone.
- Sync Device Clock with Offset. If the computer is remote, you can use this feature to offset the MC Synergy clock to the difference in hours from the remote site to the MC Synergy.
- Clear Unacknowledged Alarms. Will clear all alarms and reset digital outputs if latched. If an alarm condition is still present, then the alarm will reactivate again.
- Reset Grand Total. Resets the accumulated grand total to zero. This will not affect the archived logs, but only the grand total value stored in the device registers.
- Create Partial Records. If desired, you can manually create an archive record (daily or interval). This can be useful for starting a new record, which may be especially helpful if you have made changes to the device configuration that would affect measurement (changing a meter factor or K-factor, for example).
- Reset Port Stats. Clears the current statistics for Port 1 and 2, to allow the user to start a new period of monitoring communication. This is useful if a device stops working, and current port statistics are needed for debugging the communication.
- Load Defaults. Automatically reverts data values and units to factory default settings (Figure 10.6, page 90). By default, all default categories are included. However, you can individually select which of three functional groups you wish to return to default settings. As a best practice, always save your current configuration before loading defaults so that you have the option of restoring settings later, if desired.

- Reset Meter Kit Life. If a meter is to be installed, then the user may use this button to reset the meter life. When this is done the device will automatically set meter life using the time elapsed for the last meter. The intent is to ensure a regular maintenance schedule.

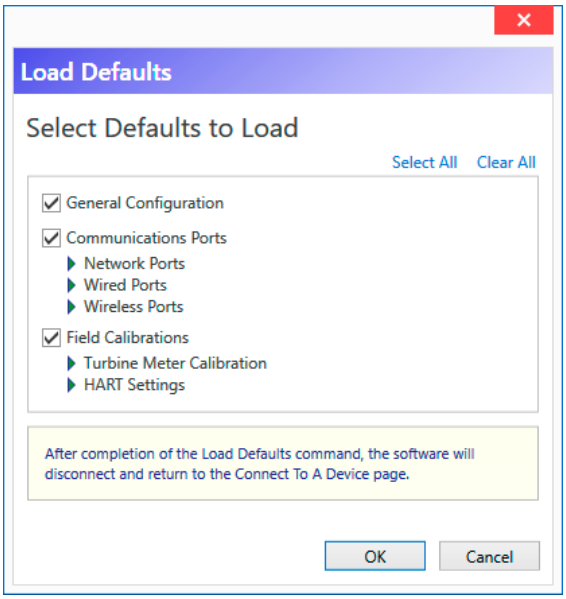


Figure 10.6—Load Defaults selections

OUTPUT CALIBRATION

If you are using the MC Synergy to configure a 4 to 20 mA output, the Analog Output Calibration tool (Figure 10.7, page 91) will allow you to set the analog trim offset and scale to calibrate the output.

Connect your device to a current readout device prior to beginning this calibration, and follow the on-screen instructions, step by step.

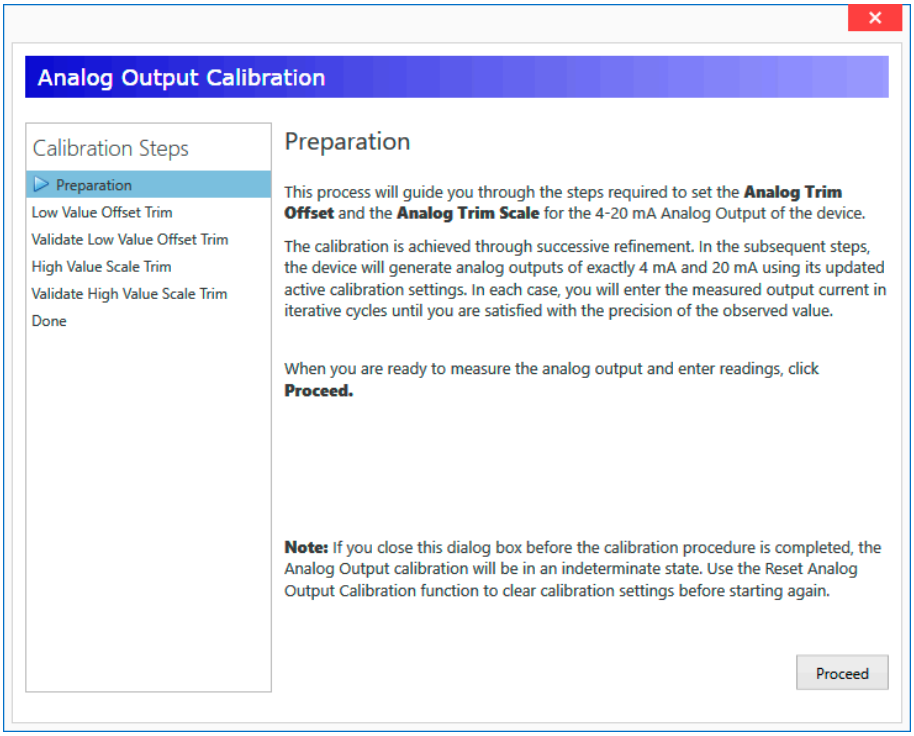


Figure 10.7—Analog output calibration tool

Important If you close the dialog before the final step of calibration, the calibration will be in an indeterminate state. At the prompt, use the Reset Analog Output Calibration command to reset the calibration to default values, and then restart the calibration procedure (Figure 10.8).

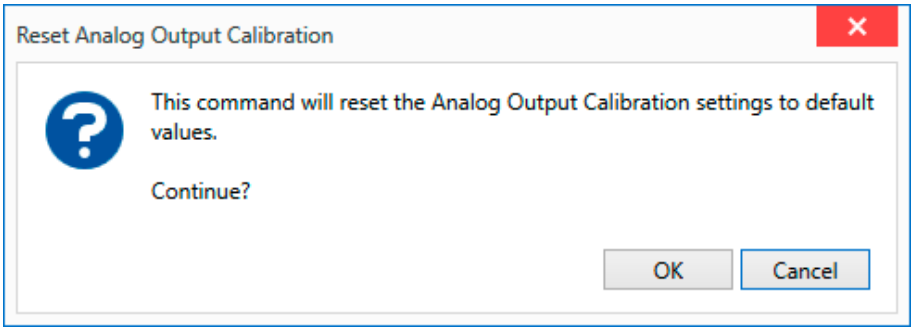


Figure 10.8—Reset Analog Output Calibration prompt

DEVICE FIRMWARE UPDATE

To maximize your MC Synergy's performance and take advantage of the latest enhancements, you should update the firmware for your device as updates become available. Firmware updates often introduce new features and can make the device more immune to errors or malfunctions.

Note Each firmware update includes release notes, updated Modbus maps, and a binary firmware file (.bin). Before updating the firmware, always read the release notes to verify that the change will not disrupt the expected operation of the MC Synergy.

- Upload Firmware Image. This operation is used to select the MC Synergy firmware file. The software will validate the firmware's compatibility with the connected device. For example, the software will reject the firmware if it does not have the same Register Table version, as this could cause a mismatch in the register addresses.
- Activate Stored Firmware. Once the firmware is verified, you can activate it on the device.

Section 11: Interface Options

Supplementing the configuration settings in the MC Synergy navigation menu is a group of optional settings that lets you fine-tune your user experience. You can change default settings to save steps in accessing the settings you use most often, change communications settings to aid in troubleshooting, and set up rules for auto-naming and storing your archive files, for example.

These configurable settings are organized within four option groups, as shown in the left column of Figure 11.1. Each of this settings is explained in detail in this section.

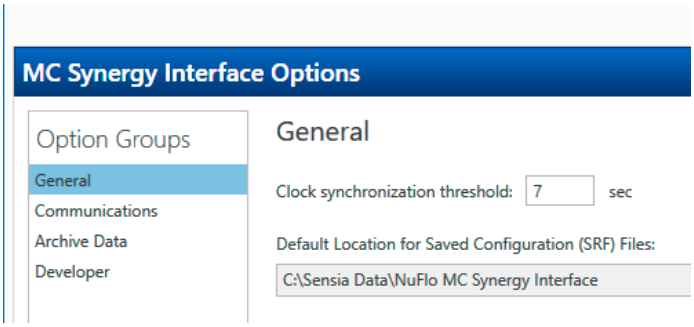


Figure 11.1—Interface Options, General Option Group

Upon making changes to these user settings, click OK at the bottom of each screen to save your changes.

If you decide the changes you made in an Interface Options screen are no longer desired, click the link in the lower left corner of each screen to reset all user settings to default settings (Figure 11.2, page 94).

These changes will be effective upon the next connection to the device.

GENERAL SETTINGS

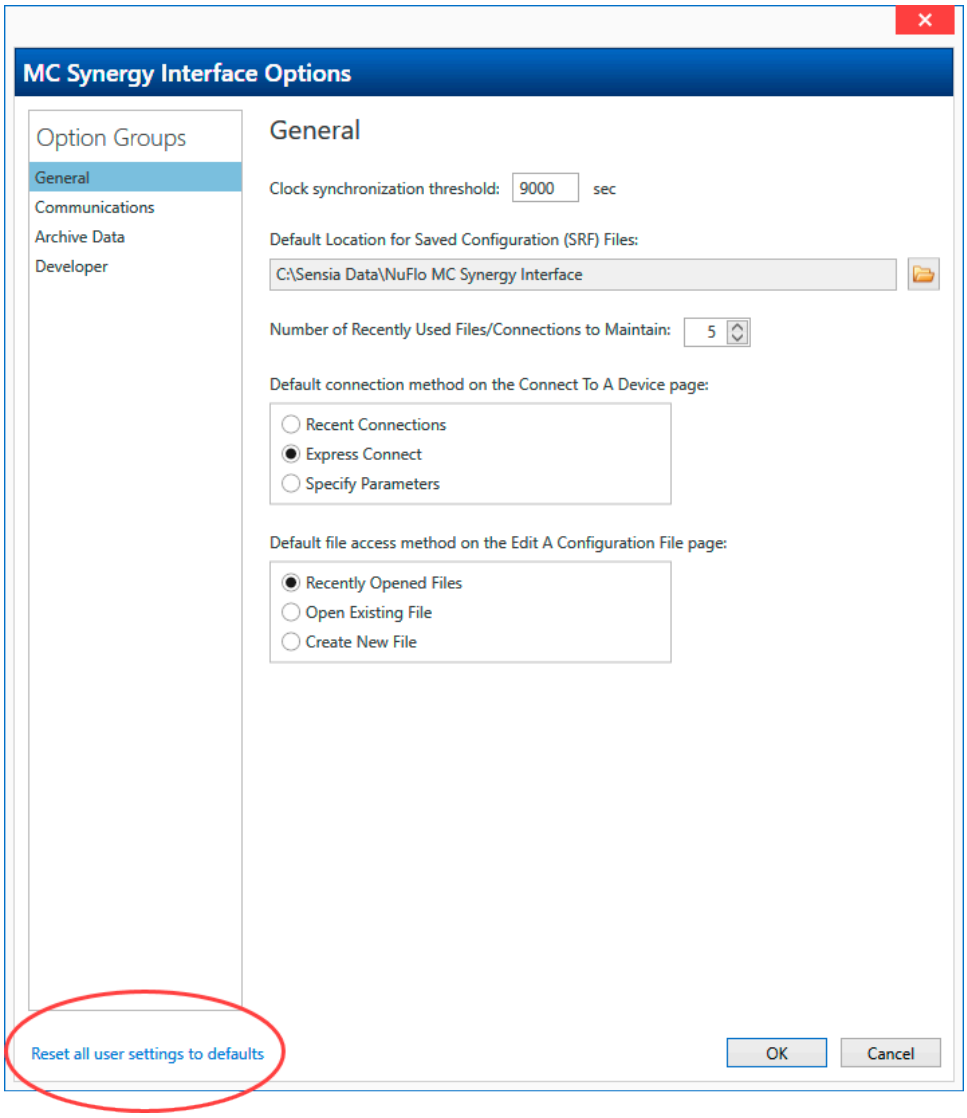


Figure 11.2—Interface Options reset to default link

CLOCK SYNCHRONIZATION THRESHOLD

Each time the PC software connects to the MC Synergy device, it reads the current time in the device real time clock and compares it to the time in the user's PC. If the time difference is greater than the value in the threshold, you will receive a prompt asking to synchronize the time with the PC.

By default, this threshold is set to 7 seconds. If you do not wish to support daylight savings changes, set this value to a number greater than 3600 seconds (1 hour). You can set the threshold to any number between 1 and 86,400 seconds (1 day).

CHANGE DEFAULT CONNECTION METHOD

This setting determines the preferred / default Connection method.

CHANGE DEFAULT CONFIGURATION FILE ACCESS METHOD

This setting is used to choose a preferred file access method selection when creating or editing a file offline using the Edit Configuration File menu selection on the software home page.

DEFAULT LOCATION FOR SAVED CONFIGURATION (SRF) FILES

Choose a default location for configuration files created offline using the Edit Configuration File menu. Once the file is ready to be saved, you can save the .SRF file in this default location. Alternatively, you can select a different folder location.

INCREASE ACCESS TO RECENTLY USED FILES/CONNECTIONS

This setting specifies the number files / number of connections to show in the Recent Files dialog and the Recent Connections dialog. You can select between 5 and 15 files / connections to show.

RESET ALL USER SETTINGS TO DEFAULTS

This link will reset all settings within the MC Synergy Interface Options dialog to their default values (not just the settings on the page in view). Click OK to save and apply the default settings and close the dialog, or click Cancel to abort the reset function and return the settings to their previous values.

Do not confuse this with the procedure for instantaneously deleting the user settings file. See Delete User Settings File, page 102, for details.

COMMUNICATION SETTINGS

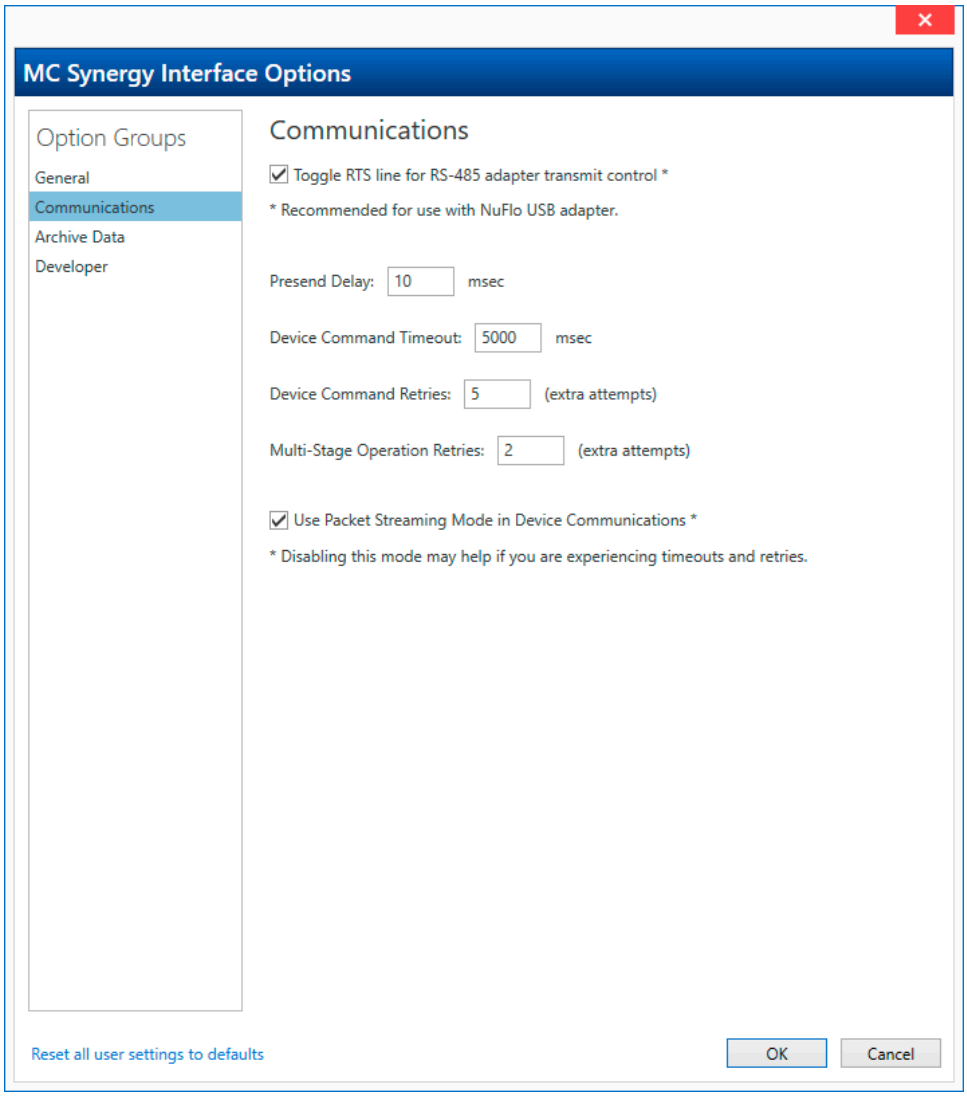


Figure 11.3—Interface Options, Communications Option Group

TOGGLE RTS LINE FOR RS-485 ADAPTER TRANSMIT CONTROL

Some USB to RS-485 converters may use the RTS signal from the PC to toggle the transmit functionality of the RS-485 converter. Enable this setting for use with the NuFlo USB. Enabling this setting may also help resolve communication stability issues observed with other USB to RS485 converters.

PRESEND DELAY

This setting is the number of milliseconds that the PC program will delay prior to starting communications with the MC Synergy on each message. For best results, keep this value as low as possible. The range of entry is 10 msec to 5000 msec. In some cases, such as connections using radio that require a warm-up period, you may need to increase this value.

DEVICE COMMAND TIMEOUT

This setting is the number of milliseconds that the PC program will wait for a response from the MC Synergy before determining that the last message being sent was unsuccessful. Normally, the MC Synergy responds very quickly. The default value for this setting (5000 msec) is recommended. This setting will accept a value range from 1000 msec to 20000 msec.

DEVICE COMMAND RETRIES

This setting provides additional retries in the event of a communication failure with the MC Synergy during top-level operations like “Read Configuration”, “Reading Real Time Data”, and “Downloading Archives”. Start with the default setting of 5 retries. This setting will accept a value from 0 to 10.

MULTI-STAGE OPERATION RETRIES

This setting provides additional retries in the event of a communication failure with the MC Synergy during lower-level operations such as “ Initiate Send”, “Range Send”, or “Packet Send”. Start with the default setting of 2 retries. This setting will accept a value from 0 to 10.

USE PACKET STREAMING MODE IN DEVICE COMMUNICATIONS

Packet streaming mode is enable to optimize communications between the MC Synergy and the PC Interface. This setting is on by default. If you are experiencing communication instability and timeouts, disabling this setting may help.

ARCHIVE DATA SETTINGS

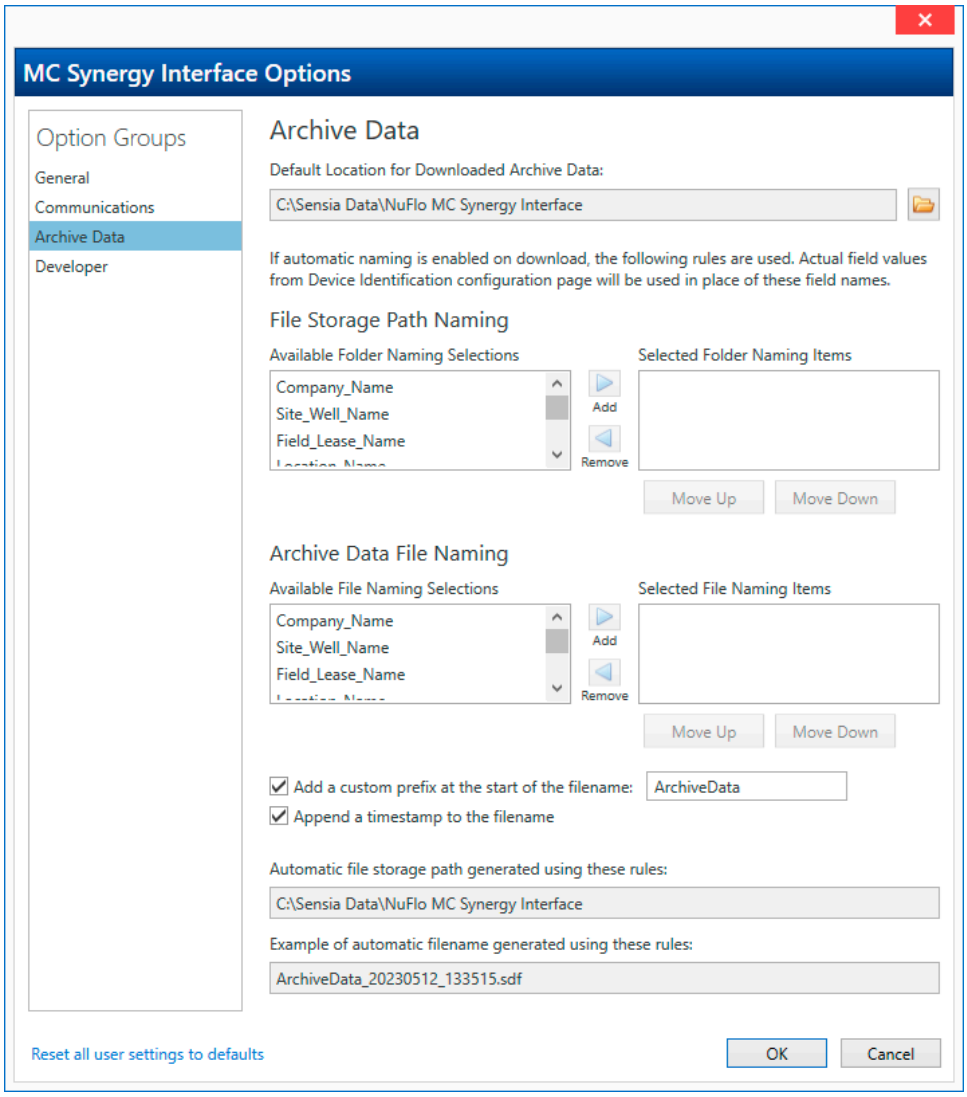


Figure 11.4—Interface Options, Archive Data Group

DEFAULT ARCHIVE LOCATION

This setting establishes the default location for storing downloaded archive files (.SDF). Changing this setting to the file path of your choice may eliminate the need to change the file path at each download and will ensure that all downloads are stored consistently in the location of your choosing.

AUTOMATING FILE PATH AND FILE NAMES

Taking a few minutes to customize the file names and file path used for your archive downloads can save you time during downloads and provide consistent file naming to simplify the process of locating the files later. Automatic Data File Naming is one of the options presented to you when you click the Download Archives menu. When you select it, you are applying the filename and file path rules established in this Option setting procedure.

Select Tools>Options from the menu bar at the top of the screen and choose Archive Data from the Option Groups in the left column to get started.

Automating the Storage Path

By default, the MC Synergy will store all archive download files in this location on your hard drive: C:\Sensia Data\NuFlo MC Synergy Interface. The Tools>Options menu gives you the tools to change and/or append this file path to group your downloads in subfolders that are most meaningful to you.

1. To change the default location, simply click the folder icon and create and/or select the folder you wish to use. Then click OK to save the changes.
2. To customize the grouping of downloads by a unique descriptor such as well name, lease name, or location name, use the Add and Remove buttons in the File Storage Path Naming dropdown menu to select the descriptors you want included in the storage path. You can include as many as you would like and they will be populated in the order you enter them in the Selected Folder Naming Items list. Move Up and Move Down buttons help you reorder items as necessary.

Note	The field names shown in Figure 11.4, page 98 will be replaced by actual company/well/lease/location names as configured in the Device Identification settings (Figure 11.5, page 100).

4. Verify the file path in the preview provided at the bottom of the screen.
5. Click OK to save your changes. They will be applied at the next device connection.

Automating the Download File Name

By default, the MC Synergy assigns the prefix ArchiveData and a date/time stamp to each download filename: ArchiveData_<YYYYMMDD>_<HRMMSS>. The Tools>Options menu gives you the tools to change and/or append this filename structure to remove or replace the prefix, remove the date/time stamp, and add unique descriptors such as well name, lease name, or location name to make them easier to identify.

To customize the filenames automatically applied to archive downloads,

1. Use the Add and Remove buttons in the Archive Data File Naming dropdown menu to select the descriptors you want included in the filename. You can include as many as you would like and they will be populated in the order you enter them in the Selected File Naming Items list. Move Up and Move Down buttons help you reorder items as necessary.

Note	The field names shown in Figure 11.4, page 98 will be replaced by actual company/well/lease/location names as configured in the Device Identification settings (Figure 11.5, page 100).

3. Enable or disable the prefix option and enter a custom prefix if applicable.
4. Enable or disable the timestamp.
5. Verify the file path in the preview provided at the bottom of the screen.
6. Click OK to save your changes. They will be applied at the next device connection.

File Name Example

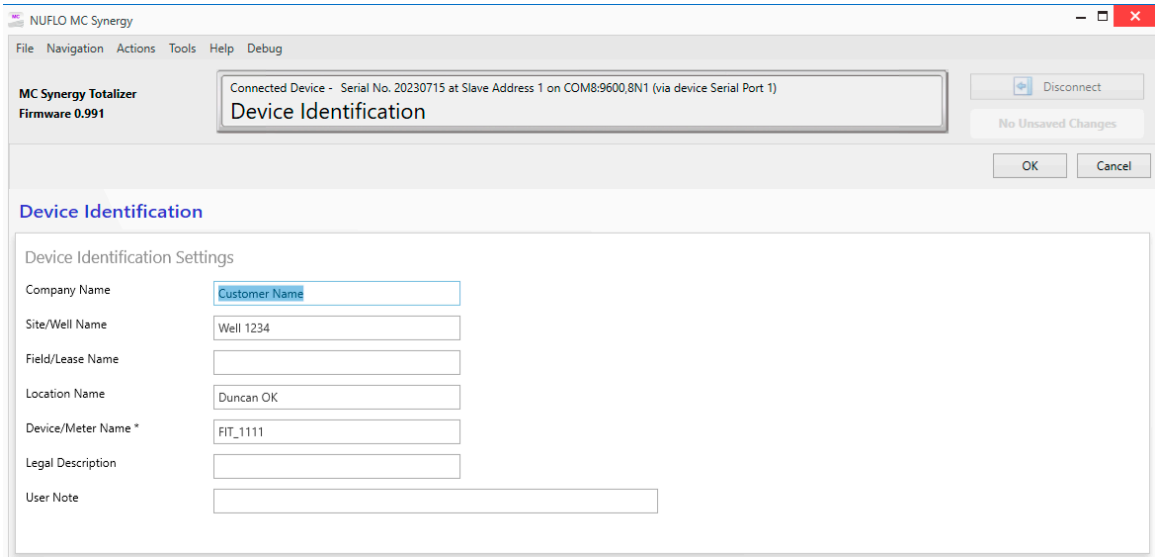


Figure 11.5—Device identification tags used in rules for automatic file name convention

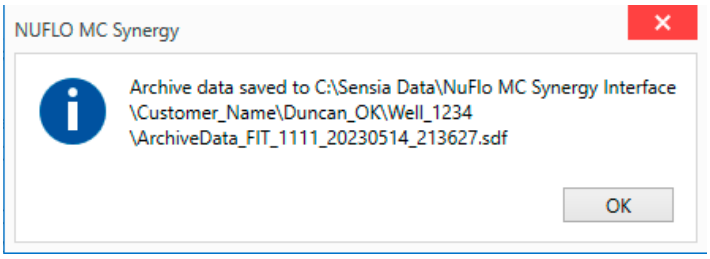


Figure 11.6—Sample result of automatic file name

DEVELOPER SETTINGS

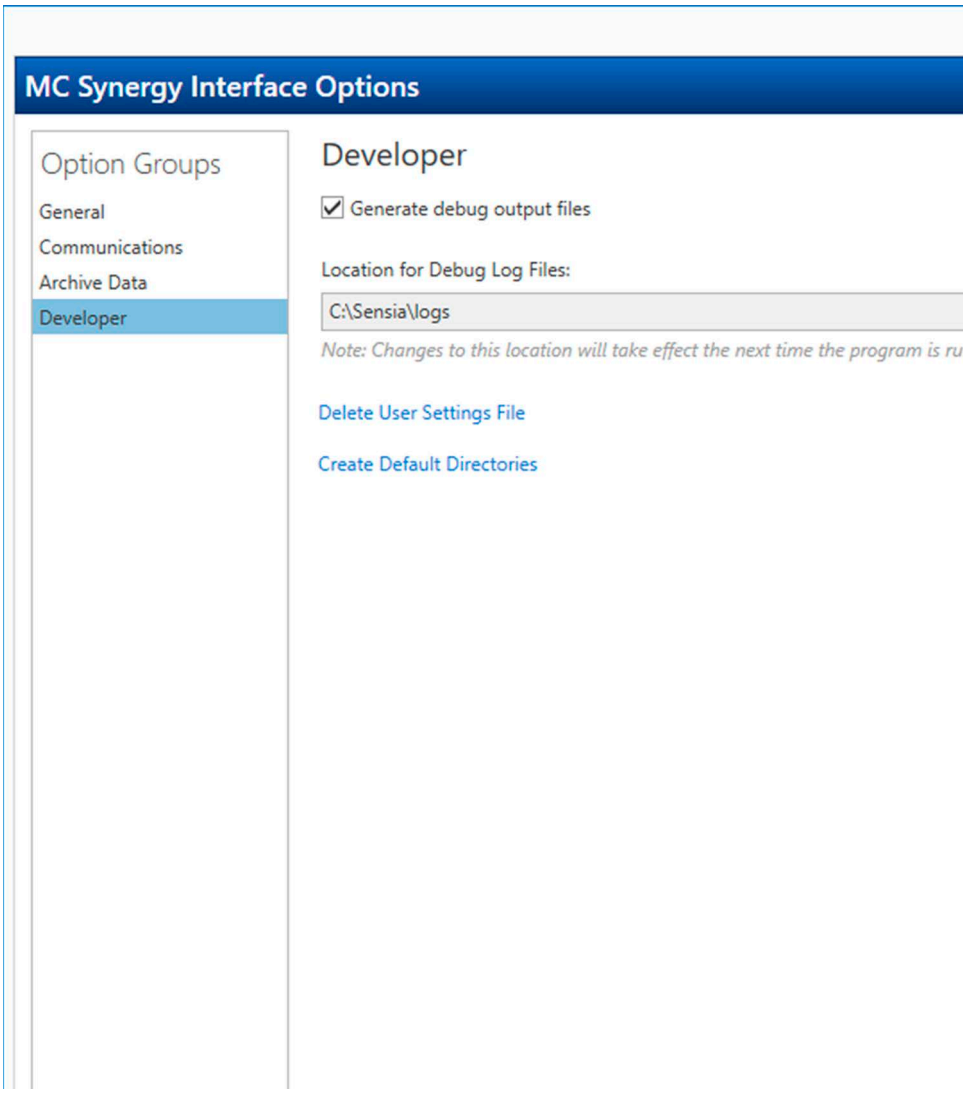


Figure 11.7—Interface Options, Developer Group

GENERATE DEBUG OUTPUT FILES

When checked, this setting creates multiple debug files that may be requested by Sensia support personnel to assist in software interface issues or communication issues.

LOCATION FOR DEBUG LOG FILES

This specifies the location of the debug log files. The debug log files are relevant for the most recent session and may be overwritten if the program closes and is later reopened. It may be necessary to make a copy of the files prior to restarting the program.

DELETE USER SETTINGS FILE

This link deletes all user settings from the Option Groups. When you click the link, you will be prompted to close the Option dialog. When the Option dialog reopens, default values will be applied and your previous user settings will be deleted and unrecoverable. Under normal operations, this file should be deleted only as a last resort.

If you suspect your software install may have become corrupted, first try resetting Interface Options settings by clicking the “Reset all user settings to defaults” link at the bottom of the Interface Options screens (Figure 11.2, page 94).

CREATE DEFAULT DIRECTORIES

Should the file paths to the directories you created for debug files become corrupt or unreliable, this tool will recreate the directories.

Appendix A—Troubleshooting Serial Communications

When the MC Synergy is connected properly with an RS-485 adapter, communication errors should be rare. Depending upon your timeout settings, the layout of your wiring, or even the processing load on your Windows operating system, you may experience the occasional communication error. To resume operations, click OK in the Communications Problem dialog box, then perform a refresh from the software screen.

However, if you experience consistent communication errors, further troubleshooting may be required to determine the source of the problem.

Review the following list of some commonly reported problems and solutions. If you cannot resolve the problem after trying these solutions, contact Sensia Technical Support. Please make a note of all troubleshooting steps attempted and the results, and be prepared to discuss this information with a technician.

EXPRESS CONNECT PROBLEMS

Express Connect allows the program to detect the MC Synergy regardless of the device's baud rate and slave address settings. If you are not able to connect, try the Specify Parameters method to specify the slave address and baud rate. Express Connect is not recommended for connecting to multiple instruments.

MULTIPLE DEVICE NETWORKS

The Express Connect method is not recommended for connecting to multiple instruments. For multi-device networks, use the Specify Parameters connection method. Each MC Synergy in the network must have a unique slave address.

BAD CONNECTION

Check to ensure connections are secure between your computer and your RS-485 adapter, and between your adapter and the MC Synergy. Also, confirm the polarity of the wiring from the converter to the instrument. For more information on wiring the converter, refer to the MC Synergy QuickStart Guide or the MC Synergy Hardware User Manual.

NUFLO USB DRIVER ISSUES

If the MC Synergy is equipped with a NuFlo USB Adapter but it does not appear as a serial port selection in the MC Synergy software, verify that the NuFlo USB driver is installed correctly. From your computer, go to Device Manager, navigate to Ports (COM & LPT) and expand the selection. If the adapter is properly installed, it should appear without a yellow exclamation mark. If the adapter appears with a yellow exclamation mark, your computer has detected the adapter but there is some issue with connectivity. Check for a conflict with the port number. If that is not the problem, try removing the driver and re-installing it.

POWER PROBLEM

Check that the MC Synergy is receiving adequate power and that the power connections are secure. Verify that the LCD display is illuminated and press the INC button on the keypad to test the display sequence, which includes a voltage display.

TIMEOUT PERIOD IS TOO SHORT

Depending on your computer's hardware and software characteristics, and the characteristics of your device network, the default timeout periods may be too short. To extend the timeout period, choose Tools>Options from the software menu bar. Then choose Communications from the Option Groups menu, and adjust the set-

ting for Device Command Timeout. By default, the timeout is 5000 msec. It can be set to any value between 1000 and 20000 msec.

The timeout period does not directly affect the time required for the device to respond. It only affects the length of time the program will wait for a response before giving up and reporting an error. If you specify a long timeout period, you will wait longer for the program to return control to you when communication errors occur.

LINE NOISE

Line noise can be the problem when you are unable to connect or experience intermittent communication errors, communication retries, CRC errors, or framing errors. Check that your RS-485 wiring is not routed near sources of electrical noise, such as electric motors. If minor line noise cannot be avoided, try lowering the baud rate of the device and/or increasing the number of retries (as described below in Not Enough Retries).

NOT ENOUGH RETRIES

If the program does not receive a valid response from the device within the specified timeout period, the program will automatically resend the message a number of times before finally reporting a communications error. Line noise can corrupt messages exchanged between the program and the device, and increasing the number of retries can improve the chance for a successful connection.

To change the number of retries, choose Tools>Options from the software menu bar. Then choose Communications from the Option Groups menu, and adjust the setting for Device Command Retries and/or Multi-Stage Operation Retries.

By default, the number of Device Command Retries is 5 and the number of Multi-Stage Operation Retries is 2. Both settings can be set to any value between 0 and 10.

- Device Command Retries is for top-level operations like "Read Configuration", "Read Real Time Data", and "Download Archives." By default, it is set to 5. It can be adjusted to any value between 0 and 10.
- Multi-Stage Operation Retries is for lower-level operations such as "Initial Send", "Range Send", or "Package Send". By default, it is set to 2. It can be adjusted to any value between 0 and 10.

Setting a high number of retries will not directly affect communication speed when there is a good connection, since there would be very few actual retries. However, setting a high number of retries will result in longer waits for the program to return and report an error when there are communications difficulties.

SPECIFIC BAUD RATE REQUIRED

If you are using a radio link, a virtual COM port, or an Ethernet serial converter, ensure that the baud rate set in the device is supported by the intermediate link.

BAUD RATE IS TOO HIGH

If you have a long wiring network, have many devices on your network, or have line noise, try a slower baud rate to achieve reliable communication among your devices.

DEVICE BUS DELAY IS TOO SHORT

The bus delay setting may be the problem when you do not receive a reply from your device, or you experience many retries.

If you are able to connect to the device, increase the time that the MC Synergy waits before responding to Modbus commands by increasing the Bus Delay value in the device. You do not need to adjust the program's timeout periods to account for the Bus Delay. This is done automatically by the software.

If you are experiencing a problem on one port, try the other port.

In cases of consistent timeouts, it may be helpful to slow the MC Synergy's message response rate by increasing the Bus Delay in the device to at least 50 msec to prevent the response from being missed by the software. The default Bus Delay is 10 msec.

PRESEND DELAY IS TOO SHORT

Increase the time that the program waits between consecutive Modbus commands by increasing the Presend Delay value. To locate this setting, choose Tools>Options from the software menu bar. Then choose Communications from the Option Groups menu, and adjust the setting for Presend Delay. By default, the setting is 10 msec. It can be set to any value between 10 and 5000 msec.

DEVICE PARAMETERS CHANGED WHILE CONNECTED

If you manually change the MC Synergy communications parameters (slave address or baud rate) from the instrument keypad, the software program will not detect the change. Return to the Home Screen and reconnect to the device.

RTS CONTROL IS NOT PROPERLY SET

Your RS-485 adapter may require that the RTS line of the COM port be toggled to control the direction of data flow for transmit and receive. If so, ensure that the "Toggle RTS line" option is enabled. To access this setting, choose Tools>Options from the software menu bar. Then choose Communications from the Option Groups menu. Check the Toggle RTS line option to enable it.

Alternatively, if your device COM port is connected to a modem device that requires the RTS line to be used in the standard way for RS-232 flow control, uncheck the Toggle RTS line checkbox to disable this feature.

SPONTANEOUS LOSS OF COMMUNICATION

If the program stops communicating with the MC Synergy while you are using the program for some unknown reason, return to the Welcome Screen and reconnect.

CORRUPT SETTINGS

If the settings in the MC Synergy become corrupted or are changed in such a way that the device fails to communicate with the software, load factory defaults from the keypad as described in the MC Synergy Hardware User Manual. The device will load factory default settings and show "DEFAULTS LOADED" on the LCD briefly.

CAUTION
Loading factory default values will replace all configuration values. However, logged data will remain intact.

SOFTWARE ERROR

An unexpected software error may interfere with communications. Close the program and run it again. If the problem persists, close all programs and restart your computer.

WINDOWS IS TOO BUSY

If you are running a large number of programs or a few CPU-intensive programs at the same time as the MC Synergy program, the processing load on Windows may cause delays in serial port processing. When this happens, the program is not receiving data from the COM port fast enough, so even though data was transmitted by the device in time, timeouts can occur. Reduce the load on Windows by closing some of the other programs.

Switching between programs also increases the operating system load by causing Windows to perform various system activities. If you navigate to another program while the MC Synergy software is busy communicating with the device, it may cause a delay in Windows delivering data from the serial port to the program.

Also, when the MC Synergy software is running in the background, it receives a smaller percentage of the CPU's processing time, and will run more slowly. If the program is completing a communication-intensive operation, this reduction in processing power may cause communication problems. If you notice problems when you switch away from the MC Synergy program, close other programs or keep the MC Synergy program in the foreground while it is being used.

Systems with faster CPUs and more memory will be less likely to experience these types of problems.

Page intentionally left blank

Scan a QR for

Technical Support

Inside Sales

sensiaglobal.com
1-866 7 SENSIA (+1-866-773-6742)
info@sensiaglobal.com

Add intelligent action to your oil & gas solutions

sensia
Rockwell Automation + Schlumberger