

# + NUFLO MC SYNERGY

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# **Explosion-proof and Weatherproof Totalizer**

**Software Manual** 

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50360934, Rev. 01

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### **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.

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# **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 offthe-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).

NUFLO MC Synerg	D/			
Connect	To A Device			Return to Home Page
Connection	Method			
Select a method to c	connect to a device, enter required parameters, and c	lick Connect.		
Select a Co	nnection Method			
Recent Conne	ections Express Connect Spece	fy Parameters		
Recent Conne	ections allows you to select from a list of previous co	nnections to devices.		
Recent Con	nections			
Select a recent device	e connection and click Connect.			Clear Recent Connections List Remove Selected Connection From List
Recent Devic	ce Connections			
COM Port	Connection Parameters	Slave Add	ess Serial Number	*
				Connect
				~
* Note: Last serial nu	mber observed on this connection.			
Current Screen: Conn	nectStartPage Version: 1.19.0.152 Loaded View: (i	none)		

Figure 2.2—Recent Connections screen

NUFLO MC Synergy	
ile Navigation Actions Tools Help Debug	
Connect To A Device	Return to Home Page
Connection Method	
elect a method to connect to a device, enter required parameters, and click Connect.	
Select a Connection Method	
Express Connect         Express Connect         Specify Parameters           Express Connect will find and connect to a device having any serial parameters and address.         Express Connect will find and connect to a device having any serial parameters and address.	
Express Connect elect a communications port, and click Express. erial Port	
COM1 Refresh Serial Ports	
Express	

Figure 2.3—Express Connect screen

NUFLO MC Synergy				- <b>-</b> ×
File Navigation Actions Tools	Help			
Connect To A [	Device			Return to Home Page
Connection Method				
Select a method to connect to a dev	ice, enter required parameters, and click Con	nect.		
Select a Connection	Method			
Recent Connections	Express Connect	neters	vice.	
Specify Parameters Select a port, enter parameters, and	click Connect.			
Serial Port				
COM5	<ul> <li>Refresh Serial Ports</li> </ul>			
Slave Address 1	Baud Rate 9600 V	Connect		
Current Screen: ConnectStartPage	Version: 1.19.0.152 Loaded View: (none)			

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.

C Synergy Totalizer rmware 1.000	Connected Device - Serie MC Synergy C	al No. 1234567 at Slave Address 5 on COM5 Configuration Menu	:9600,8N1 (via device Serial Port 1)	Disconnect     No Unsaved Changes
Upload to Device	Device Status      Re-Read From Device	Configure Device Downloa Import from SRF File	d Archives 🕅 Manage Device	View Change Repor
System	Device Units	Device Identification	Serial Ports	Ethernet Port
System	Device Interface	Reading device data	Archives Setup	Alarms Setup
Turbine	Turbine Input	K-Factor Entry		
Outputs	Analog / HART	Digital Outputs		

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

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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.

NUFLO MC Synergy		- 🗆 🗙
File Navigation Pages Actions	Tools Help Debug	
MC Synergy Totalizer Firmware 0.503	Connected Device - Serial No. 12345678 at Slave Address 1 on COM2:9600,8N1 (via device Serial Port 2) MC Synergy Configuration Menu	Disconnect  No Unsaved Changes
	🔞 Device Status 🔄 Configure Device 🖄 Download Archives 🛠 Manage Device	
Upload to Device	💽 Re-Read From Device 🛛 🚰 Import from SRF File	View Change Report

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.

	Device Units	Device Identification	Serial Ports	Ethernet Port
System	Device Interface	Bluetooth Setup	Archives Setup	Alarms Setup
Turbine	Turbine Input	K-Factor Entry		
Outputs	Analog / HART	Digital Outputs		

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

NU	FLO MC Synergy					
ile	Navigation Actions Tool	s Help Debug				
MC S Firms	ynergy Totalizer ware 1.000	Connected Devi Change	e - Serial No. 1234567 a Report - Show	at Slave Address 1 on COM5:9600,8N1 (via device Se / Changed Fields	erial Port 1) *	Disconnect     Unsaved Changes *
						Done
Cha	ange Report - Sł	now Changed	Fields			
Dat	to Field Value Chang	100			Show All Fields	Show Changed Fields Or
Dat	ta Field Value Chang	les			Show All Fields	Show Changed Fields Or
Dai	ta Field Value Chang Data Field Name	es		Original Device Value	Show All Fields Changed Val	Show Changed Fields O
Dat I	ta Field Value Chang Data Field Name A Configuration Data	es : DeviceInterface		Original Device Value	Show All Fields Changed Va	Show Changed Fields O
Dai I	ta Field Value Chang Data Field Name	es : DeviceInterface election		Original Device Value	Show All Fields Changed Va. 8292	Show Changed Fields O
Dai t	ta Field Value Chang Data Field Name Configuration Data Display4_RegisterS LCDDisplayMode	es : DeviceInterface election		Original Device Value 0 Display Total and Rate	Show All Fields Changed Val 8292 Display Ite	Show Changed Fields Or lue em Selections
Dai	ta Field Value Chang Data Field Name Configuration Data Display4_RegisterS LCDDisplayMode Display4_RegisterS	es : DeviceInterface election electionName		Original Device Value 0 Display Total and Rate	Show All Fields Changed Val 8292 Display Ite Device Tem	Show Changed Fields Or lue em Selections perature
Dai	ta Field Value Chang Data Field Name Configuration Data Display4_RegisterS LCDDisplay4_RegisterS Configuration Data	<pre>es ebviceInterface election electionName : DeviceUnitsIntern</pre>	1	Original Device Value 0 Display Total and Rate	Show All Fields Changed Va: 8292 Display Itt Device Tem	Show Changed Fields Or lue em Selections perature
Dai t	ta Field Value Chang Data Field Name Configuration Data Display4_RegisterS LCDDisplayMode Display4_RegisterS Configuration Data DISP_ITEM4_UnitsSt	<pre>es ebviceInterface election electionName : DeviceUnitsIntern ring</pre>	1	Original Device Value 0 Display Total and Rate	Show All Fields Changed Val 8292 Display Ito Device Temp °C	Show Changed Fields Or lue em Selections perature
Dai	ta Field Value Chang Data Field Name Configuration Data Display4_RegisterS LCDDisplayMode Display4_RegisterS Configuration Data DISP_ITEM4_UnitsSt ARCH_REG3_UnitsStr	<pre>eS    DeviceInterface election electionName    DeviceUnitsIntern ring ing</pre>	1	Original Device Value 0 Display Total and Rate	Show All Fields Changed Val 8292 Display Ito Device Temp °C °C °C	Show Changed Fields Or lue em Selections perature
Da <sup>1</sup>	<ul> <li>Tield Value Chang</li> <li>Configuration Data</li> <li>Display4_RegisterS</li> <li>LCDDisplayMode</li> <li>Display4_RegisterS</li> <li>Configuration Data</li> <li>DISP_ITEM4_UnitsSt ARCH_REG3_UnitsStr</li> <li>Configuration Data</li> </ul>	eS : DeviceInterface election electionName : DeviceUnitsIntern ring ing : DeviceUnitsUser	1	Original Device Value	Show All Fields Changed Va: 8292 Display It Device Temp °C °C	Show Changed Fields Or lue em Selections perature

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.

e Navigation Actions To	ools Help		
C Synergy Totalizer rmware 1.000	Connected Device MC Syner	- Serial No. 1234567 at Slave Address 5 on COM5:9600,8N1 (via device Serial Port 1) gy Archive Download No Um	Disconnect
	Ø Device Status	Configure Device Download Archives	
Select how the data file • Automatic Data File Nar	e will be named: ming Rules	Status Output	
The data file will be save downloading using the A automatic naming rules s options.	d automatically after Archive Data File specified in the user	Example of Automatic Data File Naming Rules filename: C:\Sensia Data\NuFlo MC Synergy Interface\2023\Company_Name\MC_SYNERGY\ArchiveData_2023051	15_213538.sc
Download Arch	nive Data		

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)

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Superay	- 0	×
File Navigation Actions Tools		
MC Synergy Totalizer Firmware 1.000	Connected Device - Serial No. 1234567 at Slave Address 5 on COM5/9600,8N1 (via device Serial Port 1)  M C Synergy Device Management  Disconnect  No Unsaved Changes  O Device Status  Configure Device  Configure	
Configuration Uploa	ad	^
Upload From SRF File	Upload selected groups of configuration settings to the device from a saved configuration file. Allows override of certain values.	
Device Commands		
Sync Device Clock	Synchronize device date and time to computer time.	
Sync Device Clock with Offset	Synchronize device date and time to computer time with a time zone offset.	
Clear Unacknowledged Alarms	Clear unacknowledged device alarms and clear any latched Digital Outputs.	
Reset Grand Total	Reset accumulated grand total to zero.	
Create Partial Records	Create archive records with partial time periods.	
Reset Port Stats Current Screen: DeviceManagemen	Clear communication ports statistics. nt   Version: 1.19.0.152   Loaded View: 004000010006	~

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 autonaming your archive files, for example.

	TABLE 3.1—MENU BAR	
File	File Navigation Actions To	Exit the software from any location.
Navigation	Navigation     Pages     Actions     To       Image: Disconnect     Image: Disconnect     Image: Disconnect       Image: Device Status     Image: Disconnect     Image: Disconnect       Image: Download Archives     Image: Disconnect     Image: Disconnect       Image: Disconnect     Image: Disconnect     Image: Disconnect	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	Pages       Actions       Tools       Help         System       Device Units       nected         Device Units       System       System         Device Identification       System       System         Serial Ports       Ethernet Port       vice State         Device Interface       Bluetooth Setup       -Read         Archives Setup       Alarms Setup       -Read         Turbine       Turbine Input       e         K-Factor Entry       Outputs       Interf         Digital Outputs       Interf       Interf	Appears only when the Configure Device menu is selected. Select any of the sub-menus shown to configure a specific function.
Actions	Actions     Tools     Help       Refresh     Acknowledge Alarms       Toggle Show Alarms Detail	Available actions vary, depending on your location in the interface.
Tools	Tools     Help       Image: Options     Image: Options       Image: Option Show Device ID Information     Image: Option Show Device ID Information	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	Help         User Documentation         Quick Start Guide         Software Manual         EXP Hardware Manual         WP Hardware Manual         Versions Information         About	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.

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# **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.

rmware 1.002	MC	Synergy De	evice Status			No Unsaved Changes	
	0	Device Status	Configure Device	🙆 Download A	rchives 😤 Man	age Device	No Unsaved Changes
Device Status						Auto-Refresh	Refres
General				Turbine Flow	Data		
irmware Version	1.0	02		Instantaneous Flo	w Rate	0 gal/sec	
Device Name	MO	SYNERGY		Flow Volume Gra	nd Total	336775.3 gal	
lystem Clock	5/2	3/2023 5:54 PM					
xpansion Board Type	No	t Installed					
xpansion Board Firmware Version	n/a			F	low Rate	Meter Flow F	Range
				of	0 % Full Scale	Min: 50 gal/ Max: 1000 g	sec (5 %) al/sec (100%)
Configuration Settings				Digital Output	t Data		
Contract Hour	8:0	0 AM		Digital Output 1 !	Mode	Disabled	
nterval Period	1 h	our		Digital Output 1 V	/alue	0	
ctive K-Factor	1	pulses/gal		Digital Output 2 !	Node	Disabled	
Active Meter Factor	1			Digital Output 2 \	/alue	0	
Calculation Period	2 \$	econds		HADT ON T	Data		
low Input Sensitivity	Lov	v (20mV)		HART Expansion E	Data Board is not detected	t	
eriodic Measurement Data							
		Current Day	Previous Day	Current Hour	<b>Previous Hour</b>	Current Month	Previous Month
low Volume ( gal )		0	336775.3	0	0	0	336775.3
(un Time ( s )		0	3301	0	0	0	3301
Norma Chabus Commany							Ebour All Date 7
varms status summary		Current Day	Previous Day	Current Hour	Previous Hour	Current Month	Previous Month
Turbine Alarms		ок	OK	OK	OK	ОК	OK
System Alarms	A	OK	0 1	OK	0 1	OK	0 1
User Alarms	×	O 1	OK	O 1	ок	<b>O</b> 1	ок
ystem and Archives S	tatus						
System Status				Battery Status			
Active Power Source	Extern	al Power		Battery 1	Battery 2		
supply Voltage	7.269	V					
lattery 1 Voltage	0 V						
lattery 1 Percent	0 %			0 %	0 %		
lattery 1 Run Time	0 day	5					
lattery 2 Voltage	0 V						
lattery 2 Percent	0 %						
lattery 2 Run Time	0 day	s		Archives Statu	S		
Digital Voltage	2.577	V			То	tal Store	d
xpansion Voltage	0 V			Daily Records	38	4 1	
Device Temperature	72.8 °	F		Interval Records	76	8 1	
				Event Records Alarm Records	76 76	8 606 8 189	
letwork Status							
Johuark Chature							
vetwork Status							



**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).

Device Status					Auto-Refresh	Refresh
General			Turbine Flow D	ata		
Firmware Version	0.503		Instantaneous Flow	v Rate	0 gal/sec	
Device Name	MC_SYNERGY		Flow Volume Grand	d Total	5 gal	
System Clock	4/20/2023 11:27 AM					
Expansion Board Type	Analog Output Controlle	er				
Expansion Board Firmware Version	0.077		Flo	ow Rate	Flow Range - M	lin: 0.08 gal/sec (9.6 %)
				0 %	Flow Range - M	lax: 0.83 gal/sec (100%)
			of F	ull Scale		
Configuration Settings			Digital Output	Data		
Contract Hour	8:00 AM		Digital Output 1 M	ode	Status Output	
Interval Period	1 hour		Digital Output 1 St	ate	0	
Active K-Factor	1 pulses/gal		Digital Output 2 M	ode	Status Output	
Active Meter Factor	1		Digital Output 2 St	ate	0	
Calculation Period	2 seconds			)ata		
Flow Input Sensitivity	Low (20mV)		HART Output L	Jala		
			HART Loop Voltage	2	21.875 V	
			HART Loop Curren	t	4 mA	
			HART Configuratio	n Counter	926	
Periodic Measurement Data						
	Current Day	Previous Day	Current Hour	Previous Hour	Current Month	Previous Month
Flow Volume ( gal )	1	4	0	1	5	0
Run Time ( s )	2	8	0	2	10	0
User Events	2	13	2	0	15	0

#### 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 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).

Alarms Status							Acknowledge Alarms
Alarms Status Summary							Show All Details
		Current Day	Previous Day	Current Intvl	Previous Intvl	Current Month	Previous Month
Turbine Alarms		0 2	<b>Q</b> 2	<b>2</b>	<b>O</b> 2	3 2	<b>2</b>
System Alarms	~	ок	ок	ок	ок	ок	ок
User Alarms	×	O 1	O 5	O 1	ОК	<b>O</b> 1	<b>O</b> 5



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#### **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 Val	ulnst	Unack	Current Day	Previous Day	Current Hour	Previous Hour	Current Month	Previous Month
Time Not Set	<ul> <li>Image: A second s</li></ul>	0	-			-	τ	-		
Supply Voltage	٥	27.848 V	0		0	-	0	-	0	-
Expansion Voltage	<ul> <li>Image: A second s</li></ul>	13.724 V	-		+	-	÷		+	+
BAT1 Voltage		0 V	-		0	-	0	-	0	-
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  $\triangle$ , 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).

Alarms Status Summary									Sh	ow All Details
	Current	t Day	Previous Day	Curren	t Hour	Previous Ho	our	Current Month	Previo	ous Month
▼ Turbine Alarms	OK		O 1	ОК		OK		<b>O</b> 1	<b>Q</b> 1	
Turbine Alarms Detail										
	Status	Current Va	aluInst	Unack	Current Da	y Previous Day	Curren Hour	t Previous Hour	Current Month	Previous Month
T1 Low Low Flow	~	571.43 bbl	/da-	-	-	-	-	-	-	-
T1 Low Flow	~	571.43 bbl	/dł-	-	-	-	-	-	-	-
T1 High Flow	~	571.43 bbl	/dł-	-		-	-	-	-	-
T1 High High Flow	~	571.43 bbl	/dł-	-	-	-	-		-	-
T1 Flow Stability Warning	~	0	-	-	-	-	-	-	-	-
T1 K-Factor Error	~	0	-	-	-	-	-	-	-	-
T1 Meter Factor Error	~	0	-	-	-	-	-	-	-	-
Bent Blade	~	0.02	-	-	-	-	-	-	-	-
Missing Blade	~	0	-	-	-	-	-	-		-
Erratic Signal	~	0	-	-		-	-	-	-	-
Internals Kit Run Time		2.9851 day	s -		-	0	-	-	0	0

#### 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.

### 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 Va	luInst	Unack	Current Da	y Previous Day	Current Hour	Previous Hour	Current Month	Previous Month
Time Not Set	~	0				-	-	+	+	+
Supply Voltage	۵	27.848 V	0		O	-	0	-	0	-
Expansion Voltage	~	13.724 V	-			-	÷	-	-	-
BAT1 Voltage		0 V	-		O	-	0	-	0	-
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.

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.

- 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).

User Alarms Detail										
	Status	Current Va	luInst	Unack	Current Day	/ Previous Day	Current Intvl	Previous Intvl	Current Month	Previous Month
Flow LoLo	*	9 gal/sec	LOW-LOW	<u> </u>	O	0	0	0	0	0
Flow Lo	-	9 gal/sec	LOW		0	0	0	0	0	0
Flow Hi	4	9 gal/sec	-		0	-	0	-	0	
Flow HiHi	4	9 gal/sec	-		0	-	0	-	0	
Exp. Board Volt	~	13.717 V	-		0	-	-	0	0	
ALARM 6 (Disabled)	-	0 gal/sec	-			-	-	-	-	
Battery 1 HiHi		4.507 V	HIGH-HIGH		O	0	0	0	0	0
Supply Volt Hi	-	27.878 V	HIGH	▲	0	٥	0	0	0	0

#### 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 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.

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(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.

#### System and Archives Status

System Status		Battery Status			
Active Power Source	External Power	Battery 1	Battery 2		
Supply Voltage	24.527 V				
Battery 1 Voltage	3.542 V				
Battery 1 Percent	100 %	100 %	0 %		
Battery 1 Run Time	0 days				
Battery 2 Voltage	0 V				
Battery 2 Percent	0 %				
Battery 2 Run Time	0 days	Archives Status			
Digital Voltage	2.578 V		1	Total	Stored
Expansion Voltage	13.724 V	Daily Records	3	384	30
Device Temperature	77.5 °F	Interval Records	7	768	767
		Event Records	7	768	767
		Alarm Records	-	768	767

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.

#### **Network Status**

Network Status	
Firmware Version	1.000
MAC Address	bc:34:00:60:29:d1
Ethernet VLAN Identifier	0
Max. Transmission Unit (MTU)	1500
IPv4 Address	10.126.55.131
IPv4 Subnet Mask	255.255.255.0
IPv4 Default Gateway	10.126.55.215
IPv4 Primary DNS	10.126.55.215
IPv4 Secondary DNS	10.126.55.131

#### 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.

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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.

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### 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.

MC Synergy Ethernet Option				
0	If you have reached this page, then the MC-Synergy Ethernet Option is functioning properly.			
	The MC Synergy Ethernet Option supports Modbus TCP and Modbus Over TCP. For the complete list of register definitions refer to the protocol section of the MC Synergy user manual.			
	The MC Synergy can be configured through the front panel, the Modbus registers. The PC Software and user manuals are ava <u>www.sensiaglobal.com</u> .	PC Interface Software, and via ilable on our website:		
For technical support:				
	Email: info@sensiaglobal.com			
	Website: <u>https://www.sensiaglobal.com/Techn</u> Phone: 1-866-7 SENSIA (1-866-773-6	ical-Support 742)		
	sensiaglobal.com			

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.

🥌 Save SRF File	×
← → · · ↑ 🔤 « OS (C:) → Sensia Data	> NuFlo MC Synergy Interface v 👌 🔎 Search NuFlo MC Synergy In
Organize 🔻 New folder	E • ()
> 🕂 Downloads	^
> 🁌 Music	
> E Pictures	
> 📕 Videos	SRF
> 🏥 OS (C:)	MCS_sn1234567_
> 월 SDHC (D:)	20230514_221107.
> 👳 Data\$ (\\10.92.194.22) (J:)	
File name: MCS_sn1234567_20230516	_183044.srf
Save as type: SRF Files (*.srf)	· · · · · · · · · · · · · · · · · · ·

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).

ile Navigation Pages Act	tions Tools Help Debug			
IC Synergy Totalizer	Connected Device - Serial	No. 1234567 at Slave Address 5 on CC	M5:9600,8N1 (via device Serial Port 1)	Disconnect
iniware 1.000	Twic Synergy ee			No Unsaved Changes
	O Device Status	Configure Device	iload Archives 🕺 Manage Device	
Upload to Device	Re-Read From Device	Import from SRF File	Save To SRF File	뒗 View Change Report
System	Device Units	Device Identification	Serial Ports	Ethernet Port
System	Device Interface	Bluetooth Setup	Archives Setup	Alarms Setup
Turbine	Turbine Input	K-Factor Entry		
Outputs	Analog / HART	Digital Outputs		
rrent Screen: Configuration!	Menu Version: 1.19.0.152 Loaded \	/iew: 004000010006		

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.

NUFLO MC Synergy	ions Tools Help Debug			- <b>-</b> ×
MC Synergy Totalizer Firmware 1.000	Connected Device - Serial No. 1234567 at Slave Address 5 on COM5:9600,8N1 (via device Serial Port 1) MC Synergy Configuration Menu			Disconnect No Unsaved Changes
	Ø Device Status	🗏 Configure Device 🗳 Downle	oad Archives 🕅 Manage Device	
Upload to Device	Re-Read From Device	Import from SRF File	Save To SRF File	View Change Report
	Device Units	Device Identification	Serial Ports	Ethernet Port
System	Device Interface	Bluetooth Setup	Archives Setup	Alarms Setup
Turbine	Turbine Input	K-Factor Entry		
Outputs	Analog / HART	Digital Outputs		
Current Screen: Configuration	Nenu Version: 1.19.0.152 Loaded	View: 004000010006		

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
SUFLO MC Synergy			- <b>-</b> ×
File Navigation Actions Tools Help Debug			
Edit A Configuration File			Return to Home Page
File Access Method			
Select a method to access a configuration file, enter required parameters, and	click Open.		
Select a File Access Method			
Recently Opened Files Open Existing File Create Ne Recently Opened Files allows you to select from a list of previously ope	w File ened configuration f	les.	
Recently Opened Files			
Select a Recently Opened File and click Re-Open File to edit the configuration	file.		Clear Opened Files List Remove Selected File From List
Recent Files			
File Name	Date Modified	Target Device Platform	
			Re-Open File
Current Screen: OfflineStartPage Version: 1.13.0.146 Loaded View: (none)			

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.

Superation MC Synergy				- 🗆 🗙
File Navigation Pages Ad	ctions Tools Help			
MC Synergy Totalizer	MC Synergy Totalizer -	MCS_default_configuration.srf *		Close File
Firmware 0.503	Online Coning			* Unsaved Changes *
Save SRF File	Save SRF File As			🌏 View Change Report
System	Device Units	Device Identification	Serial Ports	Ethernet Port
System	Device Interface	Bluetooth Setup	Archives Setup	Alarms Setup
Turbine	Turbine Input	K-Factor Entry		
Outputs	Analog / HART	Digital Outputs		
Current Screen: OfflineConfig	urationMenu Version: 1.13.0.146	Loaded View: 004000010006 Configurati	ion file created	

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).

IC Synergy Totalizer	Connected Device - Seria	I No. 1234567 at Slave Address 5 on CO	M5:9600,8N1 (via device Serial Port 1)	Disconnect
irmware 1.000	IVIC Synergy C			No Unsaved Changes
	Ø Device Status	🗐 Configure Device 🖄 Down	load Archives 🛛 😤 Manage Device	
Upload to Device	Re-Read From Device	Import from SRF File	📔 Save To SRF File	View Change Report
	Device Units	Device Identification	Serial Ports	Ethernet Port
System				
	Device Interface	Bluetooth Setup	Archives Setup	Alarms Setup
Turbine	Turbine Input	K-Factor Entry		
Outputs	Analog / HART	Digital Outputs		

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.

Navigation Actions Too	ls Help			
Synergy Totalizer nware 1.000	Connected Device - Serial No. 123456 Change Report - Sho	57 at Slave Address 1 on COM5:9600,8N1 (via device S W All Fields	Serial Port 1) *	Disconnect     Unsaved Changes *
				Done
ange Report - Sl	how All Fields			
ita Field Value Chang	Jes		Show All Fields	Show Changed Fields (
Data Field Name		Original Device Value	Changed Val	ue
▲ Configuration Data	a: DeviceInterface			
Display4 Register	SelectionName		Device Temp	erature
Display4_Register	SelectionName		bevice remp	er usur e
Display4 Register	Selection	0	8292	
Display5 Register	Selection	0	0	
Display7 Register	Selection	0	0	
Display6 Register	Selection	0	0	
Display8 Register	Selection	0	0	
NumberOfDisplavIte	205	0	0	
KevpadLockCode		0	0	
Display4 DecimalPo	osition	0.	0.	
Display5 DecimalPo	osition	0.	0.	
Display8_DecimalPo	osition	0.	0.	
Display7 DecimalPo	osition	0.	0.	
Display6_DecimalPo	osition	0.	0.	
Display1_DecimalPo	osition	0.00	0.00	
Display2_DecimalPo	osition	0.00	0.00	
Display3_DecimalPo	osition	0.00	0.00	
DisplayCyclePeriod	1	4	4	
LCDContrastSetting	20	6	6	
Display1_Register	Selection	8214	8214	
Display2_Register	Selection	8216	8216	
Display3_Registers	Selection	8232	8232	
Display2_ItemLabel	L	DAY	DAY	
KeypadSensitivity		Default Sensitivity	Default Sen	sitivity
Display4_ItemLabel	L	Display Item 4	Display Ite	m 4
Display5_ItemLabel	L	Display Item 5	Display Ite	m 5
Display6_ItemLabel	L	Display Item 6	Display Ite	m 6
Display7_ItemLabel	L	Display Item 7	Display Ite	m 7
Display8_ItemLabel	L	Display Item 8	Display Ite	m 8
LCDDisplayMode		Display Total and Rate	Display Ite	m Selections
EnablePublishPolli	ing	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.

Connected Device - Se MC Synergy	Connected Device - Serial No. 1234567 at Slave Address 5 on COM5:9600,8N1 (via device Serial Port 1) * MC Synergy Configuration Menu					
Ø Device Status	E Configure Device 🖄 Download Archives 🛠 Manage Device					
Re-Read From Device	Alert	View Change Report				
	Configuration changes have not been written to the device. Write new configuration to device before leaving this screen?					
Device Units	Yes - Upload any changes to device. No - Discard any changes. Cancel - Remain on this page.	Ethernet Port				
Device Interface	Yes No Cancel	Alarms Setup				

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).

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	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.

NUFLO MC Synergy				- 🗆 🗙
File Navigation Pages Act	tions Tools Help Debug			
MC Synergy Totalizer Firmware 1.000	Connected Device - Serial MC Synergy Co	No. 1234567 at Slave Address 5 on CO Onfiguration Menu	M5:9600,8N1 (via device Serial Port 1)	Disconnect
	Ø Device Status	🗐 Configure Device 🛛 🙆 Down	load Archives   X Manage Device	
Upload to Device	Re-Read From Device	Import from SRF File	Save To SRF File	View Change Report
System	Device Units	Device Identification	Serial Ports	Ethernet Port
System	Device Interface	Bluetooth Setup	Archives Setup	Alarms Setup
Turbine	Turbine Input	K-Factor Entry		
Outputs	Analog / HART	Digital Outputs		
urrent Screen: Configuration	Menu Version: 1.19.0.152 Loaded	View: 004000010006		

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.

						ā
Syı	nergy Totalizer	Connected Device - Serial	No. 12345678 at Slave Address 1	on COM2:9600,8N1 (via der	vice Serial Port 2)	Disconnect
nwa	are 0.503	Device Units				No Unsaved Changes
						OK Canc
evi	ice Units					
evi	ce Units Settings					
fau	It Units System	US Customary Units	~			
A	Default Unite System	n				
i	Default Units System	n				
1 The	Default Units System	<b>n</b> to display device values that do	not have user-configurable units			
() The	Default Units System	<b>n</b> to display device values that do	not have user-configurable unit	h		
1 The	Default Units System	<b>n</b> to display device values that do	not have user-configurable unit	i.		
1 The	Default Units System	<b>n</b> to display device values that do	not have user-configurable unit	in .		
1 The	Default Units System	<b>n</b> to display device values that do	not have user-configurable unit	ň.		
The	Default Units System e default units system is used r-Configurable M	n to display device values that do easurement Units	not have user-configurable unit	5.		
() The	Default Units System e default units system is used r-Configurable M	n to display device values that do easurement Units	not have user-configurable unit	'n		
() The ea	Default Units System e default units system is used r-Configurable M surement Units List	n to display device values that do easurement Units	not have user-configurable unit	i.		
() The ea	Default Units System e default units system is used r-Configurable M surement Units List Device Value Name	n to display device values that do easurement Units Selected Units	not have user-configurable unit			Edit Value Units
1	Default Units System e default units system is used r-Configurable M surement Units List Device Value Name Total Volume Display	n to display device values that do easurement Units Selected Units bbl	Decimals 0.0			Edit Value Units
(1) The ea	Default Units System e default units system is used r-Configurable M surement Units List Device Value Name Total Volume Display Flow Rate Display	n to display device values that do easurement Units Selected Units bbl bbl	Decimals 0.0 0.00			Edit Value Units
() The ea	Default Units System e default units system is used r-Configurable M surement Units List Device Value Name Total Volume Display Flow Rate Display Meter Flow Range	n to display device values that do easurement Units Selected Units bb1 bb1/day ga1/min	Decimals 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.			Edit Value Units
(1) The ea 1 2 3 4	Default Units System e default units system is used Configurable M surement Units List Device Value Name Total Volume Display Flow Rate Display Meter Flow Range K-Factor	n to display device values that do easurement Units Selected Units bbl bbl/day gal/min pulses/gal	Decimals 0.0 0.0 0.0 0.0 0.0			Edit Value Units
(1) The ea	Default Units System default units system is used r-Configurable M surement Units List Device Value Name Total Volume Display Flow Rate Display Meter Flow Range K-Factor	n easurement Units Selected Units bbl bbl/day gal/min pulses/gal	not have user-configurable unit			Edit Value Units
1 2 3 4	Default Units System e default units system is used r-Configurable M surement Units List Device Value Name Total Volume Display Flow Rate Display Meter Flow Range K-Factor	n to display device values that do easurement Units Selected Units bb1 bb1/day gal/min pulses/gal Liet	not have user-configurable unit Decimals 0.0 0.00 0.0 0.0 0.0 0.0			Edit Value Units
(1) The ea 1 2 3 4	Default Units System default units system is used r-Configurable M surement Units List Device Value Name Total Volume Display Flow Rate Display Meter Flow Range K-Factor Measurement Units	n to display device values that do easurement Units Selected Units bbl bbl/day gal/min gulses/gal	Decimals 0.0 0.00 0.00 0.00			Edit Value Units
1 cea a a 4	Default Units System default units system is used r-Configurable M surement Units List Device Value Name Total Volume Display Flow Rate Display Reter Flow Range K-Factor Measurement Units specified device values in th	n to display device values that do easurement Units Selected Units bb1 bb1/day gal/min pulses/gal List table above have user-configu	not have user-configurable unit	s.	t Units System	Edit Value Units
1 2 3 4	Default Units System default units system is used r-Configurable M surement Units List Device Value Name Total Volume Display Flow Rate Display Meter Flow Range K-Factor Measurement Units specified device values in th ing.	n to display device values that do easurement Units Selected Units bbl bbl/day gal/min pulses/gal tist table above have user-configure	not have user-configurable unit	s,	t Units System	Edit Value Units

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.
- 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 LINITS
Edit Units Item - Total Volume Display       Units Item Settings       Measurement Category       Units Selection	<ul> <li>Units Selection. Sets the units of the totals measured. Set for m3, ft3, I, gal, or bbl.</li> <li>Scale Units By 1000. If selected, a "x1000" will be added, and the desired place of the meat similarit will be</li> </ul>
Scale Units By 1000 No V Decimal Place Rounding 0.0 V Units Display String bbl	<ul> <li>Decimal Place Rounding. Sets the measurement precision for total.</li> </ul>
×	Flow Rate Display
Edit Units Item - Flow Rate Display Units Item Settings	<ul> <li>Units Selection. Sets the units of the volume flowing through the pipe. Set for m3, ft3, I, gal, or bbl.</li> </ul>
Measurement Category Flow Rate Display Units Selection bbl  Time Base /day	• Time Base. Sets the time over which the selected volume will be measured. Set for sec, min, hr, or day.
Scale Units By 1000 No V Decimal Place Rounding 0.000 V Units Display String bbl/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.
OK Cancel	<ul> <li>Decimal Place Rounding. Sets the measurement precision for the flow rate.</li> </ul>
×	Meter Flow Range
Edit Units Item - Meter Flow Range Units Item Settings	• Units Selection. Sets the units of the volume flowing through the meter. Set for m3, ft3, l, gal, or bbl.
Measurement Category Meter Flow Range Units Selection gal	• Time Base. Sets the time over which the volume will be measured. Set for sec, min, hr, or day.
Decimal Place Rounding	Decimal Place Rounding. Sets the measurement precision for the turbine meter flow range.
OK Cancel	
X	K-Factor
Edit Units Item - K-Factor       Units Item Settings       Measurement Category       K-Factor       Units Selection	Units Selection. The volume is incremented from turbine meter calibration per pulse registered. No other units are selectable.
Units Denominator Selection gal Decimal Place Rounding 0.00	• Units Denominator Selection. Sets the units of the volume flowing through the meter. Set for m3, ft3, l, gal, or bbl.
Units Display String pulses/gal	Decimal Place Rounding. Sets the measurement precision for the turbine meter K-factor.
OK Cancel	

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## **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.

🚆 NUFLO MC Synergy			– 🗆 🗙
<u>File</u> <u>Navigation</u> <u>Actions</u> <u>Too</u>	ols Help <u>D</u> ebug		
MC Synergy Totalizer	Connected Device - Serial No. 12345678 at Slave Address 1 on COM1:9600,8N1 (via device Serial Port 1)	Disco	nnect
Firmware 0.503	Device Identification	No Unsaved O	hanges
		ОК	Cancel
Device Identification	n		
Device Identification S	ettings		
Company Name			
Site/Well Name			
Field/Lease Name			
Location Name			
Device/Meter Name *	MC_SYNERGY		
Legal Description			
User Note			
Current Carrow David Hard Fra	tion Version 112.0.146 Londod View 004000010006 Configuration downloaded		

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.

e Navigation Actions Ioo	ls Help Debug		
IC Synergy Totalizer rmware 0.503	Connected Device - Serial No. 123456 Serial Ports	78 at Slave Address 1 on COM2:9600,8N1 (via device Serial Port 2)	Disconnect
	<u> </u>		OK Cance
erial Port 1			
Port Settings		Port Access Restrictions	
Slave Address	1	Enable Access Restrictions No	~
Baud Rate	9600 🗸	Read Access Mode Read-Write	~
Bus Delay	10 ms	Lowest Allowed Register 0	
Bus Timeout	50 ms	Highest Allowed Register 10000	
		Enron Archive Records	
		Restrict Enron Archive Retrieval No	~
erial Port 2 (Comr	nunicating with software)		
Port Settings		Port Access Restrictions	
Slave Address	1	Enable Access Restrictions	¥
Baud Rate	9600	Read Access Mode Read-Write	¥
Bus Delay	10 ms	Lowest Allowed Register 0	
Bus Timeout	50 ms	Highest Allowed Register 10000	

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).

Ile Navigation Actions Tools	Help			
MC Synergy Totalizer Firmware 1.002	Connected Device - Serial No. 12345 Ethernet Port	Disconnect * Unsaved Changes *		
Network Configuratio	'n			OK Cance
Ethernet Settings		Static IP Settings		
Enable MTU Fragmentation	Yes	Enable Static IP Configuration	No	~
Maximum Transmission Unit (MTU)	1500	IPv4 Address	192 . 168 . 000	. 040
Enable Ethernet VLAN	No	IPv4 Subnet Mask	255 . 255 . 255	. 000
Ethernet VLAN Identifier	1	IPv4 Gateway	192 . 168 . 000	. 254
		IPv4 Primary DNS	008 . 008 . 008	. 008
		IPv4 Secondary DNS	008 008 004	. 004
Modbus-TCP Port				
Port Settings		Port Access Restrictions		
Disable TCP Port	No	Enable Access Restrictions	No	<b>v</b>
TCP Port Number	502	Read Access Mode	Read-Write	<b>v</b>
Unit ID	1	Lowest Allowed Register	0	
		Highest Allowed Register	10000	
Modbus over TCP Por	t			
Port Settings		Port Access Restrictions		
Disable TCP Port	No	Enable Access Restrictions	No	¥
TCP Port Number	503	Read Access Mode	Read-Write	<b>~</b>
Slave Address	1	Lowest Allowed Register	0	
		Highest Allowed Register	10000	
		Enron Archive Records		
			1	weeks -

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.

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- 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.

NUFLO MC Synergy				
MC Synergy Totalizer Firmware 1.002	Debug onnected Device - Serial No. 12345678 at Device Interface	Slave Address 1 on COM3:9600,8N1 (via device Serial	Port 2) Disconnect No Unsaved Changes	
— Device Interface Setup			OK Cancel	
LCD Display Settings		Reset Input Settings		
Display Cycle Period	- 4 + s	Enable Clear Grand Flow Totals	No	
LCD Contrast Setting	- 6 +	Enable Clear Unacknowledged Alarms	No	
Suppress User Alarms Display	No	Enable Create Archive Partial Record	No	
Suppress System Alarms Display	No	Enable Publish Polling Accumulators	No	
Suppress Turbine Alarms Display	No			
Suppress Automatic Rate Decimal	No	Reset Input		
Kevpad Settings		The Reset Input button has two activation	on modes.	
Enable Keypad Lock	No	2. Long press (> 3 seconds) - Advance	all enabled reset functions selected above.	
Lock Code 0000		Note: The Clear Unacknowledged Alarms function will also clear any latched Digital Output status signals associated to an alarm.		
Keypad Sensitivity Mode	Default Sensitivity			
Display Items General Settings LCD Display Mode Disp	viav Total and Rate	Change Mode		
Display Total and Rate				
Status Alerts → b GAL	•8,40835 •1,585	<sup>IBL</sup> ← Total		
urrent Screen: DeviceInterface   Version:	1.19.0.153 Loaded View: 004000010006	DataStore read		

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.

Display Items			
General Settings			
LCD Display Mode	Display Total and Rate	🎲 Change Mode	
Display Total and Ra	te		
Status Alerts –	2680 • bo GAL 282	HB BBL ← Total	

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.

Disp	olay Ite	ms					
Gen	eral Sett	ings					
LCD (	Display Mod	Display Item Sele	ctions	💋 (	Change Mode		
Disp	lay Item	s List					
	Enabled	Register Selection	Display Label	Units	Decimal Position		Edit Display Item
1	Yes	T1 Instantaneous Flow Rate	RATE	bbl/day	0.00	<b>^</b>	
2	Yes	T1 Daily Total	DAY	bbl	0.00		Reset Display Item
3	Yes	T1 Previous Day Total	PREV DAY	bbl	0.00		Reset All Display Items
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.

🖺 NUFLO MC Synergy		- <b>-</b> ×
File Navigation Actions To	ols Help Debug	
MC Synergy Totalizer Firmware 0.503	Connected Device - Serial No. 12345678 at Slave Address 1 on COM2:9600,8N1 (via device Serial Port 2) Bluetooth Setup	Disconnect No Unsaved Changes
		OK Cancel
Bluetooth Setup		
Bluetooth Settings		
Enable Bluetooth	Yes	
Session Period	5 minutes 📝 Edit	
Pair Code	000000	
Current Screen: BluetoothSetup	Version: 1.13.0.146 Loaded View: 004000010006 Configuration downloaded	

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.

Synergy Totalizer		Connected Device - Serial No. 230101 at Slave Address 2 on COM3:9600,8N1 (via device Serial Port 1)					
inware 1.000	Archives	setup			No Unsaved Change		
					OK Ca		
rchives Setup							
rchive Settings							
ontract Hour	8:00 AM	~					
terval Period	10						
	10 minutes		Z Edit				
chive Items							
rchive Items List							
Register Selection	Units				Edit Archive Item		
* Record Date	n/a			^			
* Record Time	n/a				Reset Archive Item		
1 Run Time	s				Reset All Archive Items		
2 Volume Total	gal						
3 Grand Total	gal						
4 Supply Voltage	V						
5 Turbine Alarms							
6 System Alarms							
7 User Alarms							
8 Device Status	n/a			~			
Reset Archive Item Resetting an Archive Item return	s it to device defau	It values for that item					
chives Sizes							
rchive Sizes					Show M		
chive Record Type	Total	Stored					
ily Records	384	5					
erval Records	768	502					
ent Records	768	768					
arm Records	768	15					

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).

>
minute(s)
OK Cancel

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.

		×
Edit Archive Item 2		1
Archive Item Set	tings	
Register Selection	Volume Total	Select
Selection Units	gal	
		OK Cancel

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.

yn vai	ergy Total e 0.503	Connec Alar	ted Device - Serial No. 1234: ms Setup	5678 at Slave Address 1	on COM2:9600,8N1 (via	a device Serial Port 2	!)	Disconnect No Unsaved Change OK Ca
rr	n Item	15						
rm	Enabled	LIST Register Selection	Alarm Label	Units	Alarm Type	High Setpoir	ıt	Edit Alarm Item
	No		ALARM 1		High	0	^	D the h
	No		ALARM 2		High	0		Keset Alarm Item
+	No		ALARM 3		High	0		Reset All Alarm Items
+	No		ALARM 4		High	0		
+	No		ALARM 5		High	0		
_	No		ALARM 6		High	0		
+	No		ALARM 7		High	0		
_	No		ALARM 8		High	0	$\sim$	
) ese	Reset /	Alarm Item	default values for that item.					

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).

Alarm Item Setti	ngs			
Enabled	Yes	~		
Register Selection	T1 Instantaneou	is Flow Rate	Select	
Selection Units	gal/sec			
Alarm Label	Flow Hi			
Alarm Type	High	~		
High Setpoint	500	gal/sec		
Dead Band	1	gal/sec		
Hold-Off Period	5	sec		

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 userspecified setpoint.
  - Low Setpoint. The alarm will activate when the value of the configured item drops below the userspecified 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.

Upload to Device     Volume Status     Upload to Device     Device Units     System	Configure Device Month SRF File	IGod Archives X Manage Device	View Change Repo
Device Units	Device Identification		
System		Serial Ports	Ethernet Port
Device Interface	Bluetooth Setup	Archives Setup	Alarms Setup
Turbine Turbine Input	K-Factor Entry		
Outputs Analog / HART	Digital Outputs		

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.

e Navigation Actions Tool	нер Берид	
IC Synergy Totalizer irmware 1.002	Connected Device - Serial No. 12345678 at Slave Address 1 on COM3:9600,8N1 (via device Serial Turbine Input	Port 2) Disconnect No Unsaved Changes
		OK Cance
urbine Input		
Turbine Input Settings		
Sampling Period	- 4 + s	
Rate Damping Factor	- 0 +	
Pulse Input Type	Turbine Magnetic Pickup 🧳 Change Type	
nput Threshold	Low (20mV)	
Low Input Freq. Cutoff	0 Hz	
ow Flow Rate Cutoff	0 bbl/day	
lealth Test Sensitivity Level	Custom	
Health Test Period	60 s	
event Count Threshold	3	
event Accumulation Interval	60 mins	
Turbine Health Te The health of the turbine met	st r will be examined every <b>60 seconds.</b> If there are <b>3 health events</b> detected within a time interval of	60 minutes, a turbine health alarm will be trigge
urbine Input Units		Go To Device Setup to edit unit
Diselau Unite		
Jispiay Units		
Flow Volume Units	bbl	

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.

		·
Synergy Totalizer mware 1.002	Connected Device - Serial No. 12345678 at Slave Address 1 on COM3:9600,8N1 (via device Serial Port 2) Turbine Input	Disconnect
		OK Canc
Irbine Input		
urbine Input Settings		
ampling Period	- 4 + s	
ate Damping Factor	- 0 +	
ulse Input Type	Turbine Magnetic Pickup 🧳 Change Type	
put Threshold	Low (20mV)	
ow Input Freq. Cutoff	0 Hz	
ow Flow Rate Cutoff	0 bbl/day	
urbine Health Tes	t	
arameters		
ealth Test Sensitivity Level	Custom	

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.

C Synergy Totalizer	Connected Device - Seria	al No. 12345678 a	t Slave Address 1 on COM3:9600,8N1 (via device Serial Port 2)	Disconnect
mware 1.002	2 K-Factor Entry			No Unsaved Change
				OK Ca
urbine Meter				
urbine Meter Inform	ation			
Meter Part Number			]	
nternals Part Number	CONTACT_FACTORY		]	
Brand			1	
Meter Serial Number			]	
Meter Range Units	gal/min			
Flow Range - Min	5	gal/min		
low Range - Max	50	gal/min		
Number Of Blades	Blades_6			
Meter Body Diameter	1	inch		
Meter Kit Life	3650	days		
(-Factor				
K-Factor Settings				
K-Factor Units	pulses/gal			
K-Factor Type	Linear K-Factor		🤣 Change Type	
Linear K-Factor	900			
Meter Factor				
Meter Factor Settings				
Meter Factor Type	Not Used		🥜 Change Type	

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.

K-Factor			
K-Factor Settings			
K-Factor Units	pulses/gal		
K-Factor Type	Linear K-Factor	🎲 Change Type	
Linear K-Factor	3785.412		

#### Figure 7.5—Linear K-Factor

Multipoint K-Factor List

Add Point		K-Factor	equency (Hz)	Fr
	A	900.00000	10.00	1
Edit Point		900.00000	5,000.00	2
Delete Poir				
Clear All Poi				

\* Points will be sorted by frequency automatically when saving this screen

#### Figure 7.6—Multipoint K-Factor

K-Factor Point S	Settings	
Frequency (Hz)	0	
K-Factor	900	

Figure 7.7—Add K-Factor Point dialog

	×
nt 1	1111111111111
Settings	
10	
900	
	OK Cancel
	nt 1 Settings 10 900

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.

Meter Factor			
Meter Factor Settings			
Meter Factor Type	Linear Meter Factor	🎲 Change Type	
Linear Meter Factor	1.1		

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.

Multipoint Meter Factor List

Fre	quency (Hz)	Meter Factor		Add Point
1	0.00	1.00000	^	
2	0.00	1.00000		Edit Point
				Delete Point
				Delete Point Clear All Points

\* Points will be sorted by frequency automatically when saving this screen

Figure 7.10-Multipoint Meter Factor

Add Meter Facto	r Point 3	
Meter Factor Po	oint Settings	
Frequency (Hz)	Ō	
Meter Factor	1	
		OK Cance

Figure 7.11—Add Meter Factor Point dialog

Edit Meter Factor	Point 1		2
Meter Factor Pr	int Settings		
Meter Factor FC	ant settings		
Frequency (Hz)	Ō		
Meter Factor	1		
		ОК	Cancel
		OK	concer

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.

C Synergy Totalizer mware 1.000	Connected Device - Serial MC Synergy Co	No. 1234567 at Slave Address 5 on CO Infiguration Menu	M5:9600,8N1 (via device Serial Port 1)	Disconnect No Unsaved Changes
	Ø Device Status	Configure Device	load Archives 📌 Manage Device	
Upload to Device	Re-Read From Device	Import from SRF File	Save To SRF File	View Change Repor
	Device Units	Device Identification	Serial Ports	Ethernet Port
System	Device Interface	Bluetooth Setup	Archives Setup	Alarms Setup
Turbine	Turbine Input	K-Factor Entry		
Outputs	Analog / HART	Digital Outputs		

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.

C Synergy Totalizer mware 1.002	Connected Device - Serial No. 1234567 Analog Output / HAR	'8 at Slave Address 1 on COM3:9600,8N1 (via devi T	ce Serial Port 2)	Disconnect
	<u>Conneg carper, and</u>	·		OK Car
ettings				
ieneral Settings				
ART Mode	Multidrop	🦙 Change Mode		
IART Protocol Settings		HART Protocol Strings		
oll Address	0	HART Message		
(rite Protected	N-	HART Descriptor	[	
	NO			
issword Code	0	HARI lag		
equest Preamble Count	5	HART Long Tag		
esponse Preamble Count	5	HART Meter Serial Number	0	
		HART Tag Date	0000/00/00	
leasurement Units				
APT Pate Unite				
ART Rate Onits	gal/min (16)			
ART Volume Units	bbl (46)			
ART Temperature Units	°F (33)			
Measurement Un The numbers in parentheses ART Data Items	its Codes are the same unit codes defined by the HART p	rotacol.		
IART Data Items List				
Device Variable	Units	Edit HART Data	Item	
1 Flow Rate	gal/min (16)	^		
2 Grand Total	bbl (46)	Reset HART Data	aitem	
3 Daily Total	bbl (46)	Reset All HART Dat	ta Items	
4 Hourly Total	bbl (46)	(V)		
Reset HART Data	Item			
Resetting a HART Data Item r				

Figure 8.2—HART Interface screen (Multidrop)

	Connected Desire	ial No. 12245670 -+ C	e Address 1 on COM2.0600 PMI 4.2	ice Serial Port 2)	Discount
C Synergy Totalizer rmware 1.002	Analog Outpu	ut / HART	e Address 1 on COMS:9000,0111 (Via dev	ice Senal Port 2)	No Uncound Channer
					OK Canc
ettings					
General Settings					
HART Mode	4 to 20 mA Loop		🥜 Change Mode		
HART Protocol Settings			HART Protocol Strings		
Poll Address	0	]	HART Message		
Write Protected	No	1	HART Descriptor		
Password Code		1	HART Tao		
	0		in and ing		
Request Preamble Count	5	]	HARI Long lag		
Response Preamble Count	5		HART Meter Serial Number	0	
			HART Tag Date	0000/00/00	
Measurement Units					
HART Rate Units	gal/min (16) 🗸				
HART Volume Units	hbl (46)				
	551 (40)	3			
HAKI Temperature Units	°F (33)				
Measurement Unit The numbers in parentheses ar	is Codes e the same unit codes defined	by the HART protocol.			
Measurement Unit The numbers in parentheses ar Analog Output Setti	is Codes e the same unit codes defined NGS	by the HART protocol.		Go To Device Ma	nagement to calibrate Analog Outp
Measurement Unit The numbers in parentheses ar  Analog Output Settings  Analog Output Settings	s Codes e the same unit codes defined ngs	by the HART protocol.		Go To Device Ma	nagement to calibrate Analog Outp
Measurement Unit The numbers in parentheses ar  Analog Output Settings Frable Simulated Value	s Codes e the same unit codes defined ngs	by the HART protocol.	HART Output uti	Go To Device Ma	nagement to calibrate Analog Outp Flow Range
Measurement Unit The numbers in parentheses ar  Analog Output Settings Enable Simulated Value	s Codes e the same unit codes defined ngs	by the HART protocol.	HART Output uti HART Checknoint Are your	Go To Device Ma lizes Turbine Meter	nagement to calibrate Analog Outp Flow Range
Measurement Unit The numbers in parentheses ar  Analog Output Setti Analog Output Settings Enable Simulated Value Simulated Value	s Codes e the same unit codes defined ngs	by the HART protocol.	HART Output uti HART Checkpoint: Are your range?	Go To Device Ma lizes Turbine Meter r analog output range se	nagement to calibrate Analog Outp Flow Range ttings within the meter flow
Measurement Unit The numbers in parentheses ar  Analog Output Settings Enable Simulated Value Simulated Value Low Flow Rate (4 mA)	s Codes e the same unit codes defined ngs	by the HART protocol.	HART Output uti HART Checkpoint: Are your range? A HART alarm will occur if th Max value which is entered d	Go To Device Ma lizes Turbine Meter ranalog output range se e High Flow Rate value e on the K-Facto Entry page	nagement to calibrate Analog Outp Flow Range ttings within the meter flow «ceeds the meter's Flow Range
Measurement Unit The numbers in parentheses ar  Analog Output Settings Enable Simulated Value Simulated Value Low Flow Rate (4 mA) High Flow Rate (20 mA)	s Codes e the same unit codes defined ngs No v 0 0 50	by the HART protocol. gal/min (16) gal/min (16) gal/min (16)	HART Output uti HART Checkpoint: Are your range? A HART alarm will occur if th Max value which is entered c If the NuFlo Turbine QR code	Go To Device Ma lizes Turbine Meter ranalog output range se e High Flow Rate value e e high Flow Rate value e e for the installed meter hi	nagement to calibrate Analog Outp Flow Range ttings within the meter flow exceeds the meter's Flow Range s been loaded, then this value
Measurement Unit The numbers in parentheses ar  Analog Output Settings Enable Simulated Value Simulated Value Low Flow Rate (4 mA) High Flow Rate (20 mA) Analog Trim Offset	s Codes e the same unit codes defined ngs No  v 0 50 0.00000	by the HART protocol. gal/min (16) gal/min (16)	HART Output util     HART Output util     HART Checkpoint: Are your     range?     A HART alarm will occur if the     Max value which is entered c     If the NuFlo Turbine QR code     will have been correctly set.	Go To Device Ma lizes Turbine Meter r analog output range se e High Flow Rate value e on the K-Factor Entry page e for the installed meter h	nagement to calibrate Analog Outp Flow Range ttings within the meter flow acceeds the meter's Flow Range by seen loaded, then this value
Measurement Unit The numbers in parentheses ar      Analog Output Settings Enable Simulated Value Simulated Value Low Flow Rate (4 mA) High Flow Rate (20 mA) Analog Trim Offset Analog Trim Scale	s Codes te the same unit codes defined ngs No 0 0 50 0.00000 100000 100000	by the HART protocol. gal/min (16) gal/min (16) gal/min (16)	HART Output util     HART Output util     HART Checkpoint: Are your     range?     A HART alarm will occur if th     Max value which is entered o     if the NuFlo Turbine QR code     will have been correctly set.     Flow Range - Max: 50 gala	Go To Device Ma lizes Turbine Meter r analog output range se e High Flow Rate value e on the K-Factor Entry page e for the installed meter hu (min (in HART Rate L	nagement to calibrate Analog Outp Flow Range ttings within the meter flow exceeds the meter's Flow Range as been loaded, then this value inits: 50.00 gal/min )
Measurement Unit The numbers in parentheses ar Analog Output Settings Enable Simulated Value Simulated Value Low Flow Rate (4 mA) High Flow Rate (20 mA) Analog Trim Offset Analog Trim Scale	Image: Source of the same unit codes defined           Image: Source of the same unit codes defined <t< td=""><td>by the HART protocol. gal/min (16) gal/min (16) gal/min (16)</td><td>HART Output util HART Checkpoint: Are your range? A HART alarm will occur if the Max value which is entered of If the NuFlo Turbine QR code will have been correctly set. Flow Range - Max: 50 gal</td><td>Go To Device Ma lizes Turbine Meter r analog output range se e High Flow Rate value e on the K-Factor Entry page for the installed meter hi 'min (in HART Rate L</td><td>nagement to calibrate Analog Outp Flow Range ttings within the meter flow exceeds the meter's Flow Range as been loaded, then this value inits: 50.00 gal/min )</td></t<>	by the HART protocol. gal/min (16) gal/min (16) gal/min (16)	HART Output util HART Checkpoint: Are your range? A HART alarm will occur if the Max value which is entered of If the NuFlo Turbine QR code will have been correctly set. Flow Range - Max: 50 gal	Go To Device Ma lizes Turbine Meter r analog output range se e High Flow Rate value e on the K-Factor Entry page for the installed meter hi 'min (in HART Rate L	nagement to calibrate Analog Outp Flow Range ttings within the meter flow exceeds the meter's Flow Range as been loaded, then this value inits: 50.00 gal/min )
Measurement Unit The numbers in parentheses ar      Analog Output Settings Enable Simulated Value Simulated Value Low Flow Rate (20 mA) Analog Trim Offset Analog Trim Offset Analog Trim Scale      ART Data Items	s Codes e the same unit codes defined ngs No 0 0 50 0.00000 1.00000	by the HART protocol.	HART Output uti HART Checkpoint: Are your range? A HART alarm will occur if th Max value which is entered o if the NuFlo Turbine QR code will have been correctly set. Flow Range - Max: 50 gal	Go To Device Ma lizes Turbine Meter r analog output range se e High Flow Rate value e on the K-Factor Entry page e for the installed meter hi /min (in HART Rate L	nagement to calibrate Analog Outp Flow Range ttings within the meter flow exceeds the meter's Flow Range is been loaded, then this value inits: 50.00 gal/min )
Measurement Unit The numbers in parentheses ar Analog Output Settings Enable Simulated Value Simulated Value Low Flow Rate (4 mA) High Flow Rate (20 mA) Analog Trim Offset Analog Trim Scale HART Data Items HART Data Items List	s Codes e the same unit codes defined ngs 0 0 50 50 0.00000 1.00000	by the HART protocol. gal/min (16) gal/min (16)	HART Output uti HART Checkpoint: Are your ange? A HART alarm will occur if the Max value which is entered of if the NuFlo Turbine QR code will have been correctly set. Flow Range - Max: 50 gal	Go To Device Ma lizes Turbine Meter ranalog output range se e High Flow Rate value e on the K-Factor Entry page for the installed meter hi /min (in HART Rate L	nagement to calibrate Analog Outp Flow Range ttings within the meter flow exceeds the meter's Flow Range as been loaded, then this value inits: 50.00 gal/min )
Measurement Unit The numbers in parentheses ar Inalog Output Settings Enable Simulated Value Simulated Value Low Flow Rate (4 mA) High Flow Rate (20 mA) Analog Trim Offset Analog Trim Scale HART Data Items HART Data Items List Device Variable	s Codes e the same unit codes defined ngs No o o o o o o o o o o o o o o o o o o	by the HART protocol. gal/min (16) gal/min (16)	HART Output uti HART Checkpoint: Are your ange? A HART alarm will occur if the Max value which is entered of If the NuFlo Turbine QR code will have been correctly set. Flow Range - Max: 50 gal	Go To Device Ma lizes Turbine Meter ranalog output range se e High Flow Rate value e on the K-Factor Entry page for the installed meter hi min (in HART Rate L	nagement to calibrate Analog Outp Flow Range ttings within the meter flow exceeds the meter's Flow Range as been loaded, then this value inits: 50.00 gal/min )
Measurement Unit The numbers in parentheses ar Inalog Output Settings Enable Simulated Value Simulated Value Low Flow Rate (4 mA) High Flow Rate (20 mA) Analog Trim Offset Analog Trim Scale HART Data Items HART Data Items List Device Variable 1 Flow Rate 2 flow Rate	s Codes e the same unit codes defined ngs No 0 0 50 0.00000 1.00000 1.00000 Units gal/min (16) pb (45)	by the HART protocol.	HART Output uti HART Checkpoint: Are your range? A HART alarm will occur if the Max value which is entered of if the NuFlo Turbine QR code will have been correctly set. Flow Range - Max: 50 gal	Go To Device Ma lizes Turbine Meter ranalog output range se e High Flow Rate value e on the K-Factor Entry page for the installed meter hi min (in HART Rate L min (in HART Rate L a Item	nagement to calibrate Analog Outp Flow Range ttings within the meter flow exceeds the meter's Flow Range as been loaded, then this value inits: 50.00 gal/min )
Measurement Unit The numbers in parentheses ar Analog Output Settings Enable Simulated Value Simulated Value Low Flow Rate (4 mA) High Flow Rate (20 mA) Analog Trim Offset Analog Trim Scale HART Data Items HART Data Items List Device Variable 1 Flow Rate 2 Grand Total 3 Daliy Total	s Codes e the same unit codes defined ngs No 0 0 0 50 0.00000 1.00000 1.00000 Units gal/min (16) bb1 (46) bb1 (46)	by the HART protocol.	HART Output uti HART Checkpoint: Are your ange? A HART alarm will occur if the Max value which is entered of If the NuFlo Turbine QR correctly set. Flow Range - Max: 50 gald Edit HART Data Reset HART Data Reset HART Data	Go To Device Ma lizes Turbine Meter ranalog output range se e High Flow Rate value e on the K-Factor Entry page for the installed meter hi /min (in HART Rate L vitem a Item	nagement to calibrate Analog Outp Flow Range ttings within the meter flow exceeds the meter's Flow Range as been loaded, then this value inits: 50.00 gal/min )
Measurement Unit The numbers in parentheses ar      Analog Output Settings Enable Simulated Value Enable Simulated Value Ecow Flow Rate (2 mA) Analog Trim Offset Analog Trim Offset Analog Trim Scale      ARAT Data Items     I     Flow Rate     Grand Total     J     Deily Total	s Codes e the same unit codes defined ngs No 0 0 0 50 0.00000 1.00000 1.00000 Units gal/min (16) bbl (46) bbl (46)	by the HART protocol.	HART Output uti     HART Checkpoint: Are your     ange?     A HART alarm will occur if the     Max value which is entered o     If the NuFlo Turbine QR code     will have been correctly set.     Flow Range - Max: 50 gal      Edit HART Data     Reset HART Data	Go To Device Ma lizes Turbine Meter r analog output range se e High Flow Rate value e on the K-Factor Entry page i for the installed meter hi (in HART Rate L without the installed meter hi (in HART Rate L a ltem	nagement to calibrate Analog Outs Flow Range ttings within the meter flow acceeds the meter's Flow Range as been loaded, then this value inits: 50.00 gal/min )
Measurement Unit The numbers in parentheses an Analog Output Settings Enable Simulated Value Simulated Value Low Flow Rate (4 mA) High Flow Rate (20 mA) Analog Trim Offset Analog Trim Offset Analog Trim Scale HART Data Items HART Data Items List pevice Variable Flow Rate Grand Total Boily Total Hourly Total	s Codes e the same unit codes defined  ngs  No 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	by the HART protocol.	HART Output uti HART Checkpoint: Are your range? A HART alarm will occur if the Max value which is entered of If the NuFlo Turbine QR code will have been correctly set. Flow Range - Max: 50 gald Edit HART Data Reset HART Data Reset All HART Data	Go To Device Ma lizes Turbine Meter r analog output range se e High Flow Rate value e on the K-Factor Entry page e for the installed meter hi fmin ( in HART Rate L in the meter histolication of the meter fmin ( in HART Rate L a Item ) a Item )	nagement to calibrate Analog Outs Flow Range ttings within the meter flow exceeds the meter's Flow Range is been loaded, then this value inits: 50.00 gal/min )
Measurement Unit The numbers in parentheses ar Analog Output Settings Enable Simulated Value Simulated Value Low Flow Rate (4 mA) High Flow Rate (20 mA) Analog Trim Offset Analog Trim Offset Analog Trim Scale HART Data Items HART Data Items List Device Variable 1 Flow Rate 2 Grand Total 3 Daily Total 4 Hourly Total	s Codes e the same unit codes defined ngs No v v 0 0 v 0 0 50 v 0.00000 1.00000 1.00000 v v v v v v v v v v v v v	by the HART protocol.	HART Output uti HART Checkpoint: Are your ange?      A HART alarm will occur if th Max value which is entered o     if the NuFlo Turbine QR code will have been correctly set.     Flow Range - Max: 50 gal      Edit HART Data     Reset HART Data     Reset All HART Data	Go To Device Ma lizes Turbine Meter r analog output range se e High Flow Rate value e on the K-Factor Entry page e for the installed meter hi rmin (in HART Rate L min (in HART Rate L sitem a Item ta Item	nagement to calibrate Analog Outg Flow Range ttings within the meter flow acceeds the meter's Flow Range is been loaded, then this value inits: 50.00 gal/min )
Measurement Unit The numbers in parentheses ar Analog Output Settings Enable Simulated Value Simulated Value Low Flow Rate (4 mA) High Flow Rate (20 mA) Analog Trim Offset Analog Trim Offset Analog Trim Scale IART Data Items HART Data Items List Device Variable 1 Flow Rate 2 Grand Total 3 Daily Total 4 Hourly Total () Reset HART Data Items ret	s Codes e the same unit codes defined ngs No view view view view view view view view	by the HART protocol.	HART Output uti HART Checkpoint: Are your ange?      A HART alarm will occur if th Max value which is entered o     If the NuFlo Turbine QR code     will have been correctly set.     Flow Range - Max: 50 gal      Edit HART Data     Reset HART Data     Reset All HART Data	Go To Device Ma lizes Turbine Meter r analog output range se e High Flow Rate value e on the K-Factor Entry page for the installed meter hi rmin (in HART Rate L in term a Item ta Items	nagement to calibrate Analog Outy Flow Range ttings within the meter flow acceeds the meter's Flow Range as been loaded, then this value inits: 50.00 gal/min )

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

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#### **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.

	Analog Outpu	I No. 1234567 at Slave Address 1 on t / HART	COM5:9600,8N1 (	via device Serial Port 1)	Disconnect      No Unsaved Changes
The numbers in parentheses	are the same unit codes defined b	y the HART protocol.			OK Can
nalog Output Set	tings			Go To Device Ma	nagement to calibrate Analog Out
alog Output Setting	s				
able Simulated Value					low Range
nulated Value	Edit HART Item 2				ings within the meter
w Flow Rate (4 mA)		16			eeds the meter's Flow
nh Flaus Pata (20 mA)	HART Item Setting	JS			r page.
gn riow Kate (20 mA)	Device Variable Selection	Grand Total	~		been loaded, then this
alog Trim Offset	Units	Grand Total Daily Total			its: 50.00 gal/min.)
alog Trim Scale		Hourly Total			Solo guyminy
		Polling Total			
		Previous Day Total Previous Hour Total			
ART Data Items		Previous Polling Total		OK Cancel	
ART Data Items List					
Device Variable	Units		Edit HA	ART Data Item	
1 Flow Rate	gal/min (16)	^			
2 Grand Total	bbl (46)		Reset H	ART Data Item	
3 Daily Total	bbl (46)		Reset All H	HART Data Items	
4 Hourly Total	bbl (46)	$\sim$			

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.

ile Navigation Actions To	ols Help Debug	
MC Synergy Totalizer Firmware 0.503	Connected Device - Serial No. 12345678 at Slave Address 1 on COM2:9600,8N1 (via device Serial Port 2) Digital Outputs	Disconnect No Unsaved Changes
		OK Cance
Digital Output 1 S	ettings	
General Settings		
Output Mode	Disabled 🥢 Change Mode	
Output State	Normally Open	

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.

NUFLO MC Synergy		
le Navigation Actions To	ols Help Debug	
IC Synergy Totalizer irmware 1.002	Connected Device - Serial No. 12345678 at Slave Address 1 on COM3:9600,8N1 (via device Serial Port 2) Digital Outputs	Disconnect
		OK Cancel
Digital Output 1 Se	ettings	
General Settings		
Output Mode	Specified Precision Pulse Output (MC-III Compatible)	
O Specified Precis	ion Pulse Output (MC-III compatible) mode	
Specified Precise The number of pulses in the	ion Pulse Output (MC-III compatible) mode = output signal is proportional to the volume accumulated from the incoming turbine signal.	
Specified Precis The number of pulses in the Each pulse represents an ar Units.	ion Pulse Output (MC-III compatible) mode e output signal is proportional to the volume accumulated from the incoming turbine signal. nount of volume equal to a specified increment of volume in the units selected for Total Volume Display in Device	
Specified Precis     The number of pulses in the     Each pulse represents an ar     Units.	ion Pulse Output (MC-III compatible) mode c output signal is proportional to the volume accumulated from the incoming turbine signal. nount of volume equal to a specified increment of volume in the units selected for Total Volume Display in Device	
Specified Precis     The number of pulses in the     Each pulse represents an ar     Units.     Pulse Output Settings     Volume Per Pulse	ion Pulse Output (MC-III compatible) mode e output signal is proportional to the volume accumulated from the incoming turbine signal. nount of volume equal to a specified increment of volume in the units selected for Total Volume Display in Device	
Specified Precis The number of pulses in thi Each pulse represents an ar Units. Pulse Output Settings Volume Per Pulse Pulse Duration	on Pulse Output (MC-III compatible) mode e output signal is proportional to the volume accumulated from the incoming turbine signal. nount of volume equal to a specified increment of volume in the units selected for Total Volume Display in Device	
Specified Precis     The number of pulses in the     Each pulse represents an ar     Units.     Pulse Output Settings     Volume Per Pulse     Pulse Duration     Output State	on Pulse Output (MC-III compatible) mode e output signal is proportional to the volume accumulated from the incoming turbine signal. nount of volume equal to a specified increment of volume in the units selected for Total Volume Display in Device  0.01  0.01  bbl  50  ms  Normally Open	
Specified Precis     The number of pulses in thi     Each pulse represents an ar     Units.     Pulse Output Settings     Volume Per Pulse     Pulse Duration     Output State	ion Pulse Output (MC-III compatible) mode e output signal is proportional to the volume accumulated from the incoming turbine signal. nount of volume equal to a specified increment of volume in the units selected for Total Volume Display in Device	
Specified Precis     The number of pulses in the     Each pulse represents an ar     Units.     Pulse Output Settings     Volume Per Pulse     Pulse Duration     Output State     Digital Output 2 S     Concert 10 Minute	ion Pulse Output (MC-III compatible) mode eoutput signal is proportional to the volume accumulated from the incoming turbine signal. mount of volume equal to a specified increment of volume in the units selected for Total Volume Display in Device	
Specified Precis     The number of pulses in the     Each pulse represents an ar     Units.     Pulse Output Settings     Volume Per Pulse     Pulse Duration     Output State     Digital Output 2 S     General Settings	ion Pulse Output (MC-III compatible) mode e output signal is proportional to the volume accumulated from the incoming turbine signal. mount of volume equal to a specified increment of volume in the units selected for Total Volume Display in Device	
Specified Precis     The number of pulses in the     Each pulse represents an ar     Units.     Pulse Output Settings     Volume Per Pulse     Pulse Duration     Output State     Digital Output 2 S     General Settings     Output Mode	ion Pulse Output (MC-III compatible) mode         e output signal is proportional to the volume accumulated from the incoming turbine signal.         mount of volume equal to a specified increment of volume in the units selected for Total Volume Display in Device         0.01       bbl         50       ms.         Normally Open       v         ettings       Volume Change Mode	

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.

NUFLO MC synergy		
le Navigation Actions Too	ls Help Debug	
IC Synergy Totalizer irmware 0.503	Connected Device - Serial No. 12345678 at Slave Address 1 on COM2:9600,8N1 (via device Serial Port 2) Digital Outputs	Disconnect No Unsaved Changes
		OK Cancel
Digital Output 1 Se	ttings	
General Settings		
Output Mode	Scaled Pulse Output	
The number of pulses in the Each pulse represents a user	output signal is proportional to the volume accumulated from the incoming turbine signal. -configured amount of volume. The amount and units of the volume are specified in the parameters below.	
Volume Units Selection		
Volume Per Pulse	1 ьы	
Pulse Duration	50 ms	
Output State	Normally Open	

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.

Navigation Actions loois r				
C Synergy Totalizer	Connected Device - Serial No. 123456	78 at Slave Address 1 on COM2:9600,8N1 (via device S	erial Port 2) *	Disconnect
mware 0.503	Digital Outputs			* Unsaved Changes *
				OK Cance
igital Output 1 Settir	ngs			
Conoral Sottings	-			
ieneral settings			_	
utput Mode	Status Output	🧭 Change Mode		
Status Output mode	•			
The output state is controlled by	the status of the selected alarm condition:	5.		
tatus Output Sottings				
lan Cardina	lless Alexen Canadidians	Sundarm Alarm Caraditiana	Turking Alarm Conditi	·
arm Conditions lear Selections		Time Not Entered	Low Low Flow	ions
	2 - ALARM 2 (Disabled)	Supply Voltage	Low Flow	
	3 - ALARM 3 (Disabled)	Expansion Board Voltage	High Flow	
	4 - ALARM 4 (Disabled)	Battery 1 Voltage	🖌 High High Flow	
	5 - ALARM 5 (Disabled)	Battery 1 Percent	🖌 Flow Stability Warn	ing
	6 - ALARM 6 (Disabled)	Battery 2 Voltage	K-Factor Error	
	7 - ALARM 7 (Disabled)	Battery 2 Percent	Meter Factor Error	
	8 - ALARM 8 (Disabled)		🖌 Bent Blade	
			Missing Blade	
			Erratic Signal	
			Replace Meter Kit	
igger Mode	User Alarm Conditions	System Alarm Conditions	Turbine Alarm Conditions	
	Any Selected Alarm	All Selected Alarms	Any Selected Alarm	
utput Latching	Non-Latching			
utput State	Normally Open			
nable Alarm Records Generation	No			

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.

SUFLO MC Synergy		- 🗆 🗙
File Navigation Actions To	ols Help Debug	
MC Synergy Totalizer Firmware 0.503	Connected Device - Serial No. 12345678 at Slave Address 1 on COM2:9600,8N1 (via device Serial Port 2) * Digital Outputs	Disconnect     Unsaved Changes *
		OK Cancel
Digital Output 1 S	ettings	î
General Settings		
Output Mode	Amplified Raw Output	
Amplified Raw	Dutput mode	
The output signal is an Am	plified and Squared version of the raw incoming turbine signal in this digital output mode.	
Output State	Normally Open	
Current Screen: DigitalOutputs	Version: 1.13.0.146 Loaded View: 004000010006 Configuration downloaded	

#### 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.

le Navigation Actions ic	ois Help Debug	
IC Synergy Totalizer irmware 0.503	Connected Device - Serial No. 12345678 at Slave Address 1 on COM2:9600,8N1 (via device Serial Port 2) * Digital Outputs	Disconnect     Unsaved Changes *
		OK Cance
Digital Output 1 S	ettings	
General Settings		
Output Mode	Modbus Register Control	
Modbus Register	er Control mode	
The output signal is contro	led remotely by writing to a Modbus register in this digital output mode.	
<ol> <li>Zero value - Normal ou</li> <li>Non-zero value - Not N</li> </ol>	iput state. ormal output state.	
Output Settings		
Output State	Normally Open	
Output state	······································	

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.

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# **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.

NUFLO MC Synergy		- <b>-</b> ×
File Navigation Actions Tools He	p	
MC Synergy Totalizer	Connected Device - Serial No. 1234567 at Slave Address 5 on COM5:9600,8N1 (via device	Serial Port 1) 💽 Disconnect
Firmware 1.000	MC Synergy Archive Download	No Unsaved Changes
G	Device Status 🗧 Configure Device 🖄 Download Archives 📯 M	lanage Device
Archive Data Download	I	
Select how the data file will be	named:	
Automatic Data File Naming Rule	s	
Prompt For File Name	Status Output	
The data file will be saved automa downloading using the Archive D automatic naming rules specified options.	Example of Automatic Data Hie Naming Kules filename: C:\Sensia Data\NuFlo MC Synergy Interface\ArchiveData_20230515_0 in the user	J04629.sdf
Download Archive Dat		
urrent Screen: ArchiveDownload Ver	ion: 1.19.0.152 Loaded View: 004000010006 Configuration downloaded	

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).

Save SDF File							Х
$\leftrightarrow$ $\rightarrow$ $\land$ $\uparrow$	« OS (C:) »	Sensia Data → NuFlo M	AC Synergy Interface > 2023	ٽ ~		023	
Organize 🔻 New	v folder					· = =	?
Desktop	^	Name	^ Date m	odified	Туре	Size	
<ul> <li>Documents</li> <li>Downloads</li> <li>Music</li> <li>Pictures</li> <li>Videos</li> </ul>		WellABC	5/19/20	123 1:09 PM	File folder		
GS (C:) File name: Save as type:	ArchiveData_ SDF Files (*.se	_20230519_152850.sdf					>
∧ Hide Folders					Save	Cancel	

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).
- 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.

e Navigation Actions Tools Help		_
C Synergy Totalizer rmware 1.000	ected Device - Serial No. 1234567 at Slave Address 5 on COM5:9600,8N1 (via device Serial Port 1) Synergy Archive Download	Disconnect No Unsaved Changes
rchive Data Download	Ce Status E Configure Device Download Archives	
Select how the data file will be name Automatic Data File Naming Rules Prompt For File Name	d: Progress: Read 2K Archive image block (35 of 48) 72%	
The data file will be saved automatically a downloading using the Archive Data File automatic naming rules specified in the u options.	after user Phase 1 > Download Reading archive data Transferring	
Download Archive Data		

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.

Ardivestals_2023030_203017.off X         Part Ardivestals_20230301_003017.off X         Papert Data       Interval History       Device/Meter Hame: FQ11001       Downloaded on: 2023-03-03 02:03:18       Control Contreletted Contet Control Control Control Control Control	Eile Options Help													
Device/Meter Name: FQ11001         Coundaded on: 2023-03-03 02:03:18           Export Data         Interval History Configuration Snapshot Alarms [Cents Calibrations Log           Reports         Start Date [12/2023 9:19:37 PM]         Start Date [12/2023 9:19:37 PM]         Start Date [12/2023 9:19:37 PM]           Custom Reports         Number of Visble Records: 284           Voldation Report         Rec         Tempsature Supply Voltage         Battery Percent 2         CPU Percentage 56           Voldation Report         Interval History Output Flags         Volume Total gal         Grand Total 102/2023 9:19:37 PM          Start Plag         CPU           Vight Start Plag         Starts Plag         Start Plag         Start Plag         <	ArchiveData_2023030	03_020317.	sdf ×											
Export Data         Interval History         Outgoing the class of t				Device/Met	er Name: FQI100	1 D	ownloaded o	in: 20	023-03-03 02:03	:18				V
Reports         Sort Order         Date/Time - Latest First         Priter?           Custom Reports         Number of Vable Records: 284         Start Date         3/2/2023         Start Date         3/2/2023         2/2/2023         Battery Brit Date         Battery Percent 2         Percent 2         CPU Percent 2           Yee Visible Records:         12         0.000         1         3.0         115.3         65.4         12.022         0.000         0.000         47.656           Yee Visible Records:         19         0.203.03.02         22.1500         1         3.0         113.3         65.2         12.003         0.000         47.656           19         0.203.03.02         23.1500         1         5.6         1130.3         65.2         12.0030         0.000         47.656           19         0.203.03.02         23.1500         1         1.0         1.1         6.0         112.6         65.7         12.029         0.000         0.000         47.682           Email Data         115         0.030.00         1         1.2 <td< th=""><th>Export Data •</th><th>Interval</th><th>History Daily History Configu</th><th>ration Snaps</th><th>ot Alarms Ev</th><th>ents Calibrations</th><th>Log</th><th></th><th></th><th></th><th></th><th></th><th></th><th></th></td<>	Export Data •	Interval	History Daily History Configu	ration Snaps	ot Alarms Ev	ents Calibrations	Log							
Brit Linterval History - Custom Reports         Sant Date	Reports	Carl On	Date Time Labort Time	Filter?										
Custom Reports         Number of Visible Records: 284         End Date 3/3/2023 20:000 AH         End Date 3/3/2023 20:000 AH           Viglation Report         Rec         Timestamp YWY-HH-DD HitHH15S         Status Flags         Volume Total gal         Grand Total regerative gal         Internal regerative gal         Supply Voltage Percent 1 9%         Battery Percent 2 9%         Battery Percent 2 9%         CPU Percent 2 9%           Yey Trends         121         2023-03/20 23:19:00         L         1         3.0         1133.3         65.4         12.022         0.000         0.000         47,636           '0 2023-03/20 23:19:00         L         1         3.0         1133.3         65.4         12.022         0.000         0.000         44,849           '0 by Date/Time*         118         2023-03/20 23:16:00         1L         6.0         1112.6         65.2         12.029         0.000         0.000         47,682           Email Grother File         115         2023-03/20 23:15:00         1L         12         2.8         1112.6         65.2         12.029         0.000         0.000         47,682           Email Grother Data/Time Timestory Values         113         203-03/20 23:15:00         L         1.3         1108.8         65.4         12.022         0.000	Print Interval History	Sort Ord	Date/Time - Latest First	G Filter	hy Month Day			Start	Date 3/2/2023 9:	19:37 PM 🗸				
Custom Beports         Number of Viable Records: 284         Volume Total of Call         Grand Total of Call         Internal of Call         Battery Percent 2 (second and call         Coll         Percent 2 (second and call         Percent 2 (second and	(Distance in the start)			C cites			2	End	Date 3/3/2023 2:	02:00 AM	Apply			
Validation Report         Rec         Timestamp YVY-HH-05         Status Flags         Volume Total gal         Grand Total gal         Internal remperature gal         Supply Voltage         Battery Percent 1         Battery Percent 2         Percent 2           Trendog Yew Trends         121         2023 03-02 23:000         L         1         3.0         1135.3         65.4         12.022         0.000         0.000         47.656           0         5 Py Date/Time*         15         3.0         1135.3         65.4         12.022         0.000         0.000         47.656           0         97.8203-02 23:16:00         1L         6.0         1124.6         65.7         12.029         0.000         0.000         47.656           113         2023-03-02 23:16:00         1L         6.0         1124.6         65.7         12.029         0.000         0.000         47.656           Emal Ardive File         116         2023-03-02 23:15:00         1L         12         2.8         1112.6         65.2         12.029         0.000         0.000         47.636           Emal Ardive File         115         2023-03-02 23:15:00         L         12         1.0         1109.8         65.2         12.029         0.000         0.000	Custom Reports	Number	of Visible Records: 284	s Filter	by Date Kange			2010	Contraction of the second second					
Trending         Image: Constraint of the state of	Validation Report	Rec	Timestamp YYYY-MM-DD HH:MM:SS	Status	Flags	Volume Total gal	Grand To gal	otal	Internal Temperature °F	Supply Voltage V	Battery Percent 1 %	Battery Percent 2 %	CPU Percentage %	^
Yew Trends         International State         Internat         Submodel State         International	Trending	121	2023-03-02 23-20-00		1	3.0	1	136.3	65.4	12 022	0.000	0.000	47.636	
P By Records (* By Date/Time*         119         2023-03-02         23:17:00         1L         5.6         1130.3         65.4         12.012         0.000         40.499           118         2023-03-02         23:17:00         1L         6.0         112.46         65.7         12.029         0.000         .000         36.69           119         2023-03-02         23:16:00         1L         6.0         112.46         65.7         12.029         0.000         0.000         49.499           Email Archive File         116         2023-03-02         23:16:00         1L         12         1.0         109.8         65.2         12.029         0.000         49.208           * Viewing Trends by Date/Time takes         113         2023-03-02         23:14:00         L         12         1.0         1109.8         65.2         12.029         0.000         49.309           113         2023-03-02         23:14:00         L         1         3.0         1107.6         65.2         12.029         0.000         0.000         30.092           113         2023-03-02         23:14:00         L         1         3.0         1101.6         65.7         12.029         0.000         0.000         30	View Trends	120	2023-03-02 23:19:00	2	1	3.0	1	133.3	65.2	12.039	0.000	0.000	47,969	
C         By Date/Time *         118         2023-03-02 23:17:00         1L         6.0         1124.6         65.7         12.029         0.000         0.000         36.649           Email Archive File         117         2023-03-02 23:15:00         1L         6.0         1126.6         65.7         12.029         0.000         0.000         36.649           Email Archive File         115         2023-03-02 23:15:00         L         12         2.8         11126.6         65.2         12.029         0.000         0.000         47.682           Email Archive File         114         2023-03-02 23:15:00         L         12         1.3         1108.8         65.2         12.029         0.000         0.000         47.942           DataTime takes by DataTime takes to load and does not show record values         11         2.023-03-02 23:1:00         L         1         3.0         1101.6         65.7         12.029         0.000         0.000         30.993           DataTime takes to load and does not show record values         L         1         3.0         1101.6         65.7         12.029         0.000         0.000         30.993           Uses Mang         Orage states Values         L         1         0.0         10.05	By Records	119	2023-03-02 23:18:00			5.6	1	130.3	65.4	12.012	0.000	0.000	48.489	
Int         2023 03 02 23:15:00         IL         6.0         118.6         6.48         12.049         0.000         0.000         47.682           Email gridive File         I16         2023 03 02 23:15:00         IL         12         2.8         111.2         6.5.2         12.029         0.000         0.000         47.682           Email gridive File         I14         2023 03 02 23:15:00         L         12         1.0         1108.8         65.4         12.029         0.000         0.000         47.942           Email Data         I13         2023 03 02 23:13:00         L         12         3.0         107.6         65.2         12.029         0.000         0.000         48.340           DataTime takes longer to load and does not show recol         I11         2023 03 02 23:10:00         L         1         3.0         1101.6         65.7         12.029         0.000         0.000         30.092           Till         Diaza Pala         Current stelected ate//me         I	C By Date/Time *	118	2023-03-02 23:17:00	1L		6.0	1	124.6	65.7	12.029	0.000	0.000	36.649	
Enal growe File         116         0223 03 02 23:15:00         1L         12         2.8         112.6         65.2         12.029         0.000         0.000         49.08           Enal growe File         115         0223 03 02 23:15:00         L         12         1.0         1199.8         65.2         12.029         0.000         0.000         49.08           "Viewing Trends by Date/Time takes         113         0223 03 02 23:100         L         12         1.3         1108.8         65.4         12.029         0.000         0.000         49.39           "Viewing Trends by Date/Time takes         113         0223 03 02 23:100         L         1         3.0         1107.6         65.2         12.029         0.000         0.000         49.399           Status Filey - Current selected dat/me         1         3.0         1107.6         65.2         12.029         0.000         0.000         30.092           110         0223-03 02 23:10:00         L         1         3.0         109.6         65.7         12.029         0.000         0.000         30.092           110         0223-03 02 23:10:00         L         1         3.0         1096.6         64.9         12.022         0.000         0.000		117	2023-03-02 23:16:00	lL		6.0	1	118.6	64.8	12.049	0.000	0.000	47.682	
I15         2023 03 02 23:14:00         L         12         1.0         1109.8         65.2         12.029         0.000         47.942           Email Data         I14         2023 03 02 23:12:00         L         12         1.3         1108.8         65.4         12.029         0.000         47.942           Viewing Trends by DetrTime takes longer to load and does not show record         III         2023 03 02 23:12:00         L         1         3.0         1107.6         65.2         12.029         0.000         0.000         49.899           Viewing Trends by DetTTime takes longer to load and does not show record         L         1         3.0         1104.6         65.2         12.029         0.000         0.000         30.992           Viewing Trends by DetTime takes         L         1         3.0         1104.6         65.2         12.039         0.000         0.000         30.992           Viewing Trends by DetTime takes         L         1         0.0         1109.6         65.7         12.032         0.000         0.000         30.992           Uses         L         1         L         L         L         L         L         L         L         L         L         L         L         L	Email Archive File	116	2023-03-02 23:15:00	1L	12	2.8	1	112.6	65.2	12.029	0.000	0.000	49.208	1
Email Data         114         02230302 23:13:00         L         1.2         1.3         1108.8         65.4         1.2.02         0.000         0.400         49.890           * Viewing Trends by DateTrime takes         113         20230302 23:13:00         L         1         3.0         1107.6         65.2         12.029         0.000         0.000         49.890           DateTrime takes barger to load and does not show record         111         20230302 23:1000         L         1         3.0         1104.6         65.2         12.029         0.000         0.000         30.092           Values         111         20230302 23:10:00         L         1         3.0         1104.6         65.7         12.029         0.000         0.000         30.092           Values         111         20230302 23:10:00         L         1         3.0         1096.6         64.9         12.029         0.000         0.000         30.982           Values         V         Status Flag Current selected date//memet         1         1         1         1         0.000         0.000         30.982           Values         V-Satery I Percent         L         1         1         1         1         1         1		115	2023-03-02 23:14:00	L	12	1.0	1	109.8	65.2	12.029	0.000	0.000	47.942	1.00
Viewing Trends by Date/Time takes         113         2023/03/22 23:12:00         L         1         3.0         1107.6         65.2         12.029         0.000         0.000         49.89           Date/Time takes         0.00         100.46         65.2         12.039         0.000         0.000         30.092           Obset of the low record values         111         2023/03/22 23:100         L         1         3.0         1101.6         65.7         12.029         0.000         0.000         30.092           Status Flag - Current selected data/time         L         1         3.0         101.6         65.7         12.029         0.000         0.000         30.093           Status Flag - Current selected data/time         L         1         3.0         109.6         64.9         12.032         0.000         0.000         33.043           Status Flag - Current selected data/time         L         L         Low Flow         KT1 K Factor Enor         e -T1 Erraic Signal         1 - User Alarm 1         5 - User Alarm 5           Status Flag - Current selected data/time         L         L         More Flaw         MT1 MFactor Enor         e -T1 Erraic Signal         1 - User Alarm 1         5 - User Alarm 5           N - Hatry Vatage         p - Batery	Email Data 🔹	114	2023-03-02 23:13:00	L	12	1.3	1	108.8	65.4	12.022	0.000	0.000	48.340	
Date/Time takes         112         20230302 23:11:00         L         1         3.0         1104.6         65.2         12.039         0.000         0.000         30.092           Ininger to load does not show record values         111         20230302 23:00:00         L         1         3.0         1101.6         65.7         12.029         0.000         0.000         30.943           Values         111         20230302 23:00:00         L         1         3.0         1101.6         65.7         12.029         0.000         0.000         30.943           Values         1         3.0         1098.6         64.9         12.032         0.000         0.000         31.168           - Staps Flag- Current selected date//me         - <td>* Viewing Trends by</td> <td>113</td> <td>2023-03-02 23:12:00</td> <td>L</td> <td>1</td> <td>3.0</td> <td>1</td> <td>107.6</td> <td>65.2</td> <td>12.029</td> <td>0.000</td> <td>0.000</td> <td>49.899</td> <td></td>	* Viewing Trends by	113	2023-03-02 23:12:00	L	1	3.0	1	107.6	65.2	12.029	0.000	0.000	49.899	
Innger to load and does not show record         111         2023/03/22 23:10:00         L         1         3.0         110.6         65.7         12.029         0.000         0.000         30.943           values         10         2023/03/22 23:10:00         L         1         3.0         110.6         65.7         12.029         0.000         0.000         30.943           values         10         2023/03/22 23:10:00         L         1         3.0         1098.6         64.9         12.032         0.000         0.000         31.168           Values         Values         Values         L         1         Low Low Flow         K. T1 KFactor Error         e -11 Erraic Signal         1 - User Alarm 1         5 - User Alarm 5           - Supply Voltage         v - Battery 1 Percent         L -11 Low Low Flow         M. T1 MFactor Error         r - 11 Replace Kit         2 - User Alarm 1         5 - User Alarm 7           N-Hat Voltage         p - 8 attery 2 Percent         H - 11 High Flow         m - 11 Histing Blade         3 - User Alarm 3         7 - User Alarm 7	Date/Time takes	112	2023-03-02 23:11:00	L	1	3.0	1	104.6	65.2	12.039	0.000	0.000	30.092	
Values         110         2023 03 40 2 33 09:00         L         1         3.0         1098.6         6.4.9         12.032         0.000         0.000         31.168           Status Flag - Current selected date/time         -	longer to load and does not show record	111	2023-03-02 23:10:00	L	1	3.0	1	101.6	65.7	12.029	0.000	0.000	30.943	
Status Flag - Current selected date/time         I - 11 Low Low Flow         K - T1 K Factor Enor         e - T1 Erratic Signal         I - User Alarm 1         5 - User Alarm 5           t - Time Nol Set         P - Battery 1 Percent         I - 11 Low Flow         K - T1 K Factor Enor         e - T1 Erratic Signal         I - User Alarm 1         5 - User Alarm 5           s - Supply Voltage         v - Battery 2 Voltage         L - 11 Low Flow         M - T1 M-Factor Enor         r - T1 Replace Kit         2 - User Alarm 2         6 - User Alarm 5           R - Hatt Voltage         p - Battery 2 Percent         H - T1 High Flow         b - T1 Bent Blode         3 - User Alarm 3         7 - User Alarm 7           V - Battery 1 Voltage         h - T1 High Flow         m - T1 Missing Blade         4 - User Alarm 4         8 - User Alarm 8	values	110	2023-03-02 23:09:00	L	1	3.0	10	098.6	64.9	12.032	0.000	0.000	31.168	-
t - Time Not Set         P - Battery 1 Percent         I - TI Low Low Flow         K - TI K-Factor Error         e - TI Enraic Signal         1 - User Alarm 1         5 - User Alarm 5           s - Supply Voltage         v - Battery 2 Voltage         v - Battery 2 Voltage         L - TI Low Low Flow         M - TI M-Factor Error         r - TI Replace Kit         2 - User Alarm 2         6 - User Alarm 7           R - Hatt Voltage         p - Battery 2 Percent         H - TI High Flow         b - TI Bern Blide         3 - User Alarm 3         7 - User Alarm 7           V - Battery 1 Voltage         h - TI High Flow         m - TI Missing Blade         4 - User Alarm 3         8 - User Alarm 7		Status Fl	ag - Current selected date/time											
a - Supply Voltage         v - Battery 2 Voltage         L - T1 Low Flow         M - T1 M-Factor Encor         r - T1 Replace Kit         2 - User Alam 2         6 - User Alam 5           R - Hart Voltage         p - Battery 2 Percent         H - T1 High Flow         b - T1 Bent Blade         3 - User Alam 3         7 - User Alam 7           V - Battery 1 Voltage         h - T1 High Flow         m - T1 High Flow         m - T1 High Flow         4 - User Alam 4         8 - User Alam 6		t - Time M	lot Set P · Battery 1 Per	cent		I - T1 Low Lo	w Flow	К - Т1	K-Factor Error	e - T1 Erratic S	ignal 1-	User Alarm 1	5 - User Alarm 5	
R - Hart Voltage         p - Battery 2 Percent         H - T1 High Flow         b - T1 Benk Blade         3 - User Alarm 3         7 - User Alarm 7           V - Battery 1 Voltage         h - T1 High High Flow         m - T1 Missing Blade         4 - User Alarm 4         8 - User Alarm 8		s - Suppl	y Voltage v - Battery 2 Volt	age		L - T1 Low Fl	W	M · T1	1 M-Factor Error	r · T1 Replace	Kit <b>2</b> -	User Alarm 2	6 - User Alarm 6	
V - Battery 1 Voltage h - T1 High High Flow m - T1 Missing Blade 4 - User Alarm 4 8 - User Alarm 8		R - Hart	/oltage p · Battery 2 Per	sent		H - T1 High Flov	v	b · T1	Bent Blade		3 - L	Jser Alarm 3	7 - User Alarm 7	
		V - Batte	ry 1 Voltage			h · T1 High High	Flow	m · T1	Missing Blade		4 - 1	Jser Alarm 4	8 - User Alarm 8	
	File Loaded										5.1.0 - Beta	5	3/15/2023 3:06 AM	- 1 - yê

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.

C Synergy Totalizer	Connected Device - Serial No. 12345678 at Slave Address 1 on COM3:9600,8N1 (via device Serial Port 2)	Disconnect
rmware 1.002		No Unsaved Changes
	🐼 Device Status 📄 Configure Device 😢 Download Archives 🖈 Manage Device	
onfiguration Uplo	ad	
Upload From SRF File	Upload selected groups of configuration settings to the device from a saved configuration file. Allows	override of certain values.
evice Commands		
Sync Device Clock	Synchronize device date and time to computer time.	
Sync Device Clock with Offset	Synchronize device date and time to computer time with a time zone offset.	
Clear Unacknowledged Alarms	Clear unacknowledged device alarms and clear any latched Digital Outputs.	
Reset Grand Total	Reset accumulated grand total to zero.	
Create Partial Records	Create archive records with partial time periods.	
Reset Port Stats	Clear communication ports statistics.	
Load Defaults	Load default values for selected data categories.	
Reset Meter Kit Life	Reset the life time run counter for the installed turbine meter kit.	
utput Calibration		
Calibrate Analog Output	Procedure to calibrate Analog Trim Offset and Analog Trim Scale for Analog Output of the HART Interf	ace.
Reset Analog Output Calibration	Reset the Analog Output Calibration of the HART Interface to default values.	
evice Firmware Up	odate	
Upload Firmware Image	Upload a new firmware image to the device.	
Activate Stored Firmware	Activate the firmware image that was uploaded to the device, if not activated at the end of uploading.	

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.

🐣 Open SRF File	×
← → · · ↑ → This PC → OS (C:) → Sensia Data → NuFlo MC	Synergy Interface V Ö Search NuFlo MC Synergy In
Organize 🔻 New folder	<b>■ → 1 (?</b>
<ul> <li>Desktop</li> <li>Documents</li> <li>Downloads</li> <li>Music</li> <li>Pictures</li> <li>Videos</li> <li>C:)</li> </ul>	MCS_sn1234567_ 20230514_221107. srf
File name: MCS_sn1234567_20230514_221107.srf	SRF Files (*.srf)     V       Open     Cancel

Figure 10.2—Upload file selection

Data Sections	General Configurat	ion Overrides
Select All Clear All  General Configuration Communications Ports Network Ports Wired Ports Field Calibrations Turbine Meter Calibration HART Settings	Company Name Site/Well Name Field/Lease Name Location Name Device/Meter Name	Company X Well Y Field Z MC_SYNERGY
The selected data sections will be uploaded to the connected device. Optional field overrides will be available for some of the sections. There will be a Review page before executing the configuration upload.		

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

eview		
elected data sections:		^
General Configuration		
Company Name = Company	x	
Site/Well Name = Well Y		
Field/Lease Name = Field Z		
Location Name =		
Device/Meter Name = MC_SY	(NERGY	
Communications		
Network Ports		
Static IP Enabled = 0		
IP Address = 192.168.0.40		
Subnet Mask = 255.255.255	.0	~
Click OK to begin the upload pro take a few minutes. After comple the Connect To A Device page.	ocess using the specified override values. The process tion of the upload, the software will disconnect and r	may return to

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.

Device Commands	
Sync Device Clock	Synchronize device date and time to computer time.
Sync Device Clock with Offset	Synchronize device date and time to computer time with a time zone offset.
Clear Unacknowledged Alarms	Clear unacknowledged device alarms and clear any latched Digital Outputs.
Reset Grand Total	Reset accumulated grand total to zero.
Create Partial Records	Create archive records with partial time periods.
Reset Port Stats	Clear communication ports statistics.
Load Defaults	Load default values for selected data categories.

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.

elect Defaults to Load	Select All	Clear A
<ul> <li>General Configuration</li> </ul>		
<ul> <li>Communications Ports</li> <li>Network Ports</li> <li>Wired Ports</li> <li>Wireless Ports</li> </ul>		
<ul> <li>✓ Field Calibrations</li> <li>▶ Turbine Meter Calibration</li> <li>▶ HART Settings</li> </ul>		
After completion of the Load Defaults comm	nand, the software w	ill

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.

MC Synergy Interface Options		
Option Groups	General	
General Communications	Clock synchronization threshold: 7 sec	
Archive Data Developer	Default Location for Saved Configuration (SRF) Files: C:\Sensia Data\NuFlo MC Synergy Interface	

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**

	×
AC Synergy Interfa	ace Options
Option Groups	General
General Communications Archive Data	Clock synchronization threshold: 9000 sec
Developer	C:\Sensia Data\NuFlo MC Synergy Interface
	Number of Recently Used Files/Connections to Maintain: 5
	Default connection method on the Connect To A Device page:
	<ul> <li>Recent Connections</li> <li>Express Connect</li> <li>Specify Parameters</li> </ul>
	Default file access method on the Edit A Configuration File page:
	Recently Opened Files     Open Existing File     Create New File
leset all user settings to de	faults OK Cancel

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**

	Communications
Option Groups	
General	✓ Toggle RTS line for RS-485 adapter transmit control *
Communications	* Recommended for use with NuFlo USB adapter.
Archive Data Developer	Presend Delay: 10 msec
	Device Command Timeout: 5000 msec
	Device Command Retries: 5 (extra attempts)
	Multi-Stage Operation Retries: 2 (extra attempts)
	✓ Use Packet Streaming Mode in Device Communications *
	* Disabling this mode may help if you are experiencing timeouts and retries.

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**

Option Groups	Archive Data		
General	Default Location for Downloaded Archive Data:		
Communications	C:\Sensia Data\NuFlo MC Synergy Interface		
Archive Data			
Developer	If automatic naming is enabled on download, the following rules are used. Actual field values from Device Identification configuration page will be used in place of these field names.		
	File Storage Path Naming		
	Available Folder Naming Selections Selected Folder Naming Items		
	Company_Name		
	Field Lease Name		
	Remove		
	Move Up Move Down		
	Archive Data File Naming		
	Available File Naming Selections Selected File Naming Items		
	Site Well Name Add		
	Field_Lease_Name		
	Remove		
	Move Up Move Down		
	Add a custom prefix at the start of the filename: ArchiveData		
	Append a timestamp to the filename		
	Automatic file storage path generated using these rules:		
	C:\Sensia Data\NuFlo MC Synergy Interface		
	Example of automatic filename generated using these rules:		
	ArchiveData_20230512_133515.sdf		

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

NUFLO MC Synergy		- 🗆 🗙
File Navigation Actions Tools	s Help Debug	
MC Synergy Totalizer Firmware 0.991	Connected Device - Serial No. 20230715 at Slave Address 1 on COM8:9600,8N1 (via device Serial Port 1) Device Identification	Disconnect No Unsaved Changes
		OK Cancel
Device Identificatio	n	
Device Identification Se	ttings	
Company Name	Customer Name	
Site/Well Name	Well 1234	
Field/Lease Name		
Location Name	Duncan OK	
Device/Meter Name *	FIT_1111	
Legal Description		
User Note		

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

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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.

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### 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.

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