

NUFLO

ModWorX Pro Software User Manual

For use with Scanner 2000 Series Flow Computers

Manual No. 9A-30165025, Rev. 14

INTELLIGENT ACTION

+

Important Information

Symbols and Terms Used in this Manual

	NG This symbol identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss.
Caution	Indicates actions or procedures which if not performed correctly may lead to personal injury or incorrect function of the instrument or connected equipment.
IMPORTANT	Indicates actions or procedures which may affect instrument operation or may lead to an instrument response which is not planned.
Note Indicat	tes additional information about specific conditions or circumstances that may affect instrument operation.

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MWorX

Section 1 - Getting Started

Installing the Software

The NuFlo* ModWorX* Pro interface software allows a user to configure the Scanner, calibrate inputs, download logs, and view data in a table or a trend graph. The software is available for download from http://www.cameron.slb.com/flow-computers. From this website, click on *Scanner Model 2000 Flow Computer*, scroll down to the "Software" section on the right of the screen, and click *ModWorX Pro Software* to download the program.

To install the software,

- 1. Browse to the "modworx-pro-software.zip" folder on your computer, right-click, select *Extract All*, and select a location where the folder should be unzipped.
- Note To go immediately to the unzipped folder, check the box next to "Show extracted files when complete."
- 2. Click *setup.htm* to access the software installation options.
- Note Internet Explorer is required to install software from the Scanner Software Installations screen. To use a different browser, start Windows Explorer, browse to the location where the setup files were unzipped (or the CD drive), open the Install folder, and double-click on **setup.exe**.
- 3. Click Install ModWorX Pro to initiate installation.
- 4. Follow the onscreen prompts, editing the program filepath if desired. By default, program files will be stored at **C:** *NuFloWodWorX Pro 4.3.0*\
- Edit the data logs folder filepath, if desired, at the prompt provided. By default, data logs will be stored at C:WuFlo Log DataWodWorX Pro\Field_Name\Site_Name\Device_Name_Timestamp. sdf.
- 6. When the installation is complete, a ModWorX icon (shown at right) will appear on the desktop.

Installing the NuFlo USB Adapter

Users who wish to connect to the Scanner using an external USB port must first install the NuFlo USB Adapter driver on their computer. The required driver is provided as part of the ModWorX Pro software download.

IMPORTANT The USB adapter should not be connected to your computer during driver installation.

To access the driver installation file, click *setup.htm* from downloaded ModWorX Pro Software folder. Click *Install USB Driver* to install the NuFlo USB Adapter driver.

Driver installation instructions are also included in the ModWorX Pro readme file. The readme file can be accessed from the Start menu (*Start>Programs>NuFlo>ModWorX Pro 4.3.0>Documents>ReadMe.htm*).

Connecting to the Scanner

IMPORTANT Before attempting to run the interface software, verify that the Scanner is connected to a computer with an RS-485 to RS-232 converter or a NuFlo USB adapter (see the appropriate Hardware User Manual for details). The NuFlo USB adapter is standard with all Scanner 2200 EFMs.

Connecting via USB

A customer-supplied universal USB cable is required to connect the NuFlo USB adapter to a computer. Windows XP users will see a Found New Hardware Wizard dialog displayed the first time they connect the Scanner to the computer. Follow the instructions in the NuFlo USB Adapter Installation Guide to complete the installation of the NuFlo USB adapter. Other operating systems may not require this step. The NuFlo USB Adapter Installation Guide can be accessed through the ModWorX Pro Help menu.

Running ModWorX Pro

1. Click the ModWorX desktop icon, or select **Start>Programs>NuFlo>ModWorX Pro 4.3.0>ModWorX Pro 4.3.0**. The Welcome screen will appear (Figure 1.1).

n Welcome - ModWorX Pre 43.0		
fie Ianis Tgols Help		
	🖅 NuFlo	
	ModWorX Pro	
	Connect Peports Quit	
	0042 4.3.0.4	89 10/11/2018 9:19 AM

Figure 1.1

2. Click *Connect*. The Connection Settings screen will appear (Figure 1.2).

Note If prompted to select a COM Port, see Changing Connection Settings, page 7 for more information.

			Ret
Connection I	Method		
elect Method			
Express Connect		Automatically connect to a single device without knowing its slave address or baud rate settings.	
Nacover Devices Specify Parameters		www.mg.to.seve.exantes.or.opuo.reve.setangs-	
Save Address:	1		
Baud Rate:	9600 baud +		
Timeout (ms):	1000		
Retres			
Use default permio	sions of connected device port	Use these settings to automatically convect next time Gennect Now	
Use default permio			
Use default permio	sions of connected device port		

Figure 1.2

- 3. Choose a Connection Method from the dropdown list.
 - <u>Express Connect</u> recommended for single instruments. The software automatically connects to an instrument without a slave address or baud rate provided.

IMPORTANT If multiple devices are daisy-chained together in a network, do NOT select the "Express Connect" connection method.

- Discover Device recommended for multiple-instrument networks when the slave address or baud rate is not known. When the software attempts to connect to a Scanner, it will compile a list of instruments on the network, and the user then chooses a device from the list (Figure 1.3, page 3). A Search Now button will appear, allowing the user to perform a new search for additional connected devices, if desired. The devices are ordered by slave address, with the lowest address at the top of the list. If two or more devices have the same slave address and baud rate, the Change Device Parameters button allows a user to select a new slave address and/or baud rate for any detected device without leaving the Discover Devices dialog (Figure 1.4, page 4).
- <u>Specify Parameters</u> recommended for multiple-instrument networks when the slave address and baud rate is known. The user enters the instrument's slave address and baud rate, and adjusts the time-out setting, if necessary. (Time-out is the length of time the software will search for the instrument before giving up and generating an error message.) The user may also enter the number of retries desired before a connection attempt is terminated.

Address	Model	Serial No.	Baud Rate	Firmware Ver	Reg Table
1	Scanner 2000	0-4098	9600	3.55	14
1 2 3	Scanner 2000	0-4095	9600	3.55	14
3	Scanner 2000	0-4085	9600	3.57	14

Figure 1.3

Change D	evice Parameters
Device Serial No.:	0-0
Slave Address:	0
Baud Rate:	19.2 Kbaud 🔻



4. On initial login, the system will automatically connect to the Scanner using default security permissions (full access). The "Use default permissions of connected device port" checkbox (shown in Figure 1.2, page 2) will be checked. No user name or password is required for login.

If individual security controls are implemented, the default permissions setting must be changed to "no access," and users will instead login with a user name and password. If the "Use default permissions..." checkbox is checked, deselect it to enter a user name and password (Figure 1.5).

5. If individual user security controls are implemented, the user name and password will be saved by default when a user logs out of ModWorX Pro, eliminating the need to re-enter the information with each login (note the "Save User Name and Password between Sessions" checkbox). If this password save feature is not desired, remove the check from the checkbox.

Welcome - ModWorX P				
le <u>T</u> asks T <u>o</u> ols <u>H</u> elp	,			
				Return
Connection	Settings			
	rootanigo			
Connection Me	ethod			
Select Method				
Express Connect	•	Automatically connect to a single device without knowing its slave address or baud rate settings.		
Connection Parameter	s			
Slave Address:	1			
Baud Rate:	9600 baud *			
Timeout (ms):	1000			
Retries	2			
Use default permission	ns of connected device port			
User Name Password		Use these settings to automatically connect next time		
		Connect Now		
Save User Name and I	Password between Sessions	Zouner now		
evice Interface User Mar	nuals			
			CQM2 4.3.0.409	10/11/2018 10:05 AM

Figure 1.5

- 6. If you will use the same connection method each time you connect to the device, select the "Use these settings to *automatically connect next time*" checkbox at the bottom of the screen (Figure 1.6, page 5). The software will attempt to connect to the device without prompting the user to select a connection method.
- Note Connection settings can be changed on the Connection Settings screen shown above or in the **Tools** menu (Options submenu, Connection screen). See Appendix A Tools Menu for details. For information about setting up and changing security settings for individual users, see Software Interface Security, page 34.
- 7. Click *Connect Now* to connect to the Scanner.

8. If the date and time setting in the Scanner differs from the date and time setting in your computer by more than 14,400 seconds (or other threshold specified by the user), the software will prompt you to synchronize the device date and time with the computer date and time. Click *Yes* to synchronize the instrument date and time with your computer (Figure 1.7, page 5). The default threshold is set at 14,400 seconds (4 hours) to prevent undesired prompts when traveling between time zones.

See Appendix A - Tools Menu for detailed instructions on changing the setpoint for the time synchronization prompt.

Welcome - ModWorX Pro 4.3.0				- 0 -
ile <u>I</u> asks T <u>o</u> ols <u>H</u> elp				Return
Connection Sett	ings			
Connection Method				
Select Method Express Connect	•	Automatically connect to a single device without knowing its slave address or baud rate settings.		
Connection Parameters		knowing its save address or baud rate settings.		
Slave Address:	1			
Baud Rate: 9600 bau	d =			
Timeout (ms):	1000			
Retries	2			
Use default permissions of connect User Name Password	ted device port	✓ Use these settings to automatically connect next time		
Save User Name and Password be	tween Sessions	Connect Now		
vice Interiment User Manuals				
			COM2 4.3.0.489	10/11/2018 10:09 AM

Figure 1.6



Troubleshooting a Connection Failure

A connection failure can be caused by a mechanical problem or incompatible software communication settings. A review of the following checkpoints may help a user to detect and correct a problem. If technical assistance is required, contact a Cameron technician using the information provided in the *ModWorX Pro Help>About* screen.

Mechanical Checkpoints

- Are the connections between your computer and your RS-485 or NuFlo USB adapter secure?
- Are the connections from your adapter to the Scanner secure?
- Is the polarity of the wiring from the converter to the instrument correct? For wiring diagrams, see the Quick-Start Guide or Hardware User Manual for your Scanner model.
- Is the Scanner receiving adequate power, and are the power connections secure?

Software Checkpoints

- Are the slave address and baud rate correct?
 - 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.
 - 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 to your devices.
- Note If you change the communications parameters (slave address, baud rate) of the Scanner from the instrument keypad, the ModWorX Pro software will not detect the change instantaneously. Return to the Welcome Screen and reconnect to the device.
- Is your computer network speed too slow for the communication setting defaults? If the software repeatedly fails to connect to the Scanner, consider the following adjustments. To locate these settings, click on *Tools* in the task bar at the top of the screen, choose *Options...*, then choose *Communications*.
 - Change the number of retries allowed ('3' is the default). If the program does not receive a valid response from the device within the specified time-out period, the program will automatically resend the message a number of times before finally reporting a communications error. By default, the program will re-attempt each communication two times before it gives up. To increase the number of retries, increase the value in the Number of Retries field in the Communications section of the Program Options dialog. Line noise can corrupt messages exchanged between the program and the device, and increasing the number of retries can improve the chances of a successful connection.
 - Change the time-out period (5000 msec is the default). Depending on your computer's hardware and software characteristics and the characteristics of your device network, the default time-out period may be too short. To extend the time-out period, enter a higher value in the Time-out Period field in the Communications section of the Program Options dialog. If the program does not receive a valid response from the device within the specified time-out period, the program will automatically resend the message a number of times before finally reporting a communications error.
 - To increase the time that the program waits between consecutive Modbus commands, increase the Presend Delay value in the Communications section of the Program Options dialog.
 - 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 in the Communications section of the Program Options dialog. Alternatively, if you are connected to a modem device on your COM port that requires the RTS line be used in the standard way for RS-232 flow control, the "Toggle RTS line" option should be disabled.

Changing Connection Settings

Users are prompted to select a connection method the first time the software is run. To change the communications port, a user can choose *Select COM Port* from the *Tools* menu (Figure 1.8) in the task bar at the top of the screen.

🎢 Scanner 2100W Main Display - ModWorX Pro 4.3.0				
<u>F</u> ile <u>T</u> asks	T <u>o</u> ols	<u>H</u> elp		
0		View Modbus Holding Regist View All Modbus Registers		
		Modbus Master Data Detail		
Refresh		Manage Configuration		
		Clear Flow Totals		
		Clear Memory		
Eleve		Copy EEPROM To File		
Flow		Create Archive Partials		
Flow I		Change Power Saving Mode		
Daily Heatir		Reset User Security		
i i i cadi		Modbus Statistics		
		Select COM Port		
Volun		Options	Shift+Ctrl+O	

Figure 1.8

A Select COM Port dialog will appear, with COM1 displayed as the default serial port (Figure 1.9). Select a new COM port from the dropdown menu and click *OK*. If the NuFlo USB adapter is in use, the COM port will appear as "NuFlo USB Adapter."

odWor	X Pro	
Selec	t COM Port	
Select fro	m available serial ports:	
COM1	Serial Port	
COM3	Serial Port	
COM4	NuFlo USB Adapter	
Refresh	QK	Cancel

Figure 1.9

To change the connection method, a user can select *Return to Welcome Page* from the *Tasks* menu (Figure 1.10) in the task bar.

🎢 Scanner	2000 Main Display - ModWorX F
<u>F</u> ile <u>T</u> asks	T <u>o</u> ols <u>H</u> elp
	Return to Welcome Page
	Calibrate Inputs
	Maintain Flow Run
	Maintain Turbine
	Configure
	Download
	View Device Reports
	Refresh F5

Figure 1.10

See Appendix A - Tools Menu for detailed instructions on changing the communications port, adjusting the time synchronization prompt, changing connection methods when the auto-connect feature is enabled, and changing other settings.

This page is left blank intentionally.

Section 2 - Navigating the Interface

Main Display

The Scanner Main Display screen appears immediately upon connecting to a Scanner (Figure 2.1). This screen is the central hub of the software interface - the point from which a user can view real-time data and access menus for all commonly performed tasks.

Note the navigating window centered at the top of the screen. This window, which changes to identify the screen in view at any given time, is displayed on nearly all screens in the interface, and allows users to navigate in and out of menus with ease. It also allows users to quickly verify the connected device by the user-assigned name, serial number, site, field, and/or location.



If an optional expansion board is installed in a Scanner 2000 or Scanner 210x, the Main Display screen will display live readings of expansion board parameters including an additional turbine input, two analog inputs, and an analog output, as shown in Figure 2.2, page 11.

If a Scanner 2200 is installed, the navigating window will display "Scanner 2200 Main Display" (Figure 2.3, page 11). The Scanner 2200 combines the inputs/outputs standard to the Scanner 2000 and the expansion board inputs/outputs on a single board. Therefore, the Main Display will display live readings for all of these parameters, without the use of an expansion board.



Figure 2.3

From the Main Display screen, a user can:

- Download logs
- Access task-based menus for
 - Calibrating inputs
 - Changing flow run parameters
 - Changing turbine parameters
 - Configuring system parameters, setting up a flow run or turbine run, and configuring inputs and outputs
- View current data
- Link to user documentation
 - Quick-start Guide (a basic reference to installation, wiring, calibration and configuration)
 - Complete hardware manual
 - Complete software manual
- Access connection information and user security settings from the status bar at the bottom of the screen

Log Downloads

The red *Download* button allows a user to download log data and device settings for viewing onscreen, printing, or exporting. A Download Device Data screen will appear. From this screen, a user can select:

- The range of logs to download (new records only, or all records)
- The log types to include (daily, interval, and/or event)
- Additional data to include (configuration, calibration, holding registers)

See Section 14 - Downloading and Exporting Logs for detailed instructions.

Task-Based Menus

The four gray menu buttons provide direct access to the controls for calibrating and configuring the Scanner for specific needs (Figure 2.4, page 13).

- <u>Calibrate inputs</u>—calibrate all input parameters from one screen
- <u>Maintain flowrun</u>—change plate or cone parameters, change gas composition or steam properties, change generic liquid parameters or change MPMS liquid parameters, change a meter factor or flow coefficient (selections vary, depending on flow run configuration)
- <u>Maintain turbine</u>—change a turbine flowmeter, change a K-factor
- <u>Configure</u>—configure basic system parameters (such as time/date and archive setup), as well as flow run, turbine, and input parameters



Figure 2.4

Current Data Display

The Main Display screen displays real-time data for monitoring the operation of the Scanner in four grids: Flow Run Data, Turbine Data, Input Data, and System Data. If an optional expansion board is installed in a Scanner 2000 or Scanner 210x, these grids will also display data for a second turbine input, two analog inputs and an analog output. If a Scanner 2200 is installed, data for the complete range of inputs and outputs will be displayed without an additional expansion board.

Units

The units of measurement displayed are read-only from the Main Display screen. Units for system parameters such as heating value and device temperature, are displayed in US Standard units by default, but these settings can be changed to metric units.

To change from US Standard to metric units, or vice versa, click on the *Tools* button in the task bar at the top of the screen, and select *Options* from the dropdown menu. The units selection is on the General tab. The values will automatically convert to the new unit selection.

Other units for measurement parameters such as volume, mass, energy, differential pressure, etc. are specified by the user during the configuration process and can be changed in the Configure menu. These settings are discussed in Section 3 - Configuring System Parameters.

Refresh Options

To manually refresh the values displayed on the Main Display screen, press the *Refresh* button near the top of the screen. To enable the automatic refreshing of values, click the *Auto-Refresh* checkbox.

Diagnostic Indicators

Color-coded diagnostic indicators are provided for input parameters, as well as for configured alarms (Figure 2.5).

<u>T</u> asks T <u>o</u> ols <u>H</u> elp							
		w - Device name [: 2100W Main			Site name Field Name Location name		C
efresh 🗸 Auto-Refresh							Re
🛞 Calibrate Inp	uts 🚺 🗿 Mai	ntain Flow Run	🛞 Mainta	ain Turbine 🛛 💮 Manag	e PID	Configure	
Flow Run Data				Turbine Data			
Flow Rate	352.687	MCF/day		Turbine 1 Flow Rate	7	BBL/day	
Daily Total (est.)	317.173	MCF		Turbine 1 Grand Total	4.52234E006	BBL	
Heating Value	1036.06	BTU/SCF		Turbine 2 Flow Rate	0	BBL/day	
				Turbine 2 Grand Total	0	BBL	
	Current Day	Previous Day			Current Day	Previous Day	
Volume Flow	45.3104	352.687		Turbine 1 Volume Flow	0.902952		BBL
Mass Flow	2014.74	15682.3	377 (S	Turbine 2 Volume Flow	0	0	BBL
Energy	46.9442	365.404	MMBTU				DETAILS
Input Data				System Data			
			-				
Static Pressure	6.22		8	Alarms			ALARMS
Differential Pressure	164.62			Supply / Battery Voltage	10.28 / 0.5		
Process Temperature	60.00		×	Temperature		7 Deg F	
Analog Input 1		inches	-	Date/Time		8 11:05:48 AM	
Analog Input 2	56.24	Deg F		Analog Output Smart Battery / Health %	83.00 / 9	0 mA	
			DETAILS	Sillar battery / Health %	83.0079	/ %	DETAILS
e Interface User Manuals							

Figure 2.5

Input Data

The diagnostic indicator in the Input Data grid is activated (turns from green to red) when communication to an input device is lost or the device reading goes outside the user-specified range. When an override value is set for an input parameter, a lock symbol appears in combination with the diagnostic indicator. The override setting can appear with either a green or red indicator. Indicators may include the following symbols:

	status is OK (no warnings)
	input value is overridden
×	input is functioning, but sampling period is set to zero (no calculations are being performed)
	failure to receive valid input; input value is overridden
×	failure to receive valid input—due to a broken RTD wire, for example—or parameter value exceeds input maxi- mum or minimum range by 500%
	parameter value exceeds input range maximum by 20% or more (up to 500%)
	parameter value exceeds input range minimum by 20% or more (up to 500%)

For a detailed view of input parameters and their diagnostic status, press the *Details* button in the Input Data grid. The Input Data Detail screen will appear.

Input Data Detail

The Input Data Detail screen (Figure 2.6) displays current values, as well as current day, previous day, current interval, and previous interval averaged values for each input parameter. The status of each parameter is indicated by the diagnostic indicator next to each parameter and the text description in the right column.

Note If an optional expansion board is installed in a Scanner 2000 or Scanner 210x, the Input Data Detail screen will display the operational status and live values for two analog inputs. If a Scanner 2200 is installed, this information will be displayed without an additional expansion board.

	Unit	Current Value	Current Day	Previous Day	Current Interval	Previous Interval	Status
Static Pressure	PSIG	110	67.3895	0	67.3895	0	OVERRIDDEN
Differential Pressure	In H2O	160.897	155.14	150	155.14	150	ок
Process Temperature	Deg F	60	60	31.6867	60	39.1656	FAILED
Process temperature	Degr	60	00	31.0007	60	39.1650	PALLED



Note To clear an override or make other input configuration changes, click on the *Configure* menu on the Main Display screen and choose the appropriate parameter from the Inputs section. See Section 6 - Configuring Inputs, page 68 for more information.

System Data

The diagnostic indicator in the System Data grid is activated when the value of a parameter that has been linked to an alarm exceeds a user-specified setpoint in the alarm configuration. If one or more configured alarms is active, a red diagnostic indicator will appear in the System Data grid (Figure 2.7, page 16). If no alarms are active (or no alarms are configured), a green diagnostic indicator will appear in the System Data grid ("Battery %") and health ("Health %") (in Figure 2.7, page 16).

Note Replace the smart battery if it's battery health ("Health %") drops to 80% or below.

DOWNLOAD		W - Device name [2100W Mair			Site name Field Name Location name		6
efresh 🗸 Auto-Refresh	<u>1</u>						Ret
🛞 Calibrate Inpu	uts 🚺 🔘 Mai	ntain Flow Run	🛞 Mainta	ain Turbine 🛛 💮 Manage	PID	Configure	
Flow Run Data				Turbine Data			
Flow Rate	352.687	MCF/day		Turbine 1 Flow Rate	7	BBL/day	
Daily Total (est.)	317.173	MCF		Turbine 1 Grand Total	4.52234E006	BBL	
Heating Value	1036.06	BTU/SCF		Turbine 2 Flow Rate	0	BBL/day	
				Turbine 2 Grand Total	0	BBL	
	Current Day	Previous Day	t		Current Day	Previous Day	1
Volume Flow	45.3104	352.687	MCF	Turbine 1 Volume Flow	0.902952	7	BBL
Mass Flow	2014.74	15682.3	6575 (d. 1996)	Turbine 2 Volume Flow	0	0	BBL
Energy	46.9442	365.404	MMBTU				DETAILS
Input Data				System Data			
Static Pressure	6.22	PSIG	6	Alarms			ALARMS
Differential Pressure	164.62	In H2O	-	Supply / Battery Voltage	10.28 /	5 V	
Process Temperature	60.00	Deg F	×	Temperature	71.6	7 Deg F	
Analog Input 1	0.00	inches	-	Date/Time	Oct 26, 201	8 11:05:48 AM	
Analog Input 2	56.24	Deg F		Analog Output	15.2	0 mA	
			DETAILS	Smart Battery / Health %	83.00 / 9	7 %	DETAILS
				1			

Figure 2.7

For a complete list of configured alarms and the status of each, press the *Alarms* button in the System Data grid. The Alarm Data Detail screen will appear. Alarms can also be downloaded for viewing in a report. See Section 14 - Downloading and Exporting Logs for more information.

The supply and battery voltage is also displayed in the System Data grid. The supply voltage is the voltage supplied to the Scanner via the external power or analog output terminal blocks on the backplate board. The battery voltage is the measured voltage supplied by the battery (either lithium or smart battery).

The values will vary, depending on whether the Scanner is powered by the battery option (lithium or smart battery) only, by external power or loop power only (Scanner 2105 only), or by external power or loop power (Scanner 2105 only) with a battery option as a backup power source.

	Supply Voltage	Battery Voltage
Lithium Battery Only	0 VDC	6.5 to 7.5 VDC
Smart Battery Only	0 VDC	9.5 to 10.7 VDC
External Power Only	(voltage rating for external power supply)	0 VDC
Loop power Only	18-30 VDC (Scanner 2105 only)	0 VDC
External Power + Lithium Battery	(voltage rating for external power supply)	6.5 to 7.5 VDC
Loop Power + Lithium Battery	18-30 VDC (Scanner 2105 only)	6.5 to 7.5 VDC
Smart Battery + Lithium Battery	0 VDC	9.5 to 10.7 VDC
External Power + Smart Battery	(voltage rating for external power supply)	9.5 to 10.7 VDC
Loop Power + Smart Battery	18-30 VDC (Scanner 2105 only)	9.5 to 10.7 VDC
External Power + Loop Power	(voltage rating for external power supply)	0 VDC

Table 2.1—Supply and Battery Voltage Measurements

Note External power (external supply or loop power) and Lithium battery voltage will be displayed in System Data. When the smart battery is connected, System Data will show the battery percentage capacity and the battery health instead of the smart battery voltage. Note If an optional expansion board is installed in a Scanner 2000 or Scanner 210x, the System Data screen will include a live analog output value. If a Scanner 2200 is installed, this value will be displayed without an additional expansion board.

Alarm Data Detail

The Alarm Data Detail screen displays a list of all configured alarm parameters and a status indicator for each (Figure 2.8). If two alarm levels are configured for a parameter—the first alarm is considered a high/low alarm and the second alarm is considered a high-high/low-low alarm. The alarm type is indicated in the alarm description by an "H/L" or an "HH/LL."

	Current Value	Unit	Statu
Process Temperature (H/L)	74.835815	Deg F	HIGH
Flow Run 1 Flow Rate (HH/LL)	269.956787	MCF/day	ОК
<unassigned></unassigned>			
<unassigned></unassigned>			
<unassigned></unassigned>			
<unassigned></unassigned>			
<unassigned></unassigned>			
<unassigned></unassigned>			
<unassigned></unassigned>			
<unassigned></unassigned>			
<unassigned></unassigned>			
<unassigned></unassigned>			



Alarm diagnostic indicators may include the following symbols:

status is OK (no warnings)
value exceeds high alarm setpoint
value exceeds low alarm setpoint

Alarms that are configured as "latched" alarms will remain active until the user clears them. To clear all active alarms, eliminate the condition(s) causing the alarm(s), then press the *Clear Alarms* button.

Note To change an alarm setpoint or deadband or configure a new alarm parameter, click on the *Configure* menu on the Main Display screen and choose *Alarms* from the System section. See Section 3 - Configuring System Parameters for more information.

Details

A detailed view of current data is available by clicking on the *Details* button in the lower right corner of each grid. The Details screen content varies, depending on the parameters monitored and the flow rate and calculation method selected.

Flow Run Detail

Flow Run Detail screens (Figure 2.9 and Figure 2.10, page 19) include current interval and previous interval volumes, calculations used to determine flow rate, and parameters used in those calculations. The contents of the Flow Run Detail screen vary, depending on the calculation methods selected for fluid property and flow rate. Figure 2.9 shows the content of a typical gas flow run using the AGA-8 Detail fluid property calculation method and the AGA-3 flow rate calculation method. Figure 2.10, page 19 shows the content of a typical steam flowrun using the AGA-3 flow rate calculation method and the Chisholm algorithm for wet correction.

Note that in a steam flowrun application, volume is expressed as "CWE" (cold water equivalent) and wet correction parameters are detailed on the Flow Run Detail screen.

lodWorXPro Flow Run							
		Grand Total	Flow Rate (/day)	Current Day	Previous Day	Current Interval	Previous Interval
Volume	MCF	57.0013	269.944	4.92271	0	4.01404	0.908669
Mass	LBM	2534.58	12003.2	218.89	0	178.486	40.4043
Energy	MMBTU	59.0566	279.678	5.10021	0	4.15878	0.941434
Run Time	SEC			1610	0	1319	291
Calculated Varia	bles			Flow Rate Para	meters (AGA-3)		
Daily Estimated W	olume	14.7681	MCF	Plate Size (unco	rrected)	1.0000	inches
Monthly Volume		52.0786	MCF	Plate Size (corre	cted)	1.000064	inches
Previous Month V	olume	0	MCF	Pipe Size (correc	ted)	2.067089	inches
Static Pressure		0	PSIG	Beta Ratio (com	ected)	0.483803	
Differential Press	ure	150	In H2O	Reynolds Numbe	er (Re)	148826.171875	
Process Temperal	ture	74.902	Deg F	Expansion Facto	rr (Y)	0.878763	
				Discharge Coeff	icient (Cd)	0.605395	
luid Properties			1	Stability Index		0.0000	%
Mass Heating Val	ue	23300.340399	BTU/LBM	Velocity of Appr	oach Factor (Ev)	1.028573	
Compressibility		0.998063		Average Sqrt (D	P)	12.247449	
Density		0.043218	LBM/CU FT				
Base Compressibi	lity	0.997858	Construction of the	wet Correction	Parameters (No	wet correction)	
Base Density		0.044465	LBM/CU FT				
Average Molecula		16.798923	LBM/LBM+MOL				
Molar Fraction Su		1.0000					
Isentropic Expone	ent	1.3000					
Specific Gravity		0.581027					
Viscosity		0.010268	cP				

Figure 2.9

		Grand Total	Flow Rate (/day)	Current Da y	Previous Day	Current Interval	Previous Interval
Volume (CWE)	BBL	0.256085	245.867	2.5149	0	0.0426853	0.17072
Mass	LBM	89.6671	86089.4	880.581	0	14.9461	59.778
Energy	MMBTU	0.104367	100.202	1.02494	0	0.0173963	0.0695783
Run Time	SEC			898	0	20	60
alculated ¥ariable	s			Flow Rate Para	meters (AGA-3)		
Daily Estimated Volu	me (CWE)	52.8129	BBL	Plate Size (unco	rrected)	1.0000	inches
Monthly Volume (CW	E)	6.19219E006	BBL	Plate Size (corre	cted)	1.004439	inches
Previous Month Volu	me (CWE)	58.3997	BBL	Pipe Size (correc	ted)	2.073153	inches
Static Pressure		1000	PSIG	Beta Ratio (corr	ected)	0.484498	
Differential Pressure		111.895	In H2O	Reynolds Numbe	er (Re)	576423.8750	
Process Temperature	в	546.431	Deg F	Expansion Facto	r (Y)	0.998633	
				Discharge Coeff	icient (Cd)	0.603818	
uid Properties Pa	rameters (Ir	-		Stability Index		0.0000	%
Enthalpy Change		1163.934241	BTU/LBM	Velocity of Appr	oach Factor (Ev)	1.028745	
Liquid Heating Value		516.742002	BTU/LBM	Average Sqrt (D	P)	10.578053	
Vapor Flowing Densil	10	2.27874	LBM/CU FT	Wet Correction	Parameters (Ori	fice (hicholos)	
Liquid Flowing Densit	y	46.183495	LBM/CU FT				
Cold Water Density		62.363613	LBM/CU FT	Steam Quality/D		100.0	%
Isentropic Exponent		1.249115		Est. Liquid Mass		0.0000	LBM/day
Specific Gravity		0.0000		Apparent Mass I		86089.4	LBM/day
Viscosity		0.018959	cP		Corr. Factor (CF)	1	
Composite Enthalpy		1163.934241	BTU/LBM	Lockhart-Martine	elli	0.0000	

Figure 2.10

Turbine Detail

Like the Flow Run Detail screen, the Turbine Detail screen (Figure 2.11) includes current interval and previous interval volumes, calculations used to determine flow rate, and parameters used in those calculations.

	etail							
		Grand Total	Flow Rate (/day)	Current Day	Previous Day	Current Interval	Previous Interval	Status
T1 Volume	BBL	3646.55	4571.89	84.0943	260.337	84.0943	69.8566	ОК
T1 Run Time	SEC			1591	4911	1591	1311	
T1 Run Time urbine 1 (T1) Ca	alculated \						1311	
urbine 1 (T1) Cr Daily Estimated Tr	alculated \	454	1.09 BBL	Daily	Estimated Tota		1311	
urbine 1 (T1) Co Daily Estimated To Monthly Total	alculated V	454	2.46 BBL	Daily Mori	Estimated Tota	al :	1311	
urbine 1 (T1) Cr Daily Estimated Tr	alculated V	454		Daily Moni Prev	Estimated Tota	al :	1311	

Figure 2.11

Note If an optional expansion board is installed in a Scanner 2000 or Scanner 210x, the Turbine Detail screen will include data for a second turbine input (T2). If a Scanner 2200 is installed, this data will be displayed without an additional expansion board.

Input Data Detail

The Input Data Detail screen (Figure 2.12) displays current values, as well as current day, previous day, current interval, and previous interval averaged values for each input parameter. The status of each parameter is indicated by the diagnostic indicator next to each parameter and the text description in the right column. See also Input Data Detail, page 15.

	Unit	Current Value	Current Day	Previous Day	Current Interval	Previous Interval	Statu
Static Pressure	PSIG	6.35941	0.0435719	0	0.0500278	0	OK
Differential Pressure	In H2O	210.413	149.546	0.466378	149.478	150	ок
Process Temperature	Deg F	74.8854	72.3478	68.2683	91.2415	73.5204	ОК

Figure 2.12

System Detail

The System Detail screen (Figure 2.13) displays information for identifying a specific instrument, to include serial numbers, manufacture and sales dates, firmware version numbers, etc. The System Detail screen also indicates the status of a device seal for custody transfer installations, and displays the power mode of the microprocessor. The Scanner optimizes performance and battery life by changing from high to low power mode or vice versa, depending on configuration settings and operational requirements. If the smart battery is supported on the device, then the installation status will be displayed. If the smart battery is installed, the System Detail screen will confirm if it is communicating with the ModWorX Pro software. The smart battery capacity ("Battery %") and health ("Health %") will be shown in System Data (Figure 2.7, page 16).

ystem Information		Expansion Board Information	
Device Type	Scanner 2100W	Board Type	Standard EFM Expansion
Main Board Serial Number	22	Board Serial Number	0
Device Serial Number	0	Board Manufacture Date	01-2000
Product Code	\$03C2	Board Sales Date	01-2000
Firmware Version	4.37		
Register Table Version	16	Expansion Board Options Insta	alled
Manufacture Date	01-2000	Interval Archive Expansion	+ 4088 interval records
Sales Date	01-2000	Analog Input 1	Not Active
Slave Address	1	Analog Input 2	Not Active
Baud Rate	9600	Digital Input 2	Active
Connected Device Port	1	Turbine Input 2	Active
Device Seal engaged	False	Analog Output 1	Active
Power Saving enabled	True	Smart Battery	Installed
Power Saving enabled	True	Smart Battery	Installed

Figure 2.13

Note If an optional expansion board is installed in a Scanner 2000 or Scanner 210x, the System Detail screen will include expansion board information and a status indication for all expansion board parameters. If a Scanner 2200 is installed, status information for the complete range of inputs/outputs will be displayed and no expansion board information will be shown.

Note Replace the smart battery if it's battery health ("Health %") drops to 80% or below.

Links to User Documentation

Electronic user documents including a hardware manual, software manual, quick start guide, and other support documentation are embedded in the ModWorX Pro software. User documents can be accessed three ways:

- Click the *User Manuals* tab at the bottom of the screen (Figure 2.14). Documents will open within the ModWorX Pro viewing window.
- Click the *Help* menu at the top of the screen and select *User Manuals* (Figure 2.15). Documents will open within the ModWorX Pro viewing window.
- Click on the *Start* menu and navigate the following path to open a pdf document in a separate window: *Start>Programs>NuFlo>ModWorX Pro 4.3.0>Documents*.

Iasks Tools Help							
DOWNLOAD	Scanner 2100W - Device name [s/n 1441792] Site name Scanner 2100W Main Display Location name						6
efresh 🗸 Auto-Refresh							Re
🛞 Calibrate Inputs	O Mair	ntain Flow Run	🛞 Mainta	ain Turbine 🛛 🐼 Manage	PID	Configure	
Flow Run Data				Turbine Data			
Flow Rate	352.687	MCF/day		Turbine 1 Flow Rate	7	BBL/day	
Daily Total (est.)	317.173	MCF		Turbine 1 Grand Total	4.52234E006	BBL	
Heating Value	1036.06	BTU/SCF		Turbine 2 Flow Rate	0	BBL/day	
				Turbine 2 Grand Total	0	BBL	
	Current Day	Previous Day			Current Day	Previous Day	
Volume Flow	45.3104	352.687	MCF	Turbine 1 Volume Flow	0.902952	7	BBL
Mass Flow	2014.74	15682.3	LBM	Turbine 2 Volume Flow	0	0	BBL
Energy	46.9442	365.404	MMBTU CETAILS				DETAIL
Input Data				System Data			
Static Pressure	6.22	PSIG		Alarms			ALARM
Differential Pressure	164.62	In H2O		Supply / Battery Voltage	10.28 / 10.55	5 V	
Process Temperature	60.00	Deg F	×	Temperature	71.67	7 Deg F	
Analog Input 1	0.00	inches		Date/Time	Oct 26, 2018	8 11:05:48 AM	
Analog Input 2	56.24	Deg F		Analog Output	15.20) mA	
				Smart Battery / Health %	83.00 / 93	7 %	
			DETAILS				DETAIL

Figure 2.14



Figure 2.15

When selecting either of the first two options (User Manuals tab or Help menu), the following screen will appear (Figure 2.16).



Figure 2.16

- 1. Select the Scanner product in use.
- 2. Then choose the desired document from the list of available documents for the selected product (Figure 2.17).



Figure 2.17

To return to the Select Your Product screen to select a different document, click the Home icon.

To restore the view of ModWorX Pro configuration controls, click the *Device Interface* tab at the bottom of the screen.

The following user documents are available from within the ModWorX Pro program:

- a quick-start guide that covers the basics of installing, wiring, and configuring the Scanner
- a complete hardware user manual
- a complete software user manual
- NuFlo USB adapter hardware installation guide (Scanner 2000 or Scanner 210x users only)
- NuFlo USB adapter driver installation guide
- NuFlo USB adapter driver troubleshooting tips
- communications troubleshooting tips

Note The initial load of these documents can take several seconds. Please be patient the first time you access these documents and allow the screens to load properly.

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Section 3 - Configuring System Parameters

This section guides users in configuring all system parameters including:

- Device Identification
- Date/Time
- Communications
- Security
- Display
- Archives
- Alarms
- User Modbus Registers

To configure system parameters,

1. Click on the *Configure* button in the task menu bar on the Main Display screen (Figure 3.1).

<u>T</u> asks T <u>o</u> ols <u>H</u> elp]		~
DOWNLOAD		w - Device name [: 2100W Main			Site name Field Name Location name		e
efresh 🔽 Auto-Refresh							Retu
🛞 Calibrate Inp	uts 🚺 🗿 Mai	ntain Flow Run	🛞 Mainta	iin Turbine 🛛 💮 Manage	PID	Configure	
Flow Run Data]	Turbine Data			
Flow Rate	352.687	MCF/day		Turbine 1 Flow Rate	7	BBL/day	
Daily Total (est.)	317.173	MCF		Turbine 1 Grand Total	4.52234E006	BBL	
Heating Value	1036.06	BTU/SCF		Turbine 2 Flow Rate	0	BBL/day	
				Turbine 2 Grand Total	0	BBL	
	Current Day	Previous Day			Current Day	Previous Day	
Volume Flow	45.3104	352.687	MCF	Turbine 1 Volume Flow	0.902952	7	BBL
Mass Flow	2014.74	15682.3	LBM	Turbine 2 Volume Flow	0	0	BBL
Energy	46.9442	365.404	MMBTU DETAILS				DETAILS
Input Data				System Data			
Static Pressure	6.22	PSIG	8	Alarms			ALARMS
Differential Pressure	164.62	In H2O		Supply / Battery Voltage	10.28 / 10.5	5 V	
Process Temperature	60.00	Deg F	×	Temperature	71.6	Deg F	
Analog Input 1	0.00	inches		Date/Time	Oct 26, 201	3 11:05:48 AM	
Analog Input 2	56.24	Deg F		Analog Output	15.20) mA	
				Smart Battery / Health %	83.00 / 93	7 %	
			DETAILS				DETAILS
ce Interface User Manuals							

Figure 3.1

2. Then, click on the appropriate parameter in the System section of the Configuration Menu screen (Figure 3.2, page 26).

💏 Scanner 2100W Configuration Menu - ModWorX Pro 4.3.0	L.				
<u>F</u> ile <u>I</u> asks T <u>o</u> ols <u>H</u> elp					
DOWNLOAD	scanner 2100w - [s/n 1441792] Scanner 2100W Configur	ration Menu			
					Return
System Device Identification Display	Date/Time Archives	Communications Alarms	Security User Modbus Registers		
Flow Runs Flow Run 1					
Turbines Turbine Input 1	Turbine Input 2				
Differential Pressure Analog Input 1	Static Pressure Pr Analog Input 2	rocess Temperature			
Outputs Digital Outputs	Analog Outputs	PID Control			
Device Interface User Manuals			COM2 4.3.0.489	<port 1="" default=""> 1</port>	0/12/2018 11:56 AM

Figure 3.2

Device Identification

To configure device identification parameters, click on the *Configure* button on the Main Display screen. Then, click on the *Device Identification* button on the Configuration Menu screen (Figure 3.3).

💏 Scanner 2100W Configuration Menu - ModWorX Pro 4	3.0		
<u>F</u> ile <u>T</u> asks T <u>o</u> ols <u>H</u> elp			
DOWNLOAD	scanner 2100w - [s/n 1441792] Scanner 2100W Configurat		
	4		Return
System Device Identification	Time Co Archives	Alarms User Modbus Re	gisters
Flow Runs How Run 1			
Turbines Turbine Input 1	Turbine Input 2		
Differential Pressure Analog Input 1	Static Pressure Proc Analog Input 2	ess Temperature	
Outputs Digital Outputs	Analog Outputs	PID Control	
Device Interface User Manuals		COM2	4.3.0.489 <port 1="" default=""> 10/12/2018 11:56 AM</port>

Figure 3.3

The Configure Device Identification screen will appear (Figure 3.4).

Configure Device Identification - ModWorX Pro	o 43.0			-
r Iasks Tgols Help				
	scanner 2100v - [s/n 1441792] Configure Device Identification		(
		Refresh	oply OK	Cancel
evice Identification Settings				
Identification Parameters	Data Storage Directories			
Device/Meter Name	Files are saved in paths configured through the Options screen			
Company Name	based upon information entered on this screen defined as:			
Site/Well Name	E:UluFlo log data\ModWorX Pro\ Field_Name\			
Field/Lease Name	Site_Name\ Device_Name_TimeStamp			
Location Name	a conspond microsoft			
	Data from this device will be saved here:			
Legal Description	E: WuFlo log data WodWorX Pro Field_Name Site_Name Device_Name_TimeStamp.*			
Legal Description	E: (NuFlo log data (ModWorX Pro (Field Jhame (Dire, Name (Device_Name_TimeStamp.*			
Legal Description	E: WuFlo log data Wodtivix Pro Pield, Name Gite, Joane Device, Jrame, TimeStamo,*			
Legal Description	E: Wu/Ro log data Wodd vork Pro Pield, Name (Site, Joane Device, Jrame, TimeStamo, *			
Legal Description	E: Wu/Ro log data Wodd Vork Pro Pield, Name Cite, Joane Device, Jrame, TimeStamo, *			
Legal Description	E: Yu/Fo log data WodViorX Pro Pold, Jeane (Site, Jeane (Pervice, Jeane, TimeStane, *			
Legal Description	E: Wu/Fo log data Wodd vork Pro Pold, Jeane (Site, Jeane (Device, Jeane, TimeStane, *			
Legal Description	E: Yu/Fo log data WodViorX Pro Pield, Name (Site, Joane (Device, Joane, TimeStane, *			
Legal Description	E: YuuFlo log data Wodd vork Pro Pield, Name Gite, Joane De voe, Joane, TimeStano, *			
Legal Description	E: Yu/Fo log data WodViorX Pro Pold, Jeane (Site, Jeane (Pervice, Jeane, TimeStane, *			
Legal Description	E: Yu/Fo log data WodViorX Pro Pield, Jeane (Site, Jeane (Device, Jeane, TimeStane, *			
Legal Description	E: YuuFlo log data Wodd vork Pro Pield Jianne (Site, Jianne (De vice, Jianne, TimeStame, *			
Legal Description	E: Yu/Fo log data WodViorX Pro Pield, Jiame (De. Voz., Jiame, TimeStamo, *			
Legal Description	E: Yu/Fo log data WodViorX Pro Pold, Jiame (Site, Jiame (Device, Jiame, TimeStame, *			
Legal Description	E: Yu/Fo log data WodViorX Pro Pield Jiame (Site, Jiame (Device, Jiame, TimeStame, *			
ung al Description	E: Yu/Fo log data Wedd Vork Pro Pield Jianne (Site, Jianne (De vice, Jianne, TimeStame, *			

Figure 3.4

The data storage directories shown in Figure 3.4 are controlled via settings within the Options dialog. See Appendix A - Tools Menu for more information.

The Configure Device Identification screen allows a user to enter information that distinguishes an instrument from other networked instruments, including

- Device/meter name
 - by default, the device/meter name is included in the filename for each download report
- Company name
- Site/well name
 - by default, the site/well name is the name of the folder created on your hard drive for storing downloaded logs:
 C:\NuFlo Log Data\ModWorX Pro\Field_Name\Site_Name
- Field/lease name
 - by default, the field/lease name is the name of the folder created on your hard drive for storing site name subfolders: C:\NuFlo Log Data\ModWorX Pro\Field_Name
- Location name
- Legal description

When the device name, site name, field name, and location name are entered, this information appears in the navigational window at the top of each screen (Figure 3.5, page 28). The serial number of the Scanner is also displayed in this window.

Dowini.OAD		
		Scamer 200W - Device name [s/n 141792] Site name Configure Device Identification Field Name Location name
		Refresh Apply OK Can
vice Identificatio		
dentification		Data Storage Directories
evice/Meter Name	Device name	Files are saved in paths configured through the Options screen
ompany Name	Company name	based upon information entered on this screen defined as:
te/Well Name	Site name	E:\Nuflo log data\ModWorX Pro\ Field_Name\
dd/Lease Name	Field Name	Site_Name\ Device_Name_TimeStamp
cation Name	Location name	
gal Description	Legal description	Data from this device will be saved here: E-Wu/Fo log data/MedWorX Pro/Pield Name/Dite name/Device name_TimeStamp.*
Interface User Manu	als	COM2 4.3.0-499 cPart 1 Defaultas 10/12/2018 1-35 PM
		Figure 3.5

Click *Apply* to save the new settings without leaving the Configure Device Identification screen. Or click *OK* to save the new settings and return to the Configuration Menu screen.

Date/Time

To configure the instrument date and time, click on the *Configure* button on the Main Display screen. Then, click on the *Date/Time* button on the Configuration Menu screen (Figure 3.6).

m Scanner 2100W Configuration Menu - ModWorX Pro 4.3.	3.0	
<u>File T</u> asks T <u>o</u> ols <u>H</u> elp		
DOWNLOAD	Scanner 2100W - [s/n 1441792] Scanner 2100W Configuration Menu	
		Return
System Device Identification	Date/Time munications Security Archives Alarms User Modbus Registers	
Flow Runs Flow Run 1		
Turbines Turbine Input 1	Turbine Input 2	
Differential Pressure Analog Input 1	Static Pressure Process Temperature Analog Input 2	
Outputs Digital Outputs	Analog Outputs PID Control	
Device Interface User Manuals	COM2 4.3.0.489 <port 1="" default=""> 10/12/2018</port>	11:56 AM

Figure 3.6
The Configure Date and Time screen (Figure 3.7) will appear.

n Configure Date and Time - M	NodWorX Pro 4.3.0				
<u>File Iasks Tools Help</u>					
DOWINLOAD		scanner 2100w - Device name [s/n 1441792 Configure Date and Time] Site Field Location	Name	
				Refresh	Done
Date and Time Setting	le				
Information					
Device Date	10/12/2018	Edit			
Device Time	01:37:52 pm	Edt			
Apply Settings Now	Click to save the date	e and time shown above to the device.			
Sync with Computer Time	Click to save the curr	ent computer date and time to the device.			
and de reference de la constant de la consta]
Device Interface User Manuals					
			COM2 4.3	1.0.489 <port 1="" default=""> 10/</port>	12/2018 1:37 PM

Figure 3.7

The Configure Date and Time screen allows a user to set the date and time two ways:

- 1. Click the *Sync with Computer Time* button to set the instrument date and time to the date and time displayed on your computer.
- 2. Click the *Edit* buttons to change the date and time displayed using the calendars shown in Figure 3.8.
 - a. To change the date, click the *Edit* button for Device Date, and select the date from the calendar provided, or click *Today* to select the current date. Click *OK* to save the setting and update the Device Date display.
 - b. To change the time, click the *Edit* button for Device Time, and enter the correct time using the -/+ buttons to change the hour, minutes and seconds shown. Click the dropdown toggle button to select "*AM*" or "*PM*." Click *OK* to save the settings and update the Device Time display.

Mod	Wor	XPr	0					
Se	lect	date						
Sele	ct new	date:						
4				mber 20			•	ModWorX Pro
_	Sun	Mon	Tue	Wed	Thu	Fri	Sat	
	29	30	1	2	з	4	5	Select time
	6	7	8	9	10	11	12	
	13	14	15	16	17	18	19	Select new time:
	20	21	22	23	24	25	26	Delecc new cline.
	27	28	29	30	- 31	1	2	Hour Minutes Seconds
	3	4	5	6	7	8	9	
			Т	oday				-11 + - 33 + - 13 + AM -
				ОК		C	ancel	OK Cancel

Figure 3.8

- c. Click Apply Settings Now on the Configure Date and Time screen to write the values to memory.
- d. Click *Done* to return to the Configuration Menu screen.

Communications

To configure the communications ports, click the *Configure* button on the Main Display screen. Then, click the *Communications* button on the Configuration Menu screen (Figure 3.9). The Configure Communications screen (Figure 3.10) will appear. If a Scanner 2200 is installed, this screen will also allow configuration of radio control settings. See Radio Control, page 31, for details. If a Scanner 2100 wireless device is installed, you will be prompted to enter the Network ID.

7 Scanner 2100W Configuration Menu - ModWorX Pro 4.3	3.0	
<u>File T</u> asks T <u>o</u> ols <u>H</u> elp		
DOWNLOAD	Scanner 2100W - [s/n 1441792] Scanner 2100W Configuration Menu	
· · · · · · · · · · · · · · · · · · ·		Return
System Device Identification Display	Date/Time Communications Security Archives Alarms User Modbus Registers	
Flow Runs How Run 1		
Turbines Turbine Input 1	Turbine Input 2	
Differential Pressure Analog Input 1	Static Pressure Process Temperature Analog Input 2	
Outputs Digital Outputs	Analog Outputs PID Control	
Device Interface User Manuals	COM2 4.3.0.489 <port 1="" default=""> 10/11</port>	2/2018 11:56 AM
	Figure 3.9	





The Configure Communications screen allows users to change the settings that are required for Modbus communication. The Scanner has two slave communications ports. The Scanner detects which of these ports is connected to the instrument and indicates the connection status on this screen, as shown in Figure 3.10.

ModWorX Pro

Both COM ports are currently slave ports. To change the slave address, click in the *Slave Address* field and enter a new number between 1 and 65535 (the default setting is 1; 252 through 255 and 64764 are reserved and should not be used). The slave address allows the Scanner to communicate with other devices via Modbus. If a Modbus request message contains the matching slave address, the device will respond to the request. In network arrangements, the slave device must have a unique address.

Note	For a Scanner 2105, Port 2 is reserved and not available for user configuration (Figure 3.11). Port 2 is exclusively
	used for communication between the main circuit board and the backplate board.

Port 2 Settings		
Port Usage	Restricted	Change

Port not available - reserved

- 1. To change the baud rate, select a number from the dropdown menu or click in the field and use the up and down arrow keys on your computer keyboard to select the desired baud rate. The default setting is 9600. The baud rate is the speed at which data is transmitted or received via the serial port. Baud rates supported by the Scanner range from 9600 to 38.4K. This setting must match the baud setting of the master device polling the Scanner serial port.
- 2. To change the bus delay, delete the existing value and enter a new value. Bus delay is the amount of time (in milliseconds) that passes before the Scanner attempts to take control of the RS-485 bus and transmit a message back to the requesting device. The Scanner responds very quickly to incoming Modbus requests—in some cases, too quickly. A configurable delay allows the user to control this response time. The default setting of 10 msec is normally sufficient, but a longer delay may be necessary when the Scanner is communicating with a radio or other end device that responds more slowly.
- 3. To change the bus time-out, delete the existing value and enter a new value. Bus time-out is the amount of time (in milliseconds) that must pass to cause the Scanner to reset its internal Modbus message handler. The default value of 50 msec is normally sufficient.
- 4. Click *Apply* to save the new settings without leaving the Configure Communications screen. Or click *OK* to save the new settings and return to the Configuration Menu screen.

Radio Control (Scanner 2200 only)

If a Scanner 2200 is installed and used to power radio communications, ModWorX Pro can be used to configure radio sleep functions for reduced power consumption.

To control power to the 2200 communications device, the device must be wired to the Power Out terminal block (TB1) of the Scanner 2200. If a 2200 radio has a hardware line for power management, it can be wired to the sleep output on TB6 to control sleep functions.

To configure radio control settings, perform the following steps:

1. From the Configure Communications screen, change the Port Usage setting in the Port 2 Settings section to "Modbus Slave with Radio Controller" (Figure 3.12, page 32).

Figure 3.11

nications - Mod	WorX Pro 4.0.0					
						0
			Refresh	Apply	ОК	Can
Modbus Sla	we	Change				
1 9600 bau 10 50	d • msec msec					
Modbus Sla	we with Radio Controller	Change				
1 19.2 kbau	e bi	Power Mode Power On Time	On/Off Times	=		
50	msec	Power Orr Imme Enable Sleep Control Awake Time Sleep Time Sleep Cycle Period	No	sleep c		L
	Modbus Sk Modbus Sk 10 50 Modbus Sk is (currenth 19.2 lbs 10 10 10 10 10 10 10 10 10 10	MD Configure Comm	Modbus Slave Change IS	AD Configure Communications Local Refresh Modbus Slave Change S S S S S Modbus Slave with Radio Controller Change S S S Currently connected) S S S S S S S S S S S S S	AD Configure Communications Field Name Location Name Refresh Apply Modbus Slave Change S I 9600 baad • 10 mesc 50 mesc S (currently connected) 19.2 Iblaud • 10 mesc 50 mesc S S S Power Mode Power Off Time • 10 mesc 50 mesc S S S S S S S S S S S S S S S S S S S	AD Configure Communications Field Name Location Name Refresh Apply OK Modbus Slave Change S Modbus Slave with Radio Controller Change Modbus Slave with Radio Controller Change S (currently connected) Radio Settings S (currently connected) Power Mode On/Off Times

Figure 3.12

- 2. In the Radio Settings section, configure the power mode as "always on" for continuous power, or "on/off times" to select the time of day for turning the radio off and on.
 - If "always on" is used, no further configuration is needed. Click *Apply* to save the new settings without leaving the Configure Communications screen. Or click *OK* to save the new settings and return to the Configuration Menu screen.
 - If "on/off times" is used, proceed to step 3.
- 3. For "on/off times" power mode configuration, enter a "power on" time and a "power off" time as follows:
 - a. Click the *Edit* button next to the Power On Time field and enter the time of day when power is to be supplied to the radio, using the "plus" and "minus" buttons shown in the Select time dialog in Figure 3.13, page 33. Click *OK*.
 - b. Click the *Edit* button next to the Power Off Time field and enter the time of day when power is to be terminated to the radio. Click *OK*.
- 4. To enable sleep control, select "Yes" in the Enable Sleep Control field.
- 5. Specify an "awake" time period and a "sleep" time period as follows:
 - a. Click the *Edit* button next to the Awake Time field and enter the period of time that the radio is to be awake during each sleep cycle period using the Edit Time Period dialog shown in Figure 3.13, page 33. Click *OK*.
 - b. Click the *Edit* button next to Sleep Time field and enter the period of time that the radio is to be asleep during each sleep cycle period. Click *OK*. The Sleep Cycle Period is a read-only display of the sum of the user-entered awake time and sleep time.
- 6. Click *Apply* to save the new settings without leaving the Configure Communications screen. Or click *OK* to save the new settings and return to the Configuration Menu screen.



Security

ModWorX Pro features three types of security controls: (1) keypad security for preventing unauthorized personnel from altering configuration settings with the keypad, (2) a custody transfer device seal which prevents all changes to configuration settings when used with the appropriate circuit board jumper setting, and (3) password-protected access to the software interface.

Keypad Security

The Scanner's keypad security feature is disabled at the factory.

To enable keypad security for the device:

1. Click the *Configure* button on the Main Display screen. Then, click the *Security* button on the Configuration Menu screen (Figure 3.14). The Configure Security screen (Figure 3.15, page 34) will appear.

Scanner 2100W Configuration Menu - ModWorX Pro 4.3.	0				
<u>File Tasks Tools H</u> elp					
DOWNLOAD	scanner 2100w - [s/n 1441792 Scanner 2100W Conf				
			4		Return
System Device Identification Display	Date/Time Archives	Communications Alarms	Security User Modbus Registers		
Flow Runs Flow Run 1					
Turbines Turbine Input 1					
Inputs Differential Pressure	Static Pressure	Process Temperature			
Outputs Digital Outputs	Analog Outputs	PID Control			
Device Interface User Manuals		1	COM2 4.3.0.489	<port 1="" default=""></port>	10/12/2018 12:29 PM

Figure 3.14

-	Isks Tgoli Help scanner 2100w - bevice name (s/n 1441792)				Site name
DOWNLOAD		Configure S			Field Name Location name
					Refresh Apply OK
curity Settings					
Keypad Securit	Y			Access Leve	ls
inypad Lock Enable	No .			Administrator: total Configuration: total	access access less security
ieypad Lock Code	0000			confi	lguration Laccess less all configuration
trict API Compliance	No •	Enabling Strict API Complian menu from the device keype	ce will prohibit access to the Plate Change	Download: down	iges niced and view reports only
Such a further of		and the second second second		No Access: total	ledkout
Custody Transl	Disabled •	When Paulos field is installed	d and enabled, no configuration changes can		
vence seal Disabled Inter Device seal is installed and endoles, no configuration changes can be made that affect measurements.					
User Login Aco	ounts				
No. User Name		Access Level	Modbus User Login Code	Add User	
1 oPort 1Default> 2 oPort 2Default>		Administrator Administrator	0	Change User	
2 Optizoeaus		Administrator			=
				Delete User	
				Delete Al Users	
				Marce Lip	
t of 9 users configured				Mover Dolori	
IOTE: Changes made to th	e default permissions for	Port 1 and Port 2 will take effect	t at the next login.		

Figure 3.15

- 2. Change the Keypad Lock Enable setting to Yes.
- 3. Enter a four-digit lock code in the field below the checkbox. (Do not use "0000.")
- 4. To lock input values (static pressure, differential pressure, and process temperature) during a plate change so that volume measurements are not lost, enable the Strict API Compliance setting. When this feature is enabled, all plate changes must be made using ModWorX Pro. When this feature is disabled, plate changes can be made from the front panel (however, the inputs will not be locked during the plate change, making the volume calculations inaccurate).
- 5. Click *Apply* to save the new settings without leaving the Configure Security screen. Or click *OK* to save the new settings and return to the Configuration Menu screen. The next time a user attempts to access the keypad, he will be prompted to enter the security lock code.

Custody Transfer

When a device seal is installed on a Scanner 2000 for compliance with Measurement Canada custody transfer regulations, the Device Seal status on the Configure Security screen must be set to *Enabled* to prohibit configuration changes that can affect measurements (Figure 3.15). The clearing of flow totals is also prohibited when the device seal is installed and enabled. See the Scanner 2000 Hardware Manual, Part No. 9A-30165023, for instructions on installing the device seal for compliance with Measurement Canada regulations.

The Scanner 210x and 2200 have not been evaluated for Measurement Canada approval.

Software Interface Security

A company administrator can assign any of five different levels of access to an employee (Table 3.1). The levels are designed to give each worker access to the functions he needs to do his job, but restrict access to other controls. Menus that are blocked due to security level assignments will be grayed out. The Tools > Options menu is accessible to all users, but access to other functions in the Tools menu will vary with security level, as shown in Table 3.1. See Appendix A - Tools Menu for more information on Tools menu functions.

Table 3.1—Security Levels

Security Level	Access Description	Tools: View All Modbus Registers	Tools: Manage Configuration	Tools: Clear Flow Totals	Tools: Clear Memory	Tools: Copy EEPROM	Tools: Create Archive Partials
Administrator	total access (at least one user must have Admin access to enable future security changes)	X	X	X	Х	X	Х
Configuration	total access less security configuration	Х	Х	Х	Х	X	Х
Calibration	total access less all configuration changes	—	Х	X	—	X	Х
Download	download and view reports only	—	—	—		X	—
No Access	total lockout	_	_	_	_	_	—

Note Up to nine user accounts can be set up in the Security menu. When nine users have been added to the User Login Accounts list, the *Add User* button will be grayed out. No more users can be added.

Changing Default Settings

Users 1 and 2, as shown under User Login Accounts on the Security screen are the default settings for Ports 1 and 2. These default levels are set to Administrator access when the software is installed, which provides full access to all controls.

IMPORTANTTo limit access to identified users via password protection, the default settings for Ports 1 and
2 must be changed to "no access." Without this change, any user can log into the software by
checking the default permissions checkbox on the Connect screen.

To change the default settings, click on the default entry (*User 1* or *User 2*) on the Configure Security screen, then click the *Change* button. A User Account dialog (Figure 3.16) will open, providing access to all user account information. From this window, the default user name, password, and access level can be changed.

An optional Modbus user login code can also be set up within this box. The Modbus user login code is needed only if the account holder will access ModWorX Pro remotely via a host network.

Setting Up New Users

To set up user access for a new account holder, click *Add User* on the Configure Security screen. A User Account dialog will appear, allowing you to enter a user name, password, Modbus user login code (if desired), and access level (Figure 3.16).



Figure 3.16

Display

To configure the parameters to be displayed on the LCD, click on the *Configure* button on the Main Display screen. Then, click on the *Display* button on the Configuration Menu screen (Figure 3.17).

ModWorX Pro 4. 2100W Configuration Menu - ModWorX Pro 4.	130	-
<u>File T</u> asks T <u>o</u> ols <u>H</u> elp		
DOWNLOAD	Scamer 2100W - 5/n 14437921 Scanner 2100W Configuration Menu	
·		Return
System Device Identification Display	Date/Time Communications Security Archives Alarms User Modbus Registers	
Flow Runs How Run 1		
Turbines Turbine Input 1	Turbine Input 2	
Differential Pressure Analog Input 1	Static Pressure Process Temperature Analog Input 2	
Outputs Digital Outputs	Analog Outputs PID Control	
Device Interface User Manuals	COM2 4.3.0.489 <port 1="" default=""> 10/12/2018 11</port>	:56 AM

Figure 3.17

The Configure Display screen will appear (Figure 3.18).

DOWNLOAD		r 2100w - Dev	ice name Is					
		igure Dis		/n 1441/9/j		Site name Field Name Location name		0
						Refresh	Apply	(ox) (o
play Settings								
CD Settings								
splay Toggle Period 📃 5	+ sec							
splay Contrast	U	-						
light	d	ark						
Display Items								
isplay items								
Display Item	Description	Decimals	Update	Text Displayed				
Text Message	#2100W	0	no updating	Description Only	Add Item			
Static Pressure (Gauge)	SP	2	no updating	Units Only		=		
Differential Pressure	DP.	2	no updating	Units Only	Change Item			
Process Temperature	TEMP	2	no updating	Units Only	Delete Item			
Flow Run 1 Flow Rate	RATE	1	no updating	Description Only	Lieleve vern			
Flow Run 1 Current Day Volume	TTOTAL	1	no updating	Description Only	Delete Al Items			
Flow Run 1 Previous Day Volume	YTOTAL	1	no updating	Description Only		-		
					Heve Do			
					(5		
					Move Down			
of 12 items assigned								
and the first of the second								

Figure 3.18

Up to 12 parameters can be selected for display on the LCD. The display scrolls from one parameter to the next until all parameters have been displayed and then repeats the sequence. From the Configure Display screen, a user can:

- change the period of time each parameter is displayed
- adjust the LCD contrast
- view parameters configured for display
- add or delete parameters from the display sequence
- enable or disable the scrolling of the display
- change the way each parameter is displayed (with or without description and/or units)
- change the order in which parameters are displayed

Display Period

By default, each parameter is displayed for 5 seconds. To change the time period, click the -/+ buttons in the Display Toggle Period field. Click *Apply* to implement the change.

LCD Contrast

LCD contrast is temperature-dependent and may require adjustment for optimum readout visibility. To change the contrast, adjust the slide bar provided. Click *Apply* to implement the changes.

Enabling or Disabling the Scrolling Feature

If a parameter description contains more than six characters, the display will automatically scroll. If you want a stationary display of the parameter name (no scrolling), limit the description to six or fewer characters.

To change the parameter description, click in the "Description" field, delete the existing characters and type a new description. Descriptions can contain up to 19 characters (spaces count with spaces counting as characters). Click *Apply* to implement the change.

Adding a Display Item

The Scanner will display up to 12 parameters. Users can select from more than 50 parameters.

To add a parameter:

- 1. Click Add Item. A Display Item screen will appear.
- 2. Select the parameter you want to display from the dropdown menu.
- 3. Edit the description, if desired.
 - If Text Message is selected, the user *must enter* the text to be displayed in the Description field. Up to 19 characters (spaces included) can be entered.
 - If the description contains more than six characters, the display will automatically scroll. To disable the scrolling feature, limit the description to six or fewer characters.
- 4. Edit the number of decimal places to be included in the display readout, if desired.
- 5. Edit the update period (seconds), if desired.
- 6. Select the way you want the parameter to be identified in the lower half of the LCD. The Example field in the following screen captures shows the various description and unit options available (Figure 3.19). The options are:
 - a. Description Only (left)
 - b. Units Only (center)
 - c. Description and Units (right)

ModWorX Pro	ModWorX Pro 💽	ModWorX Pro 🛛 🔀		
Display Item #9	Display Item #9	Display Item #9		
Select Rem to display Flow Run I Grand Total	Select item to display Flow Run 1 Grand Total	Select item to display Flow Run 1 Grand Total		
Description GRAND TOTAL Decimal Places 2 Update Period 0 Ipsplay Text Format Description Only Example GRAND TOTAL	Description GRAND TOTAL Decimal Places 2 Update Period - 0 + no updating Display Text Format Units Only Example NCF	Description GRAND TOTAL Decimal Places 2 Update Period 0 + no updating Display Text Format Cescription and Units Example GRAND TOTAL - HCF		
* Text longer than 6 characters will scroll in display.	* Text longer than 6 characters will scroll in display.	* Text longer than 6 characters will scroll in display.		
QK <u>Cancel</u>	QK <u>Cancel</u>	QK Cancel		

Figure 3.19

To delete a parameter, click on a display item to select it, and click Delete.

To change the order in which the parameters appear in the LCD scroll, click on a display item and click *Move Up* or *Move Down*.

- Note When 12 parameters have been added to the Display Item list, the *Add Item* button will be grayed out. No more parameters can be added without deleting or changing an existing parameter.
- 7. Click *Apply* to save the new settings without leaving the Configure Display screen. Or click *OK* to save the new settings and return to the Configuration Menu screen.

Archives

Caution Before configuring archive parameters, download all existing log data. For detailed instructions on downloading data, see Section 14 - Downloading and Exporting Logs.

To configure the archive settings, click on the *Configure* button on the Main Display screen. Then, click on the *Archives* button on the Configuration Menu screen (Figure 3.20).

m Scanner 2100W Configuration Menu - ModWorX Pro	43.0
<u>File Iasks Tools H</u> elp	
DOWINLOAD	Scanner 2100W - [5/n 1441792] Scanner 2100W Configuration Menu
· · · · · · · · · · · · · · · · · · ·	Return
System Device Identification Display	n Date/Time Communications Security Archives Alarms User Modbus Registers
Flow Runs Flow Run 1	
Turbines Turbine Input 1	Turbine Input 2
Differential Pressure Analog Input 1	e Static Pressure Process Temperature Analog Input 2
Outputs Digital Outputs	Analog Outputs PID Control
Device Interface User Manuals	COM2 4.3.0.489 <port 1="" default=""> 10/12/2018 11:56 AM</port>

Figure 3.20

The Configure Archive screen will appear (Figure 3.21).

Inter Teph Holp DOWNLOAD DOWNLOAD Alive Settlings Archive Control orbitetTour Annal Partial Thous Techive Parameters Data Ibma 2 Real Ibma 2 Real Ibma 2 Real Ibma 3 Hole Ratio			In - Device name (s/n 1441792 e Archive Archive Size Number of Daily Records Number of Paily Records Number of Event Records	3 765 total (768 2304 total (96 1152 total	Loc days)	site name Field Name ation name Refresh	Acciv	OK	(. a
hive settings Inchive Control votesting weathered lined 3 har weathered 1 hard 3 har weathered 1 hard 1 har base me weathered 2 hard 1 har 1 hard here 3 hore han 1 twinet 4 hore han 1 har total 5 hore nan 1 berrey Total 5 offerend Pressoe	0	Configur	e Archive Archive Size Number of Daly Records Number of Interval Records	768 total (768 2304 total (96	Loc days)	Field Name ation name	Acoly	OK.	
Inchive Control Instantian Instan	0	f.dt	Number of Daily Records Number of Interval Records	2304 total (96		Refresh	Acoly	OK) (a
Inchive Control Instantian Instan	0	fdt)	Number of Daily Records Number of Interval Records	2304 total (96					
britectificor in 600 AM derroll Periodi Shour adobri Periodi Ibour Inchrive Parameteers Data tam Data	0	Ddt .	Number of Daily Records Number of Interval Records	2304 total (96					
Anval Pend I hour while Partals No Contain team Data Item Data Item 2 Real Time 3 Real Time 4 Rear Livburne 4 Rear Livburne 5 Rear Kun I Strang Total 5 Differential Presure	0	Edt	Number of Interval Records	2304 total (96					
able Partala No Cata Item Cata		Edit	Number of Interval Records	2304 total (96					
able Partala No Cata Item Cata		101			cays, c.o reay				
Tchive Parameters Data Item Data Item Data Item Data Item Data Item Data Item Person Run 1 Volume Person Run 1 Data Total Defersol Presore Defersol Presore	•		Number of Event Records	1152 total					
Data Dem Para Den Real Time Real Time Real Run 1 Volume Plow Run 1 Mass Total Plow Run Tenegy Total 5 Differential Pressure									
Data Item Para Des Real Time Real Time Real Run 1 Mass Total Flow Run 1 Mass Total Flow Run I Desgy Total 5 Differential Pressure									
2 Real Time 3 How Run 1 Volume 4 Plaw Run 1 Mass Total 5 Plaw Run Linergy Total 5 Differential Pressure									
2 Roal Time 3 Rion Run 1 Volume 4 Plaw Run 1 Mass Total 5 Differential Pressure									
3 Flow Run 1 Volume 4 Flow Run 1 Mass Total 5 Flow Run 1 Energy Total 5 Differential Pressure					(
4 Plow Run 1 Mass Total 5 Plow Run 1 Energy Total 5 Differential Pressure					Add Parameter				
5 Flow Run 1 Energy Total 6 Differential Pressure					Change Parameter				
6 Differential Pressure									
					Delète Parameter				
					Delete Al Parameters				
7 Static Pressure (Absolute)									
8 Process Temperature									
9 Flow Run 1 Flow Time									
0 Turbine 1 Volume					Move Op				
11 Turbine 1 Flow Time					Move Down				
					move.com				
1 of 16 items assigned									
Interface User Manuals									

Figure 3.21

Archive settings control which parameters are logged by the Scanner, and the frequency of those logs. The standard Scanner 2000 or Scanner 210x will hold up to 768 daily logs, up to 2304 interval logs (configured in terms of seconds, minutes, or hours) and up to 1152 event/alarm logs. When an expansion board is added to the Scanner 2000 or Scanner 210x or a Scanner 2200 is installed, the archive capacity for interval logs is increased to 6392 records. Once the log is filled, oldest records will be over-written by new records.

Daily logs are recorded at the time of day designated by the user-specified contract hour.

From the Configure Archive screen, a user can:

- change the contract hour
- change an interval period
- enable a partial record to be stored when a calibration or configuration change is made
- change the parameters to be logged

Contract Hour

To change the contract hour, click on the Contract Hour dropdown list and select the desired hour.

Interval Period

The number in the Interval Period field determines how frequently the selected parameters are logged.

To change the interval period:

1. Click *Edit*. The Edit Synchronized Time Periods window will appear, and an arrow will point to the Interval Archive setting (Figure 3.22).

	Ig FC	riod						
Interval Archive	-	1]+	Hours	•	24 periods	pe	er day
low Run Calc	ulatio	n Pe	eriod	ł				
Flow Run	-	1	+	Minutes	•	60 periods	pe	er interval log period
Static Pressure	-	1	+	Seconds	•	60 periods		
Differential Pressure	-	1	+	Seconds	•	60 periods		per flow run calculation peri
Diricionali rossaro				· · · · · · · · · · · · · · · · · · ·				
Process Temperature	-	5	+	Seconds		12 periods		per now run calculation perio

Figure 3.22

- 2. Choose a time unit (seconds, minutes, or hours) for the archive logging period.
- 3. Click on the -/+ buttons to enter *the number of* seconds, minutes, or hours. (The minimum configurable archive period is 5 seconds.) To disable the interval period, enter a zero in this field. The screen will automatically update to show the number of interval periods that will be logged per day, based on the new settings.
- 4. Click **OK** to return to the Configure Archive screen.

Partial Records

As the name "partial" suggests, a partial record is a set of values from an incomplete daily or interval archive period. By default, the Enable Partials setting is disabled (Figure 3.21, page 39). When the setting is disabled and a calibration or configuration change is made that affects flow calculations, the daily log values recorded for that period will reflect a combination of calculations performed with the previous settings and calculations performed with modified settings.

When the Enable Partials setting is enabled and a change is made to calibration or configuration settings, the current archive record is terminated and a new record is initiated, based on the new calibration or configuration settings saved. Any flow recorded prior to the setting change will be displayed as Previous Interval and Previous Day totals, and any flow recorded after the setting change will be added to the Current Interval and Current Day totals.

For example, assume the contract hour is set at 8 a.m., and Partials is enabled. A calibration or configuration change made at 10 a.m. would cause a partial log of just 2 hours' flow to be generated. This log will be displayed as the Previous Day total. The new log is also a partial, beginning at 10 a.m. and continuing until 8 a.m. the next day. This new log is displayed as the Current Day total during this period from 10 a.m. to 8 a.m. the next day.

To enable the creation of partial records within the flow archive, change the Enable Partials setting on the Configure Archive screen to *Yes*. See also Create a Partial Record, page A-7.

Note If the Scanner is to be used with a third-party flow analysis system such as Flow-Cal or PGAS, confirm that the system will support partial records before enabling the Partials setting. Some systems will not process partial records correctly.

Archive Parameter Setup

The Scanner can log up to 16 archive parameters. Users can select from a list of more than 50 parameters.

Note The parameter assigned to Archive #3 is the parameter whose values are displayed in the top LCD readout on the front panel of the Scanner 2000 or Scanner 210x when the user views the log data. By default, this parameter is Flow Run 1 Volume. The user can change the LCD readout parameter by assigning a different parameter to Archive #3.

To add and configure an archive parameter:

1. Click Add Parameter. An Archive Parameter dialog will appear (Figure 3.23).

dodWorX Pro		
Archive Paramet	r # 10	
Select value to log		
Flow Run 1 Plate Diameter		-
The following text will appear as in the presentation of downloads Flow Run 1 Plate Size		ata parameter

Figure 3.23

- 2. Select the parameter you want to display from the dropdown menu. The text in the box at the bottom of the screen will be used to identify the parameter in download reports.
- 3. Click *OK* to return to the Configure Archive screen.

To delete a parameter, click on the parameter to select it and click *Delete Parameter*.

To change the order in which the archive parameters appear in log reports, click on an archive parameter and click *Move Up* or *Move Down*.

- Note When 16 parameters have been added to the Archive Parameter list, the Add button will be grayed out. No more parameters can be added without deleting or changing an existing parameter.
- 4. Click *Apply* to save the new settings without leaving the Configure Archive screen. Or click *OK* to save the new settings and return to the Configuration Menu screen. A warning message will appear, prompting the user to clear the memory to remove old log records.
- 5. To clear the memory, click on *Tools*>*Clear Memory*.
 - a. Select which settings you wish to delete: device settings, archive settings, or both.
 - b. Click **OK** to delete the settings.
 - c. Click Done.

Alarms

To configure the alarms settings, click on the *Configure* button on the Main Display screen. Then, click on the *Alarms* button on the Configuration Menu screen (Figure 3.24).

m Scanner 2100W Configuration Menu -	ModWorX Pro 4.3.0		
<u>File T</u> asks T <u>o</u> ols <u>H</u> elp			
	scanner 2100w - [s/n 14417 Scanner 2100W Co		
			Return
System	dentification Date/Time isplay Archives	Communications Security Alarms Modbus Registers	
Flow Runs	w Run 1		
Turbines Turbin	ne Input 1 Turbine Input 2		
Inputs	tial Pressure Static Pressure og Input 1 Analog Input 2	Process Temperature	
Outputs Digita	al Outputs Analog Outputs	PID Control	
Device Interface User Manuals		COM2 4.3.0.489	<port 1="" default=""> 10/12/2018 11:56 AM</port>

Figure 3.24

The Configure Alarms screen will appear (Figure 3.25).

DOWNLOAD Site name Field Name Social Name Location name Refeesh Apply OK	Tasks Tools Help					his in	- 0
DOWNLOAD Configure Alarms Setting Referit Apply OK							
n Settings am Parameters Alem Item	DOWINLOAD			441792]	LO	Field Name	0
n Settings am Parameters Alem Item		-					Car
Alam Dam Hgh Alam Low Alam Deabard Units Type Alam Dam Hgh Alam Low Alam Deabard Units Type Alam Dam 0 0 Alam Dam 0 Alam Dam<						Nerresn Appry OK	Lar
Alam Dam Hgh Alam Low Alam Deabard Units Type Alam Dam Hgh Alam Low Alam Deabard Units Type Alam Dam 0 0 Alam Dam 0 Alam Dam<	rm Settings						
Alaren Item Hoph Alaren Low Alaren Deadbard Lints Type Chanaguento- 0							
Attranspecto O <t< th=""><th>larm Parameters</th><th></th><th></th><th></th><th></th><th></th><th></th></t<>	larm Parameters						
Clear All Plan and Plan Clear All Plan and Plan Chanagyedo 0 More Clear	Alarm Item	High Alarm	Low Alarm Deadband Units	Type	Change Parameter		
Chromograph Chromograph Chromograph 0							
eicheangendon 0 Cher Al Parameters eicheangendon 0 1					Clear Parameter		
Bunnangedo 0 0 Carlansingedo 0 0	«Undersigned)»				Clear Al Daramatare		
citrasspecial 0					Con remaining		
Altranspreds 0 More Up Glossspreds 0 More Up Glossspreds 0 More Dawn Glossspreds 0 More Dawn Glossspreds 0 More Dawn Glossspreds 0 Glossspreds							
cit/seargends 0 Maxe Down cit/seargends/ 0 Maxe Down							
chranippedr- 0 More Down chranippedr- 0 More Down chranippedr- 0 Chranippedr-					Move Up		
ctinasignetici 0							
consequeb 0 changedb 0 changedb 0 relaxespedb 0 changedb 0 changedb 0 changedb 0 changedb 0					Move Down		
-Unampretz 0 -Unampretz 0 -Unampretz 0 -Unampretz 0 -Unampretz 0 -Unampretz 0							
-Unassyndolo 0 -Unassyndolo 0 -Unassyndolo 0 -Unassyndolo 0 -Unassyndolo 0							
Rumanghed> 0 -tunanghed> 0							
16 items assigned							
	of 16 items assigned						

Figure 3.25

From the Configure Alarms screen, a user can select up to 16 parameters for triggering an alarm. Users can configure an alarm to trigger based on a high setpoint, a low setpoint, or either a high or low setpoint. Alternatively, a user can establish a two-level alarm by assigning a high/low alarm and a high-high/low-low alarm to the same parameter. Only one alarm type can be assigned to a parameter at a time. Therefore, if a two-level alarm is desired, the parameter must be entered twice—once to assign a high/low alarm, and once to assign a high-high/low-low alarm.

For example, to enter a two-level differential pressure alarm, the user would enter Differential Pressure as Alarm Item 1 and configure it as a high/low alarm. Then, he would enter Differential Pressure as Alarm Item 2 and configure it as a high-high/low-low alarm.

Setting Up Alarm Parameters

To add an alarm parameter:

- Click in an Alarm Item space in the Alarm Parameters table and click *Change Parameter*. The Alarm Item dialog (Figure 3.26) will appear, allowing the user to select a parameter, and determine the settings that will determine its function. Those settings include the following:
 - Alarm Type High/Low or High-High/Low-Low
 - High Alarm Setpoint (or High-High Setpoint)
 - Low Alarm Setpoint (or Low-Low Setpoint)
 - Deadband
 - Output Type latching or non-latching

odWorX Pro			
Alarm Item	1		
Select alarm parameter			
Flow Run 1 Grand Tota	al		
Alarm Type	High/Low	-	
High Alarm Setpoint	High/Low High-High/Low-Lov	MCF	Disabled
Low Alarm Setpoint	0.000	MCF	Disabled
	And the second s		
Dead Band	0.000	MCF	

Figure 3.26

- 2. Select an alarm type: high/low or high-high/low-low.
- 3. Enter high and/or low setpoints as desired and click the dropdown selection beside each setpoint to enable that setpoint. If a single alarm setpoint is desired—a high setpoint, for example—the user should enable the high setpoint and disable the low setpoint.
- 4. Enter a deadband range, if desired. A deadband is a value that determines the point at which an alarm will clear once it is activated. For example, assume a differential pressure input alarm is assigned a low setpoint of 20 In.H2O, a high setpoint of 180 In.H2O, and a deadband of 5 In.H2O. A low alarm will not clear until the DP increases to 25 In.H2O (20 plus a deadband of 5). A high alarm will not clear until the DP falls below 175 In.H2O (180 minus a deadband of 5).
- 5. Enter the output type desired: latching or non-latching (A latching alarm will remain active even after the associated parameter reading returns to the assigned range; only a user can clear it. A non-latching alarm will become inactive after the associated parameter reading returns to the assigned range without any action by a user.)
- 6. Click OK to save the new settings and return to the Configure Alarms screen.

Modifying Alarm Parameters

To change an alarm parameter, click on the parameter in the Alarm Item list to highlight it, then click *Change Parameter*. The Alarm Item dialog will appear, allowing the user to change the settings associated with that parameter or to choose a new parameter and new settings.

Buttons are also provided for clearing alarm parameters, or moving them to a new location in the list.

User Modbus Registers

To configure the User Modbus Register settings, click on the *Configure* button on the Main Display screen. Then, click on the *User Modbus Registers* button on the Configuration Menu screen (Figure 3.27).

Scanner 2100W Configuration Menu - ModWorX Pro 4.3.	0				
Eile Iasks Tools Help					
DOWNLOAD	scanner 2100w - [s/n 1441792] Scanner 2100W Conf				
					Return
System Device Identification Display	Date/Time Archives	Communications	Security User Modbus Registers		
Flow Runs Flow Run 1					
Turbines Turbine Input 1	Turbine Input 2				
Differential Pressure Analog Input 1	Static Pressure Analog Input 2	Process Temperature			
Outputs Digital Outputs	Analog Outputs	PID Control			
Device Interface User Manuals			COM2 4.3.0.489	<port 1="" default=""></port>	10/12/2018 11:56 AM

Figure 3.27

The Configure User Modbus Registers screen will appear (Figure 3.28).

Iasks 1	rgols <u>H</u> elp						
\bigcirc	DOWNLO	AD Scanner 2000 - Device Configure User	Name [s/n 4096] Modbus Registers	Fie	te Name 1d Name on Name		(
				Refresh	Apply	ок	Cano
ser Mo	dbus Re	gisters Settings					
User	Modbu	is Registers					
Ad	dress	Holding Register	Source Modbus Address				
1	9100	Flow Run 1 Grand Total	8026	Chang	e Register		
2	9102	Flow Run 1 Flow Rate	8028				
3	9104	Flow Run 1 Current Day CWE	8030	Clear	Register		
4	9106	Flow Run 1 Previous Day CWE	8036	Charles	All Registers		
5	9108	Flow Run 1 Grand Energy Total	8058	Geary	al Registers		
6	9110	Flow Run 1 Energy Flow Rate	8060				
7	9112	Flow Run 1 Current Day Energy Total	8062				
8	9114	Flow Run 1 Previous Day Energy Total	8068	14	ove Up		
9	9116	Static Pressure (Gauge)	8336				
10	9118	Differential Pressure	8380	Mov	e Down		
11	9120	Process Temperature	8424				
12	9122	Turbine 1 Grand Total Volume	8216				
13	9124	Turbine 1 Flow Rate	8218				
14	9126	Turbine 1 Current Day Volume	8220				
15	9128	Turbine 1 Previous Day Volume	8226				
16	9130	Supply Voltage	8558				
17	9132	Battery Voltage	8560				
18	9134	Turbine 2 Grand Total Volume	8276				
19	9136	Turbine 2 Flow Rate	8278				
20	9138	Turbine 2 Current Day Volume	8280				
21	9140	Turbine 2 Previous Day Volume	8286				
22	9142	Analog Input 1	8468				
23	9144 ace User M	Analog Input 2	6512				



From this screen, a user can group up to 25 commonly polled Modbus holding registers into one block for maximizing a host system's polling efficiency. The user can also control the order in which the registers are read, so that the order matches the host's existing register structure.

- 1. To add a register, click on an unassigned register and click *Change Register*. A User Modbus Register dialog will appear. Select the register from the dropdown menu provided.
- 2. To change the order in which the Modbus holding registers are read, click on a Modbus register and click *Move Up* or *Move Down*.
- 3. Click *Apply* to save the new settings without leaving the Configure User Modbus Registers screen or click *OK* to save the new settings and return to the Configuration Menu screen.

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Section 4 - Setting Up a Flowrun

The Scanner allows a user to configure a flowrun for measuring gas, steam or liquid with a variety of input devices and flow calculation methods. Supported input devices include orifice plate, differential pressure cone meter, averaging pitot tube meter, and turbine meter. For steam applications supported by an orifice plate or cone meter, wet correction methods are also configurable.

This section will guide users in performing the following tasks:

- enter basic flowrun information
- select a flowrun calculation method and configure calculation parameters
- specify fluid property calculations
- specify cone flow coefficients

For information on changing gas constituents, liquid parameters, steam properties, or parameters of the input device, see the following sections, as applicable:

- Section 9 Flow Run Maintenance for Orifice Input (AGA-3 or ISO-5167 Orifice), page 119
- Section 10 Flow Run Maintenance for Cone Meter Input, page 134
- Section 11 Flow Run Maintenance for Averaging Pitot Tube (Annubar) Input, page 150

To set up a flowrun:

1. Click on the *Configure* button in the task menu bar on the Main Display screen (Figure 4.1).

<u>T</u> asks T <u>o</u> ols <u>H</u> elp	[W - Device name [/= 14417021		Site name		6
DOWNLOAD		2100W Main			Field Name Location name		e
fresh 🗹 Auto-Refresh							Retu
🛞 Calibrate Inpu	its 🚺 Mai	intain Flow Run	🛞 Mainta	ain Turbine 🛛 💮 Manage	PID	Configure	
Flow Run Data				Turbine Data			
Flow Rate	352.687	MCF/day		Turbine 1 Flow Rate	7	BBL/day	
Daily Total (est.)	317.173	MCF		Turbine 1 Grand Total	4.52234E006	BBL	
Heating Value	1036.06	BTU/SCF		Turbine 2 Flow Rate	0	BBL/day	
				Turbine 2 Grand Total	0	BBL	
	Current Day	Previous Day			Current Day	Previous Day	
Volume Flow	45.3104	352.687	MCF	Turbine 1 Volume Flow	0.902952	7	BBL
Mass Flow	2014.74	15682.3	LBM	Turbine 2 Volume Flow	0	0	BBL
Energy	46.9442	365.404	MMBTU				
			DETAILS				DETAILS
Input Data				System Data			
Static Pressure	6.22	PSIG	8	Alarms			ALARMS
Differential Pressure	164.62	In H2O	8	Supply / Battery Voltage	10.28 / 10.5	5 V	
Process Temperature	60.00	Deg F	×	Temperature	71.6	7 Deg F	
Analog Input 1	0.00	inches	-	Date/Time	Oct 26, 201	3 11:05:48 AM	
Analog Input 2	56.24	Deg F	8	Analog Output	15.2	mA	
				Smart Battery / Health %	83.00 / 9	7 %	
			DETAILS				DETAILS

Figure 4.1

7 Scanner 2100W Configuration Menu - ModWor	X Pro 4.3.0	
Eile Iasks Tools Help DOWNLOAD	Scanner 2100w - [s/n 1441792] Scanner 2100W Configuration Menu	
		Return
System Device Identifica	ation Date/Time Communications Security Archives Alarms User Modbus Registers	
Flow Runs Flow Run 1		
Turbines Turbine Input	1 Turbine Input 2	
Differential Pres Analog Input		
Outputs Digital Output	ts Analog Outputs PID Control	
Device Interface User Manuals	COM2 4.3.0.489 <p< td=""><td>Port 1 Default> 10/12/2018 11:56 AM</td></p<>	Port 1 Default> 10/12/2018 11:56 AM

2. Then, click on *Flow Run 1* in the Configuration Menu screen (Figure 4.2).

Figure 4.2

The Configure Flow Run screen will appear (Figure 4.3).

Lasks Tools Help								
Teams (Kers Tich								
			- Device name [s/n 144179 Flow Run	2]		Site name Field Name Location name		6
						Refr	esh Apply) ск с
ow Run Settings								
Information			Calculation Par	ameters				
Flow Run Name			Calculation Period	1 min	Edit			
			Rate Damping Factor	- 0	+ No damping			
Volumetric Units								
Display Unit	MCF Edit		Energy Units		_			
Rate Unit	day		Display Unit	MMBTU	Edit			
Mass Units								
Display Unit	LBM	1						
	Orifice, AGA-3 (2012)		Change					
alculation Method			Change					
alculation Method (Orifice, AGA-3 (2012) No wet correction		Ourge Base Condition	5				
alculation Method	Orifice, AGA-3 (2012) No wet correction	sare •		S 60.0000	Deg F			
alculation Method defection defectio	Orifice, AGA-3 (2012) No wet correction	sure •	Base Condition		Deg F psi			
alculation Method	Orifice, AGA-3 (2012) No wet correction Its Calibrate Inputs Integrated Differential Pres		Base Condition	60.0000				
alculation Hethod Het Correction Input Assignment Differential Pressure Source Static Pressure Source Temperature Source Temperature Source Analog Inpuesture Source	Norfice, AGA-3 (2012) No wet correction Its Calibrate Inputs Integrated Differential Press Integrated Static Pressure	Pressure Source en properly	Base Temperature Base Pressure	60.0000 14.7300	psi			
Aculation Method fet Correction Input Assignment Differential Pressure Source Static Pressure Source Temperature Source * anding Inpuesture Source or a Temperature Source	No wet correction No wet correction Its Calibrate Inputs Integrated Differential Pre- Integrated Static Pressure RID Ny available for selection as a is the input is installed and has be noducer or a Temperature Three States Sources.	Pressure Source en properly	Base Temperature Base Pressure	60.0000 14.7300	psi			

Figure 4.3

Basic Flowrun Settings

Enter basic flowrun information as follows.

- 1. Under Information, enter a name for the flowrun. This name will identify the flowrun in other software screens and in archive log reports.
- 2. Under Volumetric Units, choose a display unit and a rate unit.
 - a. Click *Edit* to change the flow volume unit, if desired. The Edit Display Unit dialog will appear (Figure 4.4). The base unit is the unit in which the Scanner measures flow.

Base Unit	MCF	_		
	MCF			
Display Unit	MCF	🔹 pe	r day	•
Display Label Text	MCF			
Jnits Conversion Factor	1.0			
Jnits Conversion Offset	0.0			

Figure 4.4

- b. Click on the *Display Unit* dropdown menus to select a display unit and/or volumetric rate unit. The conversion factor used to convert the base unit to the display unit will automatically update. To enter a custom unit, select *Custom* from the dropdown menu, and enter the desired conversion factor and offset.
- c. Click OK to save your changes and return to the Configure Flow Run screen.
- 3. Under Mass Units, enter the unit in which you want the mass flow displayed. To change the unit, click *Edit*, change the unit, and click *OK* to return to the Configure Flow Run screen.
- 4. Under Calculation Parameters, click *Edit* to change the frequency of flow rate calculations. The Edit Synchronized Time Periods dialog will appear and an arrow will point to the flowrun calculation period setting (Figure 4.5, page 50). The flowrun calculation period is the time period from one flow rate and volume calculation to the next. Increasing this period decreases the power consumption for the device.

Note The calculation period cannot be longer than the interval archive period.

Archive Logging) Pe	riod					
Interval Archive	-	1	+	Hours	▼ 24 period	ods	ber day
Flow Run Calcul	latio	n Pe	rioc	i i			
📂 Flow Run	-	1	+	Minutes	▼ 60 peri	ods	per interval log period
Input Paramete	er Sa						
The state and state and			+	Seconds	▼ 60 perie	ods .	
Static Pressure		1					
Static Pressure Differential Pressure	-	1	+	Seconds	▼ 60 peri	ods	per flow run calculation period
				Seconds Seconds	60 perio12 perio		per flow run calculation period

Figure 4.5

- 5. To change the flowrun calculation period
 - a. Choose a time unit (seconds, minutes, or hours) for the flowrun calculation period.
 - b. Click on the "+" sign to select *the number of* units (minutes, seconds, etc.) from the dropdown menu. The screen will automatically update to show the number of times the calculation will be performed in the interval log period.

For example, if the interval archive is set to record data every hour, and the flowrun calculation period is once per minute, the flow rate and volume will be calculated 60 times in a single interval log period (1 hour).

Caution Do not enter the time increment before entering the unit. Doing so will cause the time increment to be changed when the unit of measure is entered.

- c. Click OK to return to the Configure Flow Run screen.
- 6. If a rate damping factor is needed, click the "+" sign to set the appropriate value.
- 7. Under Energy Units, enter the unit in which you want the energy measurement displayed. To change the unit, click *Edit*, change the unit, and click *OK* to return to the Configure Flow Run screen.
- 8. Click Apply to save your settings without leaving the Configure Flow Run screen.

Flow Rate Calculations

The first step in entering flow rate calculation information is to select a flow rate calculation method. Click the *Change* button to view the available selections (Figure 4.6).

The Change Flow Run Calculation Method dialog will appear. The selections available on this screen will vary, depending on the fluid property and flow rate calculation methods selected.

🎢 Configure Flow Run - Mod	VorX Pro 4.3.0							
<u>F</u> ile <u>T</u> asks T <u>o</u> ols <u>H</u> elp								
			W - Device name [s/n 1441792] e Flow Run		L	Site name Field Name ocation name		
						Refresh App	ply ОК	Cancel
Flow Rate Calculation	n							^
Calculation Method Wet Correction	Orifice, AGA-3 (2012) No wet correction		Change					
Input Assignme	nts <u>Calibrate Inputs</u>		Base Conditions					
Differential Pressure Source	Integrated Differential Pro	essure 🔻	Base Temperature	60.0000	Deg F			
Static Pressure Source	Integrated Static Pressure	• •	Base Pressure	14.7300	psi			
Temperature Source	RTD	•	Atmospheric Pressure	14.7300	psi			
configured as a Pressure Tra	only available for selection as the Input is installed and has b ansducer or a Temperature Tri Analog Inputs used as source stream.	ansducer. Ensure	Value Control					E
Orifice Plate Operator: None, Changed C	<u>Change Plate</u> m:		Low Pressure Cutoff	1.0	In H2O			
Plate Size	1.0000 inch	es	Flow Run Accum	ulation				
Reference Temperature	68.0000 Deg	F	Accumulation Method	Gas Phase Only				
Plate Material	Stainless Steel (304/316)							
Plate Model Number	(To Be Configured)							
Plate Serial Number								
Pipe								
Pipe Size	2.0670 inch	es						
Pipe Material	Carbon Steel	•						
Тар Туре	Flange Tapped	•						
Device Interface User Manuals					COM	2 4.3.0.489 <port 1="" d<="" th=""><th>efault> 10/12/2018</th><th>3:06 PM</th></port>	efault> 10/12/2018	3:06 PM

Figure 4.6

Natural Gas

If the flowrun is configured for gas measurement, the selections will appear as shown in Figure 4.7, page 52. Enter the appropriate fluid properties calculation method and the flow rate calculation method, then click *OK* to return to the Configure Flow Run screen.

Note When using the NuFlo Cone Meter, choose the **Cone-Spool** algorithm as the flow rate calculation method.

Steam

If the flowrun is configured for steam measurement, the selections will appear as shown in Figure 4.8, page 53. Enter the appropriate fluid properties calculation method, flow rate calculation method, wet correction method, and flowrun accumulation method. Then, click *OK* to return to the Configure Flow Run screen. Note that the steam flowrun calculation parameters are interdependent. For example, when a user selects a fluid properties calculation method (IF-97 or IF-97/ James correlation for steam), the available selections for flow rate calculation will change to reflect only those methods that support the selected fluid property. Selections for wet correction and flowrun accumulation method will, in turn, be determined by the fluid property and flow calculation method selections.

Liquid

If the flowrun is configured for liquid measurement, the selections will appear as shown in Figure 4.9, page 53. Enter the appropriate fluid properties calculation method (generic or MPMS Chapter 11.1). If MPMS is selected, specify the type of fluid from the dropdown list provided.

For temperature-pressure correction of hydrocarbon liquids having a density greater that 610 kilograms per cubic meter (excludes LPGs and LNGs), select the MPMS 11.1 calculation.

- **<u>Refined Products</u>** include gasoline, diesel fuel, fuel oil, and jet fuel. The density at base conditions and the viscosity at flowing conditions must be input.
- <u>Special Products</u> are other hydrocarbon liquids that don't fall into the above classifications, e.g., Gasohol. For these, the fluid's expansion coefficient "alpha" is also required. Consult MPMS 11.1 for instructions on determining alpha.
- Select <u>Generic Liquid</u> for measurement of liquids in which temperature-pressure correction is not required (e.g., disposal water). The fluid's density and viscosity must be input.

Select the appropriate flow rate calculation method. Then, click OK to return to the Configure Flow Run screen.

Important If using firmware version 4.10 or earlier, the content of Change Flow Run Calculation Methods screens will be different. These older firmware versions support API-2540 standards which have since been replaced by API 11.1 standards. Please see Appendix C - Configuring Liquid Parameters Using Scanner Firmware 4.10 and Earlier, page C-1 for details.

ModWorX Pro		×	ModWorX Pro			×
Change Flow F	Run 1 Calculation Meth	ods	Change Flow R	un 1 Calculation Meth	ods	
Fluid Properties	Calculation Method		Fluid Properties	Calculation Method		
Natural Gas	Steam	Liquid	Natural Gas	Steam	Liquid	
AGA-8 Detail	○ IF-97) Generic	🔿 AGA-8 Detail	O IF-97	🔘 Generic	
AGA-8 Gross	 IF-97 with James correlation 	O MPMS Ch. 11.1 Crude Oil V	 AGA-8 Gross 	○ IF-97 with James correlation	O MPM5 Ch. 11.1 Crude Oil	Ŧ
Flow Rate Calcu	ulation Method		Flow Rate Calcu	lation Method		
 Orifice, AGA-3 (1992) 	 Orifice, AGA- 	3 (2012)	 Onifice, AGA-3 (1992) 	 Orifice, AGA 	3 (2012)	
🔿 Cone - Spool	Small Bore Or	ifice, ASME MFC-14M (2003)	🔿 Cone - Spool	🔵 Small Bore O	ifice, ASME MFC-14M (2003)	
🔿 Cone - Wafer	Averaging Pit	tot Tube (Annubar®)	🔿 Cone - Wafer	Averaging Pi	ot Tube (Annubar®)	
 Turbine, AGA-7 (2006) 			 Turbine, AGA-7 (2006) 			
Orifice, ISO-5167 (2003))		 Onifice, ISO-5167 (2003) 			
Wet Correction	Method		Wet Correction	Method		
 No wet correction 			 No wet correction 			
O Orifice (Chisholm-Steven			O Orifice (Chisholm-Steven)			
Orifice (James)			Orifice (James)			
O Cone (Chisholm-Steven)			O Cone (Chisholm-Steven)			
Flow Run Accur	nulation Method		Flow Run Accum	ulation Method		
 Gas Phase Only 			 Gas Phase Only 			
Gas Phase and Liquid Ph	ase		Gas Phase and Liquid Pha	se		
		QK <u>C</u> ancel			QK Cance	cel

Fluid Property: Natural Gas (AGA-8 Detail)



Figure 4.7

AodWorX Pro			ModWorX Pro		
Change Flow F	Run 1 Calculation Meth	ods	Change Flow Ru	in 1 Calculation Meth	ods
Fluid Properties	Calculation Method		Fluid Properties (Calculation Method	
Natural Gas	Steam	Liquid	Natural Gas	Steam	Liquid
🔿 AGA-8 Detail	 IF-97 	O Generic	🔿 AGA-8 Detail	○ IF-97	 Generic
AGA-8 Gross	 IF-97 with James correlation 	O MPM5 Ch. 11.1 Crude Oil V	O AGA-8 Gross	IF-97 with James correlation	O MPM5 Ch. 11.1 Crude Oil
Flow Rate Calc	ulation Method		Flow Rate Calcul	ation Method	
 Orifice, AGA-3 (1992) 	 Orifice, AGA- 	3 (2012)	 Orifice, AGA-3 (1992) 	 Orifice, AGA- 	3 (2012)
Cone - Spool	Small Bore Or	fice, ASME MFC-14M (2003)	Cone - Spool	Small Bore Or	ifice, ASME MFC-14M (2003)
🔵 Cone - Wafer	 Averaging Pit 	ot Tube (Annubar®)	🔘 Cone - Wafer	Averaging Pit	ot Tube (Annubar®)
O Turbine, AGA-7 (2006)			O Turbine, AGA-7 (2006)		
 Onifice, ISO-5167 (2003))		 Onifice, ISO-5167 (2003) 		
Wet Correction	Method		Wet Correction M	1ethod	
 No wet correction 			O No wet correction		
 Orifice (Chisholm-Stever 	1)		Orifice (Chisholm-Steven)		
Orifice (James)			 Orifice (James) 		
Cone (Chisholm-Steven)			O Cone (Chisholm-Steven)		
Flow Run Accur	nulation Method		Flow Run Accum	ulation Method	
Vapor Phase Only			O Vapor Phase Only		
 Vapor Phase and Liquid F 	Phase		 Vapor Phase and Liquid Phase 	ase	
		QK Cancel			QK Gancel

Fluid Property: Steam (IF-97)

Fluid Property: Steam (IF-97 + James)

Figure 4.8

ModWorX Pro	ModWorX Pro
Change Flow Run 1 Calculation Methods	Change Flow Run 1 Calculation Methods
Fluid Properties Calculation Method	Fluid Properties Calculation Method
Natural Gas Steam Liquid	Natural Gas Steam Liquid
AGA-8 Detail IF-97 Generic	AGA-8 Detail IF-97 Ogeneric
AGA-8 Gross IF-97 with James correlation MPM5 Ch. 11.1 Crude OI V	AGA+8 Gross IF-97 with James correlation MPMS Ch. 11.1 Crude OI ▼ Crude OI
Flow Rate Calculation Method	Flow Rate Calculation Method
Liquid Orifice, AGA-3 (1992) Liquid Orifice, AGA-3 (2012)	Liquid Orifice, AGA-3 (1992) Liquid Orifice, AGA-3 (2012)
O Cone - Spool Small Bore Orifice, ASME MFC-14M (2003)	Cone - Spool Small Bore Orifice, ASME MFC-14M (2003)
Cone - Wafer Averaging Pitot Tube (Annubar®)	Cone - Wafer Averaging Pitot Tube (Annubar®)
O Liquid Turbine	O Liquid Turbine
C Liquid Onfrice, 150-5167 (2003)	O Liquid Onfice, ISO-5167 (2003)
Wet Correction Method	Wet Correction Method
No wet correction	No wet correction
O Orifice (Chisholm-Steven)	O Orifice (Chisholm-Steven)
O Orifice (James)	O Orifice (James)
O Cone (Chisholm-Steven)	Cone (Chisholm-Steven)
Flow Run Accumulation Method	Flow Run Accumulation Method
Liquid Phase Only	Liquid Phase Only
O N/A	⊖ N/A
SK Cancel	QK

Fluid Property: Liquid (Generic)

Fluid Property: Liquid (MPMS Ch. 11.1)

Figure 4.9

Flow Rate Calculation Parameters for an Orifice, Cone, or Pitot Meter Run

The flow rate calculation parameters on the Configure Flow Run screen (Figure 4.10) will vary, depending on the calculation method selected. Use the following steps to configure a Scanner for use with AGA-3 (1991 or 2012), ISO-5167 Orifice, Cone-Spool, Cone-Wafer, Small Bore Orifice and Averaging Pitot Tube (Annubar) calculation methods.

Note For gas measurement, ISO-5167 is applicable only to flow that remains subsonic throughout the measuring section and where the fluid can be considered single-phase. It is not applicable to the measurement of pulsating flow. It does not cover the use of orifice plates in pipe sizes less than 50 mm

(2 in.) or more than 1000 mm (39 in.), or with pipe Reynolds numbers below 5000.

- Note Analog inputs can be selected as a pressure source or a temperature source only if they are installed and properly configured. Ensure that sampling is enabled for analog inputs used as pressure or temperature sources. See Procedure: Configuring an Analog Input, page 81 for details.
- 1. Under Input Assignments, select the type of sensor(s) used.
 - <u>Differential Pressure Source</u>—If using the MVT, select *Integrated Differential Pressure*. If using a pressure transducer via an analog input, select the analog input. The analog input must be configured before it will appear in the dropdown menu.
 - <u>Static Pressure Source</u>—If using the MVT, select *Integrated Static Pressure*. If using a pressure transducer via an analog input, select the analog input. The analog input must be configured before it will appear in the dropdown menu.
 - <u>Temperature Source</u>—If using the RTD on the Scanner circuit board, select *Integrated RTD*. If using a temperature transducer via an analog input, select the analog input. The analog input must be configured before it will appear in the dropdown menu.

🎢 Configure Flow Run - Mod	WorX Pro 4.3.0								
<u>F</u> ile <u>T</u> asks T <u>o</u> ols <u>H</u> elp									
DOWNLOAD			0w - Device name [s/n 1441792 re Flow Run	2]		Site name Field Name Location name			(
						Refresh	Apply	ОК	Cancel
Flow Rate Calculatio	n								
Calculation Method	Orifice, AGA-3 (201	2)	Change						
Wet Correction	No wet correction								
Input Assignme	ents <u>Calibrate</u> :	Inputs	Base Conditions	;					ſ
Differential Pressure Source	Integrated Differen	tial Pressure 🔻	Base Temperature	60.0000	Deg F				
Static Pressure Source	Integrated Static Pr	essure 🔻	Base Pressure	14.7300	psi				
Temperature Source	RTD	•	Atmospheric Pressure	14.7300	psi				
* Analog Input sensors are or a Temperature Source if configured as a Pressure To that sampling is enabled for * Pressure tap location is u	the Input is installed and ansducer or a Temperat Analog Inputs used as s	l has been properly ure Transducer. Ensure							
			Value Control						
Orifice Plate Operator: None, Changed	Change Plate On:		Low Pressure Cutoff	1.0	In H2O				L
Plate Size	1.0000	inches	Flow Run Accun	nulation					
Reference Temperature	68.0000	Deg F	Accumulation Method	Gas Phase Only					
Plate Material	Stainless Steel (304	/316)							
Plate Model Number	(To Be Configured)							
Plate Serial Number									
Pipe									
Pipe Size	2.0670	inches							
Pipe Material	Carbon Steel	•							
Тар Туре	Flange Tapped	-							
Device Interface User Manual	5								
					C	OM2 4.3.0.489	<port 1="" default=""></port>	10/12/201	8 3:06 PM

Figure 4.10

To calibrate the sensor inputs, click on the blue Calibrate Inputs hyperlink and follow the screen prompts.

- Note The user must enter the Maintenance Mode to calibrate an input, and will be returned to the Configure Flow Run screen upon exiting the Maintenance Mode. See Section 8 Calibrating and Verifying Inputs for complete instructions.
- 2. Verify the parameters for the differential pressure producer (orifice plate, cone meter). To change a parameter, click on the blue hyperlink next to the parameter (example: Change Plate or Change Cone Meter) and follow the screen prompts.
- Note The user must enter the Maintenance Mode to change a parameter, and will be returned to the Configure Flow Run screen upon exiting the Maintenance Mode.

See one of the following sections for complete instructions:

- Section 9 Flow Run Maintenance for Orifice Input (AGA-3 or ISO-5167 Orifice)—change orifice plate parameters
- Section 10 Flow Run Maintenance for Cone Meter Input—change cone meter parameters
- Section 11 Flow Run Maintenance for Averaging Pitot Tube (Annubar) Input, page 150—change averaging pitot tube parameters
- 3. Where applicable, update the pipe parameters. To change the pipe size, delete the current value and enter a new value. Select the pipe material and tap type from the dropdown menus provided.

Note When the Averaging Pitot Tube flow rate calculation method is selected, all parameters (including pipe parameters) must be changed by clicking on the *Change Meter* link and navigating to the Maintain Flow Run screen. See Section 11 - Flow Run Maintenance for Averaging Pitot Tube (Annubar) Input, page 150 for details.

- 4. Under Base Conditions, adjust the base temperature, base pressure, and atmospheric pressure by deleting existing values and entering new values, as required.
- 5. Under Value Control, adjust the low-pressure cutoff, if desired.
- 6. Click *Apply* to save your settings.
- 7. If Cone Spool or Cone Wafer is selected as the Flow Rate Calculation Method, a Cone Flow Coefficients section will be displayed. See Configuring Cone Flow Coefficients, page 60.
- 8. Proceed to the Fluid Properties section of the screen. See Configuring Fluid Properties, page 57.

Flow Rate Calculation Parameters for a Turbine Meter Run

The flow rate calculation parameters on the Configure Flow Run screen will vary, depending on the calculation method selected. Use the following steps to configure a Scanner for use with AGA-7 (gas) or Liquid Turbine calculation methods.

1. Under Uncorrected Volume Source, select the turbine source (Turbine 1), as shown in Figure 4.11, page 56. If an optional expansion board is installed in a Scanner 2000 or Scanner 210x, two turbine inputs are available for selection. If a Scanner 2200 is installed, these turbine inputs will be displayed without an additional expansion board.

Configure Flow Run - ModWorX Pro 4.3.0				
<u>F</u> ile <u>T</u> asks T <u>o</u> ols <u>H</u> elp				
DOWNLOAD	Scanner 2100w - Device name [s/n 144179 Configure Flow Run	92]	Site name Field Name Location name	
			Refresh	Apply OK Cancel
Flow Rate Calculation				Î
Calculation Method Turbine, AGA-7 (2006) Wet Correction No wet correction	Change			
Uncorrected Volume Source	Base Condition	IS		
Turbine Source Turbine 1	Base Temperature	60.0000 Deg F		
Turbine 1 Information Configure Tu Meter Name	Base Pressure rbine Atmospheric Pressure	14.7300 psi 14.7300 psi		
Meter Model Number				E
Meter Serial Number				
	Flow Run Accu	mulation		
Input Assignments Calibrate Inputs	Accumulation Method	Gas Phase Only		
Pressure Source Integrated Static Pressure	•			
Temperature Source Integrated RTD	•			
* Analog Input sensors are only available for selection as a F or a Temperature Source if the Input is installed and has bee configured as a Pressure Transdurer or a Imperature Trans that sampling is enabled for Analog Inputs used as sources.	n properly			
Device Interface User Manuals				
			COM2 4.3.0.489 <port 1<="" td=""><td>Default> 10/12/2018 3:13 PM</td></port>	Default> 10/12/2018 3:13 PM

Figure 4.11

Under Turbine 1 Information, verify the turbine meter model shown. To change the meter selection, click on the blue *Configure Turbine* hyperlink and follow the screen prompts. See Section 13 - Turbine Maintenance for complete instructions.

Note The user must enter the Maintenance Mode to change a meter selection, and will be returned to the Configure Flow Run screen upon exiting the Maintenance Mode.

- Under Input Assignments, verify the pressure source and/or temperature source to be used. If measuring liquids, only a temperature source will be selectable (Figure 4.12, page 57). To calibrate the sensor inputs from this screen, click on the blue *Calibrate Inputs* hyperlink and follow the screen prompts.
- Note Analog input sensors are only available for selection as a pressure source or a temperature source if the input is installed and has been properly configured as a pressure transducer or a temperature transducer. Ensure that sampling is enabled for analog inputs used as sources. See Procedure: Configuring an Analog Input, page 81, for details.
- Note The user must enter the Maintenance Mode to calibrate an input, and will be returned to the Configure Flow Run screen upon exiting the Maintenance Mode. See Section 8 Calibrating and Verifying Inputs for complete instructions.

normal Configure Flow Run - ModWorX Pro 4.3.0					
<u>File Tasks Tools H</u> elp					
Characteristic Contracteristic	gure Flow Run	441792]	Site name Field Name Location name		
			Refre	sh Apply	OK Cancel
Flow Rate Calculation					^
Calculation Method Liquid Turbine Wet Correction No wet correction	Change				
Uncorrected Volume Source	Base Condition	15			
Turbine Source Turbine 1	Base Temperature	60.0000 Deg F			
Turbine 1 Information Configure Turbine Meter Name	Base Pressure Atmospheric Pressure	14.7300 psi 14.7300 psi			Ξ
Meter Model Number Meter Serial Number					
	Flow Run Accu	mulation			
Input Assignments Calibrate Inputs Pressure Source Not Applicable	Accumulation Method	Liquid Phase Only			
Temperature Source Temperature Source Temperature Source Temperature Source Temperature Source If the Input 5 installed and has been properly configured as a Pressure Transducer or a Temperature Transducer, Ensure					
that sampling is enabled for Analog Inputs used as sources.					
Device Interface User Manuals			COM2 4.3.0.489	<port 1="" default=""></port>	10/12/2018 3:46 PM

Figure 4.12

- 4. Under Base Conditions, adjust the base temperature, base pressure, and atmospheric pressure by deleting existing values and entering new values, as required.
- Note When the fluid properties calculation method is selected for an MPMS or generic liquid, the base temperature and base pressure values are set by the configured base temperature selection in the Fluid Properties section of the screen.
- 5. Click *Apply* to save your settings.
- 6. Proceed to the Fluid Properties section of the screen.

Configuring Fluid Properties

The contents of the Fluid Properties section of the Configure Flow Run screen vary, depending on the product being measured (gas, steam or liquid) and the fluid property calculation method selected. For example, when calculating gas flow with the AGA-8 Detail method, fluid property parameters include an extensive list of gas constituents (Figure 4.13, page 58). When the AGA-8 Gross method is used, only two gas constituents are configured. When calculating steam with a wet correction, only steam quality is configurable. Use the following steps to configure all fluid properties for the Scanner. When calculating liquid flow, density and viscosity values are configurable.

1. Note the calculation method displayed. The fluid property calculation method is typically selected when the user first accesses the Change Flow Run Calculation Methods screen.

IMPORTANT The user can change the fluid property calculation method (or any other flow run calculation method) by pressing the *Change* button. However, users should be aware that changing the fluid properties calculation method may result in a change in the flow rate calculation method selected. Always verify the flow rate calculation method before clicking OK.

Section 4

Configure Flow Run - ModWorX Pro 4.3.0					
<u>File Tasks Tools H</u> elp					
DOWINLOAD	scanner 2100w - Device name [s/n 1441 Configure Flow Run	792]	Site name Field Name Location name		
				Refresh Apply	OK Cancel
Fluid Properties					^
Calculation Method AGA-8 Detail	Change				
Calculation Parameters					
Calculation Interval					
Gas Composition Change Composition Operator: None, Changed On:					
Analysis Ref. No.					
Reference Conditions United States (14.73 psi, 60 F)					
Heating Value Calculated					
Specific Gravity Calculated					
Viscosity* 0.010268 cP					
Isentropic Exponent* 1.3000					
Gas Fraction (No wet correction)					
* Natural gas recommended procedure is to use an isentropic e 1.3 and viscosity of 0.010268 cP.	xponent of				E
Gas Constituent Mole %	Gas Constituent	Mole %			
Carbon Dioxide (CO2) 0.5956	n-Octane (n-C8)	0.0000			
Nitrogen (N2) 0.2595	n-Nonane (n-C9)	0.0000			
Methane (C1) 96.5222	n-Decane (n-C10)	0.0000			
Device Interface User Manuals			COM2 4.3.0	.489 <port 1="" default=""></port>	10/12/2018 3:57 PM

Figure 4.13

- 2. The parameters displayed in the remainder of the Fluid Properties screen will vary, depending on the fluid property calculation method and flow rate calculation method selected.
 - a. If the flow run is configured for gas measurement, the Fluid Property section of the Configure Flow Run screen will display either Gas Composition information (AGA-8 Detail; see Figure 4.13), or Gross Method Parameters (AGA-8 Gross; see Figure 4.14, page 59). To change a parameter, click on the blue *Change Composition or Change Parameters* hyperlink and follow the screen prompts.
 - b. If the flow run is configured for steam measurement, Steam Property settings will be displayed (Figure 4.15, page 59). Edit the parameters as necessary. To change a parameter, click on the blue *Change Properties* hyperlink and follow the screen prompts.
 - c. If the flow run is configured for liquid measurement, Liquid Parameter settings will be displayed (Figure 4.16, page 60). Edit the parameters as necessary. To change a parameter, click on the blue *Change Parameters* hyperlink and follow the screen prompts.
- Note The user must enter the Maintenance Mode to change gas composition, gross method parameters, steam properties or liquid parameters, and will be returned to the Configure Flow Run screen upon exiting the Maintenance Mode. See Sections 9, 10, 11, and 12 for complete instructions.

Configure Flow Run - Mo	dWorX Pro 4.3.0					
e <u>T</u> asks T <u>o</u> ols <u>H</u> elp						
			nner 2100w - device name [s/n 1441792] nfigure Flow Run	Site name Field Name Location name		9
					Refresh Apply	OK Cance
luid Properties						
Calculation Method	AGA-8 Gross		Change			
Calculation Par Calculation Interval		• 1 min				
Gross Method Operator: None, Changed		Change Paramet	ters			
Analysis Ref. No.						
Reference Conditions	United States (14.	73 psi, 60 F)				
Heating Value	1031.4260	BTU/SCF				
Specific Gravity	0.600000					
Viscosity*	0.010268	cP				
(sentropic Exponent*	1.3000					
* Natural gas recommende 1.3 and viscosity of 0.010	ed procedure is to use an 268 cP.	isentropic exponent o	f			
Gas Constituent	Mole %					
Carbon Dioxide (CO2)	0.5956	6				
Nitrogen (N2)	0.2595	5				
Note						
ce Interface User Manua	als					

Figure 4.14

WorX Pro 4.3.0					
	_			~	
			Site name Field Name Location name		
				Refresh Apply	OK Cancel
					1
IF-97		Change			
ameters					
4 1	▶ 1 min				
ies <u>Change Pro</u> On:	perties				
Calculated					
Calculated					
Calculated	сP				
Calculated					
100.0	percent				
					=
1.					
s			COM2 4.3.0).489 <port 1="" defau<="" td=""><td>lt> 10/12/2018 4:00 PM</td></port>	lt> 10/12/2018 4:00 PM
	IF-97 ameters	IF-97 ameters	IF-97 Change IF-97 Change IF-97 Change Calculated Ca	scanner 2100W - Device name [s/n 1441792] Site name Location name Configure Flow Run Location name IF-97 Change ameters imin iss Change Properties iss claculated claculated<	scanner 2100w - Device name [s/n 1441792] Site name Field Name Location name Refresh Apply

Figure 4.15

Configure Flow Run - Mo	odWorX Pro 4.3.0							
Eile <u>T</u> asks T <u>o</u> ols <u>H</u> elp								
	2		anner 2100w - Device name [s/n 1441792] onfigure Flow Run	Site name Field Name Location name				
					Refresh	Apply	ОК	Cancel
Fluid Properties								
Calculation Method	MPMS Crude Oil		Change					
Calculation Pa	arameters							
Calculation Interval	4 1	▶ 1 min						
MPMS Liquid I Operator: None, Change		Change Param	eters .					
Analysis Ref. No.								
Specific Gravity	0.85084							
Viscosity	0.010268	cP						
* A typical viscosity of the the actual flowing visco	nis liquid is about 6.0 cP. osity should be determin	However, for accurate	e results					ſ
* Note that the Density of Viscosity parameter is a	or Specific Gravity param at flowing temperature.	neter is at base temper	rature and the					
Note								
Device Interface User Manu	uals							
				COM2 4.3.	0.489	<port 1="" default=""></port>	10/12/20	18 4:02 PM

Figure 4.16

Configuring Cone Flow Coefficients

If Cone - Spool or Cone - Wafer is selected as the Flow Rate Calculation Method, a fourth section of parameters entitled Cone Flow Coefficients will appear on the Configure Flow Run screen (Figure 4.17).

💏 Configure Flow Run – ModWorX Pro 4.3.0					- 0 X
Eile Iasks Tgols Help					
DOWNLOAD	Scanner 2100w - Device name [s/n 1441792] Configure Flow Run	Site name Field Name Location name			
		R	efresh Apply] Ск	Cancel
Cone Flow Coefficients					
Active Coefficients Change Flow. Core also: Hone, Olanged Or: Reynolds Number Flow Coefficient Linear Flow Coefficient 0.8800	Caefficients (Cd)				
Note					
Device Interface User Manuals	The second se	COM2 4.3.0.4	89 <port 1="" default<="" td=""><td>> 10/12/20</td><td>18 4:05 PM</td></port>	> 10/12/20	18 4:05 PM

Figure 4.17

To enter a linear or multi-point flow coefficient, click on the blue Change Flow Coefficients (Cd) hyperlink and follow the screen prompts.

Note The user must enter the Maintenance Mode to change cone flow coefficients, and will be returned to the Configure Flow Run screen upon exiting the Maintenance Mode. See Section 10 - Flow Run Maintenance for Cone

Meter Input for complete instructions.

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Section 5 - Setting up a Turbine Input or Pulse Input

The standard Scanner 2000 or Scanner 210x supports a single turbine input for measuring gas or uncompensated liquid. When an optional expansion board is installed in a Scanner 2000 or Scanner 210x, a second turbine input and a pulse input are available. The Scanner 2200 supports two turbine inputs, two pulse inputs/relay contacts, or a combination of the two.

This section will guide users in performing the following tasks:

- select the appropriate turbine meter
- configure the display of volumetric flow and flow rate
- configure input parameters including sampling period, input sensitivity, and low-flow cutoff setpoint
- configure a pulse input (requires a Scanner 2000 or Scanner 210x with expansion board or a Scanner 2200)
- override the live flow rate value with a user-specified value

Each frequency input can be configured as a turbine input, a pulse input, or a contact input. However, a Scanner device can calculate flow from no more than two frequency inputs at a time. Therefore, a pulse input may not be used as a frequency input simultaneously with two turbine inputs.

A pulse input can be used as a status input while two turbine inputs are in use. No configuration via ModWorX Pro is required for a pulse input when used as a status indicator. See the appropriate Scanner Hardware User Manual for information on the Modbus registers used to monitor a switch using the pulse input.

For information on changing a turbine K-factor, see Section 13 - Turbine Maintenance.

For information on entering gas constituents for a gas-compensated flow run, see Section 12 - Flow Run Maintenance for Turbine Input (AGA-7/Liquid Turbine).

To set up a turbine input or pulse input,

1. Click on the *Configure* button in the task menu bar on the Main Display screen (Figure 5.1).

DOWNLOAD		W - Device name	2-7.1		Site name Field Name		N
DOWINCOAD	Scanner	2100W Ma	in Display		Location name		E
fresh 🗸 Auto-Refresh							Return
🛞 Calibrate Inpu	its 🚺 🗿 Mai	ntain Flow Run	🚷 Mainta	ain Turbine 🛛 🐼 Manage	PID	Configure	
Flow Run Data				Turbine Data			
Flow Rate	352.687	MCF/day		Turbine 1 Flow Rate	7	BBL/day	
Daily Total (est.)	317.173	MCF		Turbine 1 Grand Total	4.52234E006	BBL	
Heating Value	1036.06	BTU/SCF		Turbine 2 Flow Rate	0	BBL/day	
				Turbine 2 Grand Total	0	BBL	
	Current Day	Previous Da	ay		Current Day	Previous Day	
Volume Flow	45.3104		37 MCF	Turbine 1 Volume Flow	0.902952		BBL
Mass Flow	2014.74		.3 LBM	Turbine 2 Volume Flow	0	0	BBL
Energy	46.9442	365.40	04 MMBTU				
			DETAILS				DETAILS
Input Data				System Data			
Static Pressure	6.22	PSIG	8	Alarms			ALARMS
Differential Pressure	164.62	In H2O	-	Supply / Battery Voltage	10.28 / 10.55	V	
Process Temperature	60.00	Deg F	×	Temperature	71.67	Deg F	
Analog Input 1	0.00	inches	-	Date/Time	and the second second second second	3 11:05:48 AM	
Analog Input 2	56.24	Deg F		Analog Output	15.20		
				Smart Battery / Health %	83.00 / 97	%	
			DETAILS				DETAILS

Figure 5.1

2. Then, click on *Turbine Input 1* (or *Turbine Input 2*, if applicable) in the Configure screen (Figure 5.2). To configure a pulse input for a Scanner 2000 or Scanner 210x, you must select Turbine Input 2. To configure a pulse input for a Scanner 2200, either Turbine Input 1 or Turbine Input 2 may be used.

Scanner 2100W Configuration Menu - ModWorX Pro 4	3.0				
<u>File I</u> asks T <u>o</u> ols <u>H</u> elp	~				
	scanner 2100w - [s/n 1441792] Scanner 2100W Confi				
					Return
System Device Identification	Date/Time Archives	Communications Alarms	Security User Modbus Registers		
Flow Runs Flow Run 1					
Turbines Turbine Input 1					
Inputs Differential Pressure	Static Pressure	Process Temperature			
Outputs Digital Outputs	Analog Outputs	PID Control			
Device Interface User Manuals					
			COM2 4.3.0.489	<port 1="" default=""></port>	10/12/2018 12:29 PM

Figure 5.2

The Configure Turbine Input screen will appear (Figure 5.3).

Configure Turbine Input 1	1 - ModWorX Pro 4.3.0						
<u>T</u> asks T <u>o</u> ols <u>H</u> elp							
		Scanner 2100w - Device name [s/n 144] Configure Turbine Input 1			Site name Field Name ation name		()
					Refres	h Apply	OK Cance
urbine Input Settin	Change meter	Input Settings					
Meter Name		Sampling Period	5 sec	Edit			
Meter Model Number		Rate Damping Factor	- 0 +	No damping			
Meter Serial Number		Input Threshold	Medium (50mV) -				
		Low Input Frequency Cutoff	5.0	Hz			
Units		Low Flow Rate Cutoff	17.1429	BBL/day			
Display Unit	BBL	Enable Override	Yes 👻				
Rate Unit	day	Override Value	7.0	BBL/day			
eter K-Factors							
Active K-Facto Operator: None, Calibrate							
Calibration Working Units	pulses/GAL						
Frequency	Factor						
e Interface User Manua	als						
				co	M2 4.3.0.489	<port 1="" default=""></port>	10/12/2018 4:14 PM

Figure 5.3

Procedure: Setting Up a Turbine Input

- Note This procedure may be used to set up a second turbine input or a pulse input if an optional expansion board is installed in a Scanner 2000 or Scanner 210x, or if a Scanner 2200 is installed.
- 1. Enter turbine input settings (Figure 5.3, page 63).
 - a. Under Information, enter basic meter information.
 - Enter a name for the turbine meter. This name will replace the default name "Turbine 1" or "Turbine 2" on the Main Screen and all other screens involving the turbine input and in archive log reports.
 - Confirm the meter model. To select a different meter model, click on the blue *Change Meter* hyperlink and follow the screen prompts.
- Note The user must enter the Maintenance Mode to change the meter model, and will be returned to the Configure Turbine Input screen upon exiting the Maintenance Mode. See Section 13 Turbine Maintenance for complete instructions.
 - Enter a serial number for the meter, if desired.
 - b. Under Units, adjust the volume and rate units, if desired.
 - To display flow volume or flow rate in a different unit, click *Edit*. The Edit Display Unit dialog will appear (Figure 5.4). The base unit is the unit in which the Scanner measures flow from the meter. Click on the *Display Unit* dropdown menus to select a display unit and/or volumetric rate unit. The conversion factor used to convert the base unit to the display unit will automatically update. To enter a custom unit, select *Custom* from the dropdown menu, and enter the desired conversion factor and offset factor. Click *OK* to save your changes and return to the Configure Turbine Input screen.

Base Unit	GAL			
Display Unit	BBL	▼ per	day	•
Display Label Text	BBL			
Units Conversion Factor	0.0238095243			
Units Conversion Offset	0.0			

Figure 5.4

- c. Adjust input settings, if desired.
 - To change the sampling period, click *Edit*. The Edit Synchronized Time Periods dialog will appear, and an arrow will point to Turbine Input (Figure 5.5, page 65).
 - Select the time period unit desired (seconds, minutes, or hours) using the dropdown menu. Then use the -/+ buttons to select the time period desired. The screen will automatically display the number of sampling periods that will occur per flow run calculation period. Click *OK* to save the settings and return to the Configure Turbine Input screen.
| Archive Loggin | g Pe | riod | | | | | |
|------------------|------------|------|-----------|---------|---|--------------------------|---------------------------------|
| Interval Archive | - | 1 | + | Hours | Ŧ | 24 periods | per day |
| Flow Run Calcu | latio | n Pe | eriod | ł | | | |
| Flow Run | - | 1 | + | Minutes | • | 60 periods | per interval log period |
| | 1 | | | - | | | |
| | | | | | | | |
| Input Paramet | er Sa | ampl | ling
+ | Periods | ¥ | 60 periods | - |
| | er Sa | | | | _ | 60 periods
60 periods | ner flow run calculation period |
| Static Pressure | er Sa
– | 1 | + | Seconds | • | | per flow run calculation period |

Figure 5.5

- To change the rate damping factor, click the -/+ buttons. The resulting "settling time" will always be a
 multiple of the sampling period. For example, when the sampling period is 4 seconds, entering a damping
 factor of 2 will result in a settling time of 8 seconds.
- To change the input threshold setting, click on the *Input Threshold* dropdown menu and choose a sensitivity level for minimizing noise interference in the signal reception. There are four sensitivity levels to choose from, ranging from 20 mV to 200 mV. A "low" threshold value will allow the Scanner to detect a signal of approximately 20 mV peak-to-peak, while a "max" threshold value will allow the Scanner to detect only signals that exceed 200 mV, peak-to-peak.
- To change the low input frequency cutoff, delete the existing value and enter a new value. The frequency cut-off is reserved for the turbine input only. When the low-frequency cut-off is configured, the Scanner will ignore inputs that are less than the user-entered value.
- To change the low flow rate cutoff, delete the existing value and enter a new value. The low flow rate cutoff is a setpoint for the accumulation of flow time in the hourly and daily records, and can be applied to either a turbine input or pulse input.
- To override the live flow rate value, click the *Enable Override* field and change the setting to *Yes*. Then type in the override value desired.
- d. Click *Apply* to save the new settings.
- 2. Verify the meter K-factor displayed at the bottom of the Configure Turbine Input screen. To change the K-factor, click on the blue *Change K-Factors* hyperlink and follow the screen prompts.
- Note The user must enter the Maintenance Mode to change the K-factor, and will be returned to the Configure Turbine Input screen upon exiting the Maintenance Mode. See Section 13 Turbine Maintenance for complete instructions.

If using the turbine meter for a Flow Run with AGA-7, enter the K-factor supplied by the meter manufacturer in terms of pulses/ACF. Do not correct the K-factor for average temperature and pressure.

Procedure: Setting Up a Pulse Input

Note SCANNER 2000 OR SCANNER 210X WITH EXPANSION BOARD. A single pulse input is available when an expansion board is installed on a Scanner 2000 or Scanner 210x. The Turbine Input 2 configuration screen must be used for configuring this input.

Note SCANNER 2200. Two pulse inputs are available on the Scanner 2200. They are configured using Turbine Input 1 and Turbine Input 2 configuration screens.

The following procedure is based on the configuration of a pulse input using Turbine Input 2. If a Scanner 2200 is in use, Turbine Input 1 can also be used to configure a pulse input. The same procedure applies.

To set up a pulse input, perform the following steps:

1. Select *Turbine Input 2* from the Configure screen. The Configure Turbine Input 2 screen will appear (Figure 5.6).

Configure Turbine Input 2 - ModWorX Pro 4.3.0		
<u>F</u> ile <u>T</u> asks T <u>o</u> ols <u>H</u> elp		
DOWNLOAD	Scanner 2100W - Device name [s/n 1441792] Configure Turbine Input 2	Site name Field Name Location name
		Refresh Apply OK Cancel
Turbine Input Settings		
Information Change meter	Input Settings	
Meter Name	Sampling Period 5 sec Edit	
Meter Model Number	Rate Damping Factor 0 + No damping	
Meter Serial Number	Enable Pulse Input No 💌	E
	Input Threshold Medium (50mV) 💌	
Units	Low Input Frequency Cutoff Low (20mV) Medium (50mV) Hz	
Display Unit BBL Edit	Low Flow Rate Cutoff High (100mV) Maximum (200mV) BBL/day	
Rate Unit day	Enable Override No 👻	
	Override Value 0.0 BBL/day	
Meter K-Factors		
Active K-Factors Change K-Factors Operator: <port 1="" default="">, Calibrated On: 08/02/2018</port>		
Calibration Working Units pulses/GAL		
Frequency Factor Device Interface User Manuals		Ψ.
		COM2 4.3.0.489 <port 1="" default=""> 10/12/2018 4:16 PM</port>



- 2. Follow the instructions described in Procedure: Setting Up a Turbine Input, steps 1a through 1c.
- 3. Click the *Enable Pulse Input* dropdown menu and change the setting to "yes." The Input Threshold selection will be disabled (grayed out).
- 4. Click *Apply* to save the new settings.
- 5. Verify the meter K-factor displayed at the bottom of the Configure Turbine Input screen. To change the K-factor, click on the blue *Change K-Factors* hyperlink and follow the screen prompts.
- Note The user must enter the Maintenance Mode to change the K-factor, and will be returned to the Configure Turbine Input screen upon exiting the Maintenance Mode. See Section 13 Turbine Maintenance for complete instructions.

If using the turbine meter for an AGA-7 flow run, enter the K-factor supplied by the meter manufacturer in terms of pulses/ACF. Do not correct the K-factor for average temperature and pressure.

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Section 6 - Configuring Inputs

The standard Scanner 2000 or Scanner 210x supports inputs for differential pressure, static pressure, and process temperature. If an optional expansion board is installed in a Scanner 2000 or Scanner 210x, two analog inputs are also available. A standard Scanner 2200 supports two analog inputs. This section will guide users in performing the following tasks:

- configure differential pressure input
- configure a static pressure input
- configure a process temperature input

• configure analog inputs (requires a Scanner 2000 or Scanner 210x with expansion board or a Scanner 2200) For information on calibrating inputs, see Section 8 - Calibrating and Verifying Inputs.

To configure an input,

1. Click the *Configure* button in the task menu bar on the Main Display screen (Figure 6.1).



Figure 6.1

2. Then, click the appropriate input in the Inputs section of the Configuration Menu screen (Figure 6.2).



Figure 6.2

Differential Pressure

To configure a differential pressure input, click *Differential Pressure* on the Configuration Menu screen. The Configure Differential Pressure screen will appear (Figure 6.3).

n Configure Differential Pres	ssure - ModWorX F	Pro 4.3.0							- 0
<u>File Tasks Tools H</u> elp									
			canner 2100w - Device name [s/n : Configure Differential Pr			Site name Field Name Location name			
						Refres	h Apply	ОК	Cancel
Differential Pressure	e Settings								
Information			Input Settings	l.					
Sensor Name			Sampling Period	5 sec	Edit				
Sensor Model Number	-		Damping Factor	- 0 -	+ No damping				
Sensor Serial Number	Not Detected		Failure Value	0.0	In H2O				=
Sensor Range Low	0.0	In H2O	Low Pressure Cutoff	0.1	In H2O				
Sensor Range High	1000.0	In H2O	Enable Override	Yes	•				
			Override Value	164.62	In H2O				
Units									
Display Unit	In H2O	Edit							
Sensor Calibration									
Saved Calibrat	ion Calibrate		Saved Verifica	tion Verify					
Operator: <port 1="" default<="" td=""><td></td><td></td><td>Operator: None, Calibrate</td><td>C</td><td></td><td></td><td></td><td></td><td></td></port>			Operator: None, Calibrate	C					
Calibration Working Units	In H2O		Verification Working Units	In H2O					
Zero Offset	0.000								
Device Interface User Manua	ils								
						COM2 4.3.0.489	<port 1="" default=""></port>	10/12/2018	4:20 PM

Figure 6.3

Procedure: Configuring Differential Pressure

Differential Pressure Settings

- 1. Enter basic sensor information.
 - a. Enter a unique sensor name, if desired.
 - b. Enter the sensor model number, if desired.

The serial number and the range of the sensor are automatically read and displayed on the screen.

- 2. Change the Display Unit setting, if necessary. The default is In H2O. To change the setting,
 - a. Click *Edit*. The Edit Display Unit dialog will appear (Figure 6.4). The base unit is the unit in which the Scanner measures differential pressure from the sensor.

dWorX Pro		1
Edit Display Uı	nit - Differential Pressure	
Base Unit	In H2O	
Display Unit	In H20	
Display Label Text	INH2O	
Units Conversion Factor	1.0	
Units Conversion Offset	0.0	

Figure 6.4

- b. Click on the dropdown *Display Unit* menu and select a display unit. The conversion factor used to convert the base unit to the display unit will automatically update.
- c. To enter a custom unit, select *Custom* from the dropdown menu, and enter the desired conversion factor and offset.
- d. Click OK to save your changes and return to the Configure Differential Pressure screen.
- Note When the display unit is changed, the units for other input settings (failure value, low pressure cutoff, and override) will update accordingly.
- 3. Adjust parameter values in the Input Settings section, if desired.
 - a. To change the sampling period, perform the following steps:
 - b. Click *Edit*. The Edit Synchronized Time Periods dialog will appear, and an arrow will point to Differential Pressure (Figure 6.5, page 71).

	er day							
		eriods	*	Hours	+	1	-	Interval Archive
				4	erioc	on Pe	latic	low Run Calcu
	er interval log period	eriods	•	Minutes	+	1	-	Flow Run
	1	eriods		Seconds	+	1	-	Static Pressure
n nerio	per flow rup calculation pr	eriods	•	Seconds	+	1	-	Differential Pressure
rpeno	per now ran calcalation p	eriods	•	Seconds	+	5	-	Process Temperature
		eriods	-	Seconds	+	4	-	Turbine Input 1
		chous						
ſ	per flow run calculation	eriods eriods	•	Seconds Seconds Seconds	+ + +	1 1 5	-	 Differential Pressure Process Temperature

Figure 6.5

- ii. Select the time unit desired (seconds, minutes, etc.) using the dropdown menu.
- iii. Use the -/+ buttons to select the number of seconds, minutes, etc. desired. The screen will automatically divide the flow run calculation period by the input sampling period to determine the number of sampling periods that will occur per flow run calculation period.
- iv. Click *OK* to save the settings and return to the Configure Differential Pressure screen.
- b. To change the damping factor, click the or + button. The resulting "settling time" will always be a multiple of the sampling period. For example, when the sampling period is 4 seconds, entering a damping factor of 2 will result in a settling time of 8 seconds.
- c. To change the failure value (the value that will be substituted for a live reading should the unit fail), select the existing value and type in a new value. In the event of a sensor failure, this value will be substituted for a live reading in flow calculations.
- d. To change the low pressure cutoff, select the existing value and type in a new value. Any differential pressure measurements below this value will be set to zero. This setting helps prevent inaccuracies in daily and interval differential pressure records caused by periods of very low differential pressure.
- e. To override the live input reading, click the *Enable Override* field and change the setting to *Yes*. Then type in the override value desired.
- f. Click *Apply* to save your settings.

Sensor Calibration

1. Observe the calibration settings at the bottom of the screen (Figure 6.6). To calibrate the sensor, click on the blue *Calibrate* hyperlink in the Sensor Calibration section and follow the screen prompts.

Note The green band across the top of the screen indicates that you are in Maintenance Mode.

Calibrate Differential Pressure - ModWorX Pro 4.3.0			
ile <u>T</u> asks T <u>o</u> ols <u>H</u> elp			
DOWNLOAD	scanner 2100w - Device name [s/n 1441792] Calibrate Differential Pressure	Site name Field Name Location name	- S
		Sa	ve Changes Exit Maintenance Mode
Calibrate Inputs Change Task Input Parameter Calibration Task Calibration	essure		
New Calibration Calibration Working Units In H2O Applied/As Left As Found Change (% of FS)	Current Calibration Operator: <port 1="" default="">, Calibrated Cn: 07/26/21 Acquire Point Clear All Points Load Calibration From</port>	Depending on the Options settings and the last calibration, the columns may read "Applied/Measured" o "As Left/As Found".	
Note	Note		
vice Interface User Manuals		COM2 4.3.0.489 <port< td=""><td>1 Default> 10/12/2018 4:24 PM</td></port<>	1 Default> 10/12/2018 4:24 PM

Figure 6.6

- Note The user must enter the Maintenance Mode to calibrate differential pressure, and will be returned to the Configure Differential Pressure screen upon exiting the Maintenance Mode. See Section 8 - Calibrating and Verifying Inputs for complete instructions.
- 2. Observe the verification settings at the bottom of the screen (Figure 6.6). To verify the sensor's calibration, click on the blue *Verify* hyperlink and follow the screen prompts.
- Note The user must enter the Maintenance Mode to verify differential pressure, and will be returned to the Configure Differential Pressure screen upon exiting the Maintenance Mode. See Section 8 - Calibrating and Verifying Inputs for complete instructions.

Static Pressure

To configure a static pressure input, click on the *Static Pressure* button on the Configuration Menu screen. The Configure Static Pressure screen will appear (Figure 6.7).

Configure Static Pressure -	ModWorX Pro 4.3.0						_	_		
e <u>T</u> asks T <u>o</u> ols <u>H</u> elp							~			
			canner 2100w - Device name [s/n 144 Configure Static Pressure			Site name Field Name Location name				C
							Refresh	Apply		OK Car
tatic Pressure Sett	tings									
Information			Input Settings							
Sensor Name			Sampling Period	5 sec	Edit					
Sensor Model Number			Damping Factor	- 0 - +	No damping					
Sensor Serial Number	Not Detected		Failure Value	0.0	PSIG					
Sensor Range Low	0.0	PSIG	Low Pressure Cutoff	0.5	PSIG					
Sensor Range High	10000.0	PSIG	Enable Override	Yes 👻						
			Override Value	6.22	PSIG					
Units										
Display Unit	PSIG	Edit								
ensor Calibration										
Saved Calibrati			Saved Verificati Operator: None, Calbrated							
Calibration Working Units	PSIG		Verification Working Units	PSIG						
Zero Offset	0.000									
Applied/As Left	As Found		Applied	Measured						
ce Interface User Manua	Is									
						COM2 4.3.	0.489	<port 1="" default<="" td=""><td>> 10/13</td><td>2/2018 4:41 PM</td></port>	> 10/13	2/2018 4:41 PM

Figure 6.7

Procedure: Configuring Static Pressure

Static Pressure Settings

- 1. Enter basic sensor information.
 - a. Enter a unique sensor name, if desired.
 - b. Enter the sensor model number, if desired.

The serial number and range of the sensor are automatically read and displayed on the screen..

- 2. Change the Display Unit setting, if desired. The default is PSIG. To change the setting,
 - a. Click *Edit*. The Edit Display Unit dialog will appear (Figure 6.8, page 74). The base unit is the unit in which the Scanner measures static pressure from the sensor.
 - b. Click on the dropdown *Display Unit* menu to select a display unit. The conversion factor used to convert the base unit to the display unit will automatically update.
 - c. To enter a custom unit, select *Custom* from the dropdown menu, and enter the desired conversion factor and offset factor.
 - d. Click OK to save the changes and return to the Configure Static Pressure screen.

dodWorX Pro			
Edit Display Ur	nit - Static P	ressure	
Base Unit	PSIG		
Display Unit	PSIG		
Display Label Text	PSIG		
Units Conversion Factor	1.0		
Units Conversion Offset	0.0		
		<u> ok </u>	Cancel
	Figure 6 8	3	

- Note When the display unit is changed, the units for the other input settings (failure value, low pressure cutoff, and override value) will update accordingly.
- 3. Adjust parameter values in the Input Settings section, if desired.
 - a. To change the sampling period, perform the following steps:
 - i. Click *Edit*. The Edit Synchronized Time Periods dialog will appear, and an arrow will point to Static Pressure (Figure 6.9).

Archive Loggin	g Pe	riod					
Interval Archive		1	+	Hours	Ŧ	24 periods	per day
Flow Run Calcu	Ilatio	n Pe	erioc	ł			
Flow Run	-	1	+	Minutes	•	60 periods	per interval log period
Input Paramet	er Sa	ampl	ling	Periods			
Input Paramet	er Sa	ampl	ling +	Periods	÷	60 periods	7
Input Paramet Static Pressure Differential Pressure	er Sa –					60 periods 60 periods	1
Static Pressure	er Sa –	1	+	Seconds	•		per flow run calculation perio
Static Pressure Differential Pressure	er Sa 	1	+	Seconds Seconds	•	60 periods	per flow run calculation perio
 Static Pressure Differential Pressure Process Temperature 	er Sa 	1	+	Seconds Seconds Seconds	*	60 periods 12 periods	per flow run calculation perio
 Static Pressure Differential Pressure Process Temperature 	er Sa 	1	+	Seconds Seconds Seconds	*	60 periods 12 periods	per flow run calculation perio

Figure 6.9

- ii. Select the time period unit desired (seconds, minutes, etc.) using the dropdown menu.
- iii. Use the -/+ buttons to select the number of seconds, minutes, etc. desired. The screen will automatically divide the flow run calculation period by the input sampling period to determine the number of sampling periods that will occur per flow run calculation period.
- iv. Click OK to save the settings and return to the Configure Static Pressure screen.

- b. To change the damping factor, click the -/+ buttons. The resulting "settling time" will always be a multiple of the sampling period. For example, when the sampling period is 4 seconds, entering a damping factor of 2 will result in a settling time of 8 seconds.
- c. To change the failure value, select the existing value and type in a new value. In the event of a sensor failure, this value will be substituted for a live reading in flow calculations.
- d. To change the low pressure cutoff, select the existing value and type in a new value. Any static pressure measurements below this value will be set to zero. This setting helps prevent inaccuracies in daily and interval differential pressure records caused by periods of very low differential pressure.
- e. To override the live input reading, click the Enable Override field and change the setting to *Yes*. Then type in the override value desired.
- f. Click *Apply* to save the new settings.

Sensor Calibration

1. Observe the calibration settings at the bottom of the screen (Figure 6.10). To calibrate the sensor, click on the blue *Calibrate* hyperlink in the Sensor Calibration section and follow the screen prompts.

alibrate Static Pressure - ModWorX Pro 4.3.0				
<u>I</u> asks T <u>o</u> ols <u>H</u> elp)		-
DOWINLOAD	scanner 2100w - Device name [s/n 1441792] Calibrate Static Pressure	Site name Field Name Location name		
			Save Changes	Exit Maintenance Mo
librate Inputs				
Change Task Calibration Task Calibration				
New Calibration Calibration Working Units Applied/As Left As Found Change (% of	Acquire Point Recalbrate Point Clear Point Clear All Points Factory	Depending on the Options setting and last calibration, the columns may read "Applied/Measured "As Left/As Found".	" or	
	Load Calibration From			
Note	Note			

Figure 6.10

- Note The user must enter the Maintenance Mode to calibrate static pressure, and will be returned to the Configure Static Pressure screen upon exiting the Maintenance Mode. See Section 8 Calibrating and Verifying Inputs for complete instructions.
 - a. Observe the verification settings at the bottom of the screen (Figure 6.10). To verify the sensor's calibration, click on the blue *Verify* hyperlink and follow the screen prompts.
- Note The user must enter the Maintenance Mode to verify static pressure, and will be returned to the Configure Static Pressure screen upon exiting the Maintenance Mode. See Section 8 Calibrating and Verifying Inputs for complete instructions.

Process Temperature

To configure a process temperature input, click on the *Process Temperature* button on the Configuration Menu screen. The Configure Process Temperature screen will appear (Figure 6.11).

Configure Process Tempe	rature - ModWorX	Pro 4.3.0						
e <u>T</u> asks T <u>o</u> ols <u>H</u> elp								
			scanner 2100w - Device name [s/n 14 Configure Process Tempe		Site name Field Name Location name			\bigcirc
						Refresh Apply	ОК	Cancel
Process Temperatu	re Settings							
Information			Input Settings					
Sensor Name			Sampling Period	5 sec Edit)			
Sensor Model Number			Damping Factor	- 0 + No dam	ping			
Sensor Serial Number			Failure Value	60.0 Deg F				
Sensor Range Low	-40.0	Deg F	Low Temperature Cutoff	-150.0 Deg F				
Sensor Range High	800.0	Deg F	Input Source	RTD Input				1
			Enable Override	No 🔻				
Units			Override Value	28.98 Deg F				
Display Unit	Deg F	Edit						
Sensor Calibration Saved Calibrat Operator: None, Calibrate		1	Saved Verificati Operator: None, Calibrated	and the second se				
Calibration Working Units	Deg F		Verification Working Units	Deg F				
Zero Offset	0.000							
Applied/As Left	As Found		Applied	Measured				
vice Interface User Manua	ils							

Figure 6.11

Procedure: Configuring Process Temperature

Process Temperature Settings

- 1. Enter basic sensor information.
 - a. Enter a unique sensor name, if desired.
 - b. Enter the sensor model number, if desired.
 - c. Enter the serial number for the sensor, if desired.

The range of the sensor is automatically read and displayed on the screen in the Sensor Range Low and Sensor Range High fields.

- 2. Change the Display Unit setting, if desired. The default is deg F. To change the setting,
 - a. Click *Edit*. The Edit Display Unit dialog will appear (Figure 6.12, page 77). The base unit is the unit in which the Scanner measures process temperature from the sensor.
 - b. Click on the dropdown *Display Unit* menu to select a display unit. The conversion factor used to convert the base unit to the display unit will automatically update.
 - c. To enter a custom unit, select *Custom* from the dropdown menu, and enter the desired conversion factor and offset.

d. Click OK to save the new settings and return to the Configure Process Temperature screen.

Base Unit	Deg F	
Display Unit	Deg F	
Display Label Text	Deg F Deg C	
Units Conversion Factor	K Deg R	
Units Conversion Offset	<custom></custom>	



- Note When the display unit is changed, the units for other input settings (failure, low temperature cutoff, and override) will update accordingly.
- 3. Adjust parameter values in the Input Settings section, if desired.
 - a. To change the sampling period, perform the following steps:
 - i. Click *Edit*. The Edit Synchronized Time Periods dialog will appear, and an arrow will point to Process Temperature (Figure 6.13).

odWorX Pro							
Edit Synchron	ized	Tim	ne P	eriods			
Archive Loggin	g Pe	riod					
Interval Archive	-	1	+	Hours	Ŧ	24 periods	per day
Flow Run Calcu	Ilatio	n Pe	eriod	Ŀ			
Flow Run	-	1	+	Minutes	Ŧ	60 periods	per interval log period
Input Paramet	er Sa	ampl	ina	Periods			
Static Pressure		1	+	Seconds	÷	60 periods	
Differential Pressure	-	1	+	Seconds	•	60 periods	
Process Temperature	-	5	+	Seconds		12 periods	per flow run calculation perio
Frocess reliperacare							
Turbine Input 1	-	4	+	Seconds	•	15 periods	
	-	4	+	Seconds	Ŧ	15 periods	
	-	4	+	Seconds	Ŧ	15 periods	
		4	+	Seconds	*	15 periods	
	-	4	+	Seconds	•	15 periods	

Figure 6.13

- ii. Select the time period unit desired (seconds, minutes, etc.) using the dropdown menu.
- iii. Use the -/+ buttons to select the number of second, minutes, etc. desired. The screen will automatically divide the flow run calculation period by the input sampling period to determine the number of sampling periods that will occur per flow run calculation period.
- iv. Click OK to save the new settings and return to the Configure Process Temperature screen.

Section 6

- b. To change the damping factor, click the -/+ buttons. The resulting "settling time" will always be a multiple of the sampling period. For example, when the sampling period is 4 seconds, entering a damping factor of 2 will result in a settling time of 8 seconds.
- c. To change the failure value, delete the existing value in the *Failure* field and type in a new value. In the event of a sensor failure, this value will be substituted for a live reading in flow calculations.
- d. To change the low temperature cutoff, delete the existing value and type in a new value. This setting helps prevent inaccuracies in daily and interval process temperature records caused by periods of very low temperature by establishing the minimum temperature at which a signal will be recorded.
- e. The input source allows the user to specify the temperature input logged. When the flow run is configured for gas measurement, the setting defaults to RTD and is not configurable (Figure 6.11, page 76). When the flow run is configured for steam measurement, the setting defaults to Flow Run 1 Calculated Temperature and the override settings below the Input Source field are automatically disabled

Run 1 Calculated Temperature and the override settings below the Input Source field are automatically disabled (Figure 6.14). To log a different temperature input, change the Input Source to RTD.

- Note Using the RTD setting with a steam flow run configuration DOES NOT CHANGE the temperature input used by the steam measurement (a calculated input will still be used). It only changes the temperature that will be logged by the Scanner.
 - f. To override the live input reading (when applicable), click the Enable Override field and change the setting to *Yes*. Then type in the override value desired.
- Note A change to the flow rate calculation method or fluid property calculation method will disable any override of process temperature. If such a change is required, the process temperature override must be re-enabled.
 - g. Click Apply to save the new settings.

Configure Process Tempe	rature - ModWorX	Pro 4.3.0								
e <u>T</u> asks T <u>o</u> ols <u>H</u> elp										
			scanner 2100w - Device name [s/n 144 Configure Process Tempe			Site name Field Name Location name				
							Refresh	Apply	ОК	Cancel
Process Temperatu	re Settings		Input Settings							
Sensor Name Sensor Model Number Sensor Serial Number Sensor Range Low	-40.0	Deg F	Samping Period Damping Factor Failure Value Low Temperature Cutoff	5 sec - 0 - 60.0 -150.0	Edit No damping Deg F Deg F					
Sensor Range High	800.0	Deg F	Input Source Enable Override	Flow Run 1 Calcula Yes	1 2					
Units Display Unit	Deg F	Edit	Override Value	28.98	Deg F					
Sensor Calibration Saved Calibrat			Saved Verificati							
Calibration Working Units Zero Offset	Deg F 0.000		Verification Working Units	Deg F						
Applied/As Left	As Found		Applied	Measured						
vice Interface User Manua	als					COM2 4.3.0	.489 <port< td=""><td>1 Default></td><td>10/15/2018</td><td>8:37 AM</td></port<>	1 Default>	10/15/2018	8:37 AM

Figure 6.14

Sensor Calibration

1. Observe the calibration settings at the bottom of the screen (Figure 6.15). To calibrate the sensor, click on the blue *Calibrate* hyperlink in the Sensor Calibration section and follow the screen prompts.

Calibrate Process Temperature - ModWorX F eIasksIools _Help	Pro 4.3.0			
DOWINLOAD		ocess Temperature	Site name Field Name Location name	
alibrate Inputs	<u></u>			Save Changes Exit Maintenance M
Change Task	Process Temperature Calibration			
	sg F inge (% of FS) Acquire Point Recalibrate Point	Current Calibration Operator: None, Calibrated On: Applied/As Left As Found	Depending o Options sett last calibrati columns ma "Applied/Me "As Left/As l	ing and the on, the y read easured" or
	Clear Point Clear All Points Load Calibration From	Factory Calibration		
lote		Note		
vice Interface User Manuals			COM2 4.3.0.489	<port 1="" default=""> 10/12/2018 4:53 PM</port>

Figure 6.15

- Note The user must enter Maintenance Mode to calibrate process temperature, and will be returned to the Configure Process Temperature screen upon exiting the Maintenance Mode. See Section 8 - Calibrating and Verifying Inputs for complete instructions.
- 2. Observe the verification settings at the bottom of the screen (Figure 6.15). To verify the sensor's calibration, click on the blue *Verify* hyperlink and follow the screen prompts.
- Note The user must enter Maintenance Mode to verify process temperature, and will be returned to the Configure Process Temperature screen upon exiting the Maintenance Mode. See Section 8 - Calibrating and Verifying Inputs for complete instructions.

Analog Input

When the optional expansion board is installed on a Scanner 2000 or Scanner 210x or when a Scanner 2200 is installed, up to two analog inputs can be used to provide pressure or temperature data for calculating flow in accordance with AGA-7, or to log virtually any data read by an instrument with analog output capability. The transmitter providing the analog output signal is powered by the Scanner only when the Scanner is externally powered. Wiring diagrams are provided in Scanner 2000 or Scanner 210x and Scanner 2200 hardware manuals and quick start guides.

The analog inputs can be configured for a 1-5 V, 0-5 V, or 4-20 mA signal. To configure an analog input, click on the *Analog Input 1 or Analog Input 2* button on the Configuration Menu screen (Figure 6.16, page 80). The Configure Analog Input screen will appear (Figure 6.17, page 80).

Note Analog Input 1 and Analog Input 2 function identically and are configured using identical steps. As an example, the following procedure is illustrated with screens showing configuration of Analog Input 1. The same steps should be used to configure Analog Input 2.

e <u>T</u> asks T <u>o</u> ols <u>H</u> elp		
DOWINLOAD	scanner 2100w - [s/n 1441792] Scanner 2100W Configuration Menu	
Device Identification	Date/Time Communications Security	Return
System	Archives Alarms User Modbus Registers	
Flow Runs Flow Run 1		
Turbines Turbine Input 1	Turbine Input 2	
Inputs Differential Pressure Analog Input 1	Static Pressure Process Temperature Analog Input 2	
Outputs Digital Outputs	Analog Outputs PID Control	
vice Interface User Manuals		

Figure 6.16

🔭 Configure Analog Input 1 - ModWorX Pro 4.3.0							
<u>File Tasks Tools H</u> elp					<u></u>		
DOWNLOAD	Scanner 2100W - Device name [s/n 1441 Configure Analog Input 1	1792]		Site name Field Name Location name			
					Refresh Apply	ок	Cancel
Analog Input Settings							
Transducer Signal Type 4 to 20 mA Transducer Type Static Pressure Transducer	Change						
Information	Sensor Paramet	ers					
Sensor Name	Trans. Range Low (4mA)	0.0	PSIG				
Sensor Model Number	Trans. Range High (20mA)	500.0	PSIG				
Sensor Serial Number	Shunt Resistance	250.00	Ohms				
Units	Input Settings						
Display Unit PSIG Edit	Sampling Period	5 sec	Edit				
	Damping Factor	- 0 +	No damping				
	Failure Value	0.0	PSIG				
	Low Pressure Cutoff		PSIG				
	Enable Override	Yes 👻					
	Override Value	374.75	PSIG				
Sensor Calibration							
Saved Calibration Calibrate	Saved Verification	on <u>Verify</u>					
Device Interface User Manuals				COM2 4.3.0	.489 <port 1="" defaul<="" td=""><td>t> 10/15/20</td><td>18 8:48 AM</td></port>	t> 10/15/20	18 8:48 AM

Figure 6.17

Procedure: Configuring an Analog Input

- Enter the output signal type (1-5 V, 0-5 V, or 4-20 mA) and sensor type that best describes the analog instrument connected to the Scanner. The default settings are for a pressure transducer with a 1-5 V output. To change the signal type or the sensor type, click the *Change* button on the Configure Analog Input screen. The Change Analog Input Sensor Type dialog will appear (Figure 6.18). In addition to choosing the signal type, users can select a pressure transducer, temperature sensor, level sensor, or a custom sensor. Click *OK* to save the selection. An Information message will appear, confirming that the analog input has changed.
- Note When the transducer type is changed, all calibration settings are deleted, since they will not apply to the newly selected transducer. See Sensor Calibration, page 84 for further instruction on recalibrating.

ModWorX Pro	
Change Analog Input Sensor Ty	
Transducer Signal Type	
I to 5 Volt	
O to 5 Volt	
() 4 to 20 mA	
Transducer Type	
Static Pressure Transducer	
Differential Pressure Transducer	
Temperature Transducer	
C Level Sensor	
Custom Sensor Type	
	QK Gancel

Figure 6.18

- 2. Enter basic sensor information.
 - a. Enter a unique sensor name, if desired. This name will replace the default name "Analog Input 1" or "Analog Input 2" on the Main Screen and all other screens involving the analog input and in archive log reports.
 - b. Enter the sensor model number, if desired.
 - c. Enter the serial number for the sensor, if desired.
- 3. Change the Display Unit setting, if desired. The default setting varies, depending on what type of transducer is being used. Default display unit settings include psig for static pressure, inches H2O for differential pressure, degrees F for temperature, inches for level, volts for custom voltage input, and milliamps for custom 4-20 mA input. To change the unit setting for a pressure, temperature, or level sensor,
 - a. Click *Edit*. The Edit Display Unit dialog will appear (Figure 6.19).

Base Unit	In H2O	
Display Unit	In H2O	
Display Label Text	INH2O	
Units Conversion Factor	1.0	
Units Conversion Offset	0.0	

Figure 6.19

The base unit is the unit in which the Scanner measures the signal output by the transducer or sensor.

b. Click on the dropdown *Display Unit* menu to select a display unit. The conversion factor used to convert the base unit to the display unit will automatically update.

- c. Click OK to save the new settings and return to the Configure Analog Input screen.
- 4. To change the unit setting for a Custom Sensor Type,
 - a. Click the *Edit* button next to Sensor Parameters (Figure 6.20).

🎢 Configure Analog Input 1 - ModWorX Pro 4.3.0		
<u>F</u> ile <u>T</u> asks T <u>o</u> ols <u>H</u> elp		
DOWNLOAD	Scanner 2100W - Device name [s/n 1441792] Configure Analog Input 1	Site name Field Name Location name
		Refresh Apply OK Cancel
Analog Input Settings		
Transducer Signal Type 1 to 5 Volt Transducer Type Custom Sensor Type	Change	
Information	Input Settings	
Sensor Name	Sampling Period 5 sec Edit	E
Sensor Model Number	Damping Factor – 0 + No damping	
Sensor Serial Number	Failure Value 1.0 V	
	Low Reading Cutoff 1.0 V	
Sensor Parameters Edit	Enable Override Yes 👻	
Display Label Text V	Override Value 1.0 V	
Transducer Range Low (1V) 1.0 V		
Transducer Range High (5V) 5.0 V		
Sensor Calibration		
Saved Calibration Calibrate	Saved Verification Verify	
Operator: None, Calibrated On: 10/15/2018	Operator: None, Calibrated On:	
Calibration Working Units MA	Verification Working Units MA	
Zero Offset 0.000		
Device Interface User Manuals		
		COM2 4.3.0.489 <port 1="" default=""> 10/15/2018 8:50 AM</port>

Figure 6.20

b. The Edit Custom Transducer Range dialog will appear (Figure 6.21).

	<custom> 💌</custom>		
Display Label Text	v]	
ransducer Range Low	1.0	v	
Fransducer Range High	5.0	v	

- Note When the display unit is changed, the units for other input settings (failure, low reading cutoff, and override) will update accordingly.
- 5. Enter Sensor Parameters.
 - a. The Transducer Range Low setting is the output value that will represent the low end of the sensor's range. (For example, a low setting of 10 psig for a 1-5V pressure transmitter would cause the Scanner to record a 10 psig measurement when it receives a 1-volt input.

- b. The Transducer Range High setting is the output value that will represent the high end of the sensor's range. (For example, a high setting of 200 psig for the same 1-5V pressure transmitter would cause the Scanner to record a 200 psig measurement when it receives a 5-volt input.
- c. If a 4-20 mA transmitter is being used, a resistor is required in the field wiring of the analog input device. A third data field—Shunt Resistance—will appear in the Sensor Parameters section of the screen. Enter the resistance value (ohms) of the resistor installed in that field (Figure 6.22).

	- ModWorX Pro 4.3.0						_	_	_		
<u>Iasks</u> T <u>o</u> ols <u>H</u> elp							2				-
		Scanner 2100w - Device name [s/n 1441/92] Site name Configure Analog Input 1							(
						0	Refresh	Apply		ОК	Cancel
nalog Input Settin	gs										
ransducer Signal Type ransducer Type	4 to 20 mA Differential Pressure Transduc	Change									
Information			Sensor Paramet	ers							
Sensor Name			Trans. Range Low (4mA)	0.0	In H2O						
Sensor Model Number			Trans. Range High (20mA)	0.0	In H20						
Sensor Serial Number			Shunt Resistance	250.00	Chers						
Units			Input Settings								
Display Unit	In H20 Edit		Sampling Period	5 sec	Edit						
			Damping Factor	- 0 +	No damping						
			Failure Value	0.0	In H2O						
			Low Pressure Cutoff	0.0	In H2O						
			Enable Override	Yes •							
			Override Value	0.0	In H2O						

Figure 6.22

- d. If a Custom Sensor Type is selected, click the *Edit* button next to Sensor Parameters to access the Transducer Range Low and Transducer Range High settings (see the Edit Custom Transducer Range dialog in Figure 6.21, page 82).
- 6. Adjust parameter values in the Input Settings section, if desired.
 - a. To change the sampling period, perform the following steps:
 - i. Click *Edit*. The Edit Synchronized Time Periods dialog will appear, and an arrow will point to Analog Input 1 or Analog Input 2 (Figure 6.23, page 84).
 - ii. Select the time period unit desired (seconds, minutes, etc.) using the dropdown menu.
 - iii. Use the -/+ buttons to select the number of seconds, minutes, etc. desired. The screen will automatically divide the flow run calculation period by the input sampling period to determine the number of sampling periods that will occur per flow run calculation period.
 - iv. Click **OK** to save the new settings and return to the Configure Analog Input screen.

						2
Edit Synchron	iized	Tim	ne P	Periods		
Archive Loggin	g Pe	riod				
Interval Archive	_	1	+	Hours	▼ 24 periods	per day
Flow Run Calcu	ulatic	on Pe	eriod	t		
Flow Run	-	1	+	Minutes	✓ 60 periods	per interval log period
Input Paramet	er S	ampl	ling	Periods		
Input Paramet	er Sa	ampl	ing +	Periods Seconds	✓ 60 periods	1
2	er Sa			-		1
Static Pressure	-	1	+	Seconds	← 60 periods	1
Static Pressure Differential Pressure	-	1	+	Seconds Seconds	60 periods60 periods	per flow run calculation period
Static Pressure Differential Pressure Process Temperature	-	1 1 5	+++++++++++++++++++++++++++++++++++++++	Seconds Seconds Seconds	 60 periods 60 periods 12 periods 	per flow run calculation period
Static Pressure Differential Pressure Process Temperature Analog Input 1	-	1 1 5 5	+ + + +	Seconds Seconds Seconds Seconds	 60 periods 60 periods 12 periods 12 periods 	per flow run calculation period

Figure 6.23

- b. To change the damping factor, click the -/+ buttons. The resulting "settling time" will always be a multiple of the sampling period. For example, when the sampling period is 4 seconds, entering a damping factor of 2 will result in a settling time of 8 seconds.
- c. To change the failure value, delete the existing value in the *Failure* field and type in a new value. In the event of a sensor failure, this value will be substituted for a live reading in flow calculations.
- d. To change the low reading cutoff (which may be identified as low pressure cutoff, low temperature cutoff, etc., depending on the sensor type selected), delete the existing value and type in a new value. This setting helps prevent inaccuracies in daily and interval analog input records caused by periods of very low activity by establishing the minimum output at which a signal will be recorded.
- e. To override the live input reading (when applicable), click the *Enable Override* field and change the setting to *Yes*. Then type in the override value desired.
- f. Click *Apply* to save the new settings.

Sensor Calibration

- IMPORTANT Analog Input 1 and Analog Input 2 are calibrated at the factory before each unit is shipped, and typically, field calibration of an analog input is not required. However, if a periodic field calibration is required or desired, be sure to enter the range BEFORE performing the calibration. Adjusting the range after an analog input has been calibrated can cause erroneous analog records.
- 1. Observe the calibration settings at the bottom of the screen (Figure 6.24, page 85). To calibrate the sensor, click on the blue *Calibrate* hyperlink in the Sensor Calibration section and follow the screen prompts.

ModWorX Pro

Calibrate Analog Input 1 - ModWorX Pro 4.3.0		
e <u>T</u> asks T <u>o</u> ols <u>H</u> elp		
DOWNLOAD	scanner 2100w - Device name [s/n 1441792] Calibrate Analog Input 1	Site name Field Name Location name
		Save Changes Exit Maintenance Mode
alibrate Inputs		
Change Task Input Parameter Analog Input	1	
Calibration Task Calibration		
New Calibration Calibration Working Units Applied/As Left As Found Change (% of FS)	Current Calibration Operator: None, Calibrated On: 10/15/2018 Acquire Point Clear All Points Load Calibration From	Depending on the Options setting and the last calibration, the columns may read "Applied/Measured", or "As Left/As Found".
Note	Note	
ce Interface User Manuals		
		COM2 4.3.0.489 <port 1="" default=""> 10/15/2018 8:57 AM</port>

Figure 6.24

- Note The user must enter Maintenance Mode to calibrate an analog input, and will be returned to the Configure Analog Input screen upon exiting the Maintenance Mode. See Section 8 Calibrating and Verifying Inputs for complete instructions.
- 2. Observe the verification settings at the bottom of the screen (Figure 6.24). To verify the sensor's calibration, click on the blue *Verify* hyperlink and follow the screen prompts.
- Note The user must enter Maintenance Mode to verify an analog input, and will be returned to the Configure Analog Input screen upon exiting the Maintenance Mode. See Section 8 Calibrating and Verifying Inputs for complete instructions.

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Section 7 - Configuring Outputs

The standard Scanner 2000 or Scanner 210x supports a single digital output. The Scanner 2200 supports two digital outputs. A digital output can be configured to represent any of the following:

- a pulse output indicating the volume, mass, or energy of gas or liquid passing through a flow run
- a pulse output indicating the volume of gas or liquid passing through a turbine input run
- a pulse output based on time
- a response to a value that triggers an alarm
- a response to a value that goes above a user-defined setpoint, below a user-defined setpoint, or out of the range of user-defined setpoints
- a programmable output state

An analog output is standard on Scanner 2105 and 2200 devices. To use the analog output to transmit data to another current-reading device, an analog readout device must be connected to the Scanner and the Scanner must be powered either by an external power supply or loop power (Scanner 2105 only).

For instructions on configuring an analog output, see Analog Output, page 97.

Procedures for each of these configuration options are provided in this section.

Digital Output

To configure a digital output, click the Configure button in the task menu bar on the Main Display screen (Figure 7.1).

	Scanner 2100	W - Device name [s/n 14417921		Site name		5
DOWNLOAD		2100W Main			Field Name Location name		e
fresh 🔽 Auto-Refresh							Retu
Salibrate Inpu	uts 🚺 🗿 Mai	ntain Flow Run	🛞 Mainta	ain Turbine 🛛 💮 Manage	PID 🛛	Configure	
Flow Run Data				Turbine Data			
Flow Rate	352.687	MCF/day		Turbine 1 Flow Rate	7	BBL/day	
Daily Total (est.)	317.173	MCF		Turbine 1 Grand Total	4.52234E006	BBL	
Heating Value	1036.06	BTU/SCF		Turbine 2 Flow Rate	0	BBL/day	
				Turbine 2 Grand Total	0	BBL	
	Current Day	Previous Day	_		Current Day	Previous Day	
Volume Flow	45.3104	352.687	MCF	Turbine 1 Volume Flow	0.902952	7	BBL
Mass Flow	2014.74	15682.3	LBM	Turbine 2 Volume Flow	0	0	BBL
Energy	46.9442	365.404	MMBTU				
			DETAILS				DETAILS
Input Data				System Data			
Static Pressure	6.22	PSIG	8	Alarms			ALARMS
Differential Pressure	164.62	In H2O	8	Supply / Battery Voltage	10.28 / 10.5	5 V	
Process Temperature	60.00	Deg F	×	Temperature	71.6	Deg F	
Analog Input 1	0.00	inches	-	Date/Time	Oct 26, 2018	3 11:05:48 AM	
Analog Input 2	56.24	Deg F	8	Analog Output	15.20) mA	
				Smart Battery / Health %	83.00 / 97	7 %	
			DETAILS				DETAILS
Interface User Manuals							

Figure 7.1

Then, click the *Digital Output* button in the Outputs section of the Configuration Menu screen (Figure 7.2).

T Scanner 2100W Configuration Menu - ModWorX Pro 4.3.	0				
Eile Iasks Tgols Help DOWNLOAD	Scanner 2100w - [s/n 1441792 Scanner 2100W Con				
					Return
System Device Identification Display	Date/Time Archives	Communications Alarms	Security User Modbus Registers		
Flow Runs How Run 1					
Turbines Turbine Input 1	l				
Inputs Differential Pressure	Static Pressure	Process Temperature			
Outputs Digital Outputs	Analog Outputs	PID Control	-		
Device Interface User Manuals			COM2 4.3.0.489	<port 1="" default=""></port>	10/12/2018 12:29 PM

Figure 7.2

The Configure Digital Outputs screen will appear (Figure 7.3). By default, the digital output is disabled.

🎢 Configure Digital Outputs - Moo	dWorX Pro 4.3.0					
Eile Lasks Tools Help						
		nner 2100w - Device name [s/n 1441792] Donfigure Digital Outputs	Site name Field Name Location name			
				Refresh Apply	0	K Cancel
Digital Output 1 Setting	s					
Output Hode Dis	abled	Change				
Digital Output is Di The output is inactive.	isabled					
Device Interface User Manuals						
City of the second			COMZ 4.3.0	0.489 <port 1="" defa<="" td=""><td>lt> 10/15/</td><td>2018 9:24 AM</td></port>	lt> 10/15/	2018 9:24 AM

Figure 7.3

To enable a digital output, click *Change*. The Change Digital Output Mode dialog (Figure 7.4, page 89) will appear, displaying all of the possible configuration options.



Procedure: Configure a Volume-Proportional Pulse Output

- 1. From the Change Digital Output screen, select the parameter that the digital output will represent (Figure 7.5):
 - flow run 1 volume
 - flow run 1 mass
 - flow run 1 energy
 - periodic
 - turbine input 1 volume
 - turbine input 2 volume (will appear only if optional expansion board is installed in Scanner 2000 or Scanner 210x, or if Scanner 2200 is installed)



Figure 7.5

2. Click OK to save the setting and return to the Configure Digital Outputs screen (Figure 7.6, page 90).

Configure Digital Outputs - M	lodWorX Pro 4.3.0					- lun	
e ⊥asks Tgols <u>H</u> elp					~		
			canner 2100w - Device name [s/n 1441792] Configure Digital Outputs	Site name Field Name Location name			6
				C	Refresh Apply	ок	Can
igital Output 1 Settin	gs						
Dutput Hode Fl	low Run 1 Volume		Change				
			volume divided by the Output Scaling factor.				
Output Scaling		MO [#] per pulse					
Pulse Duration	Ford Press	msec					
Dutput State	Normally Closed *		duration				
Other Parameter	rs						
Animum Pulse Period	20	msec					
taximum Output Frequency	50.0	Hz					
Maximum Uncached Flow Rate	0.0	MCF/DAY	(Puises are cached above this flow rate)				
te Interface User Manuals							
				COM2 4.3.0	0.489 <port 1="" defa<="" td=""><td>st> 10/15/201</td><td>18 9:25 AM</td></port>	st> 10/15/201	18 9:25 AM

Figure 7.6

- 3. In the Output Scaling field, enter the volume that each pulse will represent. The engineering unit that is selected for displaying volume (as entered on the Configure Flow Run or Configure Turbine screen) will appear as the output scaling unit on this screen.
- 4. Adjust the pulse duration (in milliseconds) using the -/+ buttons, if desired.
- 5. Select the appropriate output state (normally closed or normally open). The screen will automatically display the minimum pulse period, maximum output frequency, and maximum uncached flow rate, based on the scaling, volume units, and pulse duration selected.

Procedure: Configure a Periodic (Time-Based) Pulse Output

1. From the Change Digital Output screen, select *Periodic* (Figure 7.7).



Figure 7.7

2. Click OK to save the setting and return to the Configure Digital Outputs screen (Figure 7.8, page 91).



Figure 7.8

3. Adjust the output period by clicking the *Edit* button (Figure 7.9). The output period can be entered in terms of seconds, minutes or hours.

Enter amount of time 0 Seconds Seconds Minutes Hours	Edit T	ime Period	
Seconds Minutes	Enter amou	int of time	
Minutes	0	Seconds 🔽	
		Minutes	

Figure 7.9

- 4. Click *OK* to save the setting and return to the Configure Digital Outputs screen.
- 5. Adjust the pulse duration using the -/+ buttons (default is 10 msec).
- 6. Change the output state, if necessary. Options are Normally Open and Normally Closed.
- 7. Click *Apply* to save the new settings.

Procedure: Configure an Alarm Output

An alarm output is used to generate a pulse output as a result of an alarm activation. If a digital output is desired when certain conditions occur, but the user does not desire to log an alarm each time the trigger condition occurs, consider using a conditional output. See Procedure: Configure a Conditional Output, page 94.

1. From the Change Digital Output screen, select *Activated Alarms* (Figure 7.10, page 92).



Figure 7.10

2. Click OK to save the setting and return to the Configure Digital Outputs screen (Figure 7.11).

nfigure Digital Outpu <u>Tasks</u> T <u>o</u> ols <u>H</u> elp					
	,	scanner 2100w - Device name [s/n 1441792] Configure Digital Outputs	Site name Field Name Location name		E
			Refresh	Apply	OK Can
gital Output 1 Se					
utput Mode	Activated Alarms	Change			
Output Settin	96				
		enabled and the corresponding alarm conditions exist.			
	om the Configure Alarms screen.	chabica and the conceptioning arean contrations exist.			
arameter	Either High or Low Alarm	Select			
rigger Conditions	Flow Run Alarms				
		e (H/L) - high enabled/low enabled			
		(H/L) - high enabled/low enabled			
		L) - high enabled/low enabled			
	🛄 4 Unassigned -				
	5 Unassigned -				
	6 Unassigned -				
	7 Unassigned -				
	8 Unassigned -				
	9 Unassigned -				
	10 Unassigned -				
	11 Unassigned -				
	12 Unassigned - 13 Unassigned -				
	14 Unassigned -				
	15 Unassigned -				
	16 Unassigned -				
larm Trigger Hold-Off	10 sec Edit)			
Output State	Normally Closed 💌				
Output Latching	Non-latching 👻				
e Interface User Man					

Figure 7.11

- 3. Click the *Select* button beside the Parameter field and select a digital output parameter from the dropdown list on the dialog screen (Figure 7.12).
 - Select "*Either High or Low Alarm*" to generate a pulse output whenever a configured high or low alarm is activated. A list of configured alarms will appear in the Trigger Conditions field.
 - Select "Low Alarm Status" to generate a pulse output only when a configured low alarm is activated. A list of configured alarms will appear in the Trigger Conditions field.

lodWorX Pro	
Select Digital Outp	ut Parameter
Select register to assign	
Either High or Low Alarm	
Ether High or Low Alarm Low Alarm Status High Alarm Status Diagnostic 1 Diagnostic 2 Diagnostic 3 Diagnostic 4	

Figure 7.12

- Select "High Alarm Status" to generate a pulse output only when a configured high alarm is activated. A list of configured alarms will appear in the Trigger Conditions field.
- Select "*Diagnostic 1*" to generate a pulse output when a user-selected failure or override condition occurs. A list of 16 diagnostic bits will appear in the Trigger Conditions field. Up to four diagnostic parameters ("Diagnostic 1, 2, 3, or 4") can be used to generate a digital output and up to 16 diagnostic bits can be assigned as triggers for each diagnostic parameter.
- 4. To enable the trigger conditions that will generate a digital output, check the appropriate selections in the Trigger Conditions field.
 - If one of the top three selections was chosen in step 3, only parameters that are configured as alarms will appear in the Trigger Conditions field (Figure 7.11, page 92). To add a parameter, configure a new alarm in the Configure Alarms menu. See Archive Parameter Setup, page 41, for more details.
 - If a diagnostic parameter is chosen in step 3, check the diagnostic bits that you want to generate a digital output (Figure 7.13, page 94). Up to 16 diagnostic bits can be selected as triggers for each diagnostic parameter.
- 5. Click *Apply* to save the new settings.

<u>T</u> asks T <u>o</u> ols <u>H</u> elp		(1	-
DOWNLOAD	D	Scanner 2100w - Device name [s/n 1441792] Configure Digital Outputs	site name Field Name Location name		e
				Refresh Apply	OK Can
gital Output 1 Se	ettings				
stput Hode	Activated Alarms	Change			
Output Settin	igs				
he output is active if an Nams are configured fr	ny of the trigger conditions below are on the Configure Alarms screen.	enabled and the corresponding alarm conditions exist.			
arameter	Diagnostic 1	Select			
ingger Candibans	Degrostic Bis Filter Run I Pall - Renered - Turbine 2 Fall - Turbine 2 Fall - Gross Tenpestare Fall - Gross Tempestare 1 - Analog 2 hauf Fall - Renered - - Turbine 2 Override - Static Pressure Overric - Gross Tempestare 1 - Gross Tempestare 1 - Gross Tempestare 1 - Analog 2 hauf Fall - Gross Tempestare 1 - Analog 2 hauf Fall - Coverde - Coverd	•			
klarm Trigger Hold-Off Output State Output Latching	0 sec Edit Normally Closed Normality Closed No)			
e Interface User Man	uals			0.489 cPort 1 Defaul	it> 10/15/2018 9:34 AM

Figure 7.13

Procedure: Configure a Conditional Output

- 1. From the Change Digital Output screen, select the conditions under which the alarm output is to activate:
 - value below setpoint- the alarm is activated when the assigned value is below the designated threshold (Figure 7.14)
 - value above setpoint the alarm is activated when the assigned value is above the designated threshold
 - value out of setpoint range (above or below threshold) the alarm is activated when the assigned value goes above or below the designated threshold



Figure 7.14

2. Click *OK* to save the setting and return to the Configure Digital Outputs screen (Figure 7.15). In this example, the alarm output is configured to activate when the value is below the designated threshold.

📅 Configure Digital Outputs	- ModWorX Pro 4.3.0					
Eile ⊥asks Tools Help						
			scanner 2100w - Device name [s/n 1441792] Configure Digital Outputs	Site name Field Name Location name		S
				Refr	esh Apply	OK Cancel
Digital Output 1 Set	tings					1
Output Mode	Value Below Setpoi	nt	Overge			
Output Setting	s					
The output is active while t	the Parameter value is le	ss than the Low	Setpoint value.			
Parameter	Flow Run 1 Flow Ra	ste	Select			
Low Setpoint	0.0	MCF/day				
Alarm Trigger Hold-Off	0 sec	Edit				
Output State	Normally Closed 🔻					
Output Latching	Non-latching 🝷					
levice Interface User Manua	ls.					
				COM2 4.3.0.485	<pre></pre>	10/15/2018 9:40 AM

Figure 7.15

3. Select the parameter to be assigned to the digital output. Click *Select* to view the options. A Select Digital Output Parameter window will appear (Figure 7.16). Click on the dropdown arrow to view all available parameters. Click on the parameter of your choice, and click *OK* to save the selection and return to the Configure Digital Outputs screen.

IodWorX Pro			_	
Select Digital	Output	Parame		
Select register to assign Flow Run 1 Flow Rate				•
Source Modbus Address	8028			
		QK	⊆ ⊆a	ncel

Figure 7.16

- 4. Enter low and/or high setpoint values, as applicable. The unit displayed for the setpoint is the unit in which the selected parameter is configured.
- 5. Adjust the Alarm Trigger Hold-off value, if necessary, by clicking the *Edit* button. An Edit Time Period window will appear (Figure 7.17). The alarm trigger hold-off is the amount of time the Scanner will wait before activating the alarm when the assigned parameter value exceeds the setpoint value. By default, the hold-off is set at zero. The time period can be configured in terms of seconds, minutes, or hours.
- 6. Click OK to save the selection and return to the Configure Digital Outputs screen.

Edit T	ime Period
	ime Penou
Enter amou	int of time
0	Seconds
	Seconds
	Minutes Hours

Figure 7.17

- 7. Change the output state, if necessary (Figure 7.15, page 95). Options are Normally Open and Normally Closed.
- 8. Change the Output Latching setting, if necessary (Figure 7.15, page 95). Options are Non-latching and Latching. If the alarm is latched, it will remain active once it is activated, even if the assigned parameter value returns to a normal range. The alarm must be manually cleared by the operator. If the alarm is non-latching, the alarm will clear when the assigned parameter value returns to a normal range without intervention from the operator.
- 9. Click *Apply* to save the new settings.

Procedure: Configure a Programmed Output State

1. From the Change Digital Output screen, select Controlled Output State (Figure 7.18).



Figure 7.18

2. Click OK to save the setting and return to the Configure Digital Outputs screen (Figure 7.19).

Configure Digital Outpu	sts - ModWorX Pro 4.3.0			
Eile ⊥asks Tools Help	5.			
DOWNLOA	D	scanner 2100w - Device name [s/n 1441792] Configure Digital Outputs	Site name Field Name Location name	6
			R	efresh Apply OK Cancel
Digital Output 1 Se	ettings			
Output Mode	Controlled Output State	Change		
Output Settin	1gs le the Pulse Out 1 Pulses holding regis	ter value is non-zero.		
Output State	Normally Closed 🔻			

Figure 7.19

3. Note that the Pulse Out 1 Pulses holding register controls the enabling and disabling of this output. See the protocol section of the appropriate Scanner Hardware User Manual for more information about register configuration.

- 4. Change the output state, if necessary. Options are Normally Open or Normally Closed.
- 5. Click *Apply* to save the new settings.

Analog Output

An analog output is standard on all Scanner 2105 and 2200 devices. To use the analog output to transmit data to another current-reading device, an analog readout device must be connected to the Scanner and the Scanner must be powered either by an external power supply or loop power (Scanner 2105 only). Wiring diagrams are provided in the appropriate Scanner Hardware User Manual, in the Scanner 2000 Expansion Board Quick Start Guide, and in the Scanner 2200 Quick Start Guide.

To configure an analog output, click the Configure button in the task menu bar on the Main Display screen (Figure 7.20).



Figure 7.20

Then, click the Analog Outputs button in the Outputs section of the Configuration Menu screen (Figure 7.21).

Scanner 2100W Configuration Menu - ModWorX Pro 4.	43.0	
<u>File Tasks Tools H</u> elp		
DOWNLOAD	Scanner 2100W - [s/n 1441792] Scanner 2100W Configuration Menu	
		Return
System Device Identification	Date/Time Communications Security Archives Alarms User Modbus Registers	
Flow Runs Flow Bun 1		
Turbines Turbine Input 1	Turbine Input 2	
Differential Pressure Analog Input 1	Static Pressure Process Temperature Analog Input 2	
Outputs Digital Outputs	Analog Outputs	
Device Interface User Manuals	CCH2 4.3.0-489 <port 1="" default=""></port>	10/12/2018 11:56 AM

Figure 7.21

The Configure Analog Output screen will appear (Figure 7.22). By default, the analog output is disabled.

Configure Analog Outputs - ModWork Pro 4.3.0			
Elle Inska Tgola Help			
CONVERCOND	Scamer 2300w - Device name (s/n 1441792) Configure Analog Outputs	Site name Field Name Location name	S
		Refi	esh Apply OK Canoel
Analog Output Settings			
Output Hode Disabled	Change		
Analog Output is Disabled The substite mether.			
			~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
Device Teterface User Manuals			
		COH2 4.3.0.495	Port 1 Default> 10/15/2018 9:42 AM



To enable an analog output, click Change. The Change Analog dialog will appear (Figure 7.23).



Figure 7.23

Select *Track Measured/Calculated Parameter* and click *OK*. The Configure Analog Output screen will automatically update to display fields for entering configuration parameters.

### Procedure: Configure an Analog Output

1. From the Configure Analog Outputs screen, select the parameter to be represented by the 4-20 mA output in the Parameter field (Figure 7.24). By default, Flow Run 1 Flow Rate will appear in this field.

Configure Analog Outputs - I	ModWorX Pro 4.3	۵						
ile <u>T</u> asks T <u>o</u> ols <u>H</u> elp								
			er 2100w - Device name [s/n 1441 figure Analog Outputs	792]	Site name Pield Name Location name			
						Refresh Apply	ОК	Cancel
Analog Output Setting	IS .							
Output Mode	frack Measured/	Calculated Parameter	Change					
Output Settings The output is proportional to t	the Parameter value	e between the Low Setpoin	t and High Setpoint.					
Parameter	Static Pressure (	Gauge)	Select					
Low Setpoint (for 4mA)	0.0	PSIG						
High Setpoint (for 20 mA)	500.0	PSIG						
Output Calibration								
New Output Cali Note: The maximum output ad		to +/- 500 uA.	Active Output Ca	libration				
Zero (4 mA) Adjustment	+ 0.000 uA	4 mA Setting	Zero (4 mA) Adjustment	+ 0.000 uA				
Full Scale (20 mA) Adjustment	+ 0.000 uA	20 mA Setting	Full Scale (20 mA) Adjustment	+ 0.000 uA				
		Clear Adjustments						
Test Analog Out	put							
wice Interface User Manuals					COM2 4.3.0	.489 <port 1="" defau<="" td=""><td>t&gt; 10/15/201</td><td>8 9:44 AM</td></port>	t> 10/15/201	8 9:44 AM

Figure 7.24

2. Click Select to choose a parameter from the Select Analog Output Parameter dialog (Figure 7.25).

fodWorX Pro	ut Daramastar	
Select Analog Outpu	it Parameter	
Select register to assign		
Flow Run 1 Flow Rate		-
Bow Run 1 How Rote Flow Run 1 Mass Flow Rote Flow Run 1 Energy Flow Rate Turbine 1 Flow Rate Static Pressure (Sauge) Differential Pressure Process Temperature		
	QK	Gancel

Figure 7.25

- 3. Click OK to close the Select Analog Output Parameter dialog and return to the Configure Analog Output screen.
- 4. In the Low Setpoint (for 4 mA) field, enter the parameter value that the 4 mA output signal will represent. The unit associated with this value will be the unit configured for the parameter selected in step 1.
- 5. In the High Setpoint (for 20 mA) field, enter the parameter value that the 20 mA output signal will represent. The unit associated with this value will be the unit configured for the parameter selected in step 1.
- 6. Click *OK* to save the settings and exit the Configure Analog Outputs screen, or click *Apply* to save the settings and proceed with a calibration of the analog output, as described below.

The output is proportional to the parameter value between the low and high setpoints.

### Procedure: Calibrate an Analog Output

The Scanner analog output is pre calibrated at the factory and field calibration is not required prior to use. However, ModWorX Pro provides users with an easy method of calibrating the output to minimize error in recorded measurements. This feature allows a user to scale the input of a PLC or other current-reading device without using a simulator, and can provide the high accuracy desired when using an analog output to indicate flow rate.

To calibrate the analog output,

- 1. Connect the Scanner to an ammeter or analog readout device capable of measuring actual current.
- 2. Navigate to the Configure Analog Output screen and locate the Output Calibration section of the screen.
- 3. Under New Output Calibration, click on the *4 mA Setting* button to send a 4 mA signal from the Scanner to the receiving device. The Zero (4 mA) Adjustment dialog will appear (Figure 7.26, left).

ModWorX Pro 🔛	ModWorX Pro 🔛
Zero (4 mA) Adjustment	Zero (4 mA) Adjustment
Enter measured output current:	Enter measured output current:
OK Cancel	OK Cancel



- 4. Read the output value as read by the receiving device, and enter it in the screen (Figure 7.26, right). Click *OK* to calculate the adjustment. The adjustment will appear in the box next to the 4 mA Setting button (Figure 7.28, page 101).
- 5. Click on the 20 mA Setting button to send a 20 mA signal from the Scanner to the receiving device. The Full Scale (20 mA) Adjustment dialog will appear (Figure 7.27, left).



Figure 7.27

6. Read the output value as read by the receiving device, and enter it in the screen (Figure 7.27, right). Click *OK* to calculate the adjustment. The adjustment will appear in the box next to the 20 mA Setting button (Figure 7.28, page 101).
| Configure Analog Outputs - I                  | ModWorX Pro 4.3.   | 0                  |         |                                       |            |                                          |        |       |    | - 0 1  |
|-----------------------------------------------|--------------------|--------------------|---------|---------------------------------------|------------|------------------------------------------|--------|-------|----|--------|
| ile <u>T</u> asks T <u>o</u> ols <u>H</u> elp |                    |                    |         |                                       |            |                                          |        |       |    |        |
|                                               |                    |                    |         | evice name [s/n 144]<br>nalog Outputs |            | Site name<br>Field Name<br>Location name |        |       |    | 6      |
|                                               |                    |                    |         |                                       |            | 4                                        | efresh | Apply | OK | Cancel |
| Analog Output Setting                         | s                  |                    |         |                                       |            |                                          |        |       |    |        |
| Output Mode                                   | rack Measured/     | Calculated Paramet | er Chan | ge                                    |            |                                          |        |       |    |        |
| Output Settings                               |                    |                    |         |                                       |            |                                          |        |       |    |        |
| The output is proportional to t               |                    |                    |         | ant.                                  |            |                                          |        |       |    |        |
| Parameter<br>Low Setpoint (for 4 mA)          | Static Pressure (i | Gauge)<br>PSIG     | Select  |                                       |            |                                          |        |       |    |        |
| High Setpoint (for 20 mA)                     | 500.0              | PSIG               |         |                                       |            |                                          |        |       |    |        |
|                                               |                    |                    |         |                                       |            |                                          |        |       |    |        |
| Output Calibration                            |                    |                    |         |                                       |            |                                          |        |       |    | 4      |
| New Output Cali                               |                    | 10 +/- 500 uA.     | A       | ctive Output Ca                       | libration  |                                          |        |       |    |        |
| Zero (4 mA) Adjustment                        | + 4.880 uA         | 4 mA Setting       |         | 4 mA) Adjustment                      | + 0.000 uA |                                          |        |       |    |        |
| Full Scale (20 mA) Adjustment                 | + 1.952 uA         | 20 mA Setting      |         | ale (20 mA) Adjustment                | + 0.000 uA |                                          |        |       |    |        |
|                                               |                    | Clear Adjustments  |         |                                       |            |                                          |        |       |    |        |
|                                               |                    |                    |         |                                       |            |                                          |        |       |    |        |
| Test Analog Out                               | put                |                    |         |                                       |            |                                          |        |       |    |        |

Figure 7.28

- 7. Click *Apply* to save the adjustments. The adjustments will appear under the Active Output Calibration section of the screen. Click *OK* to return to the Configuration menu, or click Apply to save the new settings without leaving the Configure Analog Outputs screen.
- 8. To clear adjustments and repeat the calibration process, click the *Clear Adjustments* button; then, repeat steps 3 through 6.
- 9. To test the analog output following adjustments, click the *Test Output* button at the bottom of the Configure Analog Outputs screen. A Test Analog Output dialog will appear (Figure 7.29).

odWorX Pro			
Test Analo	g Outpu	ţ	
Output Value (mA):	4.000		Apply
			Done

Figure 7.29

10. Enter the output value (in mA) you wish to apply and click *Apply*. The Scanner will send the user-specified signal to the receiving device. If the trim was applied correctly, the readout of the receiving device should match the test value entered in the Test Analog Output screen. If the values do not match, repeat steps 3 through 7. Reading an input value from the receiving device incorrectly or transposing numbers typed into the screen may be the cause of the discrepancy in values.

Note The Scanner will not allow adjustments of more than 500 uA. If the value read by the receiving device varies by more than 500 uA from the value read by the Scanner, equipment failure should be investigated.

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# Section 8 - Calibrating and Verifying Inputs

The standard Scanner supports inputs for differential pressure, static pressure, and process temperature.

This section will guide users in performing the following tasks:

- calibrate an input
- zero an input
- verify an input

Before attempting to calibrate an input, make sure the calibration test device is securely connected to the Scanner. See the wiring diagrams and manifold valve diagrams in the appropriate Scanner Hardware User Manual for more information.

To calibrate or verify an input, click the *Calibrate Inputs* button in the task menu bar on the Main Display screen (Figure 8.1).



Figure 8.1

The instrument will enter the Maintenance mode. Click *Yes* at the Enter Maintenance Mode dialog to proceed. (Maintenance Mode is a requirement for all calibration, verification, and set zero offset tasks.)

The Change Calibration Task dialog will appear (Figure 8.2, page 104). On this screen, the user selects both the calibration task to be performed (calibrate, zero, or verify) and the input parameter to be calibrated (differential pressure, static pressure, or process temperature). If the optional expansion board is installed in a Scanner 2000 or Scanner 210x, or if a Scanner 2200 is installed, the listing of selectable input parameters will include Analog Input 1 and Analog Input 2.

Note If an input is disabled (sampling period is set to zero), the input cannot be calibrated, and the option will be grayed out and marked as "disabled."

ОК

## Procedure: Calibrating an Input

In the following example, differential pressure will be calibrated. The same procedural steps can be applied in calibrating any of the input parameters.

- 1. On the Change Calibration Task screen, click *Calibrate (Multi-point)* as the Calibration task, and click the input parameter of your choice. For this example, Differential Pressure is the input parameter to be calibrated (Figure 8.2).
- 2. Click **OK** to save the settings.
- 3. The Calibrate Differential Pressure screen will appear, and the input parameter and calibration task selections you made will appear at the top of the screen (Figure 8.3, page 105).

Note For more information about the appearance of column headings on the Calibrate screen, see Change Format of Newly-Saved Calibrations, page A-12.

ilibrate Differential Pressure - ModWorX Pro 4.3.0 <u>T</u> asks T <u>o</u> ols <u>H</u> elp			
DOWNLOAD	Scanner 2100w - Device name [s/n 1441792] Calibrate Differential Pressure	Site name Field Name Location name	()
		Save Ch	anges Exit Maintenance Moo
librate Inputs Change Task Input Parameter Differential Pre	ssure		
New Calibration Calibration Working Units Applied/As Left As Found Change (% of FS)	Current Calibration         Operator: <pre>cont         Acquire Point         Clear Point         Clear All Points         Load Calibration From</pre>	Depending on the Options settings and the last calibration, the columns may read "Applied/Measured" or "As Left/As Found".	
Note	Note	1	
e Interface User Manuals		COM2 4.3.0.489 <port 1="" def<="" td=""><td>fault&gt; 10/12/2018 4:24 PM</td></port>	fault> 10/12/2018 4:24 PM

- Note The current calibration data (in this example, factory calibration data) appears on the right half of the screen, and the new calibration data will be entered on the left half of the screen.
- 4. In Figure 8.3, the "Calibration Working Units" located above the new calibration table shows the unit of measure to which the differential pressure will be calibrated. To use a different unit, select the desired unit from the Calibration Working Units dropdown menu.

The "working unit" setting is independent of the unit used to display differential pressure. The "working unit" applies only to the calibration process itself. Therefore, a user who configures his device to display differential pressure as In H2O can calibrate the device in In H2O or in a different unit; in either case, differential pressure will continue to be displayed on the LCD, on the Main Display screen of the software, and in calibration reports as In H2O. A user can view current calibration values in any available unit simply by selecting a new "working unit" on the Calibrate screen. The values will automatically convert to the unit selected.

5. Apply a known pressure to the calibration test device (for example, 25 In H2O) and click *Acquire Point* (Figure 8.3). An Enter Applied Value dialog will appear (Figure 8.4).

ModWorX Pro			
Enter Applie	d Valu	e	
Applied differential p	ressure:		
2억	In H2O		
29	In H2O		
		ОК	Cancel

Figure 8.4

6. Enter the applied pressure value (for example, 25) in this field, and click *OK*. A screen will appear, showing the live value, the measured value, and a stability bar showing the progression of the calibration (Figure 8.5). The live value is the instantaneous reading of the pressure input, and the measured value is the average of all samples read.

ModWorX	Pro	_		_	_	
Acquir	e Differe	ntial Press	ure - (25.00	00 In H2	20)	
Live Value	24.948	In H2O	Measured Value	24.939	In H	20
Stability						Show Irend >>
				(	QK	Cancel



7. To view the progression of the calibration process in a graph, click *Show Trend* (Figure 8.5). This view also shows the spread of values and the number of sample readings taken (Figure 8.6).

10dWorXI Acquir		ntial Press	ure - (25.00	00 In H2	20)
Live Value	24.938	In H2O	Measured Value	22.777	In H2O
Stability					Hide Irend <<
Spread: 10.03	6 In H2O (Toleranc	e: 0.200 In H2O)			Samples: 14
44.0					
42.0					
40.0					
38.0					
36,0					
39.0					
30.0					
28.0					
26.0					
24.0					
22.0					
20.0					
18.0					
16.0					······
14.0					
10.0					
8.0					
6.0					
Force Lock	On			ſ	OK Cancel

Figure 8.6

When the Scanner reads 10 consecutive readings (within the tolerance based on the range of the sensor), it will "lock on" to that data set and display a "measured value" (Figure 8.7).



- Figure 0.7
- Note Should the Scanner fail to lock on to a calibration value within a reasonable time period, the user can terminate the calibration process from the trend graph screen by clicking on the *Force Lock On* button in the lower left corner of the screen. The user can then recalibrate the point by clicking the *Recalibrate Point* button on the Configure Differential Pressure screen.
- 8. When a measured value is indicated, click *OK* to save the calibration point and return to the Calibrate Differential Pressure screen (Figure 8.8, page 108). The New Calibration table is updated with the applied pressure, the measured value, and a percentage of change. The percentage of change is expressed as a percentage of full scale, and is a measure of how the calculated value will change based on the new calibration with respect to the previous calibration.

	Tools Hel	ential Pres							
			Differential Proceure			Site Name ield Name tion Name			
		_						Save Changes	Exit Maintenance Mod
libra	ate Inpu	ts							
Chan	ge Task	Input Para	meter	Differentia	l Pressure				
Chidry	ge rask	Calibration	Task	Calibratio	1				
	w Calib		In H2O	•		Current Calib Operator: None, Calibra			
	pplied		Change	(% of FS)		Applied	Measured		
1	25.000			-0.02	Acquire Point				
3	75.000			-0.01	Recalibrate Point				
4	100.000	99.992		0.00	Clear Point				
					Clear All Points		Factory		
					Load Calibration From	Calibration			
Note						Note			
2									
	orface USE	Manuala							
e Inte	Use Use	manuals				COM6	4.0.0.444 <	Port 2 Default>	12/17/2009 6:10 PM

Figure 8.8

- 9. Repeat steps 5 through 8 to enter up to 12 differential points.
- 10. To store additional information about this calibration, enter a note in the Note field. The note will be saved with the calibration data when the calibration data is written to memory.
- 11. Click *Save Changes* in the top right corner of the screen to save the differential pressure calibration. The new values will not be applied until the user exits the Maintenance Mode.
- 12. To perform a different calibration task or to calibrate a different input parameter, click *Change Task*. The Change Calibration Task dialog will reappear, allowing the user to make a new selection.
- 13. When all calibration tasks are completed and all changes saved, click *Exit Maintenance Mode*. Inputs will be restored to live conditions and the Main Display screen will reappear.

To calibrate using a previous set of applied values,

- 1. Click Load Calibration From... on the Calibrate Differential Pressure screen.
- 2. Select "Factory Defaults" or select a previously saved calibration from the dialog (Figure 8.9).

ModWorX Pro	
Select An Item	
Calibration to copy from:	
1: Factory Defaults	-
1: Factory Defaults 2: Current Calibration (01)	/15/2010 7:07:31 pm)

Figure 8.9

3. Click *OK* to save the selection. The calibration points will be transferred to the New Calibration table on the Calibrate Differential Pressure screen.

To recalibrate a data point, click on the point, apply the designated amount of pressure to the Scanner using the calibration test device, and click *Recalibrate Point*. It is not necessary to re-enter applied values.

## Procedure: Zeroing an Input

In the following example, static pressure will be zeroed. The same procedural steps can be applied in zeroing any of the input parameters.

Note Performing a multipoint calibration will clear the Set Zero Offset.

- 1. On the Change Calibration Task screen, click *Set Zero Offset* as the Calibration Task, and click the input parameter of your choice. For this example, Static Pressure is the input parameter to be zeroed (Figure 8.10).
- 2. Click **OK** to save the settings.

Calibration	Task	
Calibrate (Multi-	point)	
<ul> <li>Set Zero Offset</li> </ul>		
○ Verify		
input Para		
O Differential Pres	sure	
Static Pressure		
<ul> <li>Process Temper</li> <li>AI1_SPTrans</li> </ul>	ature	
AI2_TempTrans		

3. The Set Zero Offset – Static Pressure screen will appear, and the input parameter and calibration task selections you made will appear at the top of the screen (Figure 8.11, page 110).

Note that the current zero offset data appears on the right half of the screen, and the new zero offset data will be entered on the left half of the screen.

DOWNLOAD       Scanner 2000 - Device Name [15/n 4098]       Site Name Field Name Location Name         Set Zero Offset - Static Pressure       Site Name Location Name         Save Changes       Exit Maintennoe N         rote Inputs       Static Pressure         ange Task       Input Parameter Static Pressure         Calibration Task       Zero Offset         Operator: None, Calibrated On:       Down Working Links         PSIS       Acquire Zero Offset       0.000	ks Tools Help	ure - ModWorX Pro 4.0.0			-
rote Inputs       ange Task     Input Parameter     Static Pressure       Calibration Task     Zero Offset       2w Zero Offset     Current Zero Offset       coding Links     PSIG     Operator: None, Calibrated On:       coffset     Acquire Zero Offset     0.000			occuro	Field Name	C
ange Task Input Parameter Static Pressure Zero Offset Zero Offset Operator: None, Calbrated On: Acquire Zero Offset 0.000				Save Changes	Exit Maintenance Mo
ange Task Calibration Task Zero Offset Current Zero Offset Current Zero Offset Operator: None, Calibrated On: Coffset Coffset Coffset Correct Zero Offset Concerned	orate Inputs				
Calibration Task Zero Offset Current Zero Offset Current Zero Offset Coperator: None, Calibrated On: Coffset Coperator: None, Calibrated On: Coperator: None,	Input Paramete	er Static Pressure			
sration Working Links PSIG		zero Offset			
Offset Acquire Zero Offset Zero Offset 0.000	ew Zero Offset		Current Zero Offset		
	bration Working Units PSIG	•	Operator: None, Calibrated On:		
e Clear Zero Offset Note	Offset	Acquire Zero Offset	Zero Offset	0.000	
	e	Clear Zero Offset	Note		
Renface Uzer Manuals	nterface User Manuals				

Figure 8.11

4. Note the unit displayed as the Calibration Working Unit. If a different unit will be used to calibrate the zero offset, select the desired unit from the Calibration Working Units dropdown menu.

The "working unit" setting is independent of the unit used to display static pressure. The "working unit" applies only to the calibration process itself. Therefore, a user who configures his device to display static pressure as psi can calibrate the zero offset in psi or in a different unit; in either case, static pressure will continue to be displayed on the LCD, on the Main Display screen of the software, and in calibration reports as psi. A user can view current zero offset values in any available unit simply by selecting a new "working unit" on the Calibrate screen. The values will automatically convert to the unit selected.

5. Apply 0 psig pressure to the calibration test device and click *Acquire Zero Offset*. An Enter Applied Value dialog will appear (Figure 8.12).

ModWorX Pro		<b>×</b>
Enter Applied Val	ue	
Applied static pressure:	ок	Cancel

Figure 8.12

6. Enter zero (0) in this field, and click *OK*. A screen will appear, showing the live value, the measured value, and a stability bar showing the progression of the calibration (Figure 8.13). The live value is the instantaneous reading of the pressure input, and the measured value is the average of all samples read.

ModWorX P	ro				×
Acquire	e Static Pr	essure -	(0.000 PSIC	5)	
Live Value	-0.125	PSIG	Measured Value	-0.061	PSIG
Stability					Show Irend >>
					OK <u>C</u> ancel



7. To view the progression of the calibration process in a graph, click *Show Trend* (Figure 8.13). This graph view also shows the spread of values and the number of sample readings taken (Figure 8.14).

ModWorX Pr	·0				×
Acquire	Static Pr	essure - (0.	.000 PSIG	5)	
Live Value	-0.039	PSIG	Measured Value	-0.050	PSIG
Stability					Hide <u>I</u> rend <<
Spread: 0.211 PS	GG (Tolerance: 1.50	00 PSIG)			Samples: 8
140.0					
120.0					
100.0					
80.0					
60.0					
40.0					
20.0					
0.0					
-20.0					
-40.0					
-60.0					
-80.0					
-100.0					
-120.0					
-140.0					
Force Lock O	n				<u>⊙</u> K <u>C</u> ancel
		Fiau	re 8.14		

When the Scanner reads 10 consecutive readings (within the tolerance based on the range of the sensor), it will "lock on" to that data set and display a "measured value" (Figure 8.15).

odWorX	Pro				
Acquir	e Static I	Pressure -	(0.000 PSIC	G)	
ive Value	-0.082	PSIG	Measured Value	-0.060	PSIG
Stability					Hide Irend <<
Spread: 0.211	PSIG (Tolerance: 1	.500 PSIG)			Samples: 10
140.0					
120.0					
100.0					
80.0					
60.0					
40.0	D.d.s		Malan	0 000	DOLO
20.0	ivie	asured	Value: -	0.060	PSIG
0.0					
-40.0					
-60.0					
-80.0					
-100.0					
-120.0					

Figure 8.15

- 8. When a measured value is indicated, click *OK* to save the calibrated zero offset value and return to the Set Zero Offset Static Pressure screen. The calibrated value will appear in the Zero Offset field (Figure 8.16).
- Note The zero offset is the value that is added to the instrument's reading to obtain the desired (applied) value. If the sensor is reading high, the zero offset will be a negative value.

DOWNLOAD		00 - Device Name [s/n 4098] o Offset - Static Pre	essure	Site Name Field Name Location Name	6
	_			Save Changes	Exit Maintenance Mode
alibrate Inputs					y
Change Task	arameter Static Pr tion Task Zero Offs				
New Zero Offse			Current Zero O		
Calibration Working Units Dero Offset	PSIG • 0.060	Acquire Zero Offset	Operator: None, Calibrated Zero Offset	0n: 0.000	
iote		Clear Zero Offset	Note		

Figure 8.16

- 9. To store additional information about this calibration, enter a note in the Note field. The note will be saved with the calibration data when the calibration data is written to memory.
- 10. Click *Save Changes* to save the zero offset calibration. The new values will not be applied until the user exits the Maintenance Mode.
- 11. To perform a different calibration task or to calibrate a different input parameter, click *Change Task*. The Change Calibration Task dialog will reappear, allowing the user to make a new selection.
- 12. When all calibration tasks are completed and all changes are saved, click *Exit Maintenance Mode*. Inputs will be restored to live conditions and the Main Display screen will reappear.

## Procedure: Verifying an Input

In the following example, process temperature will be verified. The same procedural steps can be applied in verifying any of the input parameters.

- 1. On the Change Calibration Task screen, click *Verify* as the Calibration Task, and click the input parameter of your choice. For this example, Process Temperature is the input parameter to be verified (Figure 8.17).
- 2. Click *OK* to save the settings.

~ ~		
	librate (Multi-point) t Zero Offset	
⊙ Se ⊙ Ve		
000		
~	fferential Pressure atic Pressure	
) St	terential Pressure atic Pressure occess Temperature	
) St	atic Pressure	

Figure 8.17

3. The Verify Process Temperature screen will appear, and the input parameter and calibration task selections you made will appear at the top of the screen (Figure 8.18).

erify Process Temperature	- ModWorX Pro	4.0.0			area a cha
Iasks Tools Help					
		ocess Temperatur		Site Name Field Name Location Name	6
				Save Changes	Exit Maintenance Mod
alibrate Inputs					
Change Task Calibration Ta					
New Verification			Current Verificatio	ก	
Verification Working Units De	9F +		Operator: None, Verified On:		
Applied Measured Err	or (% of P5)		Applied M	easured	
		Acquire Point			
		Re-verify Paint			
		Clear Point			
		Clear All Points	Factor	γ	
			Verificat	ion	
Note			Note		
ce Interface User Manuals					
31	-		COM6 4.0.0.4	444 <port 2="" default=""></port>	12/17/2009 6:36 PM

Figure 8.18

Note that the current verification data appears on the right half of the screen, and the new verification data will be entered on the left half of the screen.

4. Note the unit displayed as the Verification Working Unit. If a different unit will be used to verify the device, select the desired unit from the dropdown Verification Working Units menu.

The "working unit" setting is independent from the unit used to display process temperature. The "working unit" applies only to the verification process itself. Therefore, a user who configures his device to display process temperature as degrees F can calibrate the device in degrees F or in a different unit; in either case, process temperature will continue to be displayed on the LCD, on the Main Display screen of the software, and in calibration reports as degrees F. A user can view current verification values in any available unit simply by selecting a new "working unit" on the Verify screen. The values will automatically convert to the unit selected.

5. Apply a known temperature to the calibration test device (for example, 50 degrees F) and click *Acquire Point* (Figure 8.18). An Enter Applied Value dialog will appear (Figure 8.19).

ModWorX	Pro 📧
Enter Aj	oplied Value
Applied temp	erature:
	50 Deg F
	OK Cancel

Figure 8.19

6. Enter the applied temperature value (for example, 50) in this field, and click *OK*. A screen will appear, showing the live value, the measured value, and a stability bar showing the progression of the verification (Figure 8.20). The live value is the instantaneous reading of the temperature input, and the measured value is the average of all samples read.

1odWorX		ature - (50	.000 Deg F)	)	
Live Value	49.954	Deg F	Measured Value	49.971	Deg F
Stability					Show Irend >>
				(	QK Cancel

Figure 8.20

7. To view the progression of the verification process in a graph, click *Show Trend* (Figure 8.20). This graph view also shows the spread of values and the number of sample readings taken (Figure 8.21).

ive Value	50.034	Deg F	Measured Value	35.030	Deg F
itability					Hide Irend <<
pread: 50.10	6 Deg F (Tolerance	: 2.100 Deg F)			Samples: 15
130.0					
120.0					
110.0					
100.0					
90.0					
80.0					
70.0					
60.0					
50.0					
40.0					
30.0					
20.0					
10.0					
0.0					
-10.0					
-20.0					

8. When the Scanner reads 10 consecutive readings (within the tolerance based on the range of the sensor), it will "lock on" to that data set and display a "measured value" (Figure 8.22, page 116).



Figure 8.22

- Note Should the Scanner fail to lock on to a verification value within a reasonable time period, the user can terminate the verification process from the trend graph screen by clicking on the *Force Lock On* button in the lower left corner of the screen. The user can then re-verify the point by clicking the *Re-verify Point* button on the Verify Process Temperature screen.
- 9. When a measured value is indicated, click *OK* to save the verification and return to the Verify Process Temperature screen (Figure 8.23). The New Calibration table is updated with the applied temperature, the measured temperature, and a percentage of error. The percentage of error is expressed as a percentage of full scale, and is calculated with respect to the applied value.

erny	Process	Temperati	ure - Mo	dWorX Pro 4	0.0.1			
Iasks	Tools Hel	p						
0	DOWN	LOAD			- Device Name [s/n 4098 DCESS Temperatu	5	Site Name Field Name Location Name	6
							Save Changes	Exit Maintenance Mod
alibra	ate Inpu	ts						
Chang	pe Task	Input Par	ameter	Process Ten	nperature			
		Calibratio	n Task	Verification				
	v Verif	ication gunts	DegF	•		Current Verificati Operator: None, Verified On:	on	
A	pplied	Measured	Error (%	of PS)		Applied 1	Measured	
1	50.000			0.00	Acquire Point			
2	100.000			0.00	Re-verify Point			
					Clear Point			
					Clear All Points	Facto Verifica		
						verifica	tion	
Note						Note		
	uface Use	-						

Figure 8.23

10. Repeat steps 5 through 8 to enter up to 12 verification points.

- 11. To store additional information about this verification, enter a note in the Note field. The note will be saved with the verification data when the verification data is written to memory.
- 12. Click *Save Changes* to save the temperature verification. The new values will not be applied until the user exits the Maintenance Mode.
- 13. To perform a different calibration or verification task, click *Change Task*. The Change Calibration Task dialog will reappear, allowing the user to make a new selection.
- 14. When all calibration/verification tasks are completed and all changes are saved, click *Exit Maintenance Mode*. Inputs will be restored to live conditions and the Main Display screen will reappear.

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# Section 9 - Flow Run Maintenance for Orifice Input (AGA-3 or ISO-5167 Orifice)

Routine flow run maintenance tasks for an AGA-3 or ISO-5167 run, such as changing gas constituents or changing plate size, are easily performed from the Maintain Flow Run screen. This section will guide you in performing the following tasks:

- view existing orifice parameters
- change plate parameters
- change gas constituents (for AGA-8 Detail calculations)
- change gross method parameters (for AGA-8 Gross calculations)
- change steam properties (steam flow runs only)
- change liquid parameters (liquid flow runs only)
- Note Before making changes to the flow run configuration, make sure the flow run is configured to use the desired flow rate calculation method:

Gas Measurement: AGA-3 (1992 or 2012), ISO-5167 Orifice, or Small Bore Orifice (based on ASME MFC-14M)

Liquid Measurement: Liquid Orifice AGA-3 (1992 or 2012), Liquid Orifice (based on ISO-5167), or Small Bore Orifice (based on ASME MFC-14M).

See Section 4 - Setting Up a Flowrun for instructions on selecting the flow run calculation method.

For gas measurement, ISO-5167 is applicable only to flow that remains subsonic throughout the measuring section and where the fluid can be considered single-phase. It is not applicable to the measurement of pulsating flow. It does not cover the use of orifice plates in pipe sizes less than 50 mm or more than 1000 mm, or for pipe Reynolds numbers below 5000.

For liquid measurement, the Small Bore Orifice flow rate calculation method is appropriate for 1/2-in. to 1-1/2-in. meter sizes with a beta ratio between 0.1 and 0.75. The ASME small bore orifice meter can be used to measure natural gas, steam, and liquids.

To perform flow run maintenance for an orifice run,

1. Click on the Maintain Flow Run button in the task menu bar on the Main Display screen (Figure 9.1).

DOWNLOAD	Scanner	W Main	Display		Field Name		
	Jocariner		reispidy		Location name		
efresh 🔽 Auto-Refresh							Re
0	-		0	-			_
🛛 🍪 Calibrate Inp	uts 🚺 🔘 Mai	ntain Flow Run	😸 Mainta	in Turbine 🛛 💮 Manage	PID 🛛	Configure	
Flow Run Data				Turbine Data			
Flow Rate	352.687			Turbine 1 Flow Rate		BBL/day	
Daily Total (est.)	317.173			Turbine 1 Grand Total	4.52234E006		
Heating Value	1036.06	BTU/SCF		Turbine 2 Flow Rate		BBL/day	
				Turbine 2 Grand Total		BBL	
	Current Day	Previous Day		2120100000000	Current Day	Previous Day	
Volume Flow	45.3104	352.687		Turbine 1 Volume Flow	0.902952		BBL
Mass Flow	2014.74	15682.3	Constant and the second se	Turbine 2 Volume Flow	0	0	BBL
Energy	46.9442	365.404	MMBTU				-
			DETAILS				DETAIL
Input Data				System Data			
Static Pressure	6.22	PSIG	8	Alarms			ALARM
Differential Pressure	164.62	In H2O	-	Supply / Battery Voltage	10.28 / 10.5	5 V	
Process Temperature	60.00	Deg F	×	Temperature	71.6	7 Deg F	
Analog Input 1	0.00	inches		Date/Time	Oct 26, 201	3 11:05:48 AM	
Analog Input 2	56.24	Deg F	8	Analog Output	15.2	) mA	
				Smart Battery / Health %	83.00 / 9	7 %	
			DETAILS				DETAILS

Figure 9.1

2. Click *Yes* at the Enter Maintenance Mode prompt. The Change Flow Run Maintenance Task screen will appear (Figure 9.2).

low Run Selectio	'n
Flow Run 1	
Maintenance Tasl	×
Change Orifice Plate	
Change Gas Composition	

Figure 9.2

- 3. Flow Run 1 is automatically selected.
- 4. Select the maintenance task to be performed. The maintenance tasks displayed will vary, depending on the type of flow being measured—gas, steam or liquid. Examples are provided in the following procedures.
- 5. Click OK to save the selections. The Maintain Flow Run screen will appear (Figure 9.3).

🎢 Maintain Flow Run 1 - M	lodWorX Pro 4.	0.0				
Elle Iasks Tools Help						
		Scanner 2000 - Device Name [s/n 4096] Fi Maintain Flow Run 1				6
					Save Changes	Exit Maintenance Mode
Maintain Flow Run						1
Change Task Selecte	d Flow Run Flow	v Run 1				
Change rask Mainter	nance Task Cha	nge Orifice Plate				
New Orifice Plat	te Paramet	ers	Current Orifice Operator: None, Changed		ameters	
Plate Size		inches	Plate Size	1.0000	inches	
Reference Temperature		Deg F	Reference Temperature	68.000	Deg F	
Plate Material	Select an optic	n •	Plate Material	Stainless Ste	el (304/316)	
Model Number			Model Number	( To Be Confi	gured )	
Serial Number			Serial Number			
Note			Note			
Clear New Data	Copy From Curre	ot ]				
-						
	i -					
Device Interface User Manuals			US8 4	.0.0.445 <	Port 1 Default>	1/7/2010 6:11 PM
	_				111111000000000	

Figure 9.3

By default, engineering units are provided in US standard format. If metric units are required, click on the *Tools* button in the task bar at the top of the screen, and select *Options* from the dropdown menu. Click on the *Units System* dropdown menu to change the units selection to Metric. See Figure A.17, page A-12.

## Procedure: Change Plate Parameters

Flow Run 1

Maintenance Task

Change Generic Liquid Parar

O Change Orifice Plate

1. If Change Orifice Plate is not displayed in the Maintenance Task field at the top of the Maintain Flow Run screen, click on *Change Task* (Figure 9.3, page 120). The Change Flow Run Maintenance Task dialog will appear. The selections available on this screen will vary, depending on the fluid property calculation method selected, as shown in Figure 9.4.

ModWorX Pro 🔊	ModWorX Pro	×	ModWorX Pro	<b>X</b>
Change Flow Run Maintenance Task	Change Flow Run Main	tenance Task	Change Flow Run Mainte	enance Task
Flow Run Selection	Flow Run Selection		Flow Run Selection	
Flow Run 1	• Flow Run 1		Flow Run 1	
Maintenance Task	Maintenance Task		Maintenance Task	
Change Orifice Plate  Change Gas Composition	Change Orfice Plate Change Gross Method Parameters		Change Onlice Plate Change Steam Properties	
QK Cancel		QK Cancel		OK Cancel
Natural Gas (AGA-8 Detail)	Natural Gas (AGA	1-8 Gross)	Steam (IF-97 or IF-	97+James)
ModWorX Pro		ModWorX Pro		
Change Flow Run	n Maintenance Task	Change Flow Run	Maintenance Task	
Flow Run Selection	n	Flow Run Selection		

• Flow Run 1

Maintenance Task

Change MPMS Liquid Parameters

Change Orifice Plate

Liquid (Generic)

Liquid (MPMS)

QK

Figure 9.4

- a. Under the Maintenance Task heading, click Change Orifice Plate.
- b. Click OK to save your selections and return to the Maintain Flow Run screen (Figure 9.5, page 122).

QK Cancel

DOWRLOAD Mainta afintain Flow Run Change Task Selected Flow Run Flow R Maintenance Task Change		6)	Fie	te Nane 1d Nane on Name Save Changes	Exit Maintenance Mod
Change Task Selected Flow Run Flow R				Save Changes	Exit Maintenance Mod
Change Task Maintenance Task Change					
Change Task Maintenance Task Change					
Maintenance Task Chang	e Orifice Plate				
New Orifice Plate Parameter					
New Orifice Plate Parameter					
	s	Current Orifice Operator: None, Changed O		ameters	
Plate Size	inches	Plate Size	1.0000	inches	
Reference Temperature	Deg F	Reference Temperature	68.000	Deg F	
Plate MaterialSelect an option		Plate Material	Stainless Stee	(304/316)	
Model Number		Model Number	( To Be Config	ured )	
Serial Number		Serial Number			
Note		Note			
	-				
Clear New Data Copy From Current					

Figure 9.5

- Note that current orifice plate parameters appear on the right half of the screen. If you are making a minor change to current parameters, click *Copy from Current*. Current parameters will be pasted into the fields on the left. This will help to minimize the number of fields that have to be changed.
- 3. Update the following plate parameters on the left half of the screen, as necessary:
  - a. plate size click in the field and type in a value
  - b. reference temperature click in the field and type in a value; this value is typically provided on a test report issued by the laboratory that calibrated the orifice plate
  - c. plate material choose a material from the dropdown list; use the scroll bar to view the entire list of materials
  - d. model number (optional)
  - e. serial number (optional)
- 4. Enter a note in the Note field, if desired. The note will be stored with the new plate parameter settings.
- 5. Click *Save Changes* in the upper right corner of the screen. The new settings will be saved and will be made effective when the user exits the Maintain Flow Run screen.
- 6. To perform a new maintenance task without leaving the screen, click on *Change Task* and make a new selection.
- 7. To exit the Maintain Flow Run screen and return to the Main Display screen, click *Exit Maintenance Mode* in the upper right corner of the screen.

## Procedure: Change Gas Composition

1. If Change Gas Composition is not displayed in the Maintenance Task field at the top of the Maintain Flow Run screen, click on *Change Task*. The Change Flow Run Maintenance Task dialog will appear (Figure 9.6).

odWorX Pro	
Change Flow Run	Maintenance Task
Flow Run Selection	n
• Flow Run 1	
Maintenance Task	
Change Orifice Plate	
Change Gas Composition	
	0*

Figure 9.6

- a. Under the Maintenance Task heading, click Change Gas Composition.
- b. Click OK to save the settings and return to the Maintain Flow Run screen (Figure 9.7, page 124).
- Note that current gas composition appears on the right half of the screen and the new gas composition will be entered in the left half of the screen. If you are making a minor change to current parameters, click *Copy from Current*. Current parameters will be pasted into the fields on the left. This will help to minimize the number of fields that have to be changed.
- Note that the fluid properties calculation method selected for the flow run appears near the top of the New Gas Composition section. The calculation method is read-only. To change this method, see Configuring Fluid Properties, page 57.
- 4. In the Analysis Reference No. field, enter a reference number from the gas analysis report, if desired.
- 5. Update the Reference Conditions field, if necessary. This selection identifies the ideal mass heating value table for use in calculating the heating value of the gas composition and sets the reference temperature and pressure used in converting the user-supplied heating value into the heating value mass basis required for energy calculations.
- 6. In the Heating Value field, specify a calculated or manually entered value. If the value is entered manually, enter the heating value in the field provided.
- 7. In the Specific Gravity field, specify a calculated or manually entered value. If the value is entered manually, enter the specific gravity value in the field provided.
- 8. Enter the viscosity of the measured fluid in the field provided. If you are unsure of the value, enter 0.010268.
- 9. Enter the isentropic exponent of the measured fluid in the field provided. If you are unsure of the value, enter 1.3.

Note Disregard the Gas Fraction field. This setting is not currently used in flow calculations.

[asks Tgols Help	Sca	inner 200	0 - Device N	ame [s/n 4096]			Site N	ane	6
DOWNLOAD			n Flow Ru				Field N Location N	ane	
							Save	Changes	Exit Maintenance Mo
intain Flow Run									
Folosta	d Flow Run	Flow Run							
Change Task			57						
Mainte	nance Task	Change G	as Composition	1					
New Gas Compo	osition				Cu	rrent Gas Con	nposition		
uid Properties Calculation	AGA-8 Detail					ator: None, Changed On			
nalysis Ref. No.	-			-		ysis Ref. No.			
teference Conditions	United States	s (14.73 ps	i, 60 F) 👻		Refe	rence Conditions	United States (14.7	3 psi, 60 F)	
leating Value	Calculated	• (c	alculated)		Heat	ing Value	Calculated	(calculated)	
ipecific Gravity	Calculated	• (c	alculated)		Spec	ific Gravity	Calculated	(calculated)	
iscosity	Manual entry	( )		cP	Visco	sity	Manual entry	0.010268	cP
sentropic Exponent	Manual entry	,		1	Isen	tropic Exponent	Manual entry	1.3000	
ias Fraction	(No wet corre			d.	6 m	Fraction	(No wet correction)		
Constituent 1 Carbon Dioxide (CO2)		Mole %	_	Mole %	1		Mole 9 0.595	6	
	1.	P4010 76	Change	Mole %	1				
2 Nitrogen (N2)			Clear	Male %	2		0.259		
3 Methane (C1)			Clear A	Mole %	3	Methane (C1)	96.522		
4 Ethane (C2)			(		4	Ethane (C2)	1.010		
5 Propane (C3) 6 n-Butane (n-C4)		_	Load Com	position	5	Propane (C3) n-Butane (n-C4)	0.459		
7 i-Butane (i-C4)				position	7	i-Butane (i-C4)	0.097		
8 n-Pentane (n-C5)					8	n-Pentane (n-C5)	0.032		
9 i-Pentane (i-C5)		_			9	i-Pentane (i-CS)	0.047		
10 n-Hexane (n-C6)					10		0.066	4	
11 n-Heptane (n-C7)					11	to competence for any	0.000		
12 n-Octane (n-C8)						n-Octane (n-C8)	0.000		
13 n-Nonane (n-C9)						n-Nonane (n-C9)	0.000		
14 n-Decane (n-C10) 15 Oxygen (O2)					14		0.000		
15 Oxygen (O2) 16 Carbon Monoxide (CC	1)					Carbon Monoxide (CO)	0.000		
17 Hydrogen (H2)						Hydrogen (H2)	0.000		
18 Hydrogen Sulfide (H2	5)					Hydrogen Sulfide (H2S			
19 Water (H2O)					19	Water (H2O)	0.000	0	
20 Helium (He)						Helium (He)	0.000		
21 Araon (Ar)					21		0.000		
	Fotal % 0	.0000				Т	otal % 100.0000	'	
					Note				
iote				]					
iote									
iote important: Total of all co	instituents mu	ust be 100	19/0.						

Figure 9.7

- 10. To change the mole percentages of individual gas constituents,
  - a. Locate the gas constituent to be changed.
  - b. Double-click the constituent or click on the *Change Mole* % button and enter the appropriate percentage in the dialog provided.
  - c. Repeat steps 10a and 10b until all constituents are entered.

Note When the AGA-8 Detail method is used, all constituent percentages entered must total 100%.

- 11. To load the current gas composition or a previously saved composition, click *Load Composition...* and select the set of gas composition values from the dropdown menu in the dialog provided. If only minor changes are required to an existing composition, this can save time by minimizing the number of constituents that have to be changed.
- 12. Enter a note in the Note field, if desired (for example, to identify the gas composition for future reference). The note will be stored with the gas composition settings.
- 13. Click *Save Changes* in the upper right corner of the screen. The changes will be saved as the Current Gas Composition and will be put into effect when the user exits the Maintain Flow Run screen.

- 14. To perform a new maintenance task without leaving the screen, click on *Change Task* and make a new selection.
- 15. To exit the Maintain Flow Run screen and return to the Main Display screen, click *Exit Maintenance Mode* in the upper right corner of the screen.

#### Procedure: Change Gross Method Parameters

1. If Change Gross Method Parameters is not displayed in the Maintenance Task field at the top of the Maintain Flow Run screen, click on *Change Task*. The Change Flow Run Maintenance Task dialog will appear (Figure 9.8).

1odWorX Pro		
Change Flow Run Main	ntenance Tas	k
Flow Run Selection		
Flow Run 1		
Maintenance Task		
Change Orifice Plate     Change Gross Method Parameters		
	QK	⊆ancel

Figure 9.8

- a. Under the Maintenance Task heading, click *Change Gross Method Parameters*.
- b. Click OK to save the settings and return to the Maintain Flow Run screen (Figure 9.9, page 126).
- 2. Note that current gross method parameters appear on the right half of the screen and the new gross method parameters will be entered in the left half of the screen. If you are making a minor change to current parameters, click *Copy from Current*. Current parameters will be pasted into the fields on the left. This will help to minimize the number of fields that have to be changed.
- 3. Note that the fluid properties calculation method selected for the flow run appears near the top of the New Gross Method Parameters section. The calculation method is read-only. To change this method, see Configuring Fluid Properties, page 57.
- 4. In the Analysis Reference No. field, enter a reference number from the gas analysis report, if desired.
- 5. Update the Reference Conditions field, if necessary. This selection sets the reference temperature and pressure for air density, which is used in converting the user-supplied heating value into the heating value mass basis required for energy calculations.
- 6. Enter the heating value of the measured fluid in the field provided.
- 7. Enter the specific gravity of the measured fluid in the field provided.
- 8. Enter the viscosity of the measured fluid in the field provided. If you are unsure of the value, enter 0.010268.
- 9. Enter the isentropic exponent of the measured fluid in the field provided. If you are unsure of the value, enter 1.3.
- 10. Enter the carbon dioxide content (mole %) in the field provided.

Maintain Flow Run 1 - N	lodWorX Pro 4.	0.0					
Iasks Tools Help	-						
		ntain Flow	e Name [s/n 4096] Run 1			t Name 5 Name 6 Name	S
					Sa	we Changes	Exit Maintenance Mod
laintain Flow Run							
	ed Flow Run Flow	v Run 1					
Change Task Mainte	nance Task Cha	nge Gross Metho	d Parameters				
New Gross Metil Fluid Properties Calculation Analysis Ref. No.	hod Parame AGA-8 Gross	eters		Current Gross Operator: None, Changed Analysis Ref. No.	Contraction of the second	ameters	
Reference Conditions	United States (14	1.73 psi, 60 F)	•	Reference Conditions	United States (1	4.73 psi, 60 F)	
Heating Value	Manual entry		BTU/SCF	Heating Value	Manual entry	1031.4260	BTU/SCF
Specific Gravity	Manual entry			Specific Gravity	Manual entry	0.600000	
Viscosity	Manual entry		cP	Viscosity	Manual entry	0.010268	cP
Isentropic Exponent	Manual entry			Isentropic Exponent	Manual entry	1.3000	
Carbon Dioxide (CO2)		Mole %		Carbon Dioxide (CO2)	0.5956	Mole %	
Nitrogen (N2)		Mole %		Nitrogen (N2)	0.2595	Mole %	
Clear New Data	Copy From Curre	nt					
Note				Note			
ce Interface User Manuals				USB	4.0.0.445 <port< td=""><td>1 Default&gt;</td><td>1/7/2010 6:31 PM</td></port<>	1 Default>	1/7/2010 6:31 PM

Figure 9.9

- 11. Enter the nitrogen content (mole %) in the field provided.
- 12. Enter a note in the Note field, if desired (for example, to identify the gross method settings for future reference). The note will be stored with the gross method settings.
- 13. Click *Save Changes* in the upper right corner of the screen. The changes will be saved as the Current Gross Method Parameters and will be put into effect when the user exits the Maintain Flow Run screen.
- 14. To perform a new maintenance task without leaving the screen, click on Change Task and make a new selection.
- 15. To exit the Maintain Flow Run screen and return to the Main Display screen, click *Exit Maintenance Mode* in the upper right corner of the screen.

### Procedure: Change Steam Properties (Steam Flow Runs Only)

If a flowrun is configured for measuring steam *and a wet correction is enabled*, the steam quality or dryness can be configured from the Maintain Flow Run screen. All other steam properties are calculated and are non-configurable.

1. If Change Steam Properties is not displayed in the Maintenance Task field at the top of the Maintain Flow Run screen, click on *Change Task*. The Change Flow Run Maintenance Task dialog will appear (Figure 9.10, page 127).

Change Flow Rur	n Maintenance Task	
Flow Run Selectio	p	
Flow Run 1		
Maintenance Task	<	
Change Onifice Plate		
Change Steam Properties		
	OK Can	

Figure 9.10

- a. Under the Maintenance Task heading, click Change Steam Properties.
- b. Click OK to save the settings and return to the Maintain Flow Run screen (Figure 9.11).

Maintain Flow Run 1 - M	lodWorX Pro 4	0.0				
jle ∐asks Tools <u>H</u> elp						
DOWNLOAD		er 2000 - Device Name [s/n ntain Flow Run 1	4096]		e Name d Name n Name	
				S	ave Changes	Exit Maintenance Mode
Maintain Flow Run						î
Change Task Selecte	d Flow Run Flo	w Run 1				
	nance Task Cha	ange Steam Properties				
New Steam Pro	perties		Current Steam	Properties		
Fluid Properties Calculation	IF-97		Operator: None, Changed	On:		
Analysis Ref. No.			Analysis Ref. No.			
Enthalpy	Calculated	(calculated)	Enthalpy	Calculated	(calculated)	
Specific Gravity	Calculated	(calculated)	Specific Gravity	Calculated	(calculated)	
Viscosity	Calculated	(calculated)	Viscosity	Calculated	(calculated)	
Isentropic Exponent	Calculated	(calculated)	Isentropic Exponent	Calculated	(calculated)	
Steam Quality/Dryness		percent	Steam Quality/Dryness	100.0	percent	
Clear New Data	Copy From Curr	ent				
- 10 <b>1</b>						
Note			Note			
						~
Vevice Interface User Manuals						
			U58 4	.0.0.446 <por< td=""><td>t 1 Default&gt;</td><td>1/18/2010 12:48 PM</td></por<>	t 1 Default>	1/18/2010 12:48 PM

Figure 9.11

2. Note that current steam properties appear on the right half of the screen and the new steam properties will be entered in the left half of the screen. If you are making a minor change to current parameters, click *Copy from Current*. Current parameters will be pasted into the fields on the left. This will help to minimize the number of fields that have to be changed.

#### Section 9

- 3. Note that the fluid properties calculation method selected for the flow run appears near the top of the New Steam Properties section. The calculation method is read-only. To change this method, see Configuring Fluid Properties, page 57.
- 4. In the Analysis Reference No. field, enter a reference number from the steam analysis report, if desired.
- Note When a steam measurement algorithm is selected, enthalpy, specific gravity, viscosity, and isentropic exponent values are automatically calculated. Proceed to step 5.
- 5. In the Steam Quality/Dryness field, enter the steam quality (percent).
- 6. Enter a note in the Note field, if desired (for example, to identify the steam properties for future reference). The note will be stored with the steam property settings.
- 7. Click *Save Changes* in the upper right corner of the screen. The changes will be saved as the Current Steam Properties and will be put into effect when the user exits the Maintain Flow Run screen.
- 8. To perform a new maintenance task without leaving the screen, click on *Change Task* and make a new selection.
- 9. To exit the Maintain Flow Run screen and return to the Main Display screen, click *Exit Maintenance Mode* in the upper right corner of the screen.

## Procedure: Change MPMS Liquid Parameters

If a flowrun is configured for measuring liquid, the liquid parameters can be configured from the Maintain Flow Run screen.

1. If Change MPMS Liquid Parameters is not displayed in the Maintenance Task field at the top of the Maintain Flow Run screen, click on *Change Task*. The Change Flow Run Maintenance Task dialog will appear (Figure 9.12).

ModWorX Pro	×
Change Flow Run Maintenance Task	
Flow Run Selection	
• Flow Run 1	
Maintenance Task	
Change Orifice Plate     Change MPMS Liquid Parameters	
	:el

Figure 9.12

- a. Under the Maintenance Task heading, click Change MPMS Liquid Parameters.
- b. Click OK to save the settings and return to the Maintain Flow Run screen (Figure 9.13, page 129).

intain Flow Run 1 - ModWe	orX Pro 4.1.0			_	
DOWNLOAD	scanner 2000 - [s/n 152621] Maintain Flow Run 1				(
			Save Ch	nanges	Exit Maintenance Mode
intain Flow Run					
Change Task Selected Flow Maintenance					
Jew MPMS Liquid F uid Properties Calculation MP nalysis Ref. No.	Parameters MS Crude Oil	Current MPMS Operator: None, Changed Analysis Ref. No.	Liquid Paramet	ters	
	solute Density 💌	Density Source	Specific Gravity		
ase Absolute Density	KG/M3	Base Specific Gravity	0.85084		
iscosity	cP	Viscosity	0.010268	сP	
actual flowing viscosity should be Note that the Density or Specific Viscosity is at flowing temperatur	Gravity is at base temperature and the				
ote		Note			
Interface User Manuals		USB	4.1.0.466 <port 2="" del<="" td=""><td></td><td>24/2013 12:05 PM</td></port>		24/2013 12:05 PM

Figure 9.13

- 2. Note that current liquid parameters appear on the right half of the screen and the new liquid parameters will be entered in the left half of the screen. If you are making a minor change to current parameters, click *Copy from Current*. Current parameters will be pasted into the fields on the left. This will help to minimize the number of fields that have to be changed.
- 3. The fluid properties calculation method selected for the flow run (Example: Special Liquids) appears near the top of the New MPMS Liquid Properties section. The calculation method is read-only. To change this method, see Config-uring Fluid Properties, page 57.
- 4. In the Analysis Reference No. field, enter a reference number from the liquid analysis report, if desired.
- Note The density source, base density, and viscosity parameters can be populated with a set of default parameters, or with values supplied by the user. To use the set of default values, click *Load Default Params* near the bottom of the screen.
- 5. In the Density Source field, select a source to be used for the density value: *Absolute Density*, *Specific Gravity*, or *API Gravity*.
- 6. Enter the Base Density (Absolute, Specific Gravity or API Gravity) value of the liquid. Density is assumed to be at base temperature.
- 7. If Special Products is selected as the fluid type for the MPMS fluid properties calculation method, enter the fluid's expansion coefficient "alpha" (Figure 9.14, page 130) in accordance with MPMS Chapter 11.1. You may enter a numeric value, or click the *Select Alpha* button to select a predetermined alpha value for products such as ethanol and gasohol.

faintain Flow Run 1 - ModV	NorX Pro 4.2.0	_			_	_	
<u>I</u> asks T <u>o</u> ols <u>H</u> elp							
		2000 - [s/n ain Flow I					S
					Se	ive Changes	Exit Maintenance Mode
aintain Flow Run			8				
Change Task		Run 1 - Flow Ru					
Mainter	nance Task Chang	ge MPMS Liquid	Parameters				
New MPMS Liqu	id Parameter	rs		Current MPMS	Liquid Para	meters	
Fluid Properties Calculation	MPMS Special Produ	xts		Operator: None, Changed	i On:		
Analysis Ref. No.		]		Analysis Ref. No.			
Density Source	Absolute Density		•	Density Source	Specific Gravity		
Base Absolute Density		KG/M3		Base Specific Gravity	0.8508373		
Alpha (at 60 deg F)		/Deg F	Select Alpha	Alpha (at 60 deg F)	62.303852	/Deg F	
Viscosity		ø		Viscosity	0.010268	ø	
* A typical viscosity of this lic		wever, for accura	te results the actual				
flowing viscosity should be * Note that the Viscosity par-		nperature.					
Clear New Data	Copy From Current	Load Def	ault Params				
liote				Note			
ce Interface User Manuals							
				US8 4	.2.0.485 <port< td=""><td>2 Default&gt;</td><td>5/16/2017 2:32 PM</td></port<>	2 Default>	5/16/2017 2:32 PM

- 8. For best accuracy, enter the viscosity value of the liquid at flowing temperature. If the viscosity is unknown, use the recommended default value for the liquid type selected.
- 9. Enter a note in the Note field, if desired (for example, to identify the liquid parameters for future reference). The note will be stored with the liquid parameter settings.
- 10. Click *Save Changes* in the upper right corner of the screen. The changes will be saved as the Current MPMS Liquid Parameters and will be put into effect when the user exits the Maintain Flow Run screen.
- 11. To perform a new maintenance task without leaving the screen, click on *Change Task* and make a new selection.
- 12. To exit the Maintain Flow Run screen and return to the Main Display screen, click *Exit Maintenance Mode* in the upper right corner of the screen.

## Procedure: Change Generic Liquid Parameters

If a flowrun is configured for measuring liquid, the liquid parameters can be configured from the Maintain Flow Run screen.

1. If Change Generic Liquid Parameters is not displayed in the Maintenance Task field at the top of the Maintain Flow Run screen, click on *Change Task*. The Change Flow Run Maintenance Task dialog will appear (Figure 9.15).

odWorX Pro	
hange Flow Run	Maintenance Task
low Run Selection	ı
• Flow Run 1	
Maintenance Task	
Change Orifice Plate     Change Generic Liquid Param	neters
	<u>QK</u> <u>C</u> an

Figure 9.15

- a. Under the Maintenance Task heading, click Change Generic Liquid Parameters.
- b. Click OK to save the settings and return to the Maintain Flow Run screen (Figure 9.16, page 132).
- Note that current liquid parameters appear on the right half of the screen and the new liquid parameters will be entered in the left half of the screen. If you are making a minor change to current parameters, click *Copy from Current*. Current parameters will be pasted into the fields on the left. This will help to minimize the number of fields that have to be changed.
- 3. The fluid properties calculation method selected for the flow run (Example: Generic Liquid) appears near the top of the New Generic Liquid Properties section. The calculation method is read-only. To change this method, see Configuring Fluid Properties, page 57.
- 4. In the Analysis Reference No. field, enter a reference number from the liquid analysis report, if desired.

Tesks Tgols Help DOWNLOAD Maintain Flow Run 1		Save		()
DOWNLOAD Maintain Flow Run 1		Save		Solution
A sint-sin Flow Dun		Save		
Asistais Flow Dus			Changes	Exit Maintenance Mode
Iaintain Flow Kull				
Selected Flow Run Flow Run 1				
Change Task Maintenance Task Change Generic Liquid Parameters				
New Generic Liquid Parameters Fluid Properties Calculation Generic Liquid	Current Generic Operator: None, Changed On:		neters	
Analysis Ref. No.	Analysis Ref. No.			
Flowing Density Calculation Manual Entry of Flowing Density	Flowing Density Calculation	Manual Entry of Flo	wing Density	
Density Source Absolute Density -	Density Source	Specific Gravity		
Base Absolute Density KG/M3	Base Specific Gravity	0.8508406		
Flowing Absolute Density KG/M3	Flowing Specific Gravity	0.998999		
Viscosity CP	Viscosity	0.010268	cP	
<ul> <li>The Base Density value is required. If it is not known, use the same value as for Flowing Density.</li> <li>A typical viscosity of this liquid is about 1.0 cp. However, for accurate results the actual flowing viscosity should be determined.</li> <li>Note that the Viscosity parameter is at flowing temperature.</li> </ul>				
Note that the viscosity parameter is at nowing temperature.				
Clear New Data Copy From Current Load Default Params				
Note	Note			
vice Interface User Manuals	USB 4.1.	0.466 <port 21<="" td=""><td>Defaultis</td><td>6/24/2013 12:08 PM</td></port>	Defaultis	6/24/2013 12:08 PM
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- Note The density source, base density, and viscosity parameters can be populated with a set of default parameters which are the values for water. While the default values are specific to water, they indicate the value range that is applicable for these parameters. To load the default values, click *Load Default Params* near the bottom of the screen.
- 5. In the Density Source field, select a source to be used for the density value: *Absolute Density* or *Specific Gravity*.
- 6. Enter the Base Density (Absolute or Specific Gravity) value of the liquid. If the base density of the liquid is unknown, enter the flowing density into both the Base Density and Flowing Density fields.
- 7. Enter the Flowing Density (Absolute or Specific Gravity) value, if applicable.
- 8. Enter the viscosity of the liquid. Viscosity is assumed to be at flowing temperature. If the viscosity is unknown, a value of 1.0 cP (viscosity of water) is recommended.
- 9. Enter a note in the Note field, if desired (for example, to identify the liquid parameters for future reference). The note will be stored with the liquid parameter settings.
- 10. Click *Save Changes* in the upper right corner of the screen. The changes will be saved as the Current Generic Liquid Parameters and will be put into effect when the user exits the Maintain Flow Run screen.
- 11. To perform a new maintenance task without leaving the screen, click on *Change Task* and make a new selection.
- 12. To exit the Maintain Flow Run screen and return to the Main Display screen, click *Exit Maintenance Mode* in the upper right corner of the screen.

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## Section 10 - Flow Run Maintenance for Cone Meter Input

Routine flow run maintenance tasks for a cone meter input are easily performed from the Maintain Flow Run screen. This section will guide users in performing the following tasks:

- change cone parameters
- change flow coefficients (Cd)
- change gas constituents (for AGA-8 Detail calculations)
- change gross method parameters (for AGA-8 Gross calculations)
- change steam properties (steam flow runs only)
- change liquid parameters (liquid flow runs only)
- Note Before making changes to the flow run configuration, make sure the flow run calculation method is configured as Cone-Spool or Cone-Wafer. See Section 4 Setting Up a Flowrun for instructions on selecting the flow run calculation method.

To perform any cone meter maintenance task,

1. Click on the *Maintain Flow Run* button in the task menu bar on the Main Display screen (Figure 10.1).

2	Scanner 2100	V - Device name [:	s/n 1441792]		Site name		1
DOWNLOAD	Scanner	)W Main	Display		Field Name Location name		
efresh V Auto-Refresh							Ret
🛞 Calibrate Inp	uts 🚺 🗿 Mair	ntain Flow Run	🛞 Mainta	ain Turbine 🛛 💮 Managi	e PID	Configure	
Flow Run Data				Turbine Data			
Flow Rate	352.687	MCF/day		Turbine 1 Flow Rate	7	BBL/day	
Daily Total (est.)	317.173	MCF		Turbine 1 Grand Total	4.52234E006	BBL	
Heating Value	1036.06	BTU/SCF		Turbine 2 Flow Rate	0	BBL/day	
				Turbine 2 Grand Total	0	BBL	
	Current Day	Previous Day			Current Day	Previous Day	
Volume Flow	45.3104	352.687	MCF	Turbine 1 Volume Flow	0.902952		BBL
Mass Flow	2014.74	15682.3		Turbine 2 Volume Flow	0	0	BBL
Energy	46.9442	365.404	MMBTU DETAILS				DETAILS
Input Data				System Data			
Static Pressure	6.22	PSIG	8	Alarms		100	ALARMS
Differential Pressure	164.62	In H2O	8	Supply / Battery Voltage	10.28 / 10.55	v	
Process Temperature	60.00	Deg F	×	Temperature		Deg F	
Analog Input 1	0.00	inches	-	Date/Time	Oct 26, 2018	11:05:48 AM	
Analog Input 2	56.24	Deg F		Analog Output	15.20	mA	
				Smart Battery / Health %	83.00 / 97	%	
			DETAILS				DETAILS

Figure 10.1

2. Click *Yes* at the Enter Maintenance Mode prompt. The Change Flow Run Maintenance Task screen will appear (Figure 10.2, page 135).

• Flow Run 1
laintenance Task
Change Cone Meter
Change Flow Coefficients (Cd)
Change Gas Composition

Figure 10.2

- 3. Select the maintenance task to be performed. The maintenance tasks displayed will vary, depending on the type of flow being measured gas, steam or liquid. Examples are provided in the following procedures.
- 4. Click OK to save the settings. The Maintain Flow Run screen will appear (Figure 10.3).

[asks Tools Help	lodWorX Pro 4	.0.0			
DOWINLOAD		Scanner 2000 - Device Name [s/n 4096] Maintain Flow Run 1		Site Name Field Name Location Name	8
				Save Changes	Exit Maintenance Mode
sintain Flow Run					
Change Task		w Run 1 ange Cone Meter			
New Cone Meter	r Parameto	ers	Current Cone N Operator: None, Changed G	Neter Parameters	
1odel Number			Model Number	( To Be Configured )	
leta Ratio			Beta Ratio	0.875	
fleter Size (I.D.)		inches	Meter Size (I.D.)	2.067	
low Coefficient (Cd)	Refer to Change	Flow Coefficient task	Flow Coefficient (Cd)	Refer to Change Flow Coefficient ta	sk
Reference Temperature	68.000	Deg /	Reference Temperature	68.000	
Cone Material	Select an opti	on 👻	Cone Material	Stainless Steel (304/316)	
Neter Material	Select an option 👻		Meter Material	Carbon Steel	
Serial Number			Serial Number		
iote			Note		
Clear New Data	Copy From Curre	ent			

Figure 10.3

## Procedure: Change Cone Parameters

1. If Change Cone Meter is not displayed in the Maintenance Task field at the top of the Maintain Flow Run screen, click on *Change Task*. The Change Flow Run Maintenance Task dialog will appear (Figure 10.4). The selections available on this screen will vary, depending on the fluid property calculation method selected, as shown below.

AodWorX Pro 🛛 🕅	ModWorX Pro		ModWorX Pro	
Change Flow Run Maintenance Task	Change Flow Run M	laintenance Task	Change Flow Run Mair	ntenance Task
Flow Run Selection	Flow Run Selection		Flow Run Selection	
Flow Run 1	• Flow Run 1		• Flow Run 1	
Maintenance Task	Maintenance Task		Maintenance Task	
Change Cone Meter	Change Cone Meter		Change Cone Meter	
Change Flow Coefficients (Cd)     Change Gas Composition	Change Flow Coefficients (Cd)     Change Gross Method Paramete		Change Flow Coefficients (Cd)     Change Steam Properties	
QK Carcel		QK <u>Cancel</u>		QK Cancel
Natural Gas (AGA-8 Detail)	Natural Gas	(AGA-8 Gross)	Steam (IF-97 or IF-97	7+James)
ModWorX Pro		ModWorX Pro		
Change Flow Run	Change Flow Run Maintenance Task Flow Run Selection		Maintenance Task	
Flow Run Selection			1	
• Flow Run 1		Flow Run 1		
Maintananca Task		Maintonanco Task		

🔿 Change Cone Meter

Change Flow Coefficients (Cd)
 Change MPMS Liquid Parameters

Liquid (MPMS)

<u>o</u>k

a. Under the Maintenance Task heading, click Change Cone Meter.

Liquid (Generic)

🔿 Change Cone Meter

Change Flow Coefficients (Cd)

Change Generic Liquid Parameters

b. Click OK to save your selections and return to the Maintain Flow Run screen (Figure 10.5, page 137).

Figure 10.4

QK
aintain Flow Run 1 - N	lodWorX Pro 4.0	1.0			
DOWINLOAD		r 2000 - Device Name [s/n tain Flow Run 1	4096]	Site Name Field Name Location Name	6
				Save Changes	Exit Maintenance Mod
intain Flow Run					
Change Task		Run 1 nge Cone Meter			
New Cone Mete	r Paramete	rs	Current Cone N Operator: None, Changed C	Neter Parameters	
odel Number			Model Number	( To Be Configured )	
eta Ratio			Beta Ratio	0.875	
leter Size (I.D.)		inches	Meter Size (I.D.)	2.067	
iow Coefficient (Cd)	Refer to Change R	Flow Coefficient task	Flow Coefficient (Cd)	Refer to Change Flow Coefficient t	ask
eference Temperature	68.000	Deg #	Reference Temperature	68.000	
one Material	Select an option	n 👻	Cone Material	Stainless Steel (304/316)	
leter Material	Select an option	ŋ 🔻	Meter Material	Carbon Steel	
erial Number			Serial Number		
ote			Note		
Clear New Data	Copy From Currer	nt			
	C-1				
Interface User Manuals			U58 4	.0.0.446 <port 1="" default=""></port>	1/18/2010 1:20 PM

Figure 10.5

- 2. Note that current cone parameters appear on the right half of the screen. To make a minor change to current parameters, click *Copy from Current*. Current parameters will be pasted into the fields on the left. This will help to minimize the number of fields that have to be changed.
- 3. Enter new cone parameters as necessary:
  - a. model number (optional)
  - b. beta ratio click in the field and type in a value (this value is typically recorded on the nameplate of the cone meter and/or recorded in the calibration data supplied with the cone meter)
  - c. meter size (ID) click in the field and type in the value (this value is typically recorded on the nameplate of the cone meter)
  - d. reference temperature click in the field and type in a value; this value is typically provided on a test report issued by the laboratory that calibrated the orifice plate; if the cone reference temperature is not known, enter 68°F (US standard units) or 20°C (metric units).
  - e. cone material choose a material from the dropdown list; use the scroll bar to view the entire list
  - f. meter material choose a material from the dropdown list; use the scroll bar to view the entire list
  - g. serial number (optional)
- 4. Enter a note in the Note field, if desired. The note will be stored with the new cone parameter settings.
- 5. Click *Save Changes* in the upper right corner of the screen. The new settings will be saved and will be made effective when the user exits the Maintain Flow Run screen.
- 6. To perform a new maintenance task without leaving the screen, click on *Change Task* and make a new selection.
- 7. To exit the Maintain Flow Run screen and return to the Main Display screen, click *Exit Maintenance Mode* in the upper right corner of the screen.
- Note In addition to entering cone meter parameters, it is important to verify that the flow coefficient(s) are appropriate for the cone parameters you have entered. See Procedure: Change Flow Coefficients (Cd), page 138, for details.

# Procedure: Change Flow Coefficients (Cd)

1. If Change Flow Coefficients (Cd) is not displayed in the Maintenance Task field at the top of the Maintain Flow Run screen, click on *Change Task*. The Change Flow Run Maintenance Task dialog will appear (Figure 10.6). The selections available on this screen will vary, depending on the fluid property calculation method selected, as shown below.

NodWorX Pro	ModWorX Pro		ModWorX Pro	
Change Flow Run Maintenance Task	Change Flow Run I	Maintenance Task	Change Flow Run	Maintenance Task
Flow Run Selection	Flow Run Selection		Flow Run Selection	
Flow Run 1	Flow Run 1		• Flow Run 1	
Maintenance Task	Maintenance Task		Maintenance Task	
Change Core Meter     Change Flow Coefficients (Cd)     Change Gas Composition	Change Cone Meter     Change Flow Coefficients (Cd)     Change Gross Method Paramet		Change Cone Meter     Change Flow Coefficients (Cd)     Change Steam Properties	
QK Cancel		OK Cancel		QK Sancel
Natural Gas (AGA-8 Detail)	Natural Gas	(AGA-8 Gross)	Steam (IF-97 or IF-	-97+James)
ModWorX Pro		ModWorX Pro		· · · · · · · · · · · · · · · · · · ·
Change Flow Run M	Maintenance Task	Change Flow Run M	laintenance Task	
Flow Run Selection		Flow Run Selection		
• Flow Run 1		Flow Run 1		
Maintenance Task		Maintenance Task		
Change Cone Meter     Change Flow Coefficients (Cd)     Change Generic Liquid Paramet	ers	Change Cone Meter     Change Flow Coefficients (Cd)     Change MPMS Liquid Parameters		
	<u>O</u> K		QK	
Liquio	d (Generic)	Liquid (N	IPMS)	
	Figur	re 10.6		

- a. Under the Maintenance Task heading, click Change Flow Coefficients (Cd).
- b. Click OK to save the new selections and return to the Maintain Flow Run screen (Figure 10.7, page 139).

asks Tools Help						
DOWINLOAD		2000 - Device Name [s/n 4096] ain Flow Run 1			Site Name Field Name Location Name	C
					Save Changes	Exit Maintenance Mo
intain Flow Run						
Change Task Maintenance		un 1 e Flow Coefficients (Cd)				
lew Flow Coefficie	nts			Flow Coeff	icients rated On: 01/18/2010	
Reynolds Number Flow	Coefficient	Entry Mode	Reynolds		v Coefficient	
		Linear Flow Coefficient     Multi-point Flow Coefficient	1 2	50.0 100.0	100.0000 150.0000	
		Enter Linear Coefficient				
		Load Coefficients From				
ote		1	Note			
Interface User Manuals						

Figure 10.7

- Note that current flow coefficients appear on the right half of the screen. To make a minor change to an existing set
  of flow coefficients, click *Load Coefficients From...* and select the set of coefficients from the dialog provided. The
  coefficients selected will be pasted into the fields on the left. This will help to minimize the number of fields that
  have to be changed.
- 3. To enter a linear flow coefficient,
  - a. Click *Linear Flow Coefficient* in the Entry Mode box.
  - b. Click the *Enter Linear Factor* button.
  - c. Type in the new linear coefficient in the dialog provided.
  - d. Click OK to update the entry in the New Flow Coefficients section of the Maintain Flow Run screen.
- 4. To enter a multi-point meter factor,
  - a. Click *Multi-point Flow Coefficient* in the Entry Mode box.
  - b. Click *Add Coefficient* and enter the appropriate Reynolds number and flow coefficient values in the dialog provided.
  - c. Click OK to update the entry in the New Flow Coefficients section of the Maintain Flow Run screen.
  - d. Repeat steps 4a through 4c as required to enter up to 12 calibration points.
- 5. Enter a note in the Note field if you want to capture additional information about the flow coefficient change. The note will be stored with the new flow coefficients.
- 6. Click *Save Changes* in the upper right corner of the screen. The new settings will be saved and will be made effective when the user exits the Maintain Flow Run screen.
- 7. To perform a new maintenance task without leaving the screen, click on *Change Task* and make a new selection.
- 8. To exit the Maintain Flow Run screen and return to the Main Display screen, click *Exit Maintenance Mode* in the upper right corner of the screen.

# Procedure: Change Gas Composition

1. If Change Gas Composition is not displayed in the Maintenance Task field at the top of the Maintain Flow Run screen, click on *Change Task*. The Change Flow Run Maintenance Task dialog will appear (Figure 10.8).

ModWorX Pro	X
Change Flow Run Maintenance Task	
Flow Run Selection	
Flow Run 1	
Maintenance Task	
Change Cone Meter	
Change Flow Coefficients (Cd)	
Change Gas Composition	
	9

Figure 10.8

- a. Under the Maintenance Task heading, click Change Gas Composition.
- b. Click OK to save your selections and return to the Maintain Flow Run screen (Figure 10.9, page 141).
- Note that current gas composition appears on the right half of the screen and the new gas composition will be entered in the left half of the screen. If you are making a minor change to current parameters, click *Copy from Current*. Current parameters will be pasted into the fields on the left. This will help to minimize the number of fields that have to be changed.
- 3. Note that the fluid properties calculation method selected for the flow run appears near the top of the New Gas Composition section. The calculation method is read-only. To change, see Configuring Fluid Properties, page 57.
- 4. In the Analysis Reference No. field, enter a reference number from the gas analysis report, if desired.
- 5. Update the Reference Conditions field, if necessary. This selection identifies the ideal mass heating value table for use in calculating the heating value of the gas composition and sets the reference temperature and pressure used in converting the user-supplied heating value into the heating value mass basis required for energy calculations.
- 6. In the Heating Value field, specify whether the heating value is to be calculated or entered manually. If the value is entered manually, enter the heating value in the field provided.
- 7. In the Specific Gravity field, specify whether specific gravity is to be calculated or entered manually. If the value is entered manually, enter the specific gravity in the field provided.
- 8. Enter the viscosity of the measured fluid in the field provided. If you are unsure of the value, enter 0.010268.
- 9. Enter the isentropic exponent of the measured fluid in the field provided. If you are unsure of the value, enter 1.3.
- 10. To change the mole percentages of individual gas constituents,
  - a. Locate the gas constituent to be changed.
  - b. Double-click the constituent or click on the *Change Mole* % button and enter the appropriate percentage in the dialog provided.
  - c. Repeat steps 10a and 10b until all constituents are entered.

DOWNLOAD		ain Flow Ru			Site N Field N Location N	ane	6
<u> </u>					Save	Changes	Exit Maintenance Mod
aintain Flow Run							
Change Task	ed Flow Run Flow Run mance Task Change	un 1 : Gas Compositio	n				
New Gas Comp	osition			Current Gas C	omposition		
Fluid Properties Calculation	AGA-8 Detail			Operator: None, Changed	and the second se		
Analysis Ref. No.				Analysis Ref. No.			
and the second second		Contracted to 10	1	e de la contra de la			
Reference Conditions	United States (14.73	And the second second		Reference Conditions	United States (14.7		
Heating Value	Calculated 👻	(calculated)		Heating Value	Calculated	(calculated)	
Specific Gravity	Calculated 👻	(calculated)		Specific Gravity	Calculated	(calculated)	
Viscosity	Manual entry		cP	Viscosity	Manual entry	0.010268	cP
Isentropic Exponent	Manual entry			Isentropic Exponent	Manual entry	1.3000	
Gas Fraction	(No wet correction)			Gas Fraction	(No wet correction)		
Clear New Data Constituent 1 Carbon Dioxide (CO2 2 Nitrogen (N2) 3 Methane (C1)	Copy From Current Mole %	Chang	e Mole %	Constituent Constituent Constituent Constituent Nitrogen (N2) Constituent Cons	Mole 9 02) 0.595 0.259 96.522	6	
4 Ethane (C2)		Clear A	Il Mole %	4 Ethane (C2)	1.818		
5 Propane (C3)				5 Propane (C3)	0.459		
6 n-Butane (n-C4)		Load Con	nposition	6 n-Butane (n-C4)	0.100		
7 i-Butane (i-C4)				7 i-Butane (i-C4)	0.097		
8 n-Pentane (n-C5) 9 i-Pentane (i-C5)				8 n-Pentane (n-C5) 9 i-Pentane (i-C5)	0.032		
10 n-Hexane (n-C6)				10 n-Hexane (n-C6)	0.066		
11 n-Heptane (n-C7)				11 n-Heptane (n-C7)	0.000		
12 n-Octane (n-C8)				12 n-Octane (n-C8)	0.000		
13 n-Nonane (n-C9) 14 n-Decane (n-C10)				13 n-Nonane (n-C9) 14 n-Decane (n-C10)	0.000		
15 Oxygen (02)				15 Oxygen (O2)	0.000		
16 Carbon Monoxide (Co	0)			16 Carbon Monoxide (			
17 Hydrogen (H2)				17 Hydrogen (H2)	0.000		
18 Hydrogen Sulfide (H2	5)			18 Hydrogen Sulfide ()			
19 Water (H2O) 20 Helium (He)				19 Water (H2O) 20 Helium (He)	0.000		
21 Araon (Ar)				21 Argon (Ar)	0.000		
	Total % 0.0000				Total % 100.0000		
Note		e		Note		-	
			ĩ				
Important: Total of all c	onstituents must be 1	00%.					



Note When the AGA-8 Detail method is used, all constituent percentages entered must total 100%.

- 11. To load the current gas composition or a previously saved composition, click *Load Composition...* and select the set of gas composition values from the dropdown menu in the dialog provided. If the desired composition is very similar to an existing composition, loading a composition can reduce setup time by eliminating the need to enter each constituent separately.
- 12. Enter a note in the Note field, if desired (for example, to identify the gas composition for future reference). The note will be stored with the gas composition settings.
- 13. Click *Save Changes* in the upper right corner of the screen. The changes will be saved as the Current Gas Composition and will be put into effect when the user exits the Maintain Flow Run screen.
- 14. To perform a new maintenance task without leaving the screen, click on *Change Task* and make a new selection.
- 15. To exit the Maintain Flow Run screen and return to the Main Display screen, click *Exit Maintenance Mode* in the upper right corner of the screen.

### Procedure: Change Gross Method Parameters

1. If Change Gross Method Parameters is not displayed in the Maintenance Task field at the top of the Maintain Flow Run screen, click on *Change Task*. The Change Flow Run Maintenance Task dialog will appear (Figure 10.10).

odWorX Pro	
Change Flow Run Maintenance Ta	ısk
Flow Run Selection	
• Flow Run 1	
Maintenance Task	
Change Cone Meter	
<ul> <li>Change Flow Coefficients (Cd)</li> </ul>	
Change Gross Method Parameters	
OK	Cancel
	Zaurei

Figure 10.10

- a. Under the Maintenance Task heading, click Change Gross Method Parameters.
- b. Click OK to save the settings and return to the Maintain Flow Run screen (Figure 10.11, page 143).
- 2. Note that current gross method parameters appear on the right half of the screen and the new gross method parameters will be entered in the left half of the screen. If you are making a minor change to current parameters, click *Copy from Current*. Current parameters will be pasted into the fields on the left. This will help to minimize the number of fields that have to be changed.
- Note that the fluid properties calculation method selected for the flow run appears near the top of the New Gross Method Parameters section. The calculation method is read-only. To change this method, see Configuring Fluid Properties, page 57.
- 4. In the Analysis Reference No. field, enter a reference number from the gas analysis report, if desired.
- 5. Update the Reference Conditions field, if necessary. This selection sets the reference temperature and pressure for air density, which is used in converting the user-supplied heating value into the heating value mass basis required for energy calculations.
- 6. Enter the heating value of the measured fluid in the field provided.
- 7. Enter the specific gravity of the measured fluid in the field provided.
- 8. Enter the viscosity of the measured fluid in the field provided. If you are unsure of the value, enter 0.010268.
- 9. Enter the isentropic exponent of the measured fluid in the field provided. If you are unsure of the value, enter 1.3.
- 10. Enter the carbon dioxide content in the field provided.

asks Tools Help							
		tain Flow	e Name [s/n 4096] Run 1		Site Field Location		Ø
					Sa	ve Changes	Exit Maintenance Moo
intain Flow Run							
	d Flow Run Flow	Run 1					
Change Task Mainter	nance Task Cha	nge Gross Metho	d Parameters				
Jew Gross Meth uid Properties Calculation nalysis Ref. No.	nod Parame AGA-8 Gross	ters		Current Gross Operator: None, Changed Analysis Ref. No.	Contraction of the second	ameters	
eference Conditions	United States (14	.73 psi, 60 F)	•	Reference Conditions	United States (14	.73 psi, 60 F)	
eating Value	Manual entry	]	BTU/SCF	Heating Value	Manual entry	1031.4260	BTU/SCF
pecific Gravity	Manual entry			Specific Gravity	Manual entry	0.600000	
iscosity	Manual entry		cP	Viscosity	Manual entry	0.010268	сР
entropic Exponent	Manual entry			Isentropic Exponent	Manual entry	1.3000	
arbon Dioxide (CO2)		Mole %		Carbon Dioxide (CO2)	0.5956	Mole %	
itrogen (N2)		Mole %		Nitrogen (N2)	0.2595	Mole %	
Clear New Data	Copy From Currer	×					
ote				Note			
Interface User Manuals							

Figure 10.11

- 11. Enter the nitrogen content in the field provided.
- 12. Enter a note in the Note field, if desired (for example, to identify the gross method settings for future reference). The note will be stored with the gross method settings.
- 13. Click *Save Changes* in the upper right corner of the screen. The changes will be saved as the Current Gross Method Parameters and will be put into effect when the user exits the Maintain Flow Run screen.
- 14. To perform a new maintenance task without leaving the screen, click on *Change Task* and make a new selection.
- 15. To exit the Maintain Flow Run screen and return to the Main Display screen, click *Exit Maintenance Mode* in the upper right corner of the screen.

#### Procedure: Change Steam Properties (Steam Flow Runs Only)

If a flowrun is configured for measuring steam *and a wet correction is enabled*, the steam quality or dryness can be configured from the Maintain Flow Run screen. All other steam properties are calculated and are non-configurable.

 If Change Steam Properties is not displayed in the Maintenance Task field at the top of the Maintain Flow Run screen, click on *Change Task*. The Change Flow Run Maintenance Task dialog will appear (Figure 10.12, page 144).

Flow Run 1	
Maintenance Task ○ Change Cone Meter	
Change Cone Heter     Order State     Change Flow Coefficients (Cd)	
Change Steam Properties	

Figure 10.12

- a. Under the Maintenance Task heading, click Change Steam Properties.
- b. Click OK to save your selections and return to the Maintain Flow Run screen (Figure 10.13).

1aintain Flow Run 1 - 1	ModWorX Pro 4	.0.0				
∐asks Tgols Help					)	
DOWNLOAD		er 2000 - Device Name [s/r ntain Flow Run 1	4096]		e Name d Name n Name	e
				S	ave Changes	Exit Maintenance Mod
aintain Flow Run						
Change Task Selection	ed Flow Run Flo	w Run 1				
	mance Task Ch	ange Steam Properties				
New Steam Pro	perties		Current Steam			
Fluid Properties Calculation	IF-97		Operator: None, Changed	On:		
Analysis Ref. No.			Analysis Ref. No.			
Enthalpy	Calculated	(calculated)	Enthalpy	Calculated	(calculated)	
Specific Gravity	Calculated	(calculated)	Specific Gravity	Calculated	(calculated)	
Viscosity	Calculated	(calculated)	Viscosity	Calculated	(calculated)	
Isentropic Exponent	Calculated	(calculated)	Isentropic Exponent	Calculated	(calculated)	
Steam Quality/Dryness		percent	Steam Quality/Dryness	100.0	percent	
Clear New Data	Copy From Curr	ent				
Note			Note			
ce Interface User Manuals						

Figure 10.13

- 2. Note that current steam properties appear on the right half of the screen and the new steam properties will be entered in the left half of the screen.
- 3. Note that the fluid properties calculation method selected for the flow run appears near the top of the New Steam Properties section. The calculation method is read-only. To change this method, see Configuring Fluid Properties, page 57.

- 4. In the Analysis Reference No. field, enter a reference number from the steam analysis report, if desired.
- 5. If wet correction is enabled, enter the steam quality (percent) in the Steam Quality/Dryness field.
- 6. Enter a note in the Note field, if desired (for example, to identify the steam properties for future reference). The note will be stored with the steam property settings.
- 7. Click *Save Changes* in the upper right corner of the screen. The changes will be saved as the Current Steam Properties and will be put into effect when the user exits the Maintain Flow Run screen.
- 8. Enter a note in the Note field, if desired (for example, to identify the liquid parameters for future reference). The note will be stored with the liquid parameter settings.
- 9. To exit the Maintain Flow Run screen and return to the Main Display screen, click *Exit Maintenance Mode* in the upper right corner of the screen.
- 10. To perform a new maintenance task without leaving the screen, click on *Change Task* and make a new selection.
- 11. To exit the Maintain Flow Run screen and return to the Main Display screen, click *Exit Maintenance Mode* in the upper right corner of the screen.

# Procedure: Change MPMS Liquid Parameters

If a flowrun is configured for measuring liquid, the liquid parameters can be configured from the Maintain Flow Run screen.

1. If Change MPMS Liquid Parameters is not displayed in the Maintenance Task field at the top of the Maintain Flow Run screen, click on *Change Task*. The Change Flow Run Maintenance Task dialog will appear (Figure 10.14).

ow Run Selec	tion	
• Flow Run 1		
laintenance T	ask	
🔵 Change Cone Meter		
Change Flow Coefficie	nts (Cd)	
Change MPMS Liquid F	arameters	

Figure 10.14

- a. Under the Maintenance Task heading, click *Change MPMS Liquid Parameters*.
- b. Click OK to save the settings and return to the Maintain Flow Run screen (Figure 10.15, page 146).

🂏 Maintain Flow Run 1 - Mod	WorX Pro 4.1.0			
<u>Eile T</u> asks T <u>o</u> ols <u>H</u> elp				
DOWNLOAD	scanner 2000 - [s/n 0] Maintain Flow Run 1			
			Save Changes	Exit Maintenance Mode
Maintain Flow Run				-
Change Task Selected I Maintenar				
New MPMS Liquid	Parameters MPMS Crude Oil	Current MPMS Operator: <port 1="" default=""></port>	Liquid Parameters », Changed On: 07/23/2013	
Analysis Ref. No.		Analysis Ref. No.		
Density Source	Absolute Density 👻	Density Source	Specific Gravity	
Base Absolute Density	KG/M3	Base Specific Gravity	1.000	
Viscosity	CP	Viscosity	6.000000 cP	
actual flowing viscosity should	ific Gravity is at base temperature and the			
Clear New Data	Copy From Current Load Default Params			
Note		Note		
Device Interface User Manuals		USB 4	.1.0.468 <port 1="" default=""></port>	7/23/2013 11:53 AM
			.1.0.466 <port 1="" derault=""></port>	//20/2010 11:03 AM

Figure 10.15

- Note that current liquid parameters appear on the right half of the screen and the new liquid parameters will be entered in the left half of the screen. If you are making a minor change to current parameters, click *Copy from Current*. Current parameters will be pasted into the fields on the left. This will help to minimize the number of fields that have to be changed.
- 3. The fluid properties calculation method selected for the flow run (Example: Crude Oil) appears near the top of the New MPMS Liquid Properties section. The calculation method is read-only. To change this method, see Configuring Fluid Properties, page 57.
- 4. In the Analysis Reference No. field, enter a reference number from the liquid analysis report, if desired.
- Note The density source, base density, and viscosity parameters can be populated with a set of default parameters, or with values supplied by the user. To use the set of default values, click *Load Default Params* near the bottom of the screen.
- 5. In the Density Source field, select a source to be used for the density value: *Absolute Density*, *Specific Gravity*, or *API Gravity*.
- 6. Enter the Base Density (Absolute, Specific Gravity or API Gravity) value of the liquid. Density is assumed to be at base temperature.
- 7. If Special Products is selected as the fluid type for the MPMS fluid properties calculation method, enter the fluid's expansion coefficient "alpha" (Figure 9.14, page 135) in accordance with MPMS Chapter 11.1. You may enter a numeric value, or click the *Select Alpha* button to select a predetermined alpha value for products such as ethanol and gasohol.
- 8. For best accuracy, enter the viscosity value of the liquid at flowing temperature. If the viscosity is unknown, use the recommended default value for the liquid type selected. Enter a note in the Note field, if desired (for example, to identify the liquid parameters for future reference). The note will be stored with the liquid parameter settings.
- 9. Click *Save Changes* in the upper right corner of the screen. The changes will be saved as the Current MPMS Liquid Parameters and will be put into effect when the user exits the Maintain Flow Run screen.
- 10. To perform a new maintenance task without leaving the screen, click on *Change Task* and make a new selection.
- 11. To exit the Maintain Flow Run screen and return to the Main Display screen, click *Exit Maintenance Mode* in the upper right corner of the screen.

# Procedure: Change Generic Liquid Parameters

If a flowrun is configured for measuring liquid, the liquid parameters can be configured from the Maintain Flow Run screen.

1. If Change Generic Liquid Parameters is not displayed in the Maintenance Task field at the top of the Maintain Flow Run screen, click on *Change Task*. The Change Flow Run Maintenance Task dialog will appear (Figure 10.16).

shange now rai	n Maintenance Task
low Run Selection	n
Flow Run 1	
Maintenance Task	¢
🔿 Change Cone Meter	
<ul> <li>Change Flow Coefficients (6</li> </ul>	Cd)
O Change Generic Liquid Para	meters
	QK <u>C</u> an

Figure 10.16

- a. Under the Maintenance Task heading, click Change Generic Liquid Parameters.
- b. Click OK to save the settings and return to the Maintain Flow Run screen (Figure 10.17, page 148).
- 2. Note that current liquid parameters appear on the right half of the screen and the new liquid parameters will be entered in the left half of the screen. If you are making a minor change to current parameters, click *Copy from Current*. Current parameters will be pasted into the fields on the left. This will help to minimize the number of fields that have to be changed.
- 3. The fluid properties calculation method selected for the flow run (Example: Generic Liquid) appears near the top of the New Generic Liquid Properties section. The calculation method is read-only. To change this method, see Config-uring Fluid Properties, page 57.
- 4. In the Analysis Reference No. field, enter a reference number from the liquid analysis report, if desired.
- Note The density source, base density, and viscosity parameters can be populated with a set of default parameters, or with values supplied by the user. To use the set of default values, click *Load Default Params* near the bottom of the screen.

🎢 Maintain Flow Run 1 - Mo	dWorX Pro 4.1.0			
<u>Eile T</u> asks T <u>o</u> ols <u>H</u> elp	<u></u>		)	
DOWNLOAD	scanner 2000 - [s/n 0] Maintain Flow Run 1			
			Save Changes	Exit Maintenance Mode
Maintain Flow Run				
Change Task Selected	Flow Run 1			
	ance Task Change Generic Liquid Parameter	5		
New Generic Liqu Fluid Properties Calculation Analysis Ref. No.	uid Parameters Generic Liquid	Current Generic Operator: <port 1="" default="">, C Analysis Ref. No.</port>	Liquid Parameters Changed On: 07/23/2013	
Flowing Density Calculation	Manual Entry of Flowing Density	Flowing Density Calculation	Manual Entry of Flowing Density	
Density Source	Absolute Density 👻	Density Source	Specific Gravity	
Base Absolute Density	KG/M3	Base Specific Gravity	1.0000	
Flowing Absolute Density	KG/M3	Flowing Specific Gravity	0.999996	
Viscosity	cP	Viscosity	6.000000 cP	
Density. * A typical viscosity of this liqu flowing viscosity should be d	guired. If it is not known, use the same value as for Fi id is about 1.0 CP. However, for accurate results the a tearmined. meter is at flowing temperature.	-		
Note		Note		
Device Interface User Manuals		USB 4.1.	0.468 <port 1="" default=""></port>	7/23/2013 11:58 AM

Figure 10.17

- 5. In the Density Source field, select a source to be used for the density value: Absolute Density or Specific Gravity.
- 6. Enter the Base Density (Absolute or Specific Gravity) value of the liquid. If the base density of the liquid is unknown, enter the flowing density into both the Base Density and Flowing Density fields.
- 7. Enter the Flowing Density (Absolute or Specific Gravity) value, if applicable.
- 8. If Special Products is selected as the fluid type for the MPMS fluid properties calculation method, enter the fluid's expansion coefficient "alpha" (Figure 9.14, page 135) in accordance with MPMS Chapter 11.1. You may enter a numeric value, or click the *Select Alpha* button to select a predetermined alpha value for products such as ethanol and gasohol.
- 9. For best accuracy, enter the viscosity value of the liquid at flowing temperature. Enter the viscosity of the liquid. If the viscosity is unknown, a value of 1.0 cP (viscosity of water) is recommended.
- 10. Enter a note in the Note field, if desired (for example, to identify the liquid parameters for future reference). The note will be stored with the liquid parameter settings.
- 11. Click *Save Changes* in the upper right corner of the screen. The changes will be saved as the Current Generic Liquid Parameters and will be put into effect when the user exits the Maintain Flow Run screen.
- 12. To perform a new maintenance task without leaving the screen, click on Change Task and make a new selection.
- 13. To exit the Maintain Flow Run screen and return to the Main Display screen, click *Exit Maintenance Mode* in the

upper right corner of the screen.

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# Section 11 - Flow Run Maintenance for Averaging Pitot Tube (Annubar) Input

Routine flow run maintenance tasks for an averaging pitot tube run, such as changing gas constituents or changing plate size, are easily performed from the Maintain Flow Run screen. This section will guide you in performing the following tasks:

- view existing averaging pitot tube parameters
- change meter parameters
- change gas constituents (for AGA-8 Detail calculations)
- change gross method parameters (for AGA-8 Gross calculations)
- change steam properties (steam flow runs only)
- change liquid parameters (liquid flow runs only)
- Note Before making changes to the flow run configuration, make sure the flow rate calculation method is configured as averaging pitot tube (Annubar). See Section 4 Setting Up a Flowrun for instructions on selecting the flow run calculation method.

To perform flow run maintenance for an orifice run,

1. Click on the Maintain Flow Run button in the task menu bar on the Main Display screen (Figure 11.1).



Figure 11.1

2. Click *Yes* at the Enter Maintenance Mode prompt. The Change Flow Run Maintenance Task screen will appear (Figure 11.2, page 151).

Figure 11.2

- 3. Flow Run 1 is automatically selected.
- 4. Select the maintenance task to be performed. The maintenance tasks displayed will vary, depending on the type of flow being measured gas, steam or liquid. Examples are provided in the following procedures.
- 5. Click OK to save the selections. The Maintain Flow Run screen will appear (Figure 11.3).

🎇 Maintain Flow Run 1 - M	lodWorX Pro	4.0.0				
Ele Iasks Tools Help						
		intain Flow Run 1	4096]	Fi	ite Name eld Name ion Name	<b>S</b>
					Save Changes	Exit Maintenance Mode
Maintain Flow Run						î
Change Task Selecte	ed Flow Run Flo	ow Run 1				
	nance Task Ch	ange Averaging Pitot Tube				
New Averaging	Pitot Tube	Parameters Select Meter	Current Averag Operator: None, Changed C		Tube Param	eters
Model Number			Model Number	( To Be Confi	gured )	
Probe Width		inches	Probe Width	1.0000	inches	
Discharge Coefficient (K)			Discharge Coefficient (K)	0.73026		
Reference Temperature	68.0000	Deg F	Reference Temperature	68.0000	Deg F	
Pipe Size (I.D.)		inches	Pipe Size (I.D.)	2.0670	inches	
Probe Material	Select an opt	tion 💌	Probe Material	Stainless Ste	H (304/316)	
Pipe Material	Select an opt	tion 👻	Pipe Material	Carbon Steel		
Serial Number			Serial Number			
Note			Note			
Clear New Data	Copy From Cur	tant				-
	copy mail car	ISIN .				
Device Interface User Manuals						
			US8 4.	0.0.446 <	ort 1 Default>	1/18/2010 4:15 PM

Figure 11.3

By default, engineering units are provided in US standard format. If metric units are required, click on the *Tools* button in the task bar at the top of the screen, and select *Options* from the dropdown menu. Click on the *Units System* dropdown menu to change the units selection to Metric. See Figure A.17, page A-12.

# Procedure: Change Averaging Pitot Tube Parameters

 If Change Averaging Pitot Tube is not displayed in the Maintenance Task field at the top of the Maintain Flow Run screen, click on *Change Task* (Figure 11.3, page 151). The Change Flow Run Maintenance Task dialog will appear (Figure 11.4). The selections available on this screen will vary, depending on the fluid property calculation method selected, as shown below.

1odWorX Pro 🛛 🐼	ModWorX Pro	<b>X</b>	ModWorX Pro	×
Change Flow Run Maintenance Task	Change Flow Run №	laintenance Task	Change Flow Run Ma	intenance Task
Flow Run Selection	Flow Run Selection		Flow Run Selection	
• Flow Run 1]	Flow Run 1		Flow Run 1	
Maintenance Task	Maintenance Task		Maintenance Task	
Change Averaging Pitot Tube Change Gas Composition	Change Averaging Pitot Tube Change Gross Method Paramete	rs	Change Averaging Pitot Tube     Orange Steam Properties	
Natural Gas (AGA-8 Detail)	Natural Gas (A	-	Steam (	(IF-97)
Natural Gas (AGA-8 Detail)	Natural Gas (A	GA-8 Gross)	Steam (	(IF-97)
ModWorX Pro		ModWorX Pro	· · · · · ·	
Change Flow Run M	aintenance Task	Change Flow Run M	aintenance Task	
Flow Run Selection		Flow Run Selection		
Flow Run 1		• Flow Run 1		
Maintenance Task		Maintenance Task		
Change Averaging Pitot Tube Change Generic Liquid Paramete	\$]	Change Averaging Pitot Tube     O Change MPMS Liquid Parameters		

Liquid (Generic)

Liquid (MPMS)

Figure 11.4

- a. Under the Maintenance Task heading, click Change Averaging Pitot Tube.
- b. Click OK to save your selections and return to the Maintain Flow Run screen (Figure 11.5, page 153).

aintain Flow Run 1 - Mo Lasks Tools <u>H</u> elp						
DOWNLOAD		2000 - Device Name [s/n 4 ain Flow Run 1	096]	Fie	te Name 1d Name on Name	S
					Save Changes	Exit Maintenance Mode
aintain Flow Run						
Change Task	Flow Run Flow Flow Flow Flow Flow Flow Flow Flow	tun I je Averaging Pitot Tube				
New Averaging P	Pitot Tube P	Select Meter	Operator: None, Changed O		ube Param	eters
1odel Number			Model Number	( To Be Config	ured)	
robe Width		inches	Probe Width	1.0000	inches	
Nischarge Coefficient (K)			Discharge Coefficient (K)	0.73026		
teference Temperature	68.0000	Deg F	Reference Temperature	68.0000	Deg F	
ipe Size (I.D.)		inches	Pipe Size (I.D.)	2.0670	inches	
robe Material	Select an option-	• •	Probe Material	Stainless Steel	(304/316)	
ipe Material	Select an option-	• · · · ·	Pipe Material	Carbon Steel		
Serial Number			Serial Number			
iote			Note			
Clear New Data	Copy From Current					
e Interface User Manuals						

Figure 11.5

- 2. Note that current meter parameters appear on the right half of the screen. If you are changing only pipe size, probe material or pipe material, click *Copy from Current*. Current parameters will be pasted into the fields on the left. This will help to minimize the number of fields that have to be changed.
- 3. Click *Select Meter* to display a list of meter selections. The Select Averaging Pitot Tube screen will appear (Figure 11.6).

Select Meter	Meter Informa	ation	
Averaging Pitot Tube Annubar® 485 Size 1	Model Number	Averaging Pitot	: Tube
Annubar® 485 Size 2 Annubar® 485 Size 3	Probe Width	0.0000	inches
Annubar® Type 10 Annubar® Type 15	Discharge Coefficient (K)	0.7500	
Annubar® Type 16 Annubar® Type 25	Reference Temp.	68.0000	Deg F
Annubar® Type 26 Annubar® Type 35 Annubar® Type 36 Annubar® Type 45 Annubar® Type 46			



4. The first selection in the list—Averaging Pitot Tube—is appropriate for any non-Annubar product. To select an averaging pitot tube meter, choose this selection on the left side of the screen, and enter the appropriate probe width, discharge coefficient (K), and reference temperature in the fields on the right side of the screen. Click *OK* to return to the Maintain Flow Run screen.

- 5. The remaining selections are Annubar meter models, with pre configured probe width, discharge coefficients (C1 and C2) and reference temperature. When an Annubar model is selected, no other entries are required on this screen. Click *OK* to return to the Maintain Flow Run screen.
- 6. Enter the following parameters as necessary:
  - a. pipe size click in the field and type in a value.
  - b. probe material choose a material from the dropdown list; use the scroll bar to view the entire list of materials
  - c. pipe material choose a material from the dropdown list; use the scroll bar to view the entire list of materials
  - a. serial number (optional)
- 7. Enter a note in the Note field, if desired. The note will be stored with the new meter parameter settings.
- 8. Click *Save Changes* in the upper right corner of the screen. The new settings will be saved and will be made effective when the user exits the Maintain Flow Run screen.
- 9. To perform a new maintenance task without leaving the screen, click on *Change Task* and make a new selection.
- 10. To exit the Maintain Flow Run screen and return to the Main Display screen, click *Exit Maintenance Mode* in the upper right corner of the screen.

#### Procedure: Change Gas Composition

1. If Change Gas is not displayed in the Maintenance Task field at the top of the Maintain Flow Run screen, click on *Change Task*. The Change Flow Run Maintenance Task dialog will appear (Figure 11.7).

odWorX Pro		
Change Flow Run Ma	aintenance Ta	isk
Flow Run Selection		
• Flow Run 1		
Maintenance Task		
Change Averaging Pitot Tube     Change Gas Composition		
	QK	⊆ancel

Figure 11.7

- a. Under the Maintenance Task heading, click Change Gas Composition.
- b. Click OK to save the settings and return to the Maintain Flow Run screen (Figure 11.8, page 155).
- Note that current gas composition appears on the right half of the screen and the new gas composition will be entered in the left half of the screen. If you are making a minor change to current parameters, click *Copy from Current*. Current parameters will be pasted into the fields on the left. This will help to minimize the number of fields that have to be changed.

DOWNLOAD		in Flow R	Name [s/n 4096] UN 1		Site N Field N Location N	ane	6
	<u></u>					Changes	Exit Maintenance Mod
aintain Flow Run	_	_	_				
antan Plow Kun				-			
Selecter	d Flow Run Flow Ru	in 1					
Change Task Mainten	ance Task Change	Gas Compositio	m				
New Gas Compo	eition			Current Gas Co	monsition		
Fluid Properties Calculation	AGA-8 Detail			Operator: None, Changed (	1		
	Man-o cotai						
Analysis Ref. No.				Analysis Ref. No.			
Reference Conditions	United States (14.73		•	Reference Conditions	United States (14.7		
Heating Value	Calculated 👻	(calculated)		Heating Value	Calculated	(calculated)	
Specific Gravity	Calculated 👻	(calculated)		Specific Gravity	Calculated	(calculated)	
Viscosity	Manual entry		cP	Viscosity	Manual entry	0.010268	cP
Isentropic Exponent	Manual entry			Isentropic Exponent	Manual entry	1.3000	
Gas Fraction	(No wet correction)			Gas Fraction	(No wet correction)		
2 Nikrogen (N2) 3 Methane (C1) 4 Ethane (C2) 5 Propare (C3) 6 n-Butane (n-C4) 7 i-Butane (n-C4) 8 n-Pentane (n-C5) 9 i-Pentane (n-C5) 10 n-Hexane (n-C6) 11 n-Heptane (n-C7) 12 n-Octane (n-C8) 13 n-Nonae (n-C9) 14 n-Decane (n-C10) 15 Covygen (O2)		Clear	Mole %	2         Nitrogen (N2)           3         Methane (C1)           4         Ethane (C2)           5         Propare (C3)           6         n-Butane (n-C4)           7         i-Butane (n-C4)           8         m-Pentane (n-C5)           9         i-Pentane (n-C5)           10         m-Hexane (n-C6)           11         m-Heptane (n-C7)           12         n-Octane (n-C6)           13         n-Nonane (n-C9)           14         n-Decane (n-C10)           15         Oxygen (O2)	0.259 96.522 1.810 0.459 0.100 0.097 0.032 0.047 0.066 0.000 0.000 0.000 0.000	2 6 6 7 7 4 8 8 9 0 0 0 0 0 0 0 0 0	
16 Carbon Monoxide (CO) 17 Hydrogen (H2)	)			<ol> <li>Carbon Monoxide (C</li> <li>Hydrogen (H2)</li> </ol>	0.000 0.000 0.000		
18 Hydrogen Sulfide (H25	)			18 Hydrogen Sulfide (H			
19 Water (H2O)				19 Water (H2O)	0.000		
20 Helium (He)				20 Helium (He)	0.000		
21 Araon (Ar)	atal % 0.0000			21 Araon (Ar)	0.000	1	
	'otal % 0.0000				Total % 100.0000		
Note	nstituents must be 1	00%.		Note			

Figure 11.8

- Note that the fluid properties calculation method selected for the flow run appears near the top of the New Gas Composition section. The calculation method is read-only. To change this method, see Configuring Fluid Properties, page 57.
- 4. In the Analysis Ref. No. field, enter a reference number from the gas analysis report, if desired.
- 5. Update the Reference Conditions field, if necessary. This selection identifies the ideal mass heating value table for use in calculating the heating value of the gas composition and sets the reference temperature and pressure used in converting the user-supplied heating value into the heating value mass basis required for energy calculations.
- 6. In the Heating Value field, specify a calculated or manually entered value. If the value is entered manually, enter the heating value in the field provided.
- 7. In the Specific Gravity field, specify a calculated or manually entered value. If the value is entered manually, enter the specific gravity value in the field provided.
- 8. Enter the viscosity of the measured fluid in the field provided. If you are unsure of the value, enter 0.010268.

9. Enter the isentropic exponent of the measured fluid in the field provided. If you are unsure of the value, enter 1.3.

Note Disregard the Gas Fraction field. This setting is not currently used in flow calculations.

- 10. To change the mole percentages of individual gas constituents,
  - a. Locate the gas constituent to be changed.
  - b. Double-click the constituent or click on the *Change Mole* % button and enter the appropriate percentage in the dialog provided.
  - c. Repeat steps 10a and 10b until all constituents are entered.

Note When the AGA-8 Detail method is used, all constituent percentages entered must total 100%.

- 11. To load the current gas composition or a previously saved composition, click *Load Composition...* and select the set of gas composition values from the dropdown menu in the dialog provided. If only minor changes are required to an existing composition, this can save time by minimizing the number of constituents that have to be changed.
- 12. Enter a note in the Note field, if desired (for example, to identify the gas composition for future reference). The note will be stored with the gas composition settings.
- 13. Click *Save Changes* in the upper right corner of the screen. The changes will be saved as the Current Gas Composition and will be put into effect when the user exits the Maintain Flow Run screen.
- 14. To perform a new maintenance task without leaving the screen, click on *Change Task* and make a new selection.
- 15. To exit the Maintain Flow Run screen and return to the Main Display screen, click *Exit Maintenance Mode* in the upper right corner of the screen.

#### Procedure: Change Gross Method Parameters

1. If Change Gross Method Parameters is not displayed in the Maintenance Task field at the top of the Maintain Flow Run screen, click on *Change Task*. The Change Flow Run Maintenance Task dialog will appear (Figure 11.9).

ModWorX Pro	3
Change Flow Run Maintenance Task	
Flow Run Selection	
Flow Run 1	
Maintenance Task	
Change Averaging Pitot Tube	
Change Gross Method Parameters	
QK Gancel	]

Figure 11.9

- a. Under the Maintenance Task heading, click *Change Gross Method Parameters*.
- b. Click OK to save the settings and return to the Maintain Flow Run screen (Figure 11.10, page 157).

- 2. Note that current gross method parameters appear on the right half of the screen and the new gross method parameters will be entered in the left half of the screen. If you are making a minor change to current parameters, click *Copy from Current*. Current parameters will be pasted into the fields on the left. This will help to minimize the number of fields that have to be changed.
- Note that the fluid properties calculation method selected for the flow run appears near the top of the New Gross Method Parameters section. The calculation method is read-only. To change this method, see Configuring Fluid Properties, page 57.
- 4. In the Analysis Reference No. field, enter a reference number from the gas analysis report, if desired.
- 5. Update the Reference Conditions field, if necessary. This selection sets the reference temperature and pressure for air density, which is used in converting the user-supplied heating value into the heating value mass basis required for energy calculations.
- 6. Enter the heating value of the measured fluid in the field provided.
- 7. Enter the specific gravity of the measured fluid in the field provided.

Iasks Tools Help	ModWorX Pro 4.	010					
DownLoad		r 2000 - Devic Itain Flow	e Name [s/n 4096] Run 1			Name Name Name	6
					Sa	we Changes	Exit Maintenance Moo
aintain Flow Run							
Change Task Select	ed Flow Run Flow	Run 1					
Mainte	nance Task Cha	nge Gross Metho	d Parameters				
New Gross Met Fluid Properties Calculation Analysis Ref. No.	hod Parame AGA-8 Gross	ters		Current Gross Operator: None, Changed Analysis Ref. No.	Contraction of the second	ameters	
Reference Conditions	United States (14	.73 psi, 60 F)	•	Reference Conditions	United States (1	4.73 psi, 60 F)	
Heating Value	Manual entry		BTU/SCF	Heating Value	Manual entry	1031.4260	BTU/SCF
Specific Gravity	Manual entry			Specific Gravity	Manual entry	0.600000	
Viscosity	Manual entry		CP	Viscosity	Manual entry	0.010268	cP
sentropic Exponent	Manual entry			Isentropic Exponent	Manual entry	1.3000	
Carbon Dioxide (CO2)		Mole %		Carbon Dioxide (CO2)	0.5956	Mole %	
Nitrogen (N2)		Mole %		Nitrogen (N2)	0.2595	Mole %	
Clear New Data	Copy From Curre	nt					
Note			_	Note			
e Interface User Manuals							

Figure 11.10

- 8. Enter the viscosity of the measured fluid in the field provided. If you are unsure of the value, enter 0.010268.
- 9. Enter the isentropic exponent of the measured fluid in the field provided. If you are unsure of the value, enter 1.3.
- 10. Enter the carbon dioxide content in the field provided.
- 11. Enter the nitrogen content in the field provided.
- 12. Enter a note in the Note field, if desired (for example, to identify the gross method settings for future reference). The note will be stored with the gross method settings.
- 13. Click *Save Changes* in the upper right corner of the screen. The changes will be saved as the Current Gross Method Parameters and will be put into effect when the user exits the Maintain Flow Run screen.
- 14. To perform a new maintenance task without leaving the screen, click on *Change Task* and make a new selection.
- 15. To exit the Maintain Flow Run screen and return to the Main Display screen, click *Exit Maintenance Mode* in the upper right corner of the screen.

# Procedure: Change MPMS Liquid Parameters

Important If using firmware version 4.10 or earlier, the content of Maintain Flow Run screens will be different. These older firmware versions support API-2540 standards which have since been replaced by API 11.1 standards. Please see Appendix C - Configuring Liquid Parameters Using Scanner Firmware 4.10 and Earlier, page C-1 for details.

If a flowrun is configured for measuring liquid, the liquid parameters can be configured from the Maintain Flow Run screen.

1. If Change MPMS Liquid Parameters is not displayed in the Maintenance Task field at the top of the Maintain Flow Run screen, click on *Change Task*. The Change Flow Run Maintenance Task dialog will appear (Figure 11.11).

odWorX Pro	
Change Flow Run Maintenand	ce Task
Flow Run Selection	
• Flow Run 1	
Maintenance Task  Change Averaging Pitot Tube	]
Change MPMS Liquid Parameters	
	<u>O</u> K

Figure 11.11

- a. Under the Maintenance Task heading, click Change MPMS Liquid Parameters.
- b. Click OK to save the settings and return to the Maintain Flow Run screen (Figure 11.12, page 159).
- Note that current liquid parameters appear on the right half of the screen and the new liquid parameters will be entered in the left half of the screen. If you are making a minor change to current parameters, click *Copy from Current*. Current parameters will be pasted into the fields on the left. This will help to minimize the number of fields that have to be changed.
- The fluid properties calculation method selected for the flow run (Example: Crude Oil) appears near the top of the New MPMS Liquid Properties section. The calculation method is read-only. To change this method, see Configuring Fluid Properties, page 57.
- 4. In the Analysis Reference No. field, enter a reference number from the liquid analysis report, if desired.
- Note The density source, base density, and viscosity parameters can be populated with a set of default parameters, or with values supplied by the user. To use the set of default values, click *Load Default Params* near the bottom of the screen.

🎢 Maintain Flow Run 1 - ModWorX	( Pro 4.1.0			
Eile <u>T</u> asks T <u>o</u> ols <u>H</u> elp				
DOWNLOAD	scanner 2000 - [s/n 0] Maintain Flow Run 1			
			Save Changes	Exit Maintenance Mode
Maintain Flow Run				
Change Task Selected Flow R Maintenance Ta				
New MPMS Liquid Par	rameters		Liquid Parameters	
Fluid Properties Calculation MPMS	Crude Oil	Operator: <port 1="" default:<="" td=""><td>&gt;, Changed On: 07/23/2013</td><td></td></port>	>, Changed On: 07/23/2013	
Analysis Ref. No.		Analysis Ref. No.		
Density Source Absolu	ite Density 👻	Density Source	Specific Gravity	
Base Absolute Density	KG/M3	Base Specific Gravity	1.000	E
Viscosity	cP	Viscosity	6.000000 cP	
* Note that the Density or Specific Gra Viscosity is at flowing temperature.	ut 6.0 GP. However, for accurate results the termined. with is at base temperature and the from Current Load Default Params			
Note		Note		
				~
Device Interface User Manuals		USB 4	4.1.0.468 <port 1="" default=""></port>	7/23/2013 11:53 AM

Figure 11.12

- 5. In the Density Source field, select a source to be used for the density value: *Absolute Density*, *Specific Gravity*, or *API Gravity*.
- 6. Enter the Base Density (Absolute, Specific Gravity or API Gravity) value of the liquid. Density is assumed to be at base temperature.
- 7. If Special Products is selected as the fluid type for the MPMS fluid properties calculation method, enter the fluid's expansion coefficient "alpha" (Figure 9.14, page 135) in accordance with MPMS Chapter 11.1. You may enter a numeric value, or click the *Select Alpha* button to select a predetermined alpha value for products such as ethanol and gasohol.
- 8. For best accuracy, enter the viscosity value of the liquid at flowing temperature. If the viscosity is unknown, use the recommended default value for the liquid type selected. Enter a note in the Note field, if desired (for example, to identify the liquid parameters for future reference). The note will be stored with the liquid parameter settings.
- 9. Enter a note in the Note field, if desired (for example, to identify the liquid parameters for future reference). The note will be stored with the liquid parameter settings.
- 10. Click *Save Changes* in the upper right corner of the screen. The changes will be saved as the Current MPMS Liquid Parameters and will be put into effect when the user exits the Maintain Flow Run screen.
- 11. To perform a new maintenance task without leaving the screen, click on *Change Task* and make a new selection.
- 12. To exit the Maintain Flow Run screen and return to the Main Display screen, click *Exit Maintenance Mode* in the upper right corner of the screen.

# Procedure: Change Generic Liquid Parameters

If a flowrun is configured for measuring liquid, the liquid parameters can be configured from the Maintain Flow Run screen.

1. If Change Generic Liquid Parameters is not displayed in the Maintenance Task field at the top of the Maintain Flow Run screen, click on *Change Task*. The Change Flow Run Maintenance Task dialog will appear (Figure 11.13).

ModWorX Pro	
Change Flow Run Maintenance Task	
Flow Run Selection	
Flow Run 1	
Maintenance Task	
Change Averaging Pitot Tube	
Change Generic Liquid Parameters	
ОКС	ancel

Figure 11.13

- a. Under the Maintenance Task heading, click Change Generic Liquid Parameters.
- b. Click OK to save the settings and return to the Maintain Flow Run screen (Figure 11.14).

🎢 Maintain Flow Run 1 - ModW	VorX Pro 4.1.0			
<u>Eile I</u> asks T <u>o</u> ols <u>H</u> elp				
DOWNLOAD	Scanner 2000 - [s/n 0] Maintain Flow Run 1			
			Save Changes	Exit Maintenance Mode
Maintain Flow Run				
Selected Fig	ow Run Flow Run 1			
Change Task Maintenand				
New Generic Liqui	d Parameters		Liquid Parameters	
Fluid Properties Calculation G	Seneric Liquid	Operator: <port 1="" default="">,</port>	Changed On: 07/23/2013	
Analysis Ref. No.		Analysis Ref. No.		
Flowing Density Calculation	Manual Entry of Flowing Density	Flowing Density Calculation	Manual Entry of Flowing Density	
Density Source A	Absolute Density 👻	Density Source	Specific Gravity	
Base Absolute Density	KG/M3	Base Specific Gravity	1.0000	
Flowing Absolute Density	KG/M3	Flowing Specific Gravity	0.999996	
Viscosity	cP	Viscosity	6.000000 cP	
* The Base Density value is requir Density.	red. If it is not known, use the same value as for Flowing			
* A typical viscosity of this liquid is flowing viscosity should be dete	is about 1.0 cP. However, for accurate results the actual ermined.			
* Note that the Viscosity paramet	ter is at flowing temperature.			
Clear New Data	Copy From Current Load Default Params			
Note		Note		
Device Interface User Manuals				
		USB 4.1	.0.468 <port 1="" default=""></port>	7/23/2013 11:58 AM

Figure 11.14

- 2. Note that current liquid parameters appear on the right half of the screen and the new liquid parameters will be entered in the left half of the screen. If you are making a minor change to current parameters, click *Copy from Current*. Current parameters will be pasted into the fields on the left. This will help to minimize the number of fields that have to be changed.
- The fluid properties calculation method selected for the flow run (Example: Generic Liquid) appears near the top of the New Generic Liquid Properties section. The calculation method is read-only. To change this method, see Configuring Fluid Properties, page 57.
- 4. In the Analysis Reference No. field, enter a reference number from the liquid analysis report, if desired.
- Note The density source, base density, and viscosity parameters can be populated with a set of default parameters which are the values for water. While the default values are specific to water, they can provide an indication of the value range that is applicable for these parameters. To load the default values, click *Load Default Params* near the bottom of the screen.
- 5. In the Density Source field, select a source to be used for the density value: *Absolute Density* or *Specific Gravity*.
- 6. Enter the Base Density (Absolute or Specific Gravity) value of the liquid. If the base density of the liquid is unknown, enter the flowing density.
- 7. Enter the Flowing Density (Absolute or Specific Gravity) value, if applicable.
- 8. Enter the viscosity of the liquid. Viscosity is assumed to be at flowing temperature. If the viscosity is unknown, a value of 1.0 cP (viscosity of water) is recommended.
- 9. Enter a note in the Note field, if desired (for example, to identify the liquid parameters for future reference). The note will be stored with the liquid parameter settings.
- 10. Click *Save Changes* in the upper right corner of the screen. The changes will be saved as the Current Generic Liquid Parameters and will be put into effect when the user exits the Maintain Flow Run screen.
- 11. To perform a new maintenance task without leaving the screen, click on Change Task and make a new selection.
- 12. To exit the Maintain Flow Run screen and return to the Main Display screen, click *Exit Maintenance Mode* in the upper right corner of the screen.

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# Section 12 - Flow Run Maintenance for Turbine Input (AGA-7/ Liquid Turbine)

For an AGA-7 run, gas constituents are easily updated from the Maintain Flow Run screen, as described in this section.

For instructions on turbine maintenance activities, such as changing a K-factor or changing the flowmeter model, see Section 13 - Turbine Maintenance.

Note Before making changes to the flow run configuration, make sure the flow run calculation method is configured as AGA-7 or Liquid Turbine. See Section 4 - Setting Up a Flowrun for instructions on selecting the flow run calculation method.

To change the gas composition,

1. Click on the *Maintain Flow Run* button in the task menu bar on the Main Display screen (Figure 12.1).

DOWNLOAD		W - Device name [	-		Site name Field Name		6
DOWNLOAD	Scanner	2 DW Mair	n Display		Location name		C
Refresh Vato-Refresh							Ret
🛞 Calibrate Inpe	uts 🚺 🗿 Mai	ntain Flow Run	🛞 Mainta	ain Turbine 🛛 💮 Manage	PID 🦉	Configure	
Flow Run Data				Turbine Data			
Flow Rate	352.687	MCF/day		Turbine 1 Flow Rate	7	BBL/day	
Daily Total (est.)	317.173	MCF		Turbine 1 Grand Total	4.52234E006	BBL	
Heating Value	1036.06	BTU/SCF		Turbine 2 Flow Rate	0	BBL/day	
				Turbine 2 Grand Total	0	BBL	
	Current Day	Previous Day			Current Day	Previous Day	
Volume Flow	45.3104	352.687	MCF	Turbine 1 Volume Flow	0.902952	7	BBL
Mass Flow	2014.74	15682.3	LBM	Turbine 2 Volume Flow	0	0	BBL
Energy	46.9442	365.404	MMBTU				
			DETAILS				DETAILS
Input Data				System Data			
Static Pressure	6.22	PSIG		Alarms			ALARMS
Differential Pressure	164.62	In H2O		Supply / Battery Voltage	10.28 / 10.5	5 V	
Process Temperature	60.00	Deg F	×	Temperature	71.6	7 Deg F	
Analog Input 1	0.00	inches	-	Date/Time	Oct 26, 201	8 11:05:48 AM	
Analog Input 2	56.24	Deg F	-	Analog Output	15.2	0 mA	
				Smart Battery / Health %	83.00 / 9	7 %	
			DETAILS				DETAILS

Figure 12.1

2. Click *Yes* at the Enter Maintenance Mode prompt. The Change Flow Run Maintenance Task screen will appear (Figure 12.2, page 164). The maintenance task displayed will vary, depending on the fluid property calculation method selected. For example, when calculating gas flow with the AGA-8 Detail method is used, the maintenance task will be "Change Gas Composition." When the AGA-8 Gross method is used, the maintenance task will be "Change Gross Method Parameters."

ModWorX Pro	ModWorX Pro
Change Flow Run Maintenance Task	Change Flow Run Maintenance Task
Flow Run Selection	Flow Run Selection
• Flow Run 1	• Flow Run 1
Maintenance Task	Maintenance Task
Change Gas Composition	Ohange Gross Method Parameters
	×Q

Figure 12.2

3. Click *OK* to proceed. The Maintain Flow Run screen will appear (Figure 12.3).

DOWNLOAD		ain Flow R	Name [s/n 4096] Sun 1		Site N Field N Location N	ine	6
					Save	Thanges	Exit Maintenance Mo
aintain Flow Run							
	Flow Run Flow F						
Change Task		2004. D'					
Maintena	ince Task Chang	je Gas Compositi	on				
New Gas Compos				Operator: None, Changed C			
Fluid Properties Calculation	AGA-8 Detail			operator: None, Charged o	ALC:		
Analysis Ref. No.				Analysis Ref. No.			
Reference Conditions	United States (14.7	3 psi, 60 F)	•	Reference Conditions	United States (14.73	psi, 60 F)	
Heating Value	Calculated 👻	(calculated)		Heating Value	Calculated	(calculated)	
Specific Gravity	Calculated •	(calculated)		Specific Gravity	Calculated	(calculated)	
riscosity	Manual entry		æ	Viscosity	Manual entry	0.010268	¢P
Isentropic Exponent	Manual entry		-	Isentropic Exponent	Manual entry	1.3000	
Sas Fraction	(No wet correction)	I	-	Gas Fraction	(No wet correction)		
Clear New Data	Copy From Current						
Constituent 1 Carbon Dioxide (CO2)	Mole 1	6 Chan	ge Mole %	Constituent 1 Carbon Dioxide (CO2	Mole % 0.5956		
2 Nitrogen (N2)		Clea	r Mole %	2 Nitrogen (N2)	0.2595		
3 Methane (C1)			All Mole %	3 Methane (C1)	96.5222	: · · · · · · · · · · · · · · · · · · ·	
4 Ethane (C2)		Clear	All 1900 76	4 Ethane (C2)	1.8186		
5 Propane (C3) 6 n-Butane (n-C4)		Lander	mposition	5 Propane (C3) 6 n-Butane (n-C4)	0.4596		
7 i-Butane (i-C4)		- LOUD C		7 i-Butane (i-C4)	0.0977		
8 n-Pentane (n-C5)				8 n-Pentane (n-C5)	0.0324		
9 i-Pentane (i-C5)				9 i-Pentane (i-CS)	0.0473	1	
10 n-Hexane (n-C6)				10 n-Hexane (n-C6)	0.0664		
11 n-Heptane (n-C7)				11 n-Heptane (n-C7) 12 n-Octane (n-C8)	0.0000		
12 n-Octane (n-C8) 13 n-Nonane (n-C9)				12 n-Octane (n-C8) 13 n-Nonane (n-C9)	0.000		
14 n-Decane (n-C10)				14 n-Decane (n-C10)	0.0000		
15 Oxygen (O2)				15 Oxygen (O2)	0.0000		
16 Carbon Monoxide (CO)				16 Carbon Monoxide (Co			
17 Hydrogen (H2)				17 Hydrogen (H2)	0.000		
18 Hydrogen Sulfide (H2S) 19 Water (H2O)				18 Hydrogen Sulfide (H2 19 Water (H2O)	(5) 0.0000 0.0000		
20 Helium (He)				20 Helium (He)	0.0000		
21 Argon (Ar)				21 Argon (Ar)	0.000	1	
Т	otal % 0.000	D			Total % 100.0000		
Note				Note			
222 c.			1				
Important: Total of all con	Alternation and the	100%					

Figure 12.3

# Procedure: Change Gas Composition

- If Change Gas Composition is not displayed in the Maintenance Task field at the top of the Maintain Flow Run screen, click on *Change Task*. The Change Flow Run Maintenance Task dialog will appear (Figure 12.2, page 164).
  - a. Under the Maintenance Task heading, click *Change Gas Composition*.
  - b. Click OK to save your selections and return to the Maintain Flow Run screen (Figure 12.3, page 164).
- Note that current gas composition appears on the right half of the screen and the new gas composition will be entered in the left half of the screen. If you are making a minor change to current parameters, click *Copy from Current*. Current parameters will be pasted into the fields on the left. This will help to minimize the number of fields that have to be changed.
- Note that the fluid properties calculation method selected for the flow run appears near the top of the New Gas Composition section. The calculation method is read-only. To change this method, see Configuring Fluid Properties, page 57.
- 4. Enter a reference number from the gas analysis report, if desired, in the Analysis Reference No. field under New Gas Composition.
- 5. Update the Reference Conditions field, if necessary. This selection identifies the ideal mass heating value table for use in calculating the heating value of the gas composition and sets the reference temperature and pressure used in converting the user-supplied heating value into the heating value mass basis required for energy calculations.
- 6. In the Heating Value field, specify whether the heating value is to be calculated or entered manually. If the value is entered manually, enter the heating value in the field provided.
- 7. Enter the specific gravity of the gas composition.
- 8. Enter the viscosity of the measured fluid in the field provided. If you are unsure of the value, enter 0.010268.
- 9. Enter the isentropic exponent of the measured fluid in the field provided. If you are unsure of the value, enter 1.3.
- 10. To change the mole percentages of individual gas constituents,
  - a. Locate the gas constituent to be changed.
  - b. Double-click the constituent or click on the *Change Mole* % button and enter the appropriate percentage in the dialog provided.
  - c. Repeat steps 10a and 10b until all constituents are entered.

Note When the AGA-8 Detail method is used, all constituent percentages entered must total 100%.

- 11. To load the current gas composition or a previously saved composition, click *Load Composition...* and select the set of gas composition values from the dropdown menu in the dialog provided. If only minor changes are required to an existing composition, this can save you time by minimizing the number of constituents that have to be changed.
- 12. Enter a note in the Note field, if desired (for example, to identify the gas composition for future reference). The note will be stored with the gas composition settings.
- 13. Click *Save Changes* in the upper right corner of the screen. The changes will be saved as the Current Gas Composition and will be put into effect when the user exits the Maintain Flow Run screen.
- 14. To exit the Maintain Flow Run screen and return to the Main Display screen, click *Exit Maintenance Mode* in the upper right corner of the screen.

#### Procedure: Change Gross Method Parameters

- If Change Gross Method Parameters is not displayed in the Maintenance Task field at the top of the Maintain Flow Run screen, click on *Change Task*. The Change Flow Run Maintenance Task dialog will appear (Figure 12.2, page 164).
  - a. Under the Maintenance Task heading, click Change Gross Method Parameters.
  - b. Click OK to save the settings and return to the Maintain Flow Run screen (Figure 12.4).

Lasks Tools Help	100						
		r 2000 - Device Itain Flow	e Name [s/n 4096] Run 1			Name Name Name	6
					Sa	ve Changes	Exit Maintenance Mo
intain Flow Run							
Change Task. Selecte	d Flow Run Flow	Run 1					
	hance Task Cha	nge Gross Metho	d Parameters				
New Gross Meth Ruid Properties Calculation Inalysis Ref. No.	nod Parame AGA-8 Gross	ters		Current Gross Operator: None, Changed Analysis Ref. No.	the second second second	ameters	
teference Conditions	United States (14	.73 psi, 60 F)	•	Reference Conditions	United States (14	.73 psi, 60 F)	
feating Value	Manual entry		BTU/SCF	Heating Value	Manual entry	1031.4260	BTU/SCF
ipecific Gravity	Manual entry			Specific Gravity	Manual entry	0.600000	
iscosity	Manual entry		cP	Viscosity	Manual entry	0.010268	dP
sentropic Exponent	Manual entry			Isentropic Exponent	Manual entry	1.3000	
Carbon Dioxide (CO2)		Mole %		Carbon Dioxide (CO2)	0.5956	Mole %	
litrogen (N2)		Mole %		Nitrogen (N2)	0.2595	Mole %	
Clear New Data	Copy From Curre	nt					
Note				Note			
e Interface User Manuals							



- 2. Note that current gross method parameters appear on the right half of the screen and the new gross method parameters will be entered in the left half of the screen. If you are making a minor change to current parameters, click *Copy from Current*. Current parameters will be pasted into the fields on the left. This will help to minimize the number of fields that have to be changed.
- Note that the fluid properties calculation method selected for the flow run appears near the top of the New Gross Method Parameters section. The calculation method is read-only. To change this method, see Configuring Fluid Properties, page 57.
- 4. In the Analysis Reference No. field, enter a reference number from the gas analysis report, if desired.
- 5. Update the Reference Conditions field, if necessary. This selection sets the reference temperature and pressure for air density, which is used in converting the user-supplied heating value into the heating value mass basis required for energy calculations.
- 6. Enter the heating value of the measured fluid in the field provided.
- 7. Enter the specific gravity of the measured fluid in the field provided.
- 8. Enter the viscosity of the measured fluid in the field provided. If you are unsure of the value, enter 0.010268.
- 9. Enter the isentropic exponent of the measured fluid in the field provided. If you are unsure of the value, enter 1.3.
- 10. Enter the carbon dioxide content in the field provided.
- 11. Enter the nitrogen content in the field provided.

- 12. Enter a note in the Note field, if desired (for example, to identify the gross method settings for future reference). The note will be stored with the gross method settings.
- 13. Click *Save Changes* in the upper right corner of the screen. The changes will be saved as the Current Gross Method Parameters and will be put into effect when the user exits the Maintain Flow Run screen.
- 14. To exit the Maintain Flow Run screen and return to the Main Display screen, click *Exit Maintenance Mode* in the upper right corner of the screen.

#### Procedure: Change MPMS Liquid Parameters

Important If using firmware version 4.10 or earlier, the content of Maintain Flow Run screens will be different. These older firmware versions support API-2540 standards which have since been replaced by API 11.1 standards. Please see Appendix C - Configuring Liquid Parameters Using Scanner Firmware 4.10 and Earlier, page C-1 for details.

If a flowrun is configured for measuring MPMS liquid such as crude oil, gasoline, jet fuel, fuel oils, and lube oil, the liquid parameters can be configured from the Maintain Flow Run screen (Figure 12.5).

🂏 Maintain Flow Run 1 - ModW	/orX Pro 4.1.0			
Eile Tasks Tools Help				
DOWNLOAD	scanner 2000 - [s/n 0] Maintain Flow Run 1			
			Save Changes	Exit Maintenance Mode
Maintain Flow Run				<u>^</u>
Change Task Selected Flo Maintenanc				
New MPMS Liquid I	Parameters		Liquid Parameters	
Fluid Properties Calculation M	IPMS Crude Oil	Operator: <port 1="" default:<="" td=""><td>&gt;, Changed On: 07/23/2013</td><td></td></port>	>, Changed On: 07/23/2013	
Analysis Ref. No.		Analysis Ref. No.		
Density Source A	bsolute Density 💌	Density Source	Specific Gravity	
Base Absolute Density	KG/M3	Base Specific Gravity	1.000	=
Viscosity	cP	Viscosity	6.000000 cP	
actual flowing viscosity should b * Note that the Density or Specific Viscosity is at flowing temperatu	c Gravity is at base temperature and the			
Note		Note		
				×
Device Interface User Manuals		USB 4	k.1.0.468 <port 1="" default=""></port>	7/23/2013 11:53 AM

Figure 12.5

- 1. Note that current liquid parameters appear on the right half of the screen and the new liquid parameters will be entered in the left half of the screen. If you are making a minor change to current parameters, click *Copy from Current*. Current parameters will be pasted into the fields on the left. This will help to minimize the number of fields that have to be changed.
- 2. The fluid properties calculation method selected for the flow run (Example: Crude Oil) appears near the top of the New MPMS Liquid Properties section. The calculation method is read-only. To change this method, see Configuring Fluid Properties, page 57.
- 3. In the Analysis Reference No. field, enter a reference number from the liquid analysis report, if desired.

Note The density source, base density, and viscosity parameters can be populated with a set of default parameters, or with values supplied by the user. To use the set of default values, click *Load Default Params* near the bottom of the screen.

4. In the Density Source field, select a source to be used for the density value: *Absolute Density*, *Specific Gravity*, or *API Gravity*.

- 5. Enter the Base Density (Absolute, Specific Gravity or API Gravity) value of the liquid. Density is assumed to be at base temperature.
- 6. If Special Products is selected as the fluid type for the MPMS fluid properties calculation method, enter the fluid's expansion coefficient "alpha" (Figure 9.14, page 135) in accordance with MPMS Chapter 11.1. You may enter a numeric value, or click the *Select Alpha* button to select a predetermined alpha value for products such as ethanol and gasohol.
- 7. For best accuracy, enter the viscosity value of the liquid at flowing temperature. If the viscosity is unknown, use the recommended default value for the liquid type selected.
- 8. Enter a note in the Note field, if desired (for example, to identify the liquid parameters for future reference). The note will be stored with the liquid parameter settings.
- 9. Click *Save Changes* in the upper right corner of the screen. The changes will be saved as the Current MPMS Liquid Parameters and will be put into effect when the user exits the Maintain Flow Run screen.
- 10. To perform a new maintenance task without leaving the screen, click on *Change Task* and make a new selection.
- 11. To exit the Maintain Flow Run screen and return to the Main Display screen, click *Exit Maintenance Mode* in the upper right corner of the screen.

# Procedure: Change Generic Liquid Parameters

Important If using firmware version 4.10 or earlier, the content of Maintain Flow Run screens will be different. These older firmware versions support API-2540 standards which have since been replaced by API 11.1 standards. Please see Appendix C - Configuring Liquid Parameters Using Scanner Firmware 4.10 and Earlier, page C-1 for details.

If a flowrun is configured for measuring generic liquid such as water or emulsions, the liquid parameters can be configured from the Maintain Flow Run screen (Figure 12.6).

🎇 Maintain Flow Run 1 - ModWorX Pro 4.1.0			
Eile Iasks Tools Help			
DOWNLOAD Scanner 2000 - [s/n 0] Maintain Flow Run 1			
		Save Changes	Exit Maintenance Mode
Maintain Flow Run			
Change Task Selected Flow Run How Run 1 Maintenance Task Change Generic Liquid Parameters			
New Generic Liquid Parameters       Fluid Properties Calculation       Generic Liquid       Analysis Ref. No.       Flowing Density Calculation       Manual Entry of Flowing Density	Current Generic Operator: <port 1="" default="">, ( Analysis Ref. No. Flowing Density Calculation</port>	Liquid Parameters Changed On: 07/23/2013 Manual Entry of Flowing Density	
Density Source Absolute Density	Density Source	Specific Gravity	
Base Absolute Density KG/M3	Base Specific Gravity	1.0000	
Flowing Absolute Density KG/M3	Flowing Specific Gravity	0.999996	
Viscosky cP	Viscosity	6.000000 cP	
The Base Density value is required. If it is not known, use the same value as for Flowing Density.     A typical vaccosity of this legal is about 1.0 cP. However, for accurate results the actual Rowing vaccosity should be determined.     Note that the Viscosity parameter is at flowing temperature.     Clear New Data Copy From Current Load Default Params			
Note	Note		
Device Interface User Manuals	USB 4.1.	0.468 <port 1="" default=""></port>	7/23/2013 11:58 AM

Figure 12.6

- 1. Note that current liquid parameters appear on the right half of the screen and the new liquid parameters will be entered in the left half of the screen. If you are making a minor change to current parameters, click *Copy from Current*. Current parameters will be pasted into the fields on the left. This will help to minimize the number of fields that have to be changed.
- The fluid properties calculation method selected for the flow run (Example: Generic Liquid) appears near the top of the New Generic Liquid Properties section. The calculation method is read-only. To change this method, see Configuring Fluid Properties, page 57.
- 3. In the Analysis Reference No. field, enter a reference number from the liquid analysis report, if desired.
- Note The density source, base density, and viscosity parameters can be populated with a set of default parameters which are the values for water. While the default values are specific to water, they can provide an indication of the value range that is applicable for these parameters. To load the default values, click *Load Default Params* near the bottom of the screen.
- 4. In the Density Source field, select a source to be used for the density value: Absolute Density or Specific Gravity.
- 5. Enter the Base Density (Absolute or Specific Gravity) value of the liquid. If the base density of the liquid is unknown, enter the flowing density.
- 6. Enter the Flowing Density (Absolute or Specific Gravity) value, if applicable.
- 7. If Special Products is selected as the fluid type for the MPMS fluid properties calculation method, enter the fluid's expansion coefficient "alpha" (Figure 9.14, page 135) in accordance with MPMS Chapter 11.1. You may enter a numeric value, or click the *Select Alpha* button to select a predetermined alpha value for products such as ethanol and gasohol.
- 8. For best accuracy, enter the viscosity value of the liquid at flowing temperature. If the viscosity is unknown, a value of 1.0 cP (viscosity of water) is recommended.
- 9. Enter a note in the Note field, if desired (for example, to identify the liquid parameters for future reference). The note will be stored with the liquid parameter settings.
- 10. Click *Save Changes* in the upper right corner of the screen. The changes will be saved as the Current Generic Liquid Parameters and will be put into effect when the user exits the Maintain Flow Run screen.
- 11. To perform a new maintenance task without leaving the screen, click on *Change Task* and make a new selection.
- 12. To exit the Maintain Flow Run screen and return to the Main Display screen, click *Exit Maintenance Mode* in the upper right corner of the screen.

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# Section 13 - Turbine Maintenance

Routine turbine maintenance tasks are easily performed from the Maintain Turbine screen. This section will guide you in performing the following tasks:

- change turbine flowmeter
- change turbine K-factor
- Note If a turbine meter is being used in a gas-compensated run, the gas composition may require adjustment periodically. To change gas constituents, navigate to the Maintain Flow Run screen and follow the instructions provided in Section 5 - Setting up a Turbine Input or Pulse Input, page 62.

A single turbine input is available with the standard Scanner 2000 or Scanner 210x. If an optional expansion board is installed in a Scanner 2000 or Scanner 210x or if a Scanner 2200 is installed, two turbine inputs are available.

To change the turbine flowmeter model or to change a turbine K-factor,

1. Click on the *Maintain Turbine* button in the task menu bar on the Main Display screen (Figure 13.1).

anner 2100W Main Display - M Tasks T <u>o</u> ols <u>H</u> elp	odworx Pro 4.3.0						
DOWINLOAD		W - Device name [ 2100W Mair			Site name Field Name Location name		
efresh 🔽 Auto-Refresh				7			Ret
🛞 Calibrate Inpu	ıts 🚺 🗿 Maii	ntain Flow Run	🛞 Mainta	ain Turbine 🛛 💮 Manage	PID	Configure	
Flow Run Data				Turbine Data			
Flow Rate	352.687	MCF/day		Turbine 1 Flow Rate	7	BBL/day	
Daily Total (est.)	317.173	MCF		Turbine 1 Grand Total	4.52234E006	BBL	
Heating Value	1036.06	BTU/SCF		Turbine 2 Flow Rate	0	BBL/day	
				Turbine 2 Grand Total	0	BBL	
	Current Day	Previous Day		2006 CONTROL 10 1000	Current Day	Previous Day	
Volume Flow	45.3104	352.687	MCF	Turbine 1 Volume Flow	0.902952	7	BBL
Mass Flow	2014.74	15682.3	LBM	Turbine 2 Volume Flow	0	0	BBL
Energy	46.9442	365.404	MMBTU				
			DETAILS				DETAILS
Input Data				System Data			
Static Pressure	6.22	PSIG	8	Alarms			ALARMS
Differential Pressure	164.62	In H2O		Supply / Battery Voltage	10.28 / 10.5	5 V	
Process Temperature	60.00	Deg F	×	Temperature	71.6	7 Deg F	
Analog Input 1	0.00	inches	-	Date/Time	Oct 26, 201	3 11:05:48 AM	
Analog Input 2	56.24	Deg F		Analog Output	15.20	) mA	
				Smart Battery / Health %	83.00 / 9	7 %	
			DETAILS				DETAILS
ce Interface User Manuals							
Cost mandals				COM2 4.3.0.490	<port 1="" default=""></port>	10/26/2018	11:06 AM

- Figure 13.1
- 2. Click *Yes* at the Enter Maintenance Mode prompt to proceed. The Change Turbine Maintenance Task screen will appear (Figure 13.2, page 172).

urbine Flowmete	r Selectio	on
• Turbine Flowmeter 1		
Naintenance Tasl		
Change Turbine Flowmeter     Change K-Factors		

Figure 13.2

- 3. Select the appropriate flowmeter, if applicable. If an optional expansion board is installed in the Scanner 2000 or Scanner 210x or if a Scanner 2200 is installed, select either *Turbine 1* or *Turbine 2*.
- 4. Select the maintenance task you want to perform, and click *OK* to save your selection. The Maintain Turbine screen will appear (Figure 13.3).

Maintain Turbine Flowmete	er 1 - ModWorX Pro 4.0.0				
Ele Iasks Tools Help					
DOWNLOAD	Scanner 2000 - Device Name [s/n 40 Maintain Turbine Flowme		Site Field Location		6
			Sa	ve Changes	Exit Maintenance Mode
Maintain Turbine					
Change Task Selected To	urbine Turbine Flowmeter 1				
Maintenan	ce Task Change Turbine Flowmeter				
New Flowmeter In	formation Select Meter	Current Flown Operator: <port 1="" default<="" td=""><td></td><td></td><td></td></port>			
Meter Model Number		Meter Model Number	NuFlo 2" Liquid		
Nominal K-Factor		Nominal K-Factor	55.0	pulses/GAL	
Note		Note			
Clear New Data	Copy From Current				
Device Interface User Manuals					
		U58	4.0.0.446 <port< td=""><td>1 Defauk&gt;</td><td>1/19/2010 7:03 PM</td></port<>	1 Defauk>	1/19/2010 7:03 PM

Figure 13.3
### Procedure: Change Turbine Flowmeter Model

1. If Change Turbine Flowmeter is not displayed in the Maintenance Task field at the top of the Maintain Turbine screen, click on *Change Task*. The Change Turbine Maintenance Task dialog will appear (Figure 13.4).

odWorX Pro	
Change Turbine Main	tenance Task
Turbine Flowmeter Sel	ection
Turbine Flowmeter 1	
Maintenance Task	
O Change Turbine Flowmeter	
<ul> <li>Change K-Factors</li> </ul>	]
	QK <u>Cancel</u>

Figure 13.4

- 2. If more than one turbine flowmeter is displayed, select the turbine flowmeter to be changed.
- 3. Click Change Turbine Flowmeter.
- 4. Click OK to save the settings and return to the Maintain Turbine screen (Figure 13.5).

🎢 Maintain Turbine Flowmeter 1	- ModWorX Pro 4.0.0			
Elle Illasks Tolois Help				
DOWNLOAD	Scanner 2000 - Device Name [s/n 4096] Maintain Turbine Flowmet		Site Name Field Name Location Name	
			Save Changes	Exit Maintenance Mode
Maintain Turbine				
Change Task Selected Turbin Maintenance T				
New Flowmeter Info	select Meter		neter Information >, Changed On: 01/06/2010	
Meter Model Number		Meter Model Number	NuFlo 2" Liquid	
Nominal K-Factor		Nominal K-Factor	55.0 pulses	/GAL
Note		Note		
Clear New Data Copy	From Current			
Device Interface User Manuals				
		US8	4.0.0.446 <port 1="" default=""></port>	1/19/2010 7:03 PM

Figure 13.5

- 5. Note that current meter information appears on the right half of the screen, and that new meter information is entered in the left half of the screen. To make a minor change to current parameters, click *Copy from Current*. Current parameters will be pasted into the fields on the left. This will help to minimize the number of fields that have to be changed.
- 6. To select a new meter, click Select Meter. The Select Turbine Meter dialog will appear (Figure 13.6).

Select Meter	Meter Infor	Mation NuFlo Liquid -	
NuFlo Liquid - 3/8" NuFlo Liquid - 1/2" NuFlo Liquid - 3/4" NuFlo Liquid - 7/8" NuFlo Liquid - 1"	Meter Model No.	NuFlo 1" Liqui	
Author Coupler - 1           Author Coupler - 1           NurFlo Liquid - 3"           NurFlo Liquid - 3"           NurFlo Liquid - 6"           NurFlo Liquid - 6"           Series 7100 - 1/4"           Series 7100 - 3(8")           Series 7100 - 3"           Series 7100 - 1/2"           Series 7100 - 3"           Series 7100 - 3"           Series 7100 - 3"           Series 7100 - 3"           Series 7100 - 6"           Series 7100 - 10"	Neter Senai No. Low Flow Rate High Flow Rate Nominal K-Factor	5.0 50.0 900.0	GAL/MIN GAL/MIN pulses/GAL

Figure 13.6

- a. Select a meter model from the list provided. The corresponding model number, low flow rate, high flow rate, and nominal K-factor for the selected meter will appear on the right side of the screen.
- b. Enter the flowmeter serial number, if desired.
- c. Click OK to save the new selections and return to the Maintain Turbine Flowmeter screen.
- 7. Enter a note in the Note field, if desired. The note will be stored with the new meter information.
- 8. Click *Save Changes* in the upper right corner of the screen. The new settings will be saved and will be made effective when the user exits the Maintain Turbine Flowmeter screen.
- 9. To change the K-factor or make changes to a different turbine input without leaving the screen, click on *Change Task* and make a new selection.
- 10. To exit the Maintain Turbine Flowmeter screen and return to the Main Display screen, click *Exit Maintenance Mode* in the upper right corner of the screen.

### Procedure: Change K-Factors

1. If Change K-Factor is not displayed in the Maintenance Task field at the top of the Maintain Turbine screen, click on *Change Task*. The Change Turbine Maintenance Task dialog will appear (Figure 13.7).

ange Turbine Maintenance Task Irbine Flowmeter Selection
Irbine Flowmeter Selection
Turbine Flowmeter 1
aintenance Task
Change Turbine Flowmeter
Change K-Factors
2

Figure 13.7

- 2. If more than one turbine flowmeter is displayed, select the turbine flowmeter for which a new K-factor is desired (Turbine 1 or Turbine 2).
- 3. Click Change K-Factors.
- 4. Click OK to save the new settings and return to the Maintain Turbine Flowmeter screen (Figure 13.8).

Tasks Tools Help					
		000 - Device Name [s/n 4096] in Turbine Flowmete	r 1	Site Name Field Name Location Name	6
				Save Changes	Exit Maintenance Mode
laintain Turbine					
Change Task Selected T	urbine Turbine	Flowmeter 1			
Maintenan	nce Task Change	K-Factor			
New K-Factors Calibration Working Units	pulses/GAL 👻	]	Current K-Factors Operator: None, Calibrated On:		
Frequency F	actor	Entry Mode   Linear K-Factor  Multi-point K-Factors	Frequency Fa	ictor	
		Enter Linear K-Factor	Linear K-F 900.000 pulses/G	00	
Note			Note		

Figure 13.8

#### Section 13

- 5. Note that current K-factors appear on the right half of the screen, and that new K-factors are entered in the left half of the screen. To make a minor change to current parameters, click *Load K-Factors From...* and select the K-Factor settings from the dialog provided. The selected K-factors will be pasted into the fields on the left. This will help to minimize the number of fields that have to be changed.
- 6. To enter a linear K-factor,
  - a. Click *Linear K-Factor* in the Entry Mode box.
  - b. Click the *Enter Linear K-Factor* button.
  - c. Type in the new linear K-factor in the dialog provided.
  - d. Click OK to update the entry in the New K-Factors section of the Maintain Turbine Flowmeter screen.
- 7. To enter a multi-point K-factor:
  - a. Click *Multi-point K-Factors* in the Entry Mode box.
  - b. Click *Add Factor* and enter the appropriate frequency and factor values from the calibration data in the dialog provided.
  - c. Click OK to update the entry in the New K-Factors section of the Maintain Turbine Flowmeter screen.
  - d. Repeat steps 7a through 7c to enter up to 12 calibration points.
- 8. Enter a note in the Note field, if desired. The note will be stored with the new K-factors.
- 9. Click *Save Changes* in the upper right corner of the screen. The new settings will be saved and will be made effective when the user exits the Maintain Turbine Flowmeter screen.
- 10. To perform a new maintenance task without leaving the screen, click on *Change Task* and make a new selection.
- 11. To exit the Maintain Turbine Flowmeter screen and return to the Main Display screen, click *Exit Maintenance Mode* in the upper right corner of the screen.

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# Section 14 - Downloading and Exporting Logs

Archive data stored within the Scanner can be downloaded in one step using the ModWorX Pro software interface. With each download performed, all selected log data is collectively stored in a single file—a Scanner Data File (.SDF). The data is simultaneously displayed on a Device Reports screen.

Any combination of the following flow logs and device settings can be selected for download:

- Daily logs containing up to 16 parameters
- Interval logs (intervals can range from 1 second to 12 hours) containing up to 16 parameters
- Event/alarm logs
- Configuration settings
- Calibration settings
- Snapshot of holding register values

With a standard Scanner 2000 or Scanner 210x, a user can view up to 768 daily logs and 2304 interval logs in a table format or in a trend chart, and up to 1152 event/alarm logs in a table format. If an optional expansion board is installed in a Scanner 2000 or Scanner 210x or if a Scanner 2200 is installed, up to 6392 interval logs can be viewed.

## **Downloading Data**

A user can download flow and event logs and device settings using the red *Download* button in the upper left corner of the Main Display screen or Configure screen.

Alternatively, a user can configure the software to automatically download the logs and/or settings each time the software connects with a Scanner. See procedures for each method below.

### Procedure: Performing a Manual Download

1. Press the red *Download* button on the Main Display screen (Figure 14.1).



Figure 14.1

The Download Device Data screen will appear (Figure 14.2).

Downloa	ad Device	e Dat	a	
Gelect the range (	of log records to d	ownload		
<ul> <li>Download New</li> </ul>	Records Only			
O Download All R	ecords			
Pelect the log tur	oo to include in the	a doumload		
Select the log typ  Daily Logs  Interval Logs	es to include in the	e download		
☑ Daily Logs		e download		
<ul> <li>Daily Logs</li> <li>Interval Logs</li> <li>Event Logs and</li> </ul>			ownload	
<ul> <li>Daily Logs</li> <li>Interval Logs</li> <li>Event Logs and</li> </ul>	Alarm Logs device data to inclu		ownload	
Daily Logs     Interval Logs     Event Logs and     Select additional of	Alarm Logs <b>device data to inclu</b> Settings		ownload	



- 2. Choose a download range: "new records only" or "all records."
- 3. Choose the type(s) of logs you want to download.
- 4. Choose any additional device settings to be included in the download (configuration settings, calibration settings, or holding register data snapshot).
- Note Basic configuration data will automatically be downloaded even when Configuration Settings is not selected for download. However, a complete set of configuration settings will be downloaded only when the Configuration Settings checkbox is selected.
- Note If you plan to export the downloaded data to Flow-Cal or PGAS format, daily logs are not required. It is recommended that all other data types (interval and event/alarm logs, configuration settings, calibration settings, and holding registers data snapshot) be selected for download for use with these third-party software applications.
- 5. Click *Download Now* to initiate the download.
- 6. A progress screen will appear momentarily while the Scanner reads all of the parameter settings and loads all selected parameters into an on-screen report.
- Note To change the parameters included in the flow logs, the order in which they appear, or the logging interval, change the settings on the Configure Archive menu. See Archive Parameter Setup, page 41, for details.

The initial download will display all records captured by the device. On subsequent downloads, however, the user can "mark" downloaded records as read, and easily distinguish between "old" and "new" records. See Marking Downloaded Records, page 183.

#### Procedure: Configuring an Automatic Download

1. Using the task bar at the top of the Main Display screen, click on the *Tools* button and choose *Options* from the dropdown menu (Figure 14.3).



Figure 14.3

2. When the Program Options dialog opens, click the *Auto-Download* option from the list at the left side of the screen (Figure 14.4).

Program Options		×
Program Opt	tions	
Options General Communications Communications Auto-Download Download Directories	Auto-Download Options  Automatically begin downloading device data after connecting  Select the range of log records to auto-download  Download New Records Only  Download All Records  Select the log types to include in the auto-download  Download All Records  Select the logs  Select additional device data to include in the auto-download  Configuration Settings Conf	
	ŌΚ	

Figure 14.4

- 3. From the Auto-Download Options screen, check the checkbox at the top of the screen: *Automatically begin downloading device data after connecting*.
- 4. Check the range of log records, log types, and device settings you want included in each download.
- 5. Click *OK* to save the new settings.
- 6. The next time ModWorX Pro connects to the Scanner, the Download Device Data screen will automatically appear, prompting the user to download all selected logs and/or device settings.

# **Viewing Download Reports**

When archive logs and settings are downloaded, the data is automatically presented in a report on the Device Reports screen (Figure 14.5). The various log types (Daily Logs, Interval Logs, Event Logs) and device settings (Configuration, Calibration, etc.) are identified in tabs across the top of the screen.

e <u>T</u> asks T <u>o</u> ols <u>H</u> elp	6								
	OAD	Scanner 2000 Device R	- Device Name [s. eports	/n 4096]		Site Field Location		C	The
								Do	ne
Download	Daily			s Configuration C	alibration Snapshol	t			_
Mark All as Read	Sort C	rder	Filter?						
Mark All as Read	Defa	ult (As downloaded) 🛛 👻	Filter by M	lonth/Day None sele	cted *	Start Date 1/7/2	010 4:00:00 PM +		
Save SDF File			C Filter by D	ate Range			• M9 00:00 PM	Apply	
Export Data	Rec Ti		Flow Run 1 Yolume Mass Total (MCF) (LBM)		Flow Run 1 Energy Total (MMBTU)	Differential Pressure (In H2O)	Static Pressure (A) (PSIA)	Process Temperature (Deg F)	_
Print Table								2	
View Trends	1 minutes in	01/17/2010 13:00:00	29.6750 36.0724	1362.6005	30.6076	32.4890 36.0025	124.7300 124.7300	28.9288 28.9289	
These seconds	C Contractor	01/17/2010 14:00:00 01/17/2010 15:00:00	34,3540	1577.4515	35.4337	35.2601	124.7300	28.9289	
Email SDF File		01/17/2010 15:00:00	46,7047	2144.5627	48,1725	46.8249	124.7300	28.9431	
enter set Dietti		01/17/2010 17:00:00	51.6578	2371.9973	53.2813	52.5439	124.7300	28.9442	
Email Data 🔹		01/17/2010 18:00:00	55,1505	2532.3723	56.8837	56.4557	124.7300	28.9545	
Pure care	A second second	01/17/2010 19:00:00	50,5169	2319.6116	52.1045	49.8941	124.7300	28.9485	
	1000000000	01/17/2010 20:00:00	48.0850	2207.9910	49.5973	47.3365	124.7300	28,9393	
	and the second second	01/17/2010 21:00:00	46.8044	2149.1414	48,2753	46.7750	124.7300	28,9437	
	Contraction of the	01/17/2010 22:00:00	39.4872	1813.1536	40.7282	40.5340	124,7300	28,9330	
	100000000000000000000000000000000000000	01/17/2010 23:00:00	33.6254	1543.9969	34.6822	34.5113	124.7300	28.9247	
	and the second second	01/18/2010 00:00:00	21.4190	983.5075	22.0921	29.3295	124.7300	28.9263	
	250	01/18/2010 01:00:00	16.5581	760.3083	17.0785	23.0018	124.7300	28.9261	
	251	01/18/2010 02:00:00	13.6644	627.4376	14.0939	23.2466	124.7300	28.9088	
	252	01/18/2010 03:00:00	11.3266	520.0875	11.6825	20.4143	124.7300	28.9152	
	253	01/18/2010 04:00:00	13.0180	597.7539	13.4271	21.5941	124.7300	28.9089	
	254	01/18/2010 05:00:00	10.4574	480.1787	10.7861	20.4229	124.7300	28.9104	
	255	01/18/2010 06:00:00	8.7488	401.7230	9.0237	19.5141	124.7300	28.9096	
	256	01/18/2010 07:00:00	12.3795	568.4362	12.7686	22.0659	124.7300	28.9126	
Show Download Stats	257	01/18/2010 08:00:00	18.3597	843.0321	18.9367	24.3392	124.7300	28.9204	
vice Interface User	4			10			2		>

Figure 14.5

### Sort Order

By default, the logs will appear in the order in which they are downloaded, top to bottom. However, the user can change the sort order by changing the selection in the dropdown Sort Order box on the Device Reports screen (Figure 14.6, page 182). Users can base sort order on the date/time stamp or record number, as shown.

Each sort order selection is specific to the log type view (tab) selected when the sort order is designated, and sort order selections are retained between ModWorX Pro sessions.

Iasks Tools Help										
	DAD	scanner 20 Device		ce Name [s/	'n 4096]		Site Field Location		0	7
									De	one
Download		terval Logs	vent Logs		Configuration	Calibration Snapshot				_
Mark All as Read	Sort Order Default (As d	ownloaded)	-	Filter?	onth/Day None s	elected *	Start Date 1/7/2	010 4:00:00 PM +		
Save SDF File	Default (As downloaded)  Default (As downloaded) Date/Time - Earlest First Date/Time - Latest First Record Number - Descending Record Number - Descending Record Timestamp			C Filter by De				2010 1:00:00 PM 🔹	Apply	
Export Data •				Flow Run 1 Flow Run 1 Flow Run 1 Yolume Mass Total Energy Total				Differential Static Pressure Pressure (A)		
Print Table	Net III	reseamp		ICF)	(LBM)	(MMBTU)	(In H2O)	(PSIA)	Temperature (Deg F)	
	238 01/17	/2010 13:00:00	1	29.6750	1362.600	5 30.6076	32.4890	124.7300	28.9288	
View Trends	239 01/17,	/2010 14:00:00	1	36.0724	1656.353	1 37.2060	36.0025	124.7300	28.9289	
	240 01/17	2010 15:00:00	1	34.3540	1577.451	5 35.4337	35.2601	124.7300	28.9337	
Email SDF File		/2010 16:00:00		46.7047	2144.562		46.8249	124.7300	28.9431	
	242 01/17,	2010 17:00:00	1	51.6578	2371.997	3 53.2813	52.5439	124.7300	28.9442	
Email Data 🔹	243 01/17	2010 18:00:00	1	55.1505	2532.372	3 56.8837	56.4557	124.7300	28.9545	
	244 01/17	2010 19:00:00	1	50.5169	2319.611	5 52.1045	49.8941	124.7300	28.9485	
	245 01/17	2010 20:00:00	)	48.0860	2207.991	0 49.5973	47.3365	124.7300	28.9393	
	246 01/17,	2010 21:00:00	1	46.8044	2149.141	4 48.2753	46.7750	124.7300	28.9437	
	247 01/17	/2010 22:00:00	1	39.4872	1813.153	6 40.7282	40.5340	124.7300	28.9330	
	248 01/17	2010 23:00:00	1	33.6254	1543.996	9 34.6822	34.5113	124.7300	28.9247	
	249 01/18	2010 00:00:00	)	21.4190	983.507	5 22.0921	29.3295	124.7300	28.9263	
	250 01/18	/2010 01:00:00		16.5581	760.308		23.0018	124.7300	28.9261	
	251 01/18	/2010 02:00:00	1	13.6644	627.437		23.2466	124.7300	28.9088	
	252 01/18	2010 03:00:00	1	11.3266	520.087	5 11.6825	20.4143	124.7300	28.9152	
	253 01/18,	/2010 04:00:00	)	13.0180	597.753	9 13.4271	21.5941	124.7300	28.9089	
	254 01/18,	/2010 05:00:00	1	10.4574	480.178		20.4229	124.7300	28.9104	
	255 01/18	/2010 06:00:00	1	8.7488	401.723	9.0237	19.5141	124.7300	28.9096	
	256 01/18	/2010 07:00:00		12.3795	568.436	2 12.7686	22.0659	124.7300	28.9126	
how Download Stats		/2010 08:00:00		18.3597	843.032	1 18.9367	24.3392	124.7300	28.9204	
	4 Manuals		_		10					

Figure 14.6

## Data Filtering

Log data is easily filtered using the Filter settings near the top of the screen. When the Filter checkbox is checked, data filtering is enabled. Filtering options include filtering by month/day (Figure 14.7) or by a user-specified date range (Figure 14.8, page 183). When the Filter by Month/Day option is enabled, a dropdown menu will list all months and days for which data is stored. The user can select multiple months and/or days by placing a checkbox next to each month/day desired.

Ble Iasks Tools Help									-	~
DOWNL	OAD	Device Re	- Device Name [s	/n 4096]			Fiel	e Name d Name	6	3
		Derice in	porto				Locatio	n Name	C	y
									Do	ne
Download	Daily	Logs IntervalLogs Ever	t Logs Alarm Log	s Configura	tion Calibrati	on Snapshol				
14-1-18-1-R-1-1	Sort	Order	Fiter?							
Mark All as Read	Def	ault (As downloaded)	Filter by N	fonth/Day	ione selected		Start Date 1/7/	- 100.00.00		
Save SOF File			C Filter by D	Nate Range	January 2010 Jan 7, 2010 Jan 8, 2010	Î	End Date 1/20	2010 1:00:00 PM +	<u>600/y</u>	
Export Data	Rec	Timestamp	Flow Run 1 Volume	Flow Ru Mass To	Jan 9, 2010 Jan 10, 2010		Differential Pressure	Static Pressure (A)	Process	
Brint Table			(MCF)	(LBM	Jan 11, 2010 Jan 12, 2010		(In H20)	(PSIA)	(Deg F)	
	238	01/17/2010 13:00:00	29.6750		Jan 13, 2010	*	32,4890	124.7300	28.9288	
Yew Trends		01/17/2010 14:00:00	36.0724		5.3531	37.2060	36.0025	124.7300	28.9289	
		01/17/2010 15:00:00	34.3540		7.4515	35.4337	35.2601	124.7300	28.9337	
Enal SDF Ele		01/17/2010 16:00:00	46.7047		1.5627	48.1725	46.8249	124,7300	28.9431	
		1/17/2010 17:00:00	51.6578		1.9973	53.2813	52.5439	124.7300	28.9442	
Email Data •		01/17/2010 18:00:00	\$5.1505		2.3723	56.8837	56.4557	124.7300	28.9545	
		01/17/2010 19:00:00	50.5169		2.6116	52.1045	49.8941	124.7300	28.9485	
		01/17/2010 20:00:00	48.0860		7.9910	49.5973	47.3365	124.7300	28.9393	
		01/17/2010 21:00:00	46.8044		1.1414	48.2753	46.7750	124.7300	28.9437	
		01/17/2010 22:00:00	39.4872		3.1536	40.7282	40.5340	124,7300	28.9330	
Show Download Stats		01/17/2010 23:00:00	33.6254		3.9969	34.6822	34.5113	124.7300	28.9247	
2011011111111111	4 249	01/18/2010 00:00:00	21.4190	98:	3.5075	22.0921	29.3295	124.7300	28.9263	
aute Interface User	Manuals									

Figure 14.7

Note When data is filtered by month, the first day of the month following the "filter month" will be included in the filter range because data stored on the last day of the month will be downloaded at the contract hour of the following day. For example, when a user filters data from July, the download from August 1 is included. This download includes data stored during the 24 hours between the July 31 contract hour and the August 1 contract hour. When the Filter by Date Range checkbox is checked, the Start Date and End Date fields to the right of the checkbox will be enabled. To initiate a filter, click the dropdown arrow next to the Start Date/End Date field to display a calendar dialog, select the appropriate start and end date/time, click *OK* to return to the Device Reports screen, and click *Apply* (Figure 14.8).

Iasks Tools Help									
DOWNL	OAD	Scanner 2000 Device Re	- Device Name [s. eports	/n 4096]		Site Field Location		0	
								Dor	one
Download	Daily	ogs IntervalLogs Eve	nt Logs Alarm Log	s Configuration C	alibration Snapshot				
gark All as Read	Sort O Defa	irder uit (As downloaded) 🛛 👻	Filter?	Ionth/Day None sele	cted •	Start Date 11/00	[2010 04:00:00 PM]	Apply	
Save SOF File			(* Filter by D	ate Range		End Date 1/20/	2010 1:00:00 PM ~	6447	
Export Data •	Rec	Timestamp	Flow Run 1 Volume	Flow Run 1 Mass Total	Flow Run 1 Energy Total	Differential	Static Pressure (A)	Process	-
Print Table		10000000	(MCF)	(LBM)	(MMBTU)	(In H20)	(PSIA)	(Deg F)	1/7/2010 4:00:00 PM
	238	01/17/2010 13:00:00	29.6750	1362.6005	30.6076	32.4890	124.7300	28.9288	
Vew Trends		01/17/2010 14:00:00	36.0724	1656.3531	37.2050	36.0025	124.7300	28.9289	✓ January → < 2010 →
	240	01/17/2010 15:00:00	34.3540	1577.4515	35.4337	35.2601	124.7300	28.9337	SMTWTFS
mail SOF Ele		01/17/2010 16:00:00	46.7047	2144.5627	48.1725	46.8249	124.7300	28.9431	
		01/17/2010 17:00:00	51.6578	2371.9973	53.2813	52.5439	124.7300	28.9442	27 28 29 30 31 1 2
Email Data •		01/17/2010 18:00:00	55.1505	2532.3723	56.8837	56.4557	124.7300	28.9545	3 4 5 6 7 8 9
		01/17/2010 19:00:00	50.5169	2319.6116	52.1045	49.8941	124.7300	28.9485	10 11 12 13 14 15 16
		01/17/2010 20:00:00	48.0860	2207.9910	49.5973	47.3365	124.7300	28.9393	
		01/17/2010 21:00:00	46.8044	2149.1414	48.2753	46.7750	124,7300	28.9437	17 18 19 20 21 22 23
		01/17/2010 22:00:00	39.4872	1813.1536	40.7282	40.5340	124.7300	28.9330	24 25 26 27 28 29 30
w Download Stats		01/17/2010 23:00:00	33.6254	1543.9969	34.6822	34.5113	124.7300	28.9247	- 31 1 2 3 4 5 6 04:00:00 PM
	249	01/18/2010 00:00:00	21.4190	983.5075	22.0921	29.3295	124.7300	28.9263	31 1 2 3 4 3 5

Figure 14.8

### Marking Downloaded Records

The *Mark All as Read* feature on the Device Reports screen provides a line of demarcation to separate previous downloads from current downloads, as shown in Figure 14.9. By default, the feature is enabled, and the software automatically marks new records as read after every download. The user can distinguish new records two ways:

- When a user chooses Download New Records Only, only new records will be displayed on screen. Previously downloaded records will not be displayed.
- When a user chooses Download All Records, a list of all records will be displayed, but those that were previously downloaded will appear gray.

When the "mark all as read" feature is disabled, each download displays all records on the screen. To change the setting, see Change Download Options, page A-15.

DOWNLO	DAD	Scanner 2000 Device Re	- [s/n 4096]					0	A
		Device K	eports						E
Download		ogs Interval Logs Even	and the second se	s Configuration C	alibration Snapshot				
Mark All as Read	Sort On Defau	der It (As downloaded) 🗢	Filter?	tonth/Day None sele	cted -	Start Date 2/4/2	010 2:14:00 PM +	Apply	
Save SDF File			C Filter by D	iate Range		End Date 2/4/2	010 2:14:00 PM +		
Export Data	Rec	Timestamp	Flow Run 1 Volume (MCF)	Flow Run 1 Mass Total (LBM)	Flow Run 1 Energy Total (MMBTU)	Differential Pressure (In H20)	Static Pressure (A) (PSIA)	Process Temperature (Deg F)	1
Entry Lable	1858	02/04/2010 13:41:00	2.1635	96.2004	2.2415	170.3467	1014.7300	28.9703	
View Trends	1859	02/04/2010 13:42:00	2.1635	96.2072	2.2415	170.3467	1014.7300	28,9498	
	1860	02/04/2010 13:43:00	2.1636	96.2040	2.2416	170.3490	1014.7300	28,9400	
Email SDF Ele	1861	02/04/2010 13:44:00	2.1635	96.2001	2.2415	170.3467	1014.7300	28,9716	
	1862	02/04/2010 13:45:00	2.1636	96.2050	2.2416	170.3617	1014.7300	28.9650	
Email Data •	1863	02/04/2010 13:46:00	2,1639	96.2166	2.2419	170,3964	1014.7300	28,9466	
	1864	02/04/2010 13:47:00	2.1642	96.2299	2.2422	170,4414	1014.7300	28.9425	
	1865	02/04/2010 13:48:00	2,1640	96.2232	2.2420	170.4294	1014,7300	28,9766	
	1866	02/04/2010 13:49:00	2.1641	96.2267	2.2421	170.4436	1014,7300	28,9773	
		02/04/2010 13:50:00	2,1643	96.2348	2.2423	170.4685	1014.7300	28,9685	
		02/04/2010 13:51:00	2.1645	96.2451	2.2425	170.5152	1014.7300	28.9874	
	1869	02/04/2010 13:52:00	2.1644	96.2403	2.2424	170.4937	1014.7300	28.9839	
	1870	02/04/2010 13:53:00	2.1647	96.2556	2.2428	170.5471	1014.7300	28.9769	
	1871	02/04/2010 13:54:00	2.1653	96.2814	2.2434	170.6397	1014.7300	28.9748	
	1872	02/04/2010 13:55:00	2.1651	96.2698	2.2431	170.5903	1014.7300	28.9637	
	1873	02/04/2010 13:55:00	2.1644	96.2425	2.2425	170.4861	1014.7300	28.9361	
	1874	02/04/2010 13:57:00	2.1644	96.2429	2.2425	170.4894	1014.7300	28.9461	
	1875	02/04/2010 13:58:00	2.1647	96.2529	2.2427	170.5280	1014.7300	28.9584	
	1876	02/04/2010 13:59:00	2.1654	96.2851	2.2435	170.6385	1014.7300	28.9409	
	1877	02/04/2010 14:00:00	2.1656	96.2936	2.2437	170.6764	1014.7300	28.9639	
how Download Stats	1878	02/04/2010 14:01:00	2.1657	96.2993	2.2438	170.6901	1014.7300	28.9447	
vice Interface User N	4								>
vice Interface User h	sanuals								

Figure 14.9

## Viewing Latest Download

At any time during a connection period, the latest download report can be viewed by navigating to the Main screen or the Configuration menu screen, selecting *Tasks* from the task bar at the top of the screen, and selecting *View Device Reports* (Figure 14.10).



## Viewing Reports Offline

Once logs have been downloaded, the resulting .sdf file can be viewed offline by clicking the *Reports* button on the Welcome screen (Figure 14.11).



Figure 14.11

A dialog will appear, allowing the user to select the .sdf file to be opened from a specified directory and/or subdirectory (Figure 14.12). Select the appropriate folder, then select the subdirectory and click on the filename to view the .sdf files.

Open Scanner	2000/2200 Da	ta File			23
Look jn:	ModWotX Pro	, <u> </u>	+ 🗈 💣 🎟	•	
My Recent Documents Desktop My Documents	C Auto-Logging F	iles			
My Computer My Network Places	File name: Files of type:	Scanner 2000/2200 Data Files (*.	sdf)	<u>Open</u> Cancel	

Figure 14.12

#### **File Properties**

To view a description of a downloaded record before you open it, click on the .sdf file to select it. The type of log, date and timestamp, date range for daily, interval and event logs, and firmware version is displayed in the window at the far right of the screen (Figure 14.13).

Look in:	Site_Name	0	- +		- 10		ModWorX Data File
My Recent Documents Desktop My Documents My Computer	Device_Nam	e_200091217_1747.sdf e_20100114_1354.sdf e_20100114_1354.sdf e_201001120_1327.sdf					Version: SDF 1.0 Creator: ModBorX Ps 4.0.0 Firmware: 3.66 Domioad: 12/17/2009 17:47:49 - Data - Daily Logs Interval Logs Configuration (Basic - Eange - 12/15/2009 12:00:00
My Network Places	File pame:	Device_Name_200912	17_1747.sdf	•		<u>O</u> pen	
r laves	Files of type:	Scanner 2000/2200 Da	ita Files (*.sdř)	-		Cancel	

Note Files generated with ModWorX Pro version 2.0.0 or later can be viewed with ModWorX Pro Version 4.2 software.

# Flow Logs (Table View)

When the Daily Logs tab or Interval Logs tab of the Device Report screen is selected, flow archive parameters are displayed in columns. The first two columns contain a sequential record number and a timestamp showing the time of the download. These columns cannot be reassigned or deleted. Up to 14 additional parameters may be included in the log archive. A scroll bar at the bottom of the screen provides easy access to columns not in full view when the screen loads. See Section 3 - Configuring System Parameters for instruction on configuring archive parameters.

On the Device Report screen, users can view up to 768 daily logs and 2,304 interval logs with a standard Scanner 2000 or Scanner 210x. If an optional expansion board is installed in a Scanner 2000 or Scanner 210x or if a Scanner 2200 is installed, users can view up to 6,392 interval logs.

# Flow Logs (Trend View)

To view the daily log or interval log in a graph format, click the *View Trends* button at the left side of the screen. The record values will be plotted in trend lines as shown in Figure 14.14.



Figure 14.14

The trend view presents the downloaded logs in two graphs:

The top graph provides a high-level view of all data in a downloaded log. Click anywhere in the top graph to select the group of records to be magnified in the large graph display at the bottom of the screen.

Note If the records in a download are too numerous to be displayed in the top graph, a set of gray bars will appear on either side of the top graph. Click on either bar to move the graph and bring hidden logs into view.

The bottom graph allows a user to view records in detail. Screen controls allow a user to view multiple parameters on one graph, or to isolate selected parameters for viewing.

## Configuring a Trend View

The trend view display contains a number of controls that allow a user to customize the display to his individual needs. Use the following steps as a guide:

- 1. Identify the records to be displayed in the bottom screen using one of the following methods:
  - Click on a point in the top graph. The logs nearest that selection point will appear in the bottom graph. Adjust the view, if necessary, by moving the scroll bar beneath the bottom graph.
  - Click on *Set Time Axis Range* and enter a Start date and time and an End date and time using the calendars provided. Figure 14.15, shows the calendar for selecting a range of interval logs. For daily logs, the calendar will prompt the user to enter a Start and End date only (no times).



Figure 14.15

- 2. Select the parameter to be viewed in the graph by clicking on a parameter in the table at the left side of the screen (Figure 14.16, page 188). The parameter is highlighted in blue, its title and configured unit is displayed at the top of the graph, and the graph scale changes in accordance with the values of the parameter selected. By default, all archive parameters are displayed in the table, and are displayed in the trend graph, but values are displayed only for the trend line selected at any given time. The bright yellow light bulb icon indicates that the parameter trend line is enabled for display (Figure 14.16, page 188).
  - To disable all parameter trend lines except the one that is actively selected (highlighted), click the *Disable All* button.
  - To enable all parameter trend lines, click the *Enable All* button.
  - To hide a parameter trend line, click on the yellow light bulb icon next to the parameter to be hidden. The light bulb icon will change from yellow to blue, and the trend line will disappear from the graph.
  - To display a hidden parameter trend line, click on the blue (disabled) light bulb icon. The icon will change to yellow, and the trend line will appear in the graph.



Figure 14.16

- Note Turning off the light bulb of a parameter *that is highlighted in the table* will cause the trend line and the Y axis to disappear, but the parameter name remains on screen. Click on a parameter in the table to restore the trend view with the appropriate axis.
- 3. Navigate the trend graph to analyze parameter values. Note the dotted vertical white line in the bottom graph (Figure 14.16). This Record Index line remains in a fixed location, and marks the record being read. In Figure 14.16, the Record Index line intersects the trend graph at log record number 1,996. The log number, timestamp, and individual parameter values in that log are displayed in the table at the left of the screen. To view a different section of logs, use the scroll bar beneath the graph to shift the graph to the left or right. To advance the graph one log at a time, click the right and left arrow buttons on the computer keypad, or click on the right or left arrow in the scroll bar beneath the graph.

### Viewing a Single Trend Line

A user can examine records along a single trend line by clicking on the parameter of his choice in the left table. The parameter selection will appear highlighted in the table, and the name of this parameter will appear in the corner of the graph (Figure 14.17, page 189). Move the cursor along the parameter trend line and observe the changing values in the box linked to the cursor. The cursor, which appears on screen as a dotted white circle, latches onto each data point (record) it encounters, and the associated date and time stamp, and recorded value is automatically displayed in the box. As the cursor moves from data point to data point along the trend line, the corresponding values are displayed in the table at left.



Only the trend line for the parameter that is highlighted in the table can be examined in this way. Note that the cursor will not latch onto data points along any other trend line. To view the values associated with a different parameter, select a different parameter in the table. The parameter name will be displayed in the corner of the graph, and the cursor will now latch onto data points along the newly selected trend line. The values displayed along the Y axis will also update to reflect the unit value range of the selected parameter.

## **Event Logs**

The Event Logs tab allows users to view user event logs in a table format (Figure 14.18). Event logs capture user changes es such as K-Factor, orifice meter factor, and cone meter factor changes, plate and cone size changes, gas composition changes, input setting changes and resets.

Events are logged by date and time, and each record includes the Modbus register address and register name, the old value of the parameter, and the new value.

Events and alarms are stored in one common log; up to 1,152 combined events and alarms can be stored and viewed.

DOWNLY	DAD	Scanner 200 Device F	eports			
	Deallers	our Internations Pr	entions Alarmians Config	uration Calibration Snapshot		(
Download		and the second se	Fiker?	aration calloration snapsnot	1	
Mark All as Read	Sort O					
	Defa	ult (As downloaded)	Filter by Month/Day	None selected +	Start Date 1/21/2010 8:44:41 AM	Apply
Save SDF File			C Filter by Data Range		End Date 2/3/2010 5:34:01 PM	
Export Data •	Rec	Timestamp	Register Name	Old Value	New Value	Units
	919	01/21/2010 16:45:22	Port 1 Login	<port 1="" defau<="" td=""><td>alt&gt; <port 1="" default:<="" td=""><td>&gt;</td></port></td></port>	alt> <port 1="" default:<="" td=""><td>&gt;</td></port>	>
Erint Table	920	01/22/2010 08:27:48	Port 1 Login	<port defau<="" i="" td=""><td></td><td>&gt;</td></port>		>
	921	01/22/2010 14:22:57	Port 1 Login	<port 1="" defau<="" td=""><td>alt&gt; <port 1="" default:<="" td=""><td>&gt;</td></port></td></port>	alt> <port 1="" default:<="" td=""><td>&gt;</td></port>	>
Yerry Trenvisi	922	01/22/2010 14:32:58	Port 1 Login	<port 1="" defau<="" td=""><td>alt&gt; <port 1="" default:<="" td=""><td>&gt;</td></port></td></port>	alt> <port 1="" default:<="" td=""><td>&gt;</td></port>	>
	923	01/25/2010 08:31:29	Port 1 Login	<port 1="" defau<="" td=""><td></td><td></td></port>		
Ernal SDF Ele	924	02/03/2010 16:46:30	Port 1 Login	<port 1="" defau<="" td=""><td>alt&gt; <port 1="" default:<="" td=""><td>&gt;</td></port></td></port>	alt> <port 1="" default:<="" td=""><td>&gt;</td></port>	>
	925	02/03/2010 16:47:42	FR1 Calculation Period	1	min 15 se	c
Email Data •	926	02/03/2010 16:48:38	DP - Fail Value		0 5	0 In H20
	927	02/03/2010 16:49:17	SP - Override Enable		No Ye	5
	928	02/03/2010 16:49:17	SP - Override Value		0 100	
	931	02/03/2010 16:52:27	T1 - Low Flow CutOff	17.1	429 17.142	9 BBL/day
	932	02/03/2010 17:16:58	A1 - Nominal Value		1	0 V
		02/03/2010 17:17:05			SIG In H2	-
	934	02/03/2010 17:17:05	A1 - Sampling Period	Disat		c
		02/03/2010 17:17:06		1 to 5 1		
	935	02/03/2010 17:17:06	A1 - Transducer Type		acer Differential Pressure Transd	Contraction of the local division of the loc
			A1 - Sensor Range High	0.1405	000 20	
		02/03/2010 17:19:53		4 to 20		
			A1 - Sensor Range High		200 15	
		02/03/2010 17:25:19			sec Disable	
		02/03/2010 17:29:15		Disat		
			A1 - Input Signal Type	1 to 5		
Show Download Stats		02/03/2010 17:30:34			sec Disable	
	944	02/03/2010 17:34:01	Interval Period	1h	iour 1 mi	n

Figure 14.18

## Alarm Logs

The Alarm Logs tab allows users to view alarm logs in a table format. An alarm log is generated each time a selected parameter goes outside its user-selected setpoint(s). Alarms are logged by date and time, and each record includes the Modbus register address and register name, status or type of alarm activated, and the associated value and unit where applicable (Figure 14.19, page 190).

Alarms and events are stored in one common log; up to 1,152 combined alarms and events can be stored and viewed.

Open Staf Flam.       Part Logs       Interval Logs       Central Logs       Central Logs       Central Logs       Central Logs       Central Logs       Set Logs	e Ijasiks Tgols Help								[	Don
Ser Oder       Pitri         Opert Dial       Default (All downloaded)       Pitrie to March Unit with we selected       Sert Diale       Sert Diale       Default (All downloaded)         Pitrie Table       Pitrie to March Unit we selected       End Diale       Default (All downloaded)       End Diale       End Alm Set       E Potrate Reading       42.577       11000       End Diale       End Alm Set       E Potrate Reading       44.557       11000       End Diale       End Diale <td< th=""><th>Open SDF File</th><th>Daily Lo</th><th>ogs Interval Logs E</th><th>vent Logs Alarn</th><th>Logs Configuration Calibration Snapsho</th><th>st</th><th></th><th></th><th>- Sec</th><th></th></td<>	Open SDF File	Daily Lo	ogs Interval Logs E	vent Logs Alarn	Logs Configuration Calibration Snapsho	st			- Sec	
Pert Table         Pert Table         Pert Table         Pert Table         Pert Table         Pert Table         Disc Description         Disc Description <thdisc description<="" th=""> <thdisc description<="" th=""></thdisc></thdisc>		Sort Or	der	Filter?						
Byer Table         Proc Date Surge         End Date         Undex           See 1         Timestamp         Status         Register Name         Value         Undex           Cold 3011/2010 1012/2010         Low Alam Repet         De Drader Reading         9-0774         In 100           Eand Stift (Fem.         60         01/2010 1012/2010         Low Alam Repet         De Drader Reading         9-0774         In 100           Eand Stift (Fem.         60         01/2010 1012/2010         Low Alam Repet         De Drader Reading         -0.2000         In 100           66         01/2010 1012/2010         Low Alam Repet         De Indate Reading         -0.2005         In 100           66         01/2010 1012/2010         Low Alam Repet         De Indate Reading         -0.2005         In 100           66         01/2010 1012/2010         Low Alam Repet         De Indate Reading         -0.2005         In 100           67         01/2010 1012/2010         Low Alam Repet         De Indate Reading         -0.4539         In 100           67         01/2010 1012/2010         Low Alam Repet         De Indate Reading         -4.5737         In 100           67         01/2010 1012/2010         Low Alam Reset         De Indate Reading         -4.5739         In 1	Export Data	Defau	it (As downloaded)	• @ rite	by MonthyDay None selected +	Start Date	1/20/2010	8:23:36 AM	• Arriv	
64-3         02/02(2010 10:12)         Low Amm Rest         0P Indust Passing         94-774         In HOD           Enail Str Bin         64-012(2010 10:12)         Low Amm Set         0P Indust Passing         -7-2009         In HOD           Epail Data         •         01/2010 10:12:52         Low Amm Set         0P Indust Passing         -7-2009         In HOD           Epail Data         •         01/2010 10:12:52         Low Amm Rest         0P Indust Passing         -20375         In HOD           660         01/2010 10:10:12:02         Low Amm Set         0P Indust Passing         -14335         In HOD           670         01/2010 10:10:14:32         Low Amm Set         0P Indust Passing         -414511         In HOD           670         01/2010 10:10:14:32         Low Amm Set         0P Indust Passing         -414511         In HOD           671         01/2010 10:10:14:32         Low Amm Set         0P Indust Passing         -414517         In HOD           672         01/2010 10:10:14:32         Low Amm Rest         0P Indust Passing         -414517         In HOD           673         01/2010 10:10:14:35         Low Amm Rest         0P Indust Passing         -414517         In HOD           674         01/2010 10:10:4:35         Low Amm	Erint Table			CTR	r by Date Range	End Date		11:17:07 AM		
Exad SPE F6         644         0.120201010-10.135         Low Aam Set         0 Photoste Reading         -0.2009         In ROD           Bind Data         -65         0.120201010-10.135         Low Aam Rest         0 Photoste Reading         -0.2009         In ROD           66         0.120201010-10.135         Low Aam Rest         0 Photoste Reading         -0.2006         In ROD           66         0.120201010-10.135         Low Alam Rest         0 Photoste Reading         -1.4355         In ROD           66         0.120201010-10.2145         Low Alam Rest         0 Photoste Reading         -1.4451         In ROD           67         0.1202010-10.2145         Low Alam Rest         0 Photoste Reading         -1.4451         In ROD           670         0.1202010-10.2145         Low Alam Rest         0 Photoste Reading         -4.4521         In ROD           671         0.1202010-10.2145         Low Alam Rest         0 Photoste Reading         -4.5787         In ROD           672         0.1202010-10.2145         Low Alam Rest         0 Photoste Reading         -4.5787         In ROD           673         0.1202010-10.5555         Low Alam Rest         0 Photoste Reading         -4.5787         In ROD           674         0.1202010-10.5555	Yerr Trends	Rec	Timestamp	Status	Register Name	Value		Units		
645         01/20/2010 10:152         Low Aam Rest         C Ponder Reading         8.2006         In H20           Gmail Data		663	01/20/2010 10:13:29	Low Alarm Reset	DP Instant Reading		34,0714	In H2O		
Bype Loads         666         01/20/2010 10:19:20         Low Alam Reset         OP Instart Reading         -12.3757         In H20           670         01/20/2010 10:10:10:10:10:10:10:10:10:10:10:10:10:1	Email SDF Ele	664	01/20/2010 10:13:52	Low Alarm Set	DP Instant Reading		-47.2009	In H20		
647         01/20/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/20100         0.01/2010         0.		665	01/20/2010 10:13:55	Low Alarm Reset	DP Instant Reading		8.32056	In H2O		
666         01/20/2010 10:20:40         Low Alam Rest         CP Indust Reading         44.813         In RO           669         01/20/2010 10:20:44         Low Alam Rest         CP Indust Reading         48.639         In RO           670         01/20/2010 10:24:45         Low Alam Rest         CP Indust Reading         46.639         In RO           671         01/20/2010 10:24:45         Low Alam Rest         CP Indust Reading         46.537         In RO           672         01/20/2010 10:26:45         Low Alam Rest         CP Indust Reading         46.787         In RO           673         01/20/2010 10:36:56         Low Alam Rest         CP Indust Reading         40.7875         In RO           674         01/20/2010 10:36:56         Low Alam Rest         CP Indust Reading         40.7875         In RO           675         01/20/2010 10:36:56         Low Alam Rest         CP Indust Reading         40.7735         In RO           676         01/20/2010 10:36:59         Low Alam Rest         CP Indust Reading         41.5799         In RO           677<01/20/2010 10:45:55	Email Data	666	01/20/2010 10:19:23	Low Alarm Set	DP Instant Reading		-42.5757	In H2O		
669         01/20/2010 10:2:0:4         Low Alam Rest         CP Indust Reading         455.96         In 400           670         01/20/2010 10:2:0:4         Low Alam Set         CP Indust Reading         455.96         In 400           671         01/20/2010 10:2:0:5         Low Alam Rest         CP Indust Reading         45.956         In 400           672         01/20/2010 10:3:0:5         Low Alam Rest         CP Indust Reading         45.757         In 400           673         01/20/2010 10:3:0:5         Low Alam Rest         CP Indust Reading         45.797         In 400           674         01/20/2010 10:3:0:5         Low Alam Rest         CP Indust Reading         45.797         In 400           675         01/20/2010 10:3:0:5         Low Alam Rest         CP Indust Reading         47.579         In 400           676         01/20/2010 10:3:0:5         Low Alam Rest         CP Indust Reading         37.041         In 400           677         01/20/2010 10:4:0:5         Low Alam Rest         CP Indust Reading         33.1577         In 400           678         01/20/2010 10:4:0:5         Low Alam Rest         CP Indust Reading         33.1577         In 400           680         01/20/2010 10:4:0:5         Low Alam Rest         CP Indust Reading		667					1.74335	In H2O		
670         01/20/2010         01-24-27         Low Alam Readt         CP Indust Reading         45-575         In RO           671         01/20/2010         01-36-05         Low Alam Readt         CP Indust Reading         44-575         In RO           672         01/20/2010         01-36-05         Low Alam Readt         CP Indust Reading         44-575         In RO           673         01/20/2010         01-36-05         Low Alam Readt         CP Indust Reading         40-3757         In RO           674         01/20/2010         01-36-05         Low Alam Readt         CP Indust Reading         40-3758         In RO           674         01/20/2010         01-36-05         Low Alam Readt         CP Indust Reading         40-3773         In RO           675         01/20/2010         01-36-05         Low Alam Readt         CP Indust Reading         41-3799         In RO           676         01/20/2010         01-36-05         Low Alam Readt         CP Indust Reading         41-3799         In RO           677         01/20/2010         01-36-05         Low Alam Readt         CP Indust Reading         41-3797         In RO           679         01/20/2010         01-36-05         Low Alam Readt         CP Indust Reading         41-		668	01/20/2010 10:20:43				-41.4621	In H2O		
6/1         01/20/2010 10:0:10         Low Alam Rest         CP Indust Reading         64:375         In HO           6/2         01/20/2010 10:0:0:0         Low Alam Set         CP Indust Reading         46:371         In HO           6/3         01/20/2010 10:0:0:0         Low Alam Rest         CP Indust Reading         46:371         In HO           6/4         01/20/2010 10:0:0:0         Low Alam Rest         CP Indust Reading         40:370         In HO           6/5         01/20/2010 10:0:0:0         Low Alam Rest         CP Indust Reading         49:599         In HO           6/5         01/20/2010 10:0:0:0:0         Low Alam Rest         CP Indust Reading         49:599         In HO           6/7         01/20/2010 10:0:0:0:0         Low Alam Rest         CP Indust Reading         37:0!1         In HO           6/7         01/20/2010 10:0:0:0:0         Low Alam Rest         CP Indust Reading         33:157         In HO           6/8         01/20/2010 10:0:0:0:0         Low Alam Rest         CP Indust Reading         33:157         In HO           6/8         01/20/2010 10:0:0:0:0         Low Alam Rest         CP Indust Reading         40:6185         In HO           6/8         01/20/2010 10:0:0:0:0         Low Alam Rest         CP Indust Reading										
672         01/202010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/2010         0.01/201010         0.01/201010										
673         01/20/2010         01.0010         Low Alam Rest         C Ponder Reading         40.5736         In 1400           674         01/20/2010         01.00100         Low Alam Set         C Ponder Reading         40.7735         In 1400           675         01/20/2010         0.0010         Low Alam Set         C Ponder Reading         44.5799         In 1400           676         01/20/2010         0.0010         Low Alam Rest         C Ponder Reading         44.5799         In 1400           677         01/20/2010         0.40100         Low Alam Rest         C Ponder Reading         31.507         In 1400           677         01/20/2010         0.40100         Low Alam Rest         C Ponder Reading         37.0141         In 1400           678         01/20/2010         0.40100         Low Alam Rest         C Ponder Reading         33.1577         In 1400           679         01/20/2010         0.40100         Low Alam Rest         C Ponder Reading         33.1577         In 1400           680         01/20/2010         0.40100         Low Alam Rest         C Ponder Reading         440.6185         In 1400           681         01/20/2010         0.44100         Low Alam Rest         C Ponder Reading         42.7144										
674         01/20/2010         01:301:10         Low Alam Rest         DP Instark Reading         49.7973         In HOD           675         01/20/2010         01:301:10         Low Alam Rest         DP Instark Reading         49.7973         In HOD           676         01/20/2010         01:301:10         Low Alam Rest         DP Instark Reading         41.5799         In HOD           677         01/20/2010         01:301:00         Low Alam Rest         DP Instark Reading         41.5799         In HOD           670         01/20/2010         01:4595         Low Alam Rest         DP Instark Reading         41.9711         In HOD           670         01/20/2010         01:4595         Low Alam Rest         DP Instark Reading         41.9721         In HOD           679         01/20/2010         01:4595         Low Alam Rest         DP Instark Reading         41.9721         In HOD           600         01/20/2010         01:4595         Low Alam Rest         DP Instark Reading         45.4926         In HOD           612         01/20/2010         01:4595         Low Alam Rest         DP Instark Reading         42.7194         In HOD           614         01/20/2010         01:4595         Low Alam Rest         DP Instark Reading										
6/57         01/20/2010 10.01:01:01:01:01:01:01:01:01:01:01:01:01:0										
676         01/20/2010 10:39:59         Low Alam Set         CP Instart Reading         -41.5769         In H2O           677         01/20/2010 10:49:50         Low Alam Rest         CP Instart Reading         -37.0141         In H2O           678         01/20/2010 10:49:55         Low Alam Set         CP Instart Reading         -44.9271         In H2O           679         01/20/2010 10:49:55         Low Alam Rest         CP Instart Reading         -44.9271         In H2O           600         01/20/2010 10:49:55         Low Alam Rest         CP Instart Reading         -30.1557         In H2O           601         01/20/2010 10:49:55         Low Alam Rest         CP Instart Reading         -40.6155         In H2O           602         01/20/2010 10:49:51         Low Alam Rest         CP Instart Reading         -45.4955         In H2O           613         01/20/2010 10:49:51         Low Alam Rest         CP Instart Reading         -45.4955         In H2O           616         01/20/2010 10:49:51         Low Alam Rest         CP Instart Reading         -43.1956         In H2O           616         01/20/2010 10:49:51         Low Alam Rest         CP Instart Reading         -43.1956         In H2O           616         01/20/2010 11:15:49         Low Alam Rest										
677         01/20/2010 10-4100         Low Alam Reads         CP Indust Reading         37.0141         In HOD           670         01/20/2010 10-4134         Low Alam Set         CP Indust Reading         44.9271         In HOD           679         01/20/2010 10-4134         Low Alam Set         CP Indust Reading         33.1537         In HOD           600         01/20/2010 10-4135         Low Alam Reads         CP Indust Reading         -40.6165         In HOD           620         01/20/2010 10-4135         Low Alam Reads         CP Indust Reading         -40.6165         In HOD           643         01/20/2010 10-41-35         Low Alam Rest         CP Indust Reading         -42.1144         In HOD           646         01/20/2010 10-41-95         Low Alam Rest         CP Indust Reading         -42.1144         In HOD           646         01/20/2010 10-41-95         Low Alam Rest         CP Indust Reading         -42.1144         In HOD           646         01/20/2010 10-41-95         Low Alam Rest         CP Indust Reading         -43.1508         In HOD           647         01/20/2010 10-41-95         Low Alam Rest         CP Indust Reading         -43.1508         In HOD           647         01/20/2010 10-41-95         Low Alam Rest         CP Indust R										
678         01/20/2010 10:43:54         Low Alarm Set         DP Instart Reading         -44.9271         In 1420           679         01/20/2010 10:43:55         Low Alarm Rest         CP Instart Reading         -33.1557         In 1420           600         01/20/2010 10:45:55         Low Alarm Set         CP Instart Reading         -33.6157         In 1420           602         01/20/2010 10:45:55         Low Alarm Set         CP Instart Reading         -40.6155         In 1420           633         01/20/2010 10:45:55         Low Alarm Set         CP Instart Reading         -26.4085         In 1420           644         01/20/2010 10:45:55         Low Alarm Rest         CP Instart Reading         -26.4085         In 1420           656         01/20/2010 10:45:55         Low Alarm Rest         CP Instart Reading         -13.3744         In 1420           666         01/20/2010 11:15:46         Low Alarm Rest         CP Instart Reading         -43.1508         In 1420           677         01/20/2010 11:15:46         Low Alarm Rest         CP Instart Reading         -43.1508         In 1420           686         01/20/2010 11:15:46         Low Alarm Rest         CP Instart Reading         -63.9955         In 1420           687         01/20/2010 11:15:46         Low Alarm										
679         01/20/2010 10-455         Low Alam Reset         CP Indust Reading         331537         In H2O           600         01/20/2010 10-4564         EV Mathemanno         Social 4 met         642         01/20/2010 10-4564         EV Mathemanno         Social 4 met         642         01/20/2010 10-4564         EV Mathemanno         Social 4 met         642         01/20/2010 10-4564         Low Alam Reset         CP Instart Reading         26.4595         In H2O         664         01/20/2010 10-464         Low Alam Reset         CP Instart Reading         42.7194         In H2O         665         01/20/2010 10-464         Low Alam Reset         CP Instart Reading         42.7194         In H2O         665         01/20/2010 10-464         Low Alam Reset         CP Instart Reading         43.1506         In H2O         666         01/20/2010 10-464         Low Alam Reset         CP Instart Reading         43.1506         In H2O         666         01/20/2010 10-11544         Low Alam Reset         CP Instart Reading         43.1506         In H2O         667         01/20/2010 10-11544         Low Alam Reset         CP Instart Reading         43.1506         In H2O         668         01/20/2010 1111544         Low Alam Reset         CP Instart Reading         49.5795         In H2O         668         01/20/2010 11111544         Low Alam Reset <td< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></td<>										
660         01/20/2010 10-46:54         Exit Markenance         Special event           662         01/20/2010 10-46:54         Exit Markenance         CP Instart Reading         -40.6185         In H2O           663         01/20/2010 10-46:54         Lon Alam Set         CP Instart Reading         -26.4095         In H2O           664         01/20/2010 10-46:54         Lon Alam Set         CP Instart Reading         -42.5194         In H2O           665         01/20/2010 10-46:50         Lon Alam Set         CP Instart Reading         -13.4744         In H2O           666         01/20/2010 11:15:46         Low Alam Set         CP Instart Reading         -43.1506         In H2O           667         02/20/2010 11:15:46         Low Alam Set         CP Instart Reading         -63.9905         In H2O           668         01/20/2010 11:15:44         Low Alam Rest         CP Instart Reading         -63.9905         In H2O           669         02/20/2010 11:15:44         Low Alam Rest         CP Instart Reading         -63.9905         In H2O           668         01/20/2010 11:15:44         Low Alam Rest         CP Instart Reading         -63.9905         In H2O										
642         01/20/2010 10-41:00         Low Alam Set         CP Indust Reading         -44.05         In IAO           663         01/20/2010 10-41:01         Low Alam Readt         CP Indust Reading         -25.4900         In IAO           664         01/20/2010 10-41:01         Low Alam Readt         CP Indust Reading         -42.7194         In IAO           665         01/20/2010 10-41:05         Low Alam Readt         CP Indust Reading         -43.7104         In IAO           666         01/20/2010 10-41:05         Low Alam Readt         CP Indust Reading         -43.1506         In IAO           666         01/20/2010 10-11:54         Low Alam Readt         CP Indust Reading         -43.1506         In IAO           667         01/20/2010 11:154         Low Alam Readt         CP Indust Reading         -43.1506         In IAO           687         01/20/2010 11:154         Low Alam Readt         CP Indust Reading         -69.9795         In IAO							33.1537	an m20		
663         01/20(2010 10:48:03)         Low Alarm Reset         DP Instant Reading         25:4858         In N2O           664         01/20(2010 10:48:50         Low Alarm Set         DP Instant Reading         -42:7194         In N2O           665         01/20(2010 10:48:50         Low Alarm Reset         DP Instant Reading         -3:8744         In N2O           666         01/20(2010 11:15:44         Low Alarm Reset         DP Instant Reading         -43:598         In N2O           687         01/20(2010 11:15:44         Low Alarm Reset         DP Instant Reading         -43:598         In N2O           688         01/20(2010 11:15:44         Low Alarm Reset         DP Instant Reading         -63:5905         In N2O           680         01/20(2010 11:15:44         Low Alarm Reset         DP Instant Reading         -69:7956         In N2O							40 6107	101420		
664         01/2012010 10-04-95         Low Alam Set         DP Instark Reading         13.2794         In 1420           665         01/2012010 10-04:50         Low Alam Reset         DP Instark Reading         13.2794         In 1420           666         01/2012010 10:11:54         Low Alam Reset         DP Instark Reading         -43.1506         In R20           667         01/2012010 11:154*         Low Alam Set         DP Instark Reading         -49.9795         In R20           668         01/2012010 11:154*         Low Alam Reset         DP Instark Reading         69.9795         In R20           680         01/2012010 11:17:06         Low Alam Set         DP Instark Reading         -99.9794         In R20										
665         01/20/2010 10:46:50         Low Alam Reset         DP Instant Reading         13.4744         In H2O           666         01/20/2010 11:15:49         Low Alam Reset         DP Instant Reading         -43.1508         In H2O           667         01/20/2010 11:15:49         Low Alam Reset         DP Instant Reading         -68.905         In H2O           668         01/20/2010 11:15:49         Low Alam Reset         DP Instant Reading         -68.905         In H2O           668         01/20/2010 11:17:05         Low Alam Reset         DP Instant Reading         -59.7096         In H2O										
666         01/20(2010 11:15:49         Low Alarm Set         CP Instant Reading         -43,1508         In 1420           667         01/20(2010 11:15:49         Low Alarm Reset         CP Instant Reading         66,905         In 1420           668         01/20(2010 11:17:06         Low Alarm Set         CP Instant Reading         -69,9796         In 1420           680         01/20(2010 11:17:06         Low Alarm Set         CP Instant Reading         -99,9796         In 1420										
687         01/20(2010 11:15:49         Low Alarm Reset         DP Instant Reading         68.9905         In H2O           688         01/20(2010 11:15:76         Low Alarm Set         DP Instant Reading         -59.9704         In H2O			CONCRETE CONTRACTOR							
688 01/20/2010 11:17:06 Low Alarm Set DP Instant Reading -59.9784 In H2O					address of the second se					

Figure 14.19

## **Configuration Settings Report**

The Configuration tab allows users to view the configuration settings of all aspects of the Scanner in one screen (Figure 14.20).

Before making a change to an archive parameter, users are advised to save all configuration settings by checking the Configuration Settings checkbox on the Download Device Data screen and performing a download. The configuration settings will be included in the SDF file with all other selected log file types.

					De
gpen SOF File		nt Logs Alarm Logs Configuration Ca		ŧ	
	Base Conditions	Value	Units		
Export Data	Base Temperature	60	Deg F		
Print Report	Base Pressure	14.72	psi		
Suprocedure	Atmospheric Pressure	14.73	psi		
Yew Trends	Pipe	14.73	tas		
Ten nerer	Pipe Size	2.067	inches		
Enal SOF Ele	Pipe Material	Carbon Steel	ancres		
charser (ie	Tap Type	Flange Tapped			
Emol Date	Orifice Plate	marge report			
Email Data	Plate Size	1	inches		
	Plate Material	Stainless Steel (304/316)	nones		
	Plate Model Number	areas acces (an Jano)			
	Plate Serial Number				
	Reference Temperature	60	Deg F		
	Low Pressure Cutoff	1	In H2O		
	Reference Conditions	United States (14.73 psl, 60 F)	annau		
	Isentropic Exponent	1.3			
	Uncosity	0.010268	ø		
	Specific Gravity	Calculated	0-		
	Heating Value	Calculated			
	Gas Fraction	No wet correction			
	Gas Praction Gas Composition	No wel correction			
	Analysis Ref. No.				
	Carbon Dioxide (CO2)	0.5956			
	Nitrogen (N2)	0.2595	5		
	Methane (C1)	96.5222			
		1.8186			
	Ethane (C2)				
	Propane (C3)	0.4596	%		
	n-Butane (n-C4)	0.1007	%		
	(-Butane ()-C4)	0.0977 0.0324	5		
	n-Pentane (n-CS)	0.0324	~		
	i Pentane (i-C5) n-Hexane (n-C6)	0.0664	5		
orta User Manuala	n-rexane (n-L6)	0.0664			
Ciel Manuala					
			USD 4	4.2.0.485	3/5/2017 10:51 AM

## **Calibration Settings Report**

The Calibration report allows a user to capture the instrument's input calibration settings for quick reference (Figure 14.21).

Qpen SOF File	Daily Logs	Interval Logs	Event Logs Alarm	Logs Config	uration Calibration Snap	pshot	
Export Data	Differential	Pressure Zero Offset On:	11/24/2016	14:51:23	+235 DP Zero Offset 16 48	0	
Print Report		Operator:	«Port 1 Default»				
yew Trends		Absolute Offset	0	In H2O			
Enal SDF Ele							
Emai Data *	Verif	fication (Current)					
Proto Dona	v	Verified On: erified Operator:	11/24/2016 <port 1="" default=""></port>	16:00:38	0 DP Ver 13 490		
		Appled	Measured				
	1	38.1000	35.0850	In H2O			
	2	51.1000	48.1113				
	3	64.1000	61.0726				
	4	77.0000	73,9725				
	5	90.1000	87.1308				
	6	103.0000	100.0427				
	7	116.1000	113.0966				
	8	129.1000	125.1459				
	9	142.0000	138.9945				
	10	155.0000	151.9858				
	11 12	168.0000 181.0000	165.0180 177.9277				
	Verifi	cation (Previous)					
		Verified On:	11/24/2016	15:16:08	0 DP Ver 1H 400		
	V	enfied Operator:	<port 1="" default=""></port>				
		Applied	Measured				
	1	32.1000	38.8443	In H20			
	2	45.0000	51.6937				
	3	58.1000	64.7713				
User Manuals							
					USD	4.2.0.485	3/5/2017 10:52 AM

Note If the device firmware is version 4.18 or higher, the previous and current verification settings will be included in the Calibration report.

## **Snapshot Report**

The Holding Registers Data Snapshot report allows a user to capture live flow run and turbine input data, sensor input readings, and system data (Figure 14.22). The report can be exported and e-mailed to a technician for diagnostic help.

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DOWINLOA	a	Scanner 2100w Device Re		1441792]	Site name Field Name Location name	6
						Der
Download	Daily Logs Interval Logs E	vent Logs Alarm Logs Co	nfiguration Calib	ion Snapshot		
	Description	Value	Units			
Mark All as Read	late					
	Snapshot Date/Time	10/15/2018 14:02:42				
Save SDF File F	Flow Run #1					
	Volume: Rate and Totals					
Export Data •	Grand Total	91.8351	MOF			
	Flow Rate	352.687	MCF/Bay			
Print Report	Current Day	46.8026	MCF			
	Previous Day	0	MCF			
Yew Trends	Current Interval	0.489842	MCF			
	Previous Interval	14.6953	MCF			
Email SDF Ele	Mass: Rate and Totals					
	Grand Total	5430.42	LBM			
Email Data •	Flow Rate	15682.3	LUM/day			
	Current Day	3405.77	LBM			
	Previous Day	0	LBM			
	Current Interval	21.781	LEM			
	Previous Interval	653.431	LEM			
	Energy: Rate and Totals					
	Grand Total	96.6218	MMETU			
	Flow Rate	365.404	MMBTU/day			
	Current Day	49.966	MMBTU			
	Previous Day	0	MMBTU			
	Current Interval	0.507505	MMBTU			
	Previous Interval	15.2252	MMBTU			
	Run Times					
	Current Day	20039	SEC			
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allow nonunneg state	Current Interval	140	SEC			
levice Interface User Mar	Desuinue Inhanial	. 9600	CEC.			

Figure 14.22

## Printing, Saving, E-mailing and Exporting Reports

To preserve downloaded data for future reference, the data can be formatted in an on-screen report and printed to a networked printer, or saved to your computer hard drive. Alternatively, the data can be emailed or exported in a file format that can be viewed independently of the ModWorX Pro interface software using Word, Acrobat Reader, Excel, or an internet browser.

## Printing a Report

To print a hard copy of an on-screen report,

- 1. Click the tab of the Device Reports screen containing the logs or settings you want to print.
- 2. Click *Print Table* in the left column of the screen (Figure 14.23).
- 3. A Print Preview window will appear. If necessary, change the margins or other settings to fine-tune the presentation of data.
- 4. Click *File* from the Print Preview screen, then click *Print*.
- 5. Enter your print settings in the print dialog and click *Print*.

Device Reports - le Tasks Tools Help	HUUMURA PT	14.0.0						Contraction of the local distance of the loc	<b>- - x</b>
Dower	ana	scanner 2000 Device Re	- Device Name [s. Eports	/n 4096]		Site Field Location		0	A
								De	one
Download		terval Logs Ever	Alarm Log	s Configuration C	alibration Snapshot				
Mark All as Read	Sort Order Default (As de	wnloaded) -	G Filter by 1	onth None sele	cted *	Start Date 1/8/2	010 8:00.00 AM •	600Y	
Save SOF File			C Filter by D	ate Ranga		End Date 1/20/	2010 8:00:00 AM	Ger	
Export Data •		stamp	Flow Run 1 Volume	Flow Run 1 Mass Total	Flow Run 1 Energy Total	Differential Pressure	Static Pressure (A)	Process Temperature	R
Brint Table	See Same		(MCF)	(LBM)	(MMBTU)	(In H20)	(PSIA)	(Deg F)	
Yew Trends	2 01/09/	2010 08:00:00 2010 08:00:00 2010 08:00:00	47.8223 51.6500 0.0000	5662.9248 2371.6399 0.0000	51.7191 53.2732 0.0000	163.8913 0.0000 0.0000	28.9477 14.7300 14.7369	52,8514 28,9374 28,8930	
Enal SOF Ele		2010 08:00:00	0.0000	0.0000	0.0000	0.0011	14.7318	28.9057	
	5 01/12/	2010 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.9292	
Email Data •	6 01/13/	2010 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.9407	
	7 01/14/	2010 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.9146	
		2010 08:00:00	0.0000	0.0000	0.0000	0.0000	97.7508	28.9090	
		2010 08:00:00	165.7026	7608.6523	170.9102	27.5499	124.7300	28.8967	
		2010 08:00:00	248.2567	11399.3291	256.0587	21.3535	124.7300	28.8950	
		2010 08:00:00	702.1481	32240.8945	724.2148	37.0818	124.7300	28.9305	
		2010 08:00:00	76527.7734	3423317.0000	79281.1172	62.3303	124,7300	43.8674 28.9386	-
	13 01/20/	2010 08:00:00	24050	27951.9668	1.9459	11.0650	124.7300	28.9385	-
Show Download Stats									
	4			- 10					
suice Interface User									

Figure 14.23

### Saving an SDF File

Each time you perform a download, the downloaded data is automatically saved in a proprietary data file on the hard drive of your computer. A single Scanner Data File (.SDF) contains all of the log data and/or settings associated with the log types selected for download. An .sdf file is a highly secure, uneditable file that can be opened and viewed only within the ModWorX Pro interface.

In addition to these files, a user can manually generate an .sdf file by clicking on the *Save SDF File* button before exiting the Device Reports screen. This button allows you to save the .sdf file to the location of your choice, whereas the .sdf file that is automatically saved with each download is always stored in the NuFlo Log Data folder on the computer hard drive.

If a user suspects a problem with a Scanner's performance, an sdf file can expedite a technician's analysis of the issues.

To save an SDF file:

- 1. From the Device Report screen, click on the tab containing the data you want to save.
- 2. Click Save SDF File...

- 3. The Save SDF File dialog will appear (Figure 14.24). To change the file path and/or file name from the defaults listed below, browse to the desired file path and/or type the desired entry in the field provided. See Log Directory and Filenames, page A-16 for more information.
  - The default file path is C:\NuFlo Log Data\ModWorX Pro\Field_Name\Site_Name.
  - The default filename is <Device_Name>_<date (YYYYMMDD)>_<time (hhmm)>.

Save SDF File						2 🔀
Save jn:	C Site_Name		•	÷E	-11 1	
My Recent Documents Desktop	Device_Name	_20100114_1354.sdf _20100114_1358.sdf _20100120_1327.sdf _20100120_1516.sdf				
My Documents My Computer My Network Places	File <u>n</u> ame: Save as <u>type</u> :	Device_Name_200912 SDF Files (*.sdf)	17_1747.sdf		• [ •	<u>S</u> ave Cancel

Figure 14.24

4. Click Save. The file will be saved as with an .SDF extension in the specified directory.

#### **Opening an SDF File**

Previously saved SDF files can be viewed offline. See Viewing Reports Offline, page 184.

### E-mailing an SDF File

An SDF file can be emailed directly from the ModWorX Pro interface in a single step. To email an SDF file, simply click the *Email SDF File...* button (Figure 14.25, page 194). ModWorX Pro will save the most recent SDF file (or recreate it if necessary) and attach it to an email window. The tool will automatically populate the body of the email with a detailed description of the Scanner configuration, SDF file creation date and time, software and firmware versions, and data contents of the file, including the date range of logs (Figure 14.26, page 194).

Iasks Tools Help									
DOWNER	OAD	Scanner 2000 Device Re	- Device Name [s eports	/n 4096]			Name Name Name	0	A
		-						Do	ne
Download	Daily	Logs Interval Logs Eve	nt Logs Alarm Log	s Configuration C	alibration Snapsho	t			
-	Sort	Order	Fiter?						
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Yew Trends		01/09/2010 08:00:00	51.6500	2371.6399	\$3,2732	0.0000	14.7300	28.9374	
		010 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7369	28.8930	
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		01/12/2010 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.9292	
Email Data •		01/13/2010 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.9407	
		7 01/14/2010 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.9146	
	8	3 01/15/2010 08:00:00	0.0000	0.0000	0.0000	0.0000	97.7508	28.9090	
		9 01/16/2010 08:00:00	165.7026	7608.6523	170.9102	27.5499	124.7300	28.8967	
	10	0 01/17/2010 08:00:00	248.2567	11399.3291	256.0587	21.3535	124.7300	28.8950	
		01/18/2010 08:00:00	702.1481	32240.8945	724.2148	37.0818	124.7300	28.9305	
		2 01/19/2010 08:00:00	76527.7734	3423317.0000	79281.1172	62.3303	124.7300	43.8674	
	15	01/20/2010 08:00:00	2,4050	27951.9668	1.9459	11.0850	124,7300	28,9386	

Figure 14.25



Figure 14.26

### **Emailing Data**

Daily logs, interval logs, event logs alarm logs, configuration settings, calibration settings, and a snapshot report can be transmitted via email directly from the ModWorX Pro interface using any one of four tools:

- E-mail Data allows a user to email logs of a specific file type (daily logs, for example).
- E-mail Selected allows a user to select multiple log types for emailing.
- Email All to Flow-Cal allows a user to email all data in a single Flow-Cal file.
- Email All to PGAS allows a user to email all data in PGAS files.

### Email Data of a Single Log Type

To email logs of a specific type,

- 1. Click on the appropriate log type tab to display the reports desired.
- 2. Click the *Email Data* button at the left of the screen (Figure 14.27, page 195) and select the export format desired (.XLS, .CSV, .PDF, .RTF, or html). Please note that calibration data can be exported for email in any format except .CSV.
- Note If multiple log types are desired, select *Email Selected*. See Email Selected Data (Multiple Log Types), page 196, for further instruction.

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Mark Al as Read	Sort C		Fiter?						
	Det	ault (As downloaded) •			cted *	200110-010	• MA 00.00 8 010	500H	
Save SCF File	J		C Filter by D	iste Range		End Date 1/20/	2010 B:00:00 AM +		
Export Data	Rec	Timestamp	Flow Run 1 Volume	Flow Run 1 Mass Total	Flow Run 1 Energy Total	Differential Pressure	Static Pressure (A)	Process Temperature	1
Brint Table			(MCF)	(LBM)	(MMBTU)	(In H20)	(PSIA)	(Deg F)	
View Trends	1	01/08/2010 08:00:00 01/09/2010 08:00:00	47.8223 51.6500	5662.9248 2371.6399	51.7191 53.2732	163.8913	28.9477 14.7300	52.8514 28.9374	
There is a second		01/10/2010 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7369	28.8930	
Enal SOF File		01/11/2010 08:00:00	0.0000	0.0000	0.0000	0.0011	14,7318	28,9057	
		01/10/2010 08:00:00	0.0000	0.0000	0.0000	0.0000	14,7300	28,9292	
Email Data	- C	010 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.9407	
- To		01/14/2010 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.9146	
		01/15/2010 08:00:00	0.0000	0.0000	0.0000	0.0000	97.7508	28.9090	
	9	01/16/2010 08:00:00	165.7026	7608.6523	170.9102	27.5499	124.7300	28.8967	
	10	01/17/2010 08:00:00	248.2567	11399.3291	256.0587	21.3535	124.7300	28.8950	
		01/18/2010 08:00:00	702.1481	32240.8945	724.2148	37.0818	124.7300	28.9305	
		01/19/2010 08:00:00	76527.7734	3423317.0000	79281.1172	62.3303	124.7300	43.8674	_
	13	01/20/2010 08:00:00	2.4050	27951.9668	1.9459	11.0850	124,7300	28.9386	

Figure 14.27

- 3. An Export... window will appear (Figure 14.28). To change the file path and/or file name from the defaults listed below, browse to the desired file path and/or type the desired entry in the field provided. See Log Directory and Filenames, page A-16 for more information.
  - By default, the export file will be saved in the directory C:\NuFlo Log Data\ModWorX Pro\Field_Name\Site_ Name.
  - By default, the export filename prefix will be <Device_Name>_<date (YYYYMMDD)>_<time (hhmm)>, followed by an initial to indicate the log type.

Export Daily Lo	ng Download t	o XLS				23
Save in:	Site_Name			] ← 6	D 🗗 🔟 🖬	2
My Recent Documents Deaktop My Documents	Device_Name	_20100120_1508	8_D.xls			
My Computer						
My Network Places	File pame:	Device_Name	_20100120_1508_	D xls	•	Save
	Save as type:	Excel Files (".)	ds)		•	Cancel

Figure 14.28

- 4. Click *Save* to export the data to the file. The file will automatically be attached to an email window (Figure 14.29).
- 5. Address the email, add additional notes to the body if desired, and send.

Message Inse	t Options For	mat Text	Developer Ad	lobe PDF				
	• (A' A')(≣ · ≉2 · A ·) ≡ ≡ =		Address Check Book Names		Follow Up+	spi	elling	
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Attached:			0.0726					
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Device/Meter Name Company Name: Site/Well Name: Field/Lease Name: Location Name:	Device Name Site Name Field Name Location Name		10000	1 * * * \$ *	** [ * *			• 7.4
Device/Meter Name Company Name: Site/Well Name: Field/Lease Name: Location Name: Legal Description	Device Name Site Name Field Name Location Name		10000				1	• 7 4
Device/Meter Name Company Name: Site/Well Name: Field/Lease Name: Location Name: Legal Description Downloaded on:	Device Name Site Name Field Name Location Name		10000			• \$ • • •		• 7.6
Device/Meter Name Company Name: Site/Well Name: Field/Lease Name: Legal Description Downloaded on: ModWorX Pro: Device Type:	: Device Name Site Name Field Name Location Name 01/20/2010 15: 4.0.0 Scanner 2000		10000	<u>.</u> <u>.</u> .				• 7 4
Device/Meter Name Company Name: Site/well Name: Field/Lease Name: Legal Description Downloaded on: ModWorX Pro: Device Type: Firmware:	Device Name Site Name Field Name Location Name 01/20/2010 15: 4.0.0 Scanner 2000 3.86		10000		**!**			• 7.4
Device/Meter Name Company Name: Site/well Name: Field/Lease Name: Legal Description Downloaded on: ModWorX Pro: Device Type: Firmware:	: Device Name Site Name Field Name Location Name 01/20/2010 15: 4.0.0 Scanner 2000		10000	1 · · · S · ·	**!**	* \$ * * *		* 7,4
Device/Meter Name Company Name:	Device Name Site Name Field Name Location Name 01/20/2010 15: 4.0.0 Scanner 2000 3.86		10000	1 · · · · <u>5</u> ·		* \$ * * *		• 7.4

Figure 14.29

### Email Selected Data (Multiple Log Types)

To email logs of multiple log types,

1. Click the *Email Data* button at the left of the screen and select *Email Selected* from the dropdown list (Figure 14.30).

le Iasks Tools Help		(mar.)						-
DOWNED	DAD	Device Re	- [s/n 4096] eports					E
•		<u></u>						Dor
Download	Daily L	ogs Interval Logs Eve	nt Logs Alarm Log	s Configuration C	alibration Snapshot	1		
Hark Al as Read	Sort Or		Fiter?					
Control of the local of the loc	Defau	It (As downloaded) •	C Filter by M	touth Norse sole	cted +	20010 01000	2010 0:00:00 AM ·	BORAY
Save SOF File			C Filter by D	ate Range		End Date 12/15	/2011 8:00,00 AM ·	
Export Data	Rec	Timestamp	Flow Run 1 Volume (MCF)	Flow Run 1 Mass Total (LBM)	Flow Run 1 Energy Total (MMBTU)	Differential Pressure (In H20)	Static Pressure (A) (PSIA)	Process Temperature (Deg F)
grink Table	-	04/14/2010 05:00:00	0.0000	0.0000	0.0020	0.0000	14.7300	(Deg17) 28.8921
Vew Trends	2	04/15/2010 08:00:00	0.0000	0.0000	0.0000	0.0000	14,7300	28,9113
	3	04/16/2010 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.9096
Enal SOF Ele	4	04/21/2010 08:00:00	0.0000	0.0000	0.0000	0.0000	14,7300	28.8974
	5	04/22/2010 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.9087
Email Data -	6	04/23/2010 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28,9088
Email All As Flow-Cal File	7	04/24/2010 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.9052
	8	04/25/2010 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.8830
Email All As PGAS File(s)	9	04/26/2010 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.8800
Imal Selected	10	04/27/2010 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.8932
Email 30.5 file	11	04/28/2010 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.8993
Email CSV File	12	04/29/2010 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.9020
Imail PDF File	13	04/30/2010 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.9118
Email RTF File	14	05/01/2010 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.9094
Email HTML File	15	05/02/2010 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.8811
	16	05/03/2010 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.8814
	17	05/04/2010 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.8991
	18	05/05/2010 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.9167
	19	05/06/2010 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.9222
	20	05/07/2010 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.9162
	21	05/08/2010 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.9120
	22	05/09/2010 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.8873
	23	05/10/2010 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.8962
	24	05/11/2010 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.9512
	25	05/12/2010 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.9610
	26	05/13/2010 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.9386
Show Download Stats	27	05/14/2010 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.9157
eulce Interface User M	4							

Figure 14.30

- 2. The Email Selected window will appear (Figure 14.31). Select the file format desired and select the log types/reports desired using the checkboxes provided.
  - To change the export file, enter the export file path or click on the folder icon to browse to the export location.
     See Log Directory and Filenames, page A-16 for more information. The default export file is C:\NuFlo Log Data\ModWorX Pro\Field_Name\Site_Name.
  - To change the file name, enter the file name in the field provided. The default export file name will include <Device_Name>_<date (YYYYMMDD)>_<time (hhmm)>. Each log type will be exported in a separate file, and the filename will include an initial to identify the log type. For example, a daily log downloaded on March 20, 2008 at 3:35 p.m. would be named Device_Name_20080320_1535_D.xls.

ModWorX Pro		
Email Sele	ected	
Selection C	and the second sec	
Excel Spreadshe	et (XLS)	O Word Document (RTF)
🔿 Comma Delimite	d File (CSV)	<ul> <li>Internet Document (HTML)</li> </ul>
O Acrobat Reader	(PDF)	
Daily Logs (_D Interval Logs Event Logs (_ Alarm Logs (_)	( <u>)</u> E)	Configuration Report (_C) Calibration Report (_L) Snapshot Report (_S)
File Save Director	y	
C:\NuFlo log data\M	odWorX Prol/Fie	eld_Name\Site_Name\
File Save Prefix	Device_Nam	w_20100120_1508
		QK Cancel

Figure 14.31

- 3. Click OK to export the data to the file. The file will automatically be attached to an email window (Figure 14.32).
- 4. Address the email, add additional notes to the body, if desired, and send.

B &	Nett     Options     Format Text     Developer     Adobe PDF       Image: A format Text     Image: Adobe PDF     Image: Adobe PDF       Image: A format Text     Image: Adobe PDF       Image: Adobe PDF     Image: Adobe PDF	
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To	en sent.	
ccount • Sybject:	Please review these files	
Attached	Device Name 20100121 1515 D.XLS (8 KB); Device Name 20100121 1515 H.XLS (11 KB);	
-	Device Name 20100121 1515 E.XLS (9 KB)	
Company Name: Site/Well Name: Field/Lease Name Location Name: Legal Descriptic	e: Field Name Location Name	
Downloaded on:	01/21/2010 15:15:13	
ModWorX Pro:	4.0.0	
Device Type:	Scanner 2000	
Firmware: Board ID:	3.86	
Board IU:	0	
Data:		
	Daily Logs (1/8/2010 8:00:00 AM to 1/21/2010 10:45:34 AM)	
	Interval Logs (1/20/2010 2:00:00 PM to 1/21/2010 3:00:00 PM)	
	Events Logs (1/21/2010 8:44:41 AM to 1/21/2010 11:47:00 AM)	

Figure 14.32

#### Email All Data as Flow-Cal File or PGAS Files

To email all archive data in a single Flow-Cal file or multiple PGAS files,

 Click the *Email Data* button at the left of the screen and select *Email All As Flow-Cal File* from the dropdown list (Figure 14.33). For PGAS files, select *Email All As PGAS Files*.



- 2. An Export All to Flow-Cal File or Export All to PGAS Files window will appear (Figure 14.34). To change the file path and/or file name from the defaults listed below, browse to the desired file path and/or type the desired entry in the field provided. See Log Directory and Filenames, page A-16 for more information.
  - By default, the export file will be saved in the directory C:\NuFlo Log Data\ModWorX Pro\Field_Name\Site_ Name.
  - By default, the filename will be <Device_Name>_<date (YYYYMMDD)>_<time (hhmm)>.xxx (where xxx is .CFX for Flow-Cal or .ANA for PGAS).





- 3. Click *Save* to save the data to the file. The .CFX file will automatically be attached to an email window (Figure 14.35).
- 4. Address the email, add additional notes to the body, if desired, and send.



Figure 14.35

## **Exporting Data**

Daily logs, interval logs, event logs alarm logs, configuration settings, calibration settings, and a snapshot report can be exported from ModWorX Pro to the following formats: .XLS, .CSV, .PDF, .RTF, and .HTML. Calibration settings can be exported to any of the above formats except .CSV. Additionally, all archive data can be exported, collectively, to the Flow-Cal (.CFX) format or to PGAS formats (.ANA, .VOL, and .EVT).

Data can be exported using any of four tools:

- Export Data allows a user to export logs of a specific file type (daily logs, for example).
- Export Selected allows a user to select multiple log types for exporting.
- Export All to Flow-Cal allows a user to export all data in a single Flow-Cal file.
- Export All to PGAS allows a user to export all data in PGAS files.

#### Export Data (Single Log Type)

To export logs of a specific type,

- 1. Click on the appropriate log type tab (Daily, Interval, Events, etc.) to display the reports desired (Figure 14.36, page 200).
- 2. Click the *Export Data* button at the left of the screen and select the export format desired (.XLS, .CSV, .PDF, .RTF, or .HTML).

Note If multiple log types are desired, select *Export Selected*. See Export Selected Data (Multiple Log Types), page 201, for further instruction.

Tasks Tools Help									
	DAD	Scanner 2000 Device Re	- Device Name [s/ PORTS	'n 4096]		Site Field Location			A
-		-						Dor	ne
Download	Daily Logs	Interval Logs Ever		Configuration	Calibration Snapshot				
Mark All as Read	Sort Order		Filter?						
-	Default (As	downloaded) 🔫	Filter by M	onth None sel	ected *	Start Date 1/8/2		Apply	
Save SDF File	4		C Filter by De	ste Range		End Date 1/20/	2010 8:00:00 AM -		
Export Data		mestamp	Flow Run 1 Volume	Flow Run 1 Mass Total	Flow Run 1 Energy Total	Differential Pressure	Static Pressure (A)	Process Temperature	Flo
Print Table			(MCF)	(LBM)	(MMBTU)	(In H2O)	(PSIA)	(Deg F)	
		8/2010 08:00:00	47.8223	5662.9248	51.7191	163.8913	28.9477	52.8514	
View Trends	and the second se	9/2010 08:00:00	51.6500	2371.6399	53.2732	0.0000	14.7300	28.9374	
a	(	0/2010 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7369	28.8930	
Email SDF Ele		1/2010 08:00:00	0.0000	0.0000	0.0000	0.0011	14.7318	28.9057	
		2/2010 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.9292	
Email Data •		3/2010 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.9407	
	10 C C C	4/2010 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.9146	
	and the second second second	5/2010 08:00:00	0.0000	0.0000	0.0000	0.0000	97.7508	28.9090	
		6/2010 08:00:00	165.7026	7608.6523	170.9102	27.5499	124.7300	28.8967	
	and the second second second	7/2010 08:00:00	248.2567	11399.3291	256.0587	21.3535	124.7300	28.8950	
		8/2010 08:00:00	702.1481	32240.8945	724.2148	37.0818	124.7300	28.9305	
		9/2010 08:00:00	76527.7734	3423317.0000 27951.9668	79281.1172	62.3303 11.0850	124.7300	43.8674 28.9386	-
bow Download Stats	And Designation of the local division of the	0/2010 06:00:00	2.4050	the other and the ball of the second second	1.9459	11.0650	124.7300	20.9300	
vice Interface User N	4			10					,

Figure 14.36

- 3. An Export... window will appear (Figure 14.37). To change the file path and/or file name from the defaults listed below, browse to the desired file path and/or type the desired entry in the field provided. See Log Directory and Filenames, page A-16 for more information.
  - By default, the export file will be saved in the directory C:\NuFlo Log Data\ModWorX Pro\Field_Name\Site_ Name.
  - By default, the export filename prefix will be <Device_Name>_<date (YYYYMMDD)>_<time (hhmm)>, followed by an initial to indicate the log type.
- 4. Click *Save* to export the data to the file.



Figure 14.37

#### Export Selected Data (Multiple Log Types)

To export logs of multiple log types,

1. Click the *Export Data* button at the left of the screen and select *Export Selected* from the dropdown list (Figure 14.38).

Device Reports - N	lodWorX	(Pro 4.0.5							
jile Iasks Tools Help									
	DAD	Scanner 2000 Device R						S	N N
	Daily L	DQ5 Interval Logs Ev	entions Alarmian	Configuration (	allocation Consorbot	1		Done	e
Download	and the second second	land the second s	and the second se		andracion shapshot				-
Mark All as Read	Sort Or Defau	der ik (As downloaded) 🔹	Fiker?	lonth None sele	cted *	Start Date 4/14/	2010 8:00:00 AM 🔫	Apply	
Save SDF File			C Filter by D	ate Range		End Date 12/15	/2011 8:00:00 AM 👻		
Export Data •		2	Flow Run 1	Flow Run 1	Flow Run 1	Differential	Static	Process	
Export All To Flow-Cal Export All To PGAS	Rec	Timestamp	Volume (MCF)	Mass Total (LBM)	Energy Total (MMBTU)	Pressure (In H2O)	Pressure (A) (PSIA)	Temperature (Deg F)	
Export Selected	1	04/14/2010 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.8921	
	2	04/15/2010 08:00:00	0.000	0.0000	0.0000	0.0000	14.7300	28.9113	
Export to XLS file	3	04/16/2010 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.9096	
Export to CSV file	4	04/21/2010 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.8974	
Export To PDF File	5	04/22/2010 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.9087	
Export To RTF File	6	04/23/2010 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.9088	
Export To HTML File	7	04/24/2010 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.9052	
	8	04/25/2010 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.8830	
	9	04/26/2010 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.8800	
	10	04/27/2010 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.8932	
	11	04/28/2010 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.8993	
	12	04/29/2010 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.9020	
	13	04/30/2010 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.9118	
	14	05/01/2010 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.9094	
	15	05/02/2010 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.8811	
	16	05/03/2010 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.8814	
	17	05/04/2010 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.8991	

Figure 14.38

- 2. An Export Selected window will appear (Figure 14.39). To change the file path and/or file name from the defaults listed below, browse to the desired file path and/or type the desired entry in the field provided. See Log Directory and Filenames, page A-16 for more information.
  - By default, the export file will be saved in the directory C:\NuFlo Log Data\ModWorX Pro\Field_Name\Site_ Name.
  - By default, the export filename prefix will be <Device_Name>_<date (YYYYMMDD)>_<time (hhmm)>.
     Each log type will be exported in a separate file, and the filename will include an initial to identify the log type. For example, a daily log downloaded on March 20, 2009 at 3:35 p.m. would be named Device_Name_20090320_1535_D.xls.
- 3. Click *OK* to export the data to the file.

ModWorX Pro			×
Export Sel	ected		
Selection C Select File Forma			
• Excel Spreadshe	et (XLS)	O Word Document (RTF)	
🔿 Comma Delimiter	d File (CSV)	O Internet Document (HTML)	
O Acrobat Reader	(PDF)		
Select the log typ Daily Logs (_D Interval Logs Event Logs (_)	) (_H)	ts to include Configuration Report (_C) Calibration Report (_L) Snapshot Report (_S)	
Alarm Logs (_)			
C:\NuFlo log data\M	odWorX Pro\Fi	eld_Name\Site_Name\	8
File Save Prefix	Device_Nam	e_20100120_1508	
		ØK [	Çancel

Figure 14.39

#### Export All Data to Flow-Cal File or PGAS Files

To export all archive data in a single Flow-Cal file or to multiple PGAS files,

1. Click the *Export Data* button at the left of the screen (Figure 14.40) and select *Export All to Flow-Cal*. Or for PGAS files, select *Export All to PGAS*.

COMPLE	AD	Scanner 2000 Device Re						E
								Do
Download		ogs Interval Logs Ever		s Configuration C	albration Snapshot			
Mark Al as Read	Sort O	rder	Fiker?					
	Defa	uit (As downloaded) *	Filter by H	tonth Rione sele	cted .	Start Date 4/14/	• MA 00:0018 0105	
Save SOF File			C Filter by D	ata Kange		End Date 12/15	/2011 0:00:00 AM +	Booly
-								
Export Data •	Rec	Timestamp	Flow Run 1 Volume	Flow Run 1 Mass Total	Flow Run 1 Energy Total	Differential Pressure	Static Pressure (A)	Process
sport All To Flow-Call	REC	Timescamp	(MCF)	(LBM)	(MPHITU)	(In H20)	(PSIA)	(Deg F)
sport All To PGAS	- 1	04/14/2010 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.8921
xport Selected	2	04/15/2010 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.9113
oport to 31.5 File	3	04/16/2010 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.9096
port to CSV file	4	04/21/2010 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.8974
port To POF File	5	04/22/2010 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.9087
port To RTF File	6	04/23/2010 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.9088
port To HTML File	7	04/24/2010 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.9052
	8	04/25/2010 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.8830
	9	04/26/2010 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.8800
	10	04/27/2010 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.8932
	11	04/28/2010 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.8993
	12	04/29/2010 08:00:00	0.0000	0.0000	0.0000	0.0000	14,7300	28.9020
	13	04/30/2010 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.9118
	14	05/01/2010 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.9094
	15	05/02/2010 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.8811
	16	05/03/2010 08:00:00	0.0000	0.0000	0.0000	0.0000	14,7300	28.8814
	17	05/04/2010 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.8991
	18	05/05/2010 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.9167
	19	05/06/2010 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.9222
	20	05/07/2010 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.9162
	21	05/08/2010 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.9120
	22	05/09/2010 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.6873
	23	05/10/2010 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.0962
	24	05/11/2010 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.9512
	25	05/12/2010 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.9610
	26 27	05/13/2010 08:00:00 05/14/2010 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.9306 28.9157
tow Download Stats	20	051145010 06:00:00	0.0000	0.0000	0.000.0	0.0000	14.7300	28.9157
uice Intelface User M	14							

Figure 14.40

- 2. An Export All to Flow-Cal File or Export All to PGAS Files window will appear (Figure 14.41). To change the file path and/or file name from the defaults listed below, browse to the desired file path and/or type the desired entry in the field provided. See Log Directory and Filenames, page A-16 for more information.
  - By default, the export file will be saved in the directory C:\NuFlo Log Data\ModWorX Pro\Field_Name\Site_ Name.
  - If desired, change the filename of the export file. By default, the export filename for a Flow-Cal file will be <Device_Name>_<date (YYYYMMDD)>_<time (hhmm)>.xxx (where xxx is .CFX for Flow-Cal or .ANA for PGAS).
- 3. Click *Save* to export the data to the file(s).

Export All to F	ow-Cal File			23
Save in:	Site_Name		• 🗧 🖆 📰 •	
My Recent Documents				
My Documents				
My Computer				
My Network	File name:	Device_Name_20100120_150	18.cfx	Save
Places	Save as type:	Flow-Cal Files (*.cfx)	•	Cancel

Figure 14.41

If exporting to PGAS format, three files will be generated (Figure 14.42). Configuration data is saved in a file with an .ANA extension. Interval logs are saved in a file with a .VOL extension, and events are saved in a file with an .EVT extension.



Figure 14.42

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# Appendix A - Tools Menu

In addition to the standard configuration settings provided in the Configure menu, ModWorX Pro allows users to customize software functions using settings found in the Tools menu. The Tools menu is located in the task bar at the top of the screen (Figure A.1).

DOWNLOAD		w - Device name [ 2100W Mair			Site name Field Name Location name		E
efresh 🗸 Auto-Refresh							Ret
🛞 Calibrate Inpe	ıts 🚺 🔘 Maii	ntain Flow Run	🛞 Maint	ain Turbine 🛛 🐼 Manage	PID	Configure	
Flow Run Data				Turbine Data			
Flow Rate	352.687	MCF/day		Turbine 1 Flow Rate	7	BBL/day	
Daily Total (est.)	317.173	MCF		Turbine 1 Grand Total	4.52234E006	BBL	
Heating Value	1036.06	BTU/SCF		Turbine 2 Flow Rate	0	BBL/day	
				Turbine 2 Grand Total	0	BBL	
	Current Day	Previous Day	,		Current Day	Previous Day	
Volume Flow	45.3104	352.687	MCF	Turbine 1 Volume Flow	0.902952	7	BBL
Mass Flow	2014.74	15682.3	LBM	Turbine 2 Volume Flow	0	0	BBL
Energy	46.9442	365.404	MMBTU				
			DETAILS				DETAILS
Input Data				System Data			
Static Pressure	6.22	PSIG		Alarms			ALARMS
Differential Pressure	164.62	In H2O		Supply / Battery Voltage	10.28 / 10.5	5 V	
Process Temperature	60.00	Deg F	×	Temperature	71.6	7 Deg F	
Analog Input 1	0.00	inches		Date/Time	Oct 26, 201	3 11:05:48 AM	
Analog Input 2	56.24	Deg F		Analog Output	15.20	) mA	
				Smart Battery / Health %	83.00 / 93	7 %	
			DETAILS				DETAILS

Figure A.1

Functions supported by this menu include:

- save and load configuration settings
- clear flow totals
- clear the Scanner memory
- copy Scanner memory to a binary file
- manually create a partial record (recommended following commissioning of a device)
- change the power saving mode
- reset user security settings
- modify or disable the time synchronization prompt
- change the units system
- change communications options
- enable/disable auto connection
- enable/disable auto downloads upon connection
- change download options
- change directory for configuration files
- enable automatic logging of data polls
- view Modbus registers

# Save/Load Configuration Settings

This feature of ModWorX Pro makes easy work of configuring multiple units with a known set of configuration parameters. Once a single unit is configured, the configuration settings can be saved in a single file, which can then be uploaded to other units. If user security is enabled, this feature will be available only to users with Administrator, Configuration, or Calibration security levels.

IMPORTANT To successfully upload a configuration file to another Scanner, the file being uploaded must be generated by a unit with the same firmware version or an older firmware version than the firmware in the unit being configured. If the configuration file being uploaded was created with newer firmware than that in the Scanner being configured, an error message will appear when an upload is attempted.

### Saving a Configuration File

To create the configuration file, perform the following steps:

- 1. Click on Tools>Manage Configuration (Figure A.1, page A-1). A dialog will appear (Figure A.2).
- Click the *Save Configuration* button (Figure A.2). A screen will appear, displaying a default filename (for example, Device_Name_20070803_0002.srf) and file location. The default file location is C:\NuFlo Log Data\ModWorX Pro\<Field_Name>\<Site_Name>.
- Note If the use of a single directory is preferred for storing all configuration files, as opposed to the file structure shown in step 2, see Log Directory and Filenames, page A-16.
- 3. Change the filename or file location, if desired, and click *Save*. A Communications status box will appear while the configuration files are saved, followed by an Information box confirming that the files have been saved successfully.
- 4. Click *OK* to exit the Information box, then click *Done* to exit the Manage Configuration screen. The configuration file will appear in the folder designated in step 2.



Figure A.2

## Uploading a Configuration File

To upload the configuration file to another Scanner device, perform the following steps:

Click on *Tools>Manage Configuration* (Figure A.1, page A-1) and click *Load Configuration*. The Load Configuration dialog shown in Figure A.3 will appear.

Items previously selected for upload will automatically be selected. This is a timesaving feature for users who are configuring multiple units with the same configuration settings, in that the settings need to be specified for the first upload only.

Load Configuration			-
Select Items to Resto	re		
<ul> <li>All (Board Replacement)</li> </ul>			
O Configuration and Current Calibrati	on		
<ul> <li>Configuration Only</li> </ul>			
Calibration Only			
Gas Composition Only			
Custom (choose from list)			
	< Back	Next >	Cancel

Figure A.3

2. Select the type of settings you want to restore from the selections provided.

Note To save previous and current calibration data, select "All (Board Replacement)." To save only current calibration data, select "Configuration and Current Calibration." To manually select the parameters to be uploaded from a checklist, select "Custom."

- 3. Click Next.
- 4. Select the configuration file to be uploaded. Click on the folder icon in the Filename field to open the C:\NuFlo Log Data\ModWorX Pro\ directory. Then navigate by field name and site name to locate the appropriate configuration file for upload. Double-click on the file or click *Open* to select it. The selected file will be highlighted on the Load Configuration screen.
- 5. Click Next. The Scanner will quickly read the firmware version of the configuration file selected and compare it to the firmware version of the Scanner. If no compatibility problem is detected, a Device Settings screen will appear (Figure A.4, page A-4). If configuration settings have been selected for upload, the Device/Meter Name and Site Name settings will appear. Change these settings to represent the unit being configured.

Note By default, the device will be synchronized to the computer time following upload. To override this default, deselect Synchronize Device Time at the bottom of the screen.

ModWorX Pro	
Load Configu	ration
Device Setting	S
The following parameters with the upload.	are unique to each device. Update as required before proceeding
Device/Meter Name	Device Name
Site/Well Name	Site Name
Synchronize Device Tim	e
✓ Set device time to (	computer time after upload
	< Back

#### Figure A.4

 Click *Next*. If Configuration settings were selected for upload, a Device Communications Settings screen will appear (Figure A.5). Enter slave address and baud rate settings for Ports 1 and 2 of the device being configured. If only calibration settings, gas composition settings, or custom settings are being uploaded, the Device Communications Settings screen will not appear.

Mod₩orX Pro		×
Load Configuration		
Device Communication	ns Settings	
Communications settings have been sele to set the slave address and baud rate f	ected to be loaded. Please specify how you w for each port in the device.	ould like
Port 1 Settings		
<ul> <li>Leave the settings as currently settings</li> </ul>	set in device (address 1, 9600 baud)	
O Use the settings in the configurat	ution file (address 1, 9600 baud)	
Specify the settings to store	1 9600 baud 💌	
Port 2 Settings		
<ul> <li>Leave the settings as currently settings</li> </ul>	set in device (address 1, 9600 baud)	
Use the settings in the configurat	ition file (address 1, 9600 baud)	
<ul> <li>Specify the settings to store</li> </ul>	1 9600 baud 👻	
	< Back Next >	⊆ancel
	Figure A.5	

7. Click *Next*. A summary screen will appear.
8. Click *Next* to initiate the upload . A progress screen will be displayed throughout the upload (Figure A.6), followed by a confirmation screen when the upload has been successfully completed.



Figure A.6

#### **Clear Flow Totals**

Grand totals for flow run volume and turbine meter volume can be cleared using a control in the Tools menu. Before zeroing flow totals, consider downloading a snapshot report to capture the last flow total readings for your records. Only grand totals will be cleared; all log data will remain in the archives.

If user security is enabled, this feature will be available only to users with Administrator, Configuration, or Calibration security levels.

To zero flow totals,

- 1. Click Tools>Clear Flow Totals in the task bar (Figure A.7, page A-6).
- 2. In the Clear Flow Totals window, select the totals that are to be reset.
- 3. Click *OK* to clear the totals.



Figure A.7

#### **Clear the Scanner Memory**

When updating the Scanner to a new firmware version or moving an instrument to a new site, it may be necessary to clear the Scanner's memory. Before performing this task, consider downloading all flow logs and configuration data. If user security is enabled, this feature will be available only to users with Administrator or Configuration security levels.

WARNING Users can clear either device settings or archive settings, or both, from the Scanner's memory. Clearing device settings will delete all calibration and configuration settings. Clearing the device archive will delete all daily, interval, event, and alarm log records.

To clear the memory,

- 1. Click on Tools>Clear Memory (Figure A.8).
- 2. Select which settings you wish to delete: device settings, archive settings, or both.
- 3. Click OK to delete the settings.
- 4. Click Done.



Figure A.8

## **Copy Scanner Memory to a Binary File**

The Copy EEPROM to File function is a helpful tool for users who require technical support. Copying the instrument's memory to a transportable file can significantly reduce the technician's troubleshooting time when a problem occurs that cannot be immediately diagnosed from the user's description. A user should perform this function only at the request of a Cameron technician.

To copy the memory to a file,

1. Click on Tools>Copy EEPROM to File (Figure A.9).

bus Holding Registers Iodbus Registers Shift+Ctrl+R	pevice Name [s/n 4096]	
and the first first second second		
	00 Main Display	
Configuration v Totals nory		ModWorX Pro
ROM To File	O Maintain Flow Run	Copy EEPROM To File
rchive Partials ower Saving Mode er Security	F/day	Click OK to select a filename and start saving EEPROM memory. This process will take a long time to complete. Please be patient.
tatistics M Port Shift+Ctrl+O	F J/SCF	Status:
Current Day	Previous Day	Progress:
0 0 0	0 MCF 0 LBM 0 MMBTU	Elapsed Time:
•	Current Day 0 0	Current Day Previous Day 0 0 MCF 0 0 LBM



- 2. Click OK on the Copy EEPROM to File screen (Figure A.9). A Write EEPROM to File dialog will appear, prompting the user to verify or change the location where the file will be stored, and the name of the binary file. Unless changed on the Options>Directories screen, the file location is C: NuFlo Log Data\ModWorX Pro, and the filename is EEPROM_YYYYMMDD_HHMMSS.bin where YYYYMMDD is the year, month and day that the memory is saved, and HHMMSS is the hour, minute and second that the memory is saved. For example, EE-PROM_20090118_230443.bin is the name of a file copied at 11:04:43 p.m. on January 18, 2009.
- 3. Click *Save* to initiate the copying of the memory. The Copy EEPROM to File dialog will reappear, and a progress bar will monitor the percentage of completion as the memory is copied. A confirmation message will appear on the screen when the binary file has been successfully saved.

## **Create a Partial Record**

The Create Archive Partials setting allows a user to manually end current interval/daily flow records and begin new interval/daily flow records. This may prove helpful following the commissioning of a device, since all flow data collected prior to the manual record creation will be confined to one record, and all flow data calculations from that point forward (based on current configuration parameter values) will be confined to another record, allowing the user to track actual flow based on time since commissioning.

If user security is enabled, this feature will be available only to users with Administrator, Configuration, or Calibration security levels.

To create instantaneous partial records,

- 1. Click Tools>Create Archive Partials in the task bar (Figure A.10, page A-8).
- 2. Click **OK** at the confirmation prompt.
- 3. Download daily and/or interval logs to view the results.



Figure A.10

#### **Change Power Saving Mode**

The Scanner features a power-saving mode to conserve battery power during periods when full power is not required to support current operations. When this feature is enabled, the instrument will automatically switch from high power to low power and vice versa, depending on configuration settings and operational requirements. When an instrument is shipped, this power saving feature is enabled.

To disable the setting and restore the instrument to full power for all operations,

- 1. Click Tools>Change Power Saving Mode in the task bar (Figure A.11).
- 2. Select Power Saving Disabled (Figure A.12, page A-9).
- 3. Click *OK*. A Communicating screen will appear briefly as the setting change is written to the instrument. The change will be documented in a download of event logs.



Figure A.11



Figure A.12

#### **Reset User Security Settings**

This tool will reset the Scanner security settings to factory defaults. Existing user accounts will be deleted and the default permissions for Ports 1 and 2 will be reset to Administrator (full) access level. This may be necessary in the event that security is enabled and the password to the administrator access account is lost.

To reset user security settings,

- Click *Tools>Reset User Security* in the task bar (Figure A.13). The Reset User Security screen shown in Figure A.14, page A-10, will appear. Note that the device serial number and key code are displayed on this screen. You will be asked to provide both numbers during the reset process.
- 2. With the screen in view, call the phone number for the tech support office nearest you. A Cameron technician will request the device serial number and key code displayed on your screen. When he receives this information, he will provide a one-time reset code.

# Caution Do not close the Reset User Security screen until the reset process is complete. If the screen is closed and reopened after a key code is provided, a new key code will be generated and the reset code provided by the technician will not reset the security controls.

- 3. Enter the code into the field provided, and click OK.
- 4. The software will automatically return to the Welcome screen. Login using the default permissions and reestablish user accounts with security settings, if desired.



Figure A.13

escription			Device Information		
is operation will reset the Scanner 20 counts will be deleted and the defaul		Device Type	Scanner 2000		
cess level. You will be logged out and		Main Board Serial Number	0		
u must call tech support at the numb		Device Serial Number	4096		
epared to provide your device inform	ation and customer inf	Product Code	\$00C0		
		Firmware Version	4.00		
echnical Support Contact In	formation		Register Table Version	15	
	-		Manufacture Date	04-2009	
For technical support in the U call toll-free	5,	Cameron Measurement Systems Division	Sales Date	04-2009	
1.800.654.3760		281.582.9500			
For technical support outside the U	IS, contact the support	center nearest you:	Enter Provided	Reset Code	
Canada	Asia Pacific	Europe, Middle East	Key Code IMSG		
1.877.891.6540 (toll-free) 403.291.4814	+603.5569.0501	& Africa 44.1243.826741	Reset Code		

Figure A.14

#### Select a New COM Port

Typically, the COM port used to connect to the Scanner is determined during initial login. However, should a user wish to change the COM port, he can do so by performing the following steps.

- 1. Disconnect from the device and return to the Welcome screen (click *Return* to exit the Main screen or Configuration menu screen).
- 2. Click *Tools>Select COM Port* in the task bar. This selection will appear active only when the software is disconnected from a Scanner.
- 3. Select a new COM port from the dropdown menu shown in Figure A.15. "NuFlo USB Adapter" will appear as a selection only if the NuFlo USB adapter is installed in your Scanner and the USB driver has been installed on the computer used to connect to the Scanner.



Figure A.15

## **Change the Device Clock Synchronization Settings**

The device clock synchronization setting allows a user to change the threshold used for synchronizing instrument time with computer time.

The Scanner includes a real-time clock for timekeeping and log time stamps, and the internal time and date is preset at the factory. However, if the factory-set time and date are inaccurate for the user (for example, if the user is in a different time zone), the program will automatically detect the difference between the device's internal time and the date and the time/date displayed on the user's personal computer and prompt the user to authorize time and date synchronization. By default, the Scanner prompts a user to synchronize the clock display if the time difference is 14,400 seconds (4 hours) or more.

To change the time difference required to generate a "synchronize" prompt,

- 1. Click Tools>Options in the task bar. The General Options dialog will appear (Figure A.16).
- 2. Enter a new threshold value (seconds).
- 3. Click **OK**.





#### Change the Units System

This setting allows a user to change the unit system the Scanner uses to display parameters. By default, the unit system is US Standard. Parameters that have pre-configured units that can be displayed as either US Standard or metric include system temperature, plate size, atmospheric pressure, and base conditions.

To change the units system to metric,

- 1. Click *Tools*>*Options* in the task bar (Figure A.17, page A-12).
- 2. Click on the Units System dropdown menu in the General Options screen and select Metric.
- 3. Click *OK*.



Figure A.17

#### **Change Format of Newly-Saved Calibrations**

If using firmware version 4.14 or higher, the user can select one of two calibration format options:

- **Original Format (Applied/Measured)**. This format includes the measurement value applied to the sensor ("Applied") and the resulting reading generated by the factory calibration ("Measured"). Displayed errors indicate the difference between the new user calibration results and the original factory calibration.
- <u>Extended Format (As Left/As Found)</u>. This format is the default (recommended) format. "Applied/As Left" is the measurement value applied to the sensor. "As Found" is the result of the previous user calibration. Displayed errors indicate the difference between the new user calibration results and the results of the previous user configuration.
- IMPORTANT Calibrations will only be displayed in format in which they were saved. If the user chooses "Original Format," the calibration can only be viewed in the original format. However, if you saved the calibrations in the original format but changed your settings to "Extended," old calibrations should still be displayed in the original format until they are saved again.



Figure A.18

## **Change Communications Options**

The Communications Options screen allows a user to optimize communications between a computer and a Scanner by adjusting communication parameters.

To change communications settings,

- 1. Click *Tools>Options* in the task bar (Figure A.18, page A-12).
- 2. Select Communications from the list of options in the left column of the Program Options screen (Figure A.19).
- 3. Change the selections described below, as required.
- 4. Click *OK*.

anner 2100W Main Display - Mr	odWorX Pro 4.3.0			-	Program Options	
[asks Tgols ∐elp	r				Program Opt	
DOWINLOAD	Scanner 2100W - Device name (s/n 1441792) Scanner 2100W Main Display	Field Location		Return	Options - General - Connection - Connection - Auto-Download	Communications Options
Calibrate Inpu low Run Data low Rate Daily Total (est.)	352.687 MCF/day 317.173 MCF	Turbine Data Turbine 1 Flow Rate Turbine 1 Grand Total 4.522	7 BBL/day 234E006 BBL		- Download - Advanced - Directories	Timing Parameters           Presend Delay         50         msec         Reset to Defaults           Number of Retries         3
leating Value /olume Flow fass Flow Energy	1036.06         BTU/SCF           Current Day         Previous Day           45.3104         352.667         MCF           2014.74         15682.3         LBM           46.9442         365.404         MMBTU		0 BBL/day 0 BBL ent Day Previous 902952 0	Day 7 BBL 0 BBL DETAUSI		Timeoul Period 5000 meec
nput Data		System Data				
Static Pressure Differential Pressure Process Temperature Analog Input 1 Analog Input 2	6.22 PSIG 164.62 In H2O 60.00 Deg F 0.00 Inches 56.24 Deg F	Temperature Date/Time Oct Analog Output	28 / 10.55 V 71.67 Deg F t 26, 2018 11:05:48 15.20 mA 83.00 / 97 %			
e Interface User Manuals	DETALS	COM2 4.3.0.490 <port< td=""><td>t 1 Default&gt; 10/26/</td><td>DETAILS 8018 11:06 AM</td><td></td><td></td></port<>	t 1 Default> 10/26/	DETAILS 8018 11:06 AM		

Figure A.19

#### Toggle RTS Line

Some RS-485 to RS-232 converter modules require a request-to-send (RTS) line for switching between a "receive" and "transmit" state. A check mark in the *Toggle RTS*... checkbox enables the software to toggle this line, ensuring that incoming data will be readily transmitted and that the converter will not stall in a "receive" mode after a period of inactivity. By default, this option is enabled. To disable the option, deselect the checkbox and click *OK*.

#### **Presend Delay**

The Communications Options screen allows a user to enter a presend delay period (milliseconds) to increase the chances for a successful connection between the computer and the Scanner when the instrument is networked with a radio or other low-speed device. The computer transmits a request to send, which powers the device on, and then waits the specified length of time before attempting to transmit data. By default, this parameter is set to 50 msec.

#### Number of Retries

By default, the computer will make two attempts to connect to the Scanner before providing an error message. In situations where time-outs are anticipated—for example, due to a low-speed computer—the user can increase the number of communication attempts allowed for a connection by increasing the number of retries.

#### **Time-out Period**

The time-out period is the length of time allowed for a connection to a Scanner. By default, this setting is 5000 msec (5 seconds). When connecting to a slow computer, try increasing the time-out period to increase chances for a successful connection.

#### **Change Default Connection Settings**

By default, ModWorX Pro will connect to the Scanner using the Express Connect method and using default permissions that give the user full access to all configurable controls. These default settings can be changed in the *Tools* menu.

To change the default connection settings,

- 1. Click *Tools>Options* in the task bar (Figure A.20).
- 2. Select *Connection* from the list of options in the left column of the Program Options screen.
- 3. To configure ModWorX Pro to attempt connection with the Scanner automatically using the settings specified on this screen, check the "*Attempt to connect automatically with these settings*" checkbox.
- 4. Select the connection method so be used with each automatic connection from the dropdown menu. See Connecting to the Scanner, page 1, for a description of connection methods. If the Specify Parameters method is selected, enter the appropriate slave address, baud rate and time-out period in the Connection Parameters box.
- 5. To specify a user name/password login as the default, deselect the "Use default permissions of connected device port" setting.
- 6. To make a user name and password part of the default login process, enter the user name and password on this screen.
- 7. By default, ModWorX Pro will save the user name and password when the user exits the software, eliminating the need to re-enter the information at each login. If this save feature is not desired, deselect the "Save User Name and Password between Sessions" checkbox.
- 8. Click OK to save the default changes.





#### Enable/Disable Automatic Log Downloads

A user can configure ModWorX Pro to automatically download specified log types and settings each time the computer connects with the Scanner. An .sdf file containing all downloaded data is automatically saved with each download.

To enable the auto download feature,

- 1. Click *Tools*>*Options* in the task bar (Figure A.21, page A-15).
- 2. Select Auto Download from the list of options in the left column of the Program Options screen.
- 3. Select the *"Automatically begin downloading device data after connecting"* checkbox near the top of the Auto-Download Options screen.
- 4. Click OK. The auto-download will be performed upon the next connection to the Scanner.

	Canner 2100W - Device name [s/n 144179 Scanner 2100W Main Displa		Site name Field Name		Program Opti	
sh 🗸 Auto-Refresh			Location name	639	Options	Auto-Download Options
				Return	- General - Communications	Automatically begin downloading device data after connecting
Calibrate Inputs	🔘 Maintain Flow Run 😽 Ma	ntain Turbine 🛛 💮 Managa	PID 🖉 Configur	re	- Connection Auto-Download - Download	Select the range of log records to auto-download
		Turbine Data			Directories	Download New Records Only
ow Rate	352.687 MCF/day	Turbine 1 Flow Rate	7 BBL/day			Sector and the sector of the s
ity Total (est.)	317.173 MCF	Turbine 1 Grand Total	4.52234E006 BBL			O Dewnload All Records
ating Value	1036.06 BTU/SCF	Turbine 2 Flow Rate Turbine 2 Grand Total	0 BBL/day 0 BBL			
0	rrent Day Previous Day	Turbine 2 Grand Total	Current Day Previous	is Day		Select the log types to include in the auto-download
lume Flow	45.3104 352.687 MCF	Turbine 1 Volume Flow	0.902952	7 BBL		Cally Logs
ass Flow	2014.74 15682.3 LBM	Turbine 2 Volume Flow	0	0 BBL		V Interval Loos
iergy	46.9442 365.404 MMBTU					V Event Logs
	DETAILS			DETAILS		
iput Data		System Data				Select additional device data to include in the auto-download
atic Pressure	6.22 PSIG	Alarms		ALARMS		Configuration Settings
fferential Pressure	164.62 In H2O	Supply / Battery Voltage	10.28 / 10.55 V			Calbration Settings
ocess Temperature	60.00 Deg F 🔀	Temperature	71.67 Deg F			Holding Registers Data Snapshot
alog Input 1	0.00 inches	Date/Time	Oct 26, 2018 11:05:48	3 AM		
alog Input 2	56.24 Deg F	Analog Output	15.20 mA			
	DETAILS	Smart Battery / Health %	83.00 / 97 %	DETALS		
	DETAILS					

Figure A.21

#### **Change Download Options**

A user can change the format of exported .CSV files, configure all newly downloaded records to appear "as read," change the directory used to save logs and reports, and set download streaming parameters using the Download Options settings.

To change these settings,

- 1. Click *Tools>Options* in the task bar (Figure A.22).
- 2. Select *Download* from the list of options in the left column of the Program Options screen.
- 3. Check or uncheck the download options, as required.
- 4. Change the filepath for the directory used to store all downloaded logs and reports.
- 5. Adjust the download baud rate and/or block request size if necessary to improve streaming via a radio modem. If configuring the Scanner for use with radio communications, check the *"Same as comm. baud rate"* checkbox to synchronize the download baud rate to the communication baud rate, which helps eliminate download errors.
- 6. If necessary, adjust the Error Display Threshold value. This value represents the percentage of download failure required to prompt the user to continue or cancel the download attempt. The default value is 30%.



Figure A.22

## **Enable Automatic Logging of Data Polls**

For added convenience in gathering diagnostic information, a user can configure the device to automatically save the data generated by polling the device from the Fixed Modbus Registers screen. The log file will include values that are retrieved from the instrument when the user clicks the *Get All Data* button or enables *Auto Polling* on the Fixed Modbus Registers screen.

To enable the automatic logging feature,

- 1. Click *Tools*>*Options* in the task bar (Figure A.23).
- 2. Select Advanced from the list of options in the left column of the Program Options screen.
- 3. Change the data logging filename or the file location, if desired. By default, the files will be stored in the following directory: C:\NuFlo Log Data\ModWorX Pro\Auto-Logging Files.
- 4. Check the *Automatically log data polls* checkbox.
- 5. Click OK.





## Log Directory and Filenames

The Scanner automatically saves daily flow logs on the contract hour, and saves interval flow logs hourly (or at the userconfigured interval, if applicable). The device also automatically saves an event log each time a user change is made. With each download, all log files are saved in an .sdf (Scanner data file) format.

Note If you do not select a custom filepath and filename, the files will be saved with the default storage path and filename (i.e. "C:\NuFlo log data\ModWorX Pro\Field_Name\Site_Name\Device_Name_Timestamp.sdf").

By default, *.sdf files are saved to C:\NuFlo log data\ModWorX Pro\.To change the file location,

- 1. From the Main Display, click on the *Tools* button and choose *Options* from the dropdown menu (Figure A.1, page A-1).
- 2. When the Program Options dialog opens, click the *Directories* option from the list at the left side of the screen (Figure A.24, page A-17).

Options - General - Communications - Connection - Auto-Download - Download	Data Directorie Data Directory Root Data Dire								
- Download - Advanced - Directories	C: WuFlo log	data (ModWorX Pro \			8				
Dicconta	Root Configur	Configuration Save Directory Root Configuration Save Directory							
		C: WuFlo log data/ModWorX Pro\							
	Save Cont	nguration Hies only in the	root directory - ign	oring subdirectory path opt	ons				
	Directory Settin	ngs							
	Subdirectory S	Storage Path	File Name						
	Include?	Field/Lease Name	Include?	Device/Meter Name 🔻	Default storage				
	Indude?	Site/Well Name 🔻	Indude?	*	path and filename				
	Include?		Indude?	~	will be used when				
	Example  Used write the stamp  Used wri								

Figure A.24

3. To change the directory to which non-configuration data is saved, click in the Data Directory portion of the dialog (Figure A.25), type the desired filepath or click the Folder icon to browse to the desired directory.

Options General Communications	Directorie	25				
- Connection	Data Directory					
- Auto-Download	Root Data Dire	ectory				
- Advanced Directories	C: WuFlo log	data (ModWorX Pro \			8	
	Configuration S	ave Directory				
	Root Configur	ation Save Directory				
	C:\WuFlo log data\ModWorX Pro\					
	Save Conf	figuration Files only in the	root directory - ign	oring subdirectory path of	ptions	
	Directory Settin	ngs				
	Subdirectory S	Storage Path	File Name			
	Include?	Field/Lease Name	Indude?	Device/Meter Name	Default storage	
	Indude?	Site/Well Name +	Indude?		path and filename	
	Include?	-	Indude?		will be	
			Include?	Time Stamp	nothing is selected.	
	Example	ata ModillorV Brolifield	Jamal Cita Namal Du	evice_Name_Timestamp.s	45	

Figure A.25

4. To change the directory to which configuration data is saved, click in the Configuration Save Directory portion of the dialog (Figure A.26, page A-18) and type the desired filepath or click the Folder icon to browse to the desired directory.

ptions General	Directorie	5							
- Communications									
- Connection Auto-Download	Data Directory								
- Download	Root Data Dire								
- Advanced Directories	C: WuFlo log	data WodWorX Pro\				8			
	Configuration S	ave Directory							
	Root Configur	Root Configuration Save Directory							
	C:WuFlo log	C:\WuFlo log data\ModWorX Pro\							
	Save Cont	figuration Files only in the	root directory - ign	oring subdirectory path	options				
		-	•						
	Directory Settin	ngs							
	Subdirectory S	Storage Path	File Name						
	Include?	Field/Lease Name	✓ Include?	Device/Meter Name	<ul> <li>Defa store</li> </ul>				
	Include?	Site/Well Name 🔹	Indude?		<ul> <li>path</li> <li>filen</li> </ul>				
	Include?		Indude?		- will b	when			
			✓ Indude?	Time Stamp	noth	ing is			
	Example								
	C: WuFlo log d	lata ModWorX Pro Vield_N	lame Site_Name De	vice_Name_Timestamp	.sdf				

Note To save configuration files to the root directory only, select "Save Configuration Files only in the root directory - ignore subdirectory path options."

#### **Subdirectories**

You can save data logs in up to three subdirectories, including field/lease name, site name, company name, or location name, in whatever order you choose. Unless otherwise specified, the file will be saved by default to C:\NuFlo log data\ ModWorX Pro\Field_Name\Site Name.

However, you can choose the filepath to which the data logs are saved. For example, if you have multiple clients with multiple sites, you may want to select "Company Name" as the first subdirectory, followed by "Site Name" as the second directory. To select a custom subdirectory storage path,

- 1. From the Main Display, click on the *Tools* button and choose *Options* from the dropdown menu (Figure A.1, page A-1).
- 2. When the Program Options dialog opens, click the *Directories* option from the list at the left side of the screen.
- 3. In the Directory Settings portion of the screen (Figure A.27, page A-19), select the subdirectory storage path(s) to which you want the file saved. The file will be saved in the order the subdirectories are selected.

For example, if you want to store files by field name, site name, and then company name, you would select "Include" and choose "Field/Lease Name" to set field name as the first subdirectory, then continue to the next field and select "Site/Well Name" and so on.

Options - General - Communications - Connection - Auto-Download - Download	Data Directory Root Data Directory								
- Advanced	C: WuFlo log	dataWodWorX Pro\			ð				
Directories		Configuration Save Directory Root Configuration Save Directory							
	C:\WuFlo log data\ModWorX Pro\								
	Save Con	fguration Files only in the	root directory - ign	oring subdirectory path opt	ions				
	Directory Setti	ngs							
_		Storage Path	File Name						
	Subdirectory :			Device/Meter Name -	Default				
	Subdirectory :	Field/Lease Name	✓ Include?	Device/Meter Name •	storage				
		Field/Lease Name	Indude?	Device/Meter Name  *					
	Include?		The start	Vevice/meter Name	storage path and				

Figure A.27

#### Filenames

In addition to saving files to user-specified subdirectories, you can also add up to three descriptive elements to the filename from the following options: device/meter name, field/lease name, site/well name, company name, location name, or legal description. By default, the filename will include the device/meter name and the date/time stamp (i.e. "Device_ Name_Timestamp.sdf"), which is always the last part of the name unless you chose not to include the date/time stamp. To remove the date/time stamp, uncheck the "Include" box next to the Time Stamp field.

However, you can customize the filename. For example, if you are using the same device name on multiple sites, you may want to include the site/well name as part of the filename to identify the device and the location stored in the file. The resulting filename would be "Device_Name_Site_Name_Timestamp.sdf."

To specify the descriptors to be included in the filename, select "Include" under the File Name heading and select the desired item to include in the filename. See Device Identification, page 26, for more information.

#### **View Modbus Statistics**

The Modbus Statistics selection in the Tools menu allows users to view a concise report of Modbus send and receive attempts, which may be useful in diagnosing a communications problem. An example of a Modbus statistics report is shown in Figure A.28, page A-20.

 $\mathbf{x}$ 



Figure A.28

### **View Modbus Registers**

System configurators and host programmers can view Modbus registers in either of two groupings by clicking on the *Tools* menu in the task bar at the top of the screen. To access a read-only view of Modbus *holding* registers, click *Tools*>*View Modbus Holding Registers* in the task bar.

To access *all Modbus registers* from one screen, click *Tools>View All Modbus Registers* in the task bar or use the keypad shortcut SHIFT+CONTROL+R. The Fixed Modbus Registers screen will appear (Figure A.29, page A-21). By selecting one of the tabs along the right side of the screen (real time, input configuration, output configuration...), a user can view a specific group of registers. To view all registers in one list, scroll to the end of the register groups in the column on the right and select *"All."* 

If user security is enabled, access to the View All Modbus Registers function is limited to Administrator and Configurator security levels.

le Iasks Tools	Help	_							
0 00	WNLOAD		00 - Device Na Iodbus Re				Site Name Field Name Location Name		S
Export Grid To	Excel 🥏 Export Grid	To Text 🔽 Log	Data 🚜 Print List	Options +					Done
Address	Register Name			Data Type	Hes	-	Data Yalue	-	Turbine2 Calibration
8000	Enron Hourly Point	er:		Double (32-bit Float)		90 80 00	315		
8002	Enron Daily Pointer			Double (32-bit Float)		50 00 00	13	- 3	Static Pressure Config
8004	Enron Event Count			Double (32-bit Float)	44	31 80 00	710		Static Pressure Cal.
8006	Real Date			Double (32-bit Float)		38 A8 00	12010		RTD Configuration
8008	Real Time			Double (32-bit Float)	48	35 42 C0	185611		RTD Calibration
8010	HStatus FR Alarma			Double (32-bit Float)		00 00 00	0	_	Diff Pressure Config
8012	HStatus_FR Alarm			Double (32-bit Float)		00 00 00	0		Diff Pressure Cal.
8014	HStatus_FR Alarm	High		Double (32-bit Float)	00	00 00 00	0		Analog Input 1 Config
8016	HStatus Diagn1	17.1 <b>4</b> .5		Double (32-bit Float)	42	80 00 00	64		
8018	HStatus_Diagn2			Double (32-bit Float)	00	00 00 00	0		Analog Input 1 Cal.
8020	HStatus_Diagn3			Double (32-bit Float)	45	80 00 00	4096		Analog Input 2 Config
8022	HStatus_Diagn4			Double (32-bit Float)	00	00 00 00	0		Analog Input 2 Cal.
8024	Polling Index			Double (32-bit Fleat)	00	00 00 00	0		Digital Input Config
8026	FR1 Grand Total			Double (32-bit Float)	47	98 03 AA	77831.328125		FlowRun 1 Config
8028	FR1 Instant Flow R	ate		Double (32-bit Float)	00	00 00 00	0		FlowRun 1 Calibration
8030	FR1 Daily Total			Double (32-bit Float)	00	00 00 00	0		
8032	FR1 Interval Total			Double (32-bit Float)	00	00 00 00	0		Flow Run Alarms
8034	FR1 Polling Total			Double (32-bit Float)	00	00 00 00	0		Output Configuration
8036	FR1 Previous Day			Double (32-bit Float)	00	00 00 00	0		PID Control Configuration
8038	FRI Previous Inter	val		Double (32-bit Float)	00	00 00 00	0		Modbus Master Configuratio
8040	FR1 Previous Pollin	g Total		Double (32-bit Float)	00	00 00 00	0		Publish Data Configuration
8042	FR1 Grand Mass To	stal		Double (32-bit Float)	44	A9 44 3D	5546526.5		Holding Registers
8044	FR1 Instant Mass I	flow Rate		Double (32-bit Float)	00	00 00 00	0		
8046	FR1 Daily Mass To	tal		Double (32-bit Float)	00	00 00 00	0		- <u>*</u> *
8048	FRI Interval Macc	Total		Double (32-hit Flast)	00	00.00.00	0	*	
addressing mod	le: word 📃 Reve	rse Decode By	te Order			Last poll	ed: 2010/01/20 19:05:03	3 710	registers
Get All Data	Set All Data	Get Datum	Set Datum	Auto Set on Change	Auto Polli	ing Interv	ral <mark>- 2 +</mark> sec		
evice Interface	User Manuals			and de la factoria de la compañía de					
					USB	4.0.0.4	46 <port 1="" default=""></port>	1/2	0/2010 7:05 PM
-	_	_	_					-	

Note Access to the Modbus registers is not required for the routine operation of the Scanner. Novice users should not access these screens unless instructed to do so by Cameron technical support.

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## Appendix B - PID Control

The Scanner 2000 or Scanner 210x integrated PID control can be configured and tuned via controls build into the Mod-WorX Pro software to provide a variety of control applications. The control valve position is regulated using a 4 to 20 mA output.

IMPORTANT To act as a PID controller, the Scanner 2000 or Scanner 210x must be purchased with optional PID firmware and expansion board.

The Scanner 2000 or Scanner 210x can be used to control parameters such as

- Differential pressure (from an integrated MVT or an external analog input)
- Static pressure (from an an integrated MVT or an external analog input)
- Temperature (from an integrated RTD or an external analog input)
- Flow rate (mass, volume, or energy) based on a differential pressure or a turbine input

The tuning values selected for the controller will determine if the process cotnrol is effective and stable.

All installations require tuning. Tuning by observing numeric values alone is a difficult task for even the most skilled operator. The tuning tools within ModWorX Pro simplify the process. The software plots the process variable, setpoint, and valve position in an easy-to-read, scalable graph. Output is updated in real time, so every tuning change is visible to the operator, who can then determine when an optimum response is achieved (Figure B.1).



Figure B.1

## **PID Control Methods**

From the ModWorX Pro Configuration>PID Control menu (Figure B.2), choose from the following control methods:

- Simple PID control (single variable)
- **PID control with secondary pressure control** (for flow), which enables flow rate control and maintenance of the static pressure below a user-configurable setpoint, essential for industrial applications that require the monitoring of two process variables and the flexibility to switch from one variable to the other as the primary control parameter.

Konner 2100W Configuration Menu - ModWorX Pro 4.3.	)	
Eile Iasks Tgols Help DOWNLOAD	Scanner 2100w - [s/n 1441792] Scanner 2100W Configuration Menu	
System Device Identification Display	Date/Time Communications Security Archives Alarms User Modbus Registers	Return
Flow Runs Flow Run 1		
Turbines Turbine Input 1 Inputs	Turbine Input 2 Static Pressure Process Temperature	
Analog Input 1 Outputs Digital Outputs	Analog Input 2 Analog Outputs PID Control	
Device Interface User Manuals	COM2 4.3.0.489 <port 1default=""></port>	10/12/2018 11:56 AM

Figure B.2

#### **Before Configuring the Controller**

Before configuring the PID Controller, the user must know the following information.

#### **Controller Action**

The controller action setting (direct or reverse) determines the type of change in the controller output (increase or decrease) that will be used to align the selected process variable with the control setpoint. If the wrong controller action is selected, the controller's response will be opposite the intended action (for example, increasing temperature rather than decreasing it).

Direct action causes the output value to change in the same direction as the change in the process variable. For example, an increase in process variable temperature will result in a corresponding increase in the controller output.

Reverse action causes the output value to change in the opposite direction as the change in the process variable. For example, an increase in process variable temperature will result in a decrease in the controller output.

#### **Controller Output**

The type of controller output (increased or decreased) needed for a particular application depends on

- The valve configuration (air-operated valves are referred to as "fail open" or "fail close")
- The way a change in valve position will affect the process variable (for example, opening a valve in certain installations will increase the process value, whereas opening the valve in other installations will decrease the process variable value.

The following examples demonstrate how a valve configuration can affect the action setting. In both examples, the process is designed so that the process value will decrease when the valve is opened.

#### **Direct Action**

When the controller action is "direct," the control valve will fail in the <u>closed</u> position. An increased controller output opens the valve and decreases the process value. In Figure B.3, the error is initially positive (process value – setpoint > 0). The <u>positive</u> error is counteracted by an <u>increased</u> controller output. Therefore, the controller is <u>direct-acting</u>.



#### **Reverse Action**

When the controller action is "reverse," the control valve will fail in the <u>open</u> position. A decreased controller output opens the valve and decreases the process value. In Figure B.4, the error is initially positive (process value – setpoint > 0). The <u>positive</u> error is counteracted by an <u>decreased</u> controller output. Therefore, the controller is <u>reverse-acting</u>.



#### Independent Flow and Pressure Controls

When configuring the Scanner 2000 or Scanner 210x as a flow controller with pressure override, the user must choose two controller actions settings—one for the flow controller and the other for the secondary pressure controller. The controllers operate independently to control the position of a single control valve. A single application may require increased controller output to control flow and decreased pressure controller output to relieve pressure on the system. Dual-action controller settings allow each action setting to perform the task it is designed to perform. Users must know what action is required by each setting prior to configuring the flow controller with pressure override.

#### **Configuring a Simple PID Controller**

To configure a simple PID controller,

- 1. From the Scanner 2000 or Scanner 210x Configuration Menu, click the *PID Control* button to access the Configure PID Control screen (Figure B.5).
- 2. Click the *Change* button to the right of the "Controller Type" and select *Simple PID Controller* from the Change Controller Type dialog.
- 3. From the Controller Properties section, click in the box next to "Action" and select the type of controller action desired (direct or reverse).
- 4. From the Process Variable section, click *Select* next to the "Parameter" field and choose the process variable you wish to control. The controller execution period is automatically set to match the sampling and/or calculation period of the process variable being controlled.
- Note If the process variable to be controlled is based on an analog input, you must configure the input before configuring the PID Controller. See Section 6 - Configuring Inputs, page 68 for information about configuring an analog input.

Iasks Tgols Help       Iscanner 2000 - (s/n 120427)         DOWNLOAD       Scanner 2000 - (s/n 120427)         Configure PID Control       Image PID Control         Process Variable       Ok< Cancel         Controller Properties       Control Loop         Controller Name       Process Variable         Derivative (xid)       0.5         Derivative (xid)       0.5         Derivative (xid)       0.0         Output Mode       Auto         Process Variable       Output Mode         Derivative (xid)       0.0         Market Innange)       D.0         McHory News       Parameter         Septent (within range)       D2L0         McHory News       Parameters         Mark 126/2001       MCF/day         Septent (within range)       D2L0         McHory News       Parameters         Mark 126/2001       MCF/day         Septent (within range)       D2L0         McHory News       McHory News         McHory News       Septent News <th></th> <th></th> <th></th> <th></th> <th></th>					
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Figure B.5

- 5. Enter the Range Low and Range High values for the process variable being controlled in the fields provided. In Figure B.5, page B-4, the range is 0 to 200 Lit/hour.
- 6. Enter the desired setpoint in the field provided. Note that the setpoint must be within the established low and high range.
- 7. In the Control Loop section of the screen, enter the known tuning values. If no values are known, continue to Step 8.
- Note The Proportional Constant (K_p) is referred to as "Gain" in the ModWorX Pro software interface. Gain is fundamental to the PID controller, because it is used to determine the controller output value. For example, assume a gain value of 1.0 (actual gain values will be much smaller due to normalization of the process variable operating range), a setpoint of 50%, and a process variable reading of 60%. To determine the output value, the controller multiples the error (the process variable reading minus the setpoint, so 10 in this case) by the gain factor (1), the calculated output value would be 10 × 1, or 10 (percent of output change). The direction of the change (increase or decrease) in the output is determined by the action set in Step 3.
- 8. Click Apply to save the settings. The 4 to 20 mA output will automatically be configured for PID control.
- 9. Tune the controller using the instructions in Tuning the Controller, page B-7.

#### **Configuring a Flow Controller with Pressure Override**

To configure the Scanner 2000 or Scanner 210x to provide flow rate control and maintain static pressure below a userdefined setpoint,

- 1. From the Scanner 2000 or Scanner 210x Configuration Menu, click the *PID Control* button to access the Configure PID Control screen (Figure B.5, page B-4).
- 2. Click the *Change* button to the right of the "Controller Type" and select *Flow Controller with Pressure Override* from the Change Controller Type dialog.
- 3. From the Controller Properties section, click in the box next to "Action" and select the type of controller action desired (direct or reverse).
- 4. From the Process Variable section, click *Select* next to the "Parameter" field and choose the process variable you wish to control. The controller execution period is automatically set to match the sampling and/or calculation period of the process variable being controlled.
- Note If the process variable to be controlled is based on an analog input, you must configure the input before configuring the PID Controller. See Section 5 - Setting up a Turbine Input or Pulse Input, page 62 for information about configuring an analog input.
- 5. Enter the Range Low and Range High values (0 to 200 L/hr) for the process variable being controlled in the fields provided.
- 6. Enter the desired setpoint in the field provided. Note that the setpoint must be within the established low and high range.
- 7. In the Control Loop section of the screen, enter the known tuning values. If no values are known, continue to step 8.
- Note The Proportional Constant (K_p) is referred to as "Gain" in the ModWorX Pro software interface. Gain is fundamental to the PID controller, because it is used to determine the controller output value. For example, assume a gain value of 1.0 (actual gain values will be much smaller due to normalization of the process variable operating range), a setpoint of 50%, and a process variable reading of 60%. To determine the output value, the controller multiples the error (the process variable reading minus the setpoint, so 10 in this case) by the gain factor (1), the calculated output value would be 10 × 1, or 10 (percent of output change). The direction of the change (increase or decrease) in the output is determined by the action set in Step 3.
- 8. In the Pressure Variable Override section (see Figure B.6), click in the "Static Pressure Source" field and select the static pressure source.

Note If the static pressure source is the integral MVT, the setting will read "Integrated Static Pressure."

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Pressure Setpoint	1000.0	PSIG						
Pressure Threshold Dead Band	25.0	PSIG						

- 9. To establish the pressure source's range, enter the Range Low and Range High values in the fields provided in the Pressure Variable Override section.
- 10. Enter the pressure override setpoint in the "Pressure Setpoint" field in the Pressure Variable Override section. Should the pressure exceed the setpoint value, the controller will actuate the valve to reduce the pressure.
- 11. Enter the pressure threshold dead band in the field provided in the Pressure Variable Override section. The dead band discourages valve position oscillation when values are within the entered dead band.
- 12. To control how quickly the valve responds to a pressure override, enter the pressure override for known Gain, Integral, and Derivative values in the Override Control Loop section.
- 13. To select the pressure override controller action desired (direct or reverse), select the action in the field provided in the Override Control Loop section.
- 14. Click Apply to save the settings.
- 15. Tune the controller using the instructions in Tuning the Controller, page B-7.

## **Tuning the Controller**

From the Configure PID Control screen, click the *Tune* button to open the Tune PID Control screen (Figure B.7, page B-7).

#### Main Graph

To manually control the PID controller, adjust the PID Control Loop values (which can be optionally plotted on the graph) against the setpoint and valve position, as shown in Figure B.7.



Note If the firmware version is 4.34 or higher, the "Current Output Mode" value will display the live condition, rather than the current configuration setting. Firmware versions 4.33 and lower will only display the current configuration setting.

## Managing the PID Controller

To review current PID settings, change the setpoint, or change the valve position setting, use the Manage PID option.

- From the Scanner 2000 or Scanner 210x Main Display screen, click *Manage PID*. Figure B.8, page B-8 shows a Manage PID Controller screen for a simple controller and Figure B.9, page B-8 shows a screen for a PID controller with pressure override.
- 2. To change the setpoint, enter a value in the text box below the Setpoint indicator or click and drag the Setpoint level indicator, then click *Apply*.
- 3. Click *Auto* to have the valve position set automatically by the device. To manually control valve position, click *Manual*.
- 4. To view the current valve position, click *Refresh*.
- 5. To save the settings to the device and exit the screen, click **OK**.

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Current PID S			40	80.00		40
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Figure B.8

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Figure B.9

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# Appendix C - Configuring Liquid Parameters Using Scanner Firmware 4.10 and Earlier

Scanner 2000 or Scanner 210x and Scanner 2200s with firmware version 4.18 or later can be configured for liquid measurement using the screens shown in Sections 4 and 9 through 12 of this manual. However, if the Scanner in use has older firmware (version 4.10 or earlier), the liquid calculations were developed in accordance with API -2540 standards and the screen selections will be different.

Refer to the screens and instructions in this appendix when using firmware version 4.10 or earlier.

## **Flow Rate Calculation Methods**

The first step in entering flow rate calculation information is to select a flow rate calculation method. Click the *Change* button to view the available selections (Figure C.1).

The Change Flow Run Calculation Method dialog box will appear. The selections available on this screen will vary, depending on the fluid property and flow rate calculation methods selected.

onfigure Flow Run - I	ModWorX Pro	1.0.0						(10.00) (10.00)
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Temperature Source	Integrated RT	D	÷.	Atmospheric Pressure	14.7300	psi		
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or a Temperature Source 6 configured as a Pressure 1 that sampling is enabled fo * Pressure top location is u Orifice Plate Operator: None, Changed Plate Size Reference Temperature Plate Model Number	the Input is installe ransducer or a Tem e Analog Inputs use pstream. Change Plate On: 1.0000 68.0000	id and has been prop perature Transducer d as sources. inches Deg F	perly	and Base Pressure values Selection in Fluid Procertie Value Control Low Pressure Cutoff Flow Run Accu	1.0 mulation	In H2O	ture -	
or a Temperature Source for configured as a Pressure T that sampling is enabled for * Pressure tap location is u Orifice Plate Operator: None, Changed Plate Size Reference Temperature Plate Model Number Plate Model Number	the Input is installe ransducer or a Tem e Analog Inputs use pstream. Change Plate On: 1.0000 68.0000	id and has been prop perature Transducer d as sources. inches Deg F	perly	and Base Pressure values Selection in Fluid Procertie Value Control Low Pressure Cutoff Flow Run Accu	1.0 mulation	In H2O	lure -	
or a Temperature Source for Configured as a Pressure 1 that sampling is enabled for * Pressure tap location is u Orifice Plate Operator: None, Changed Plate Size Reference Temperature Plate Model Number Plate Serial Number Plate Serial Number Plate Serial Number	the Input is installe ransducer or a Tem e Analog Inputs use pstream. Change Plate On: 1.0000 68.0000	id and has been prop perature Transducer d as sources. inches Deg F	perly	and Base Pressure values Selection in Fluid Procertie Value Control Low Pressure Cutoff Flow Run Accu	1.0 mulation	In H2O	ture	
or a Temperature Source if configured as a Pressure T that sampling is enabled fo * Pressure tap location is u	the Input is installed randog Inputs use pstream. Change Plate On: 1.0000 66.0000 Stainless Steel	inches Deg F (304/316)	perly	and Base Pressure values Selection in Fluid Procertie Value Control Low Pressure Cutoff Flow Run Accu	1.0 mulation	In H2O	lure	

Figure C.1

#### Appendix C

If the flow run is configured for liquid measurement, the selections will appear as shown in Figure C.2. Enter the appropriate fluid properties calculation method (generic or API-2540). If API-2540 is selected, specify the type of fluid from the dropdown list provided.

- The API-2540 flow rate calculation method allows the user to select from a list of commonly measured liquids. The user supplies the appropriate base temperature, density and viscosity of the fluid used in his application.
- When the API-2540 fluids do not adequately represent the thermal expansion properties of an application's liquid or when precise thermal expansion coefficients are known, the Generic fluid property calculation method with the Individual Applications fluid property calculation selection is recommended.
- When only the flowing density and viscosity of the fluid are known, the Generic fluid property calculation method with the Manual Flowing Density Calculation selection is recommended. If a base liquid density is also known, the Scanner will correct the liquid volumes from the static flowing conditions to the base conditions.

Select the appropriate flow rate calculation method. Then, click OK to return to the Configure Flow Run screen.

#### **Flow Run Maintenance**

Routine flow run maintenance tasks such as changing liquid parameters are easily performed from the Maintain Flow Run screen.

#### Procedure: Change API Liquid Parameters

If a flowrun is configured for measuring liquid, the liquid parameters can be configured from the Maintain Flow Run screen.

1. If Change API Liquid Parameters is not displayed in the Maintenance Task field at the top of the Maintain Flow Run screen, click on *Change Task*. The Change Flow Run Maintenance Task dialog box will appear (Figure C.2).

1odWorX Pro	
Change Flow Run Mai	intenance Task
Flow Run Selection	
• Flow Run 1	
Maintenance Task	
Change Orifice Plate	)
Change API Liquid Parameters	
	<u>OK</u> <u>C</u> ancel

Figure C.2

- a. Under the Maintenance Task heading, click *Change API Liquid Parameters*. The other selections will vary, depending on the flow rate calculation method selected.
- b. Click OK to save the settings and return to the Maintain Flow Run screen (Figure C.3, page C-3).

laintain Flow Run 1 - Mo Tasks Tools Help	aworx Pro 4.0.0			_	_	
DOMINICOAD		00 - Device Name [s/n 4096 in Flow Run 1	6]	Fie	ite Name eld Name ion Name	6
					Save Changes	Exit Maintenance Mode
aintain Flow Run						
Change Task Selected	Flow Run Flow Run	1				
	ance Task Change	API Liquid Parameters				
New API Liquid F Fluid Properties Calculation	Parameters API-2540 Crude Oil		Current API Liqu Operator: None, Changed On:		neters	
Analysis Ref. No.			Analysis Ref. No.			
Base Temperature Reference	United States (14.73 psi, 60 F) 🔹	Base Temperature Reference				
Density Source	Absolute Density		Density Source	Specific Gravi	ty	
Base Absolute Density		KG/M3	Base Specific Gravity	0.85084		
ńscosity		cP	Viscosity	0.010268	сP	
* Recommended procedure for * Note that the Density param Viscosity parameter is assum Clear New Data	eter is assumed to be at	base temperature and the				
iote			Note			
e Interface User Manuals			USB 4.0.			

Figure C.3

- 2. Note that current liquid parameters appear on the right half of the screen and the new liquid parameters will be entered in the left half of the screen. If you are making a minor change to current parameters, click *Copy from Current*. Current parameters will be pasted into the fields on the left. This will help to minimize the number of fields that have to be changed.
- 3. The fluid properties calculation method selected for the flow run (Example: API-2540 Crude Oil) appears near the top of the New API Liquid Properties section. The calculation method is read-only. To change this method, see Configuring Fluid Properties, page 57.
- 4. In the Analysis Reference No. field, enter a reference number from the liquid analysis report, if desired.
- 5. In the Base Temperature Reference field, select either *United States* (default) or *Canada and UK*. Choose the region that most closely matches the base condition requirements of the region where the Scanner will be used.
- Note The density source, base density, and viscosity parameters can be populated with a set of default parameters, or with values supplied by the user. To use the set of default values, click *Load Default Params* near the bottom of the screen.
- 6. In the Density Source field, select a source to be used for the density value: *Absolute Density*, *Specific Gravity*, or *API Gravity*.
- 7. Enter the Base Density (Absolute, Specific Gravity or API Gravity) value of the liquid. Density is assumed to be at base temperature.
- 8. Enter the viscosity value of the liquid. Viscosity is assumed to be at flowing temperature. If the viscosity is unknown, use the recommended default value for the liquid type selected.
- 9. Enter a note in the Note field, if desired (for example, to identify the liquid parameters for future reference). The note will be stored with the liquid parameter settings.
- 10. Click *Save Changes* in the upper right corner of the screen. The changes will be saved as the Current API Liquid Parameters and will be put into effect when the user exits the Maintain Flow Run screen.
- 11. To perform a new maintenance task without leaving the screen, click on *Change Task* and make a new selection.
- 12. To exit the Maintain Flow Run screen and return to the Main Display screen, click *Exit Maintenance Mode* in the upper right corner of the screen.

#### Procedure: Change Generic Liquid Parameters

If a flowrun is configured for measuring liquid, the liquid parameters can be configured from the Maintain Flow Run screen.

1. If Change Generic Liquid Parameters is not displayed in the Maintenance Task field at the top of the Maintain Flow Run screen, click on *Change Task*. The Change Flow Run Maintenance Task dialog box will appear (Figure C.4).

lodWorX Pro	
Change Flow Run Mainte	enance Task
Flow Run Selection	
• Flow Run 1	
Maintenance Task	
Change Orifice Plate     Change Generic Liquid Parameters	
ſ	<u>O</u> K <u>C</u> ancel

Figure C.4

- a. Under the Maintenance Task heading, click *Change Generic Liquid Parameters*. The other selections will vary, depending on the flow rate calculation method selected.
- b. Click OK to save the settings and return to the Maintain Flow Run screen (Figure C.5, page C-5).
- Note that current liquid parameters appear on the right half of the screen and the new liquid parameters will be entered in the left half of the screen. If you are making a minor change to current parameters, click *Copy from Current*. Current parameters will be pasted into the fields on the left. This will help to minimize the number of fields that have to be changed.
- 3. The fluid properties calculation method selected for the flow run (Example: Generic Liquid) appears near the top of the New Generic Liquid Properties section. The calculation method is read-only. To change this method, see Configuring Fluid Properties, page 57.
- 4. In the Analysis Reference No. field, enter a reference number from the liquid analysis report, if desired.
- 5. In the Base Temperature Reference field, select either *United States* (default) or *Canada and UK*. Choose the region that most closely matches the base condition requirements of the region where the Scanner will be used.

laintain Flow Run 1 - Mo	dWorX Pro_4.0.0				
Iasks Tgols Help DOWINLOAD	Scanner 2000 - Device Name [s/n 4 Maintain Flow Run 1	096]		e Name d Name n Name	S
			S	ave Changes	Exit Maintenance Mod
aintain Flow Run					
Change Task Selected	Flow Run 1				
	nce Task Change Generic Liquid Parameters				
New Generic Liqu Fluid Properties Calculation	uid Parameters Generic Liquid	Current Generic Operator: None, Changed On		ameters	
Analysis Ref. No. Base Temperature Reference	United States (14.73 psi, 60 F) 🔻	Analysis Ref. No. Base Temperature Reference	United States (1	4.73 psi, 60 F)	
Flowing Density Calculation	Manual Entry of Flowing Density 👻	Flowing Density Calculation	Manual Entry of Flowing Density		
Density Source	Absolute Density 👻	Density Source	Specific Gravity		
Base Absolute Density	KG/M3	Base Specific Gravity	0.8508406		
Howing Absolute Density	KG/M3	Flowing Specific Gravity	0.998999		
iliscosity	cP	Viscosity	0.010268	cP	
Density. * If Viscosity is unknown, recor	paired. If it is not known, use the same value as for Flow mmended procedure for this liquid type is to use 1.0 cP. neter is assumed to be at Flowing temperature.	ing			
	Copy From Currence				
Note		Note			
e Interface User Manuals					



- 6. Select the method for calculating flowing density in the Flowing Density Calculation field (Figure C.6, page C-6). Select either *Manual Entry of Flowing Density* or *Individual Applications (Table 6C)*.
  - Manual Entry of Flowing Density: Recommended for applications in which only the flowing density and viscosity are known. If a base density is not known, resultant volumes will be at flowing temperature. If a base density is entered, the Scanner will calculate a mass flow rate and a corrected liquid volume at the base temperature condition.
  - Individual Applications (Table 6C): Recommended for applications in which API-2540 fluids do not adequately represent the thermal expansion properties of the process liquid or when precise thermal expansion coefficients are known. Utilizing Table 6C from API-2540, the Scanner will compute the mass flow rate and the liquid volume at the base temperature condition. When this method is selected, the user is prompted to select a temperature coefficient or "alpha" value rather than a flowing density value (see step 9).

Iasks Tools Help						
DOWNLOAD	1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.	2000 - Device Name [s/n 4 tain Flow Run 1	096]	Fie	te Name 1d Name on Name	6
					Save Changes	Exit Maintenance Mor
aintain Flow Run						
Change Task Selected	Flow Run Flow	Run 1				
	ince Task Char	ige Generic Liquid Parameters				
New Generic Liqu	uid Parame	ters	Current Generic	Liquid Pa	rameters	
luid Properties Calculation	Generic Liquid		Operator: None, Changed On:			
inalysis Ref. No.			Analysis Ref. No.			
ase Temperature Reference	Canada and UK (1	01.325 kPa, 15 C) 💌	Base Temperature Reference	United States	(14.73 psi, 60 F)	
lowing Density Calculation	Manual Entry of P	owing Density	Flowing Density Calculation	Flowing Density Calculation Manual Entry of Flowing Density		
ensity Source	Manual Entry of Fl Individual Applicat	owing Density ions (Table 6C)	Density Source	Specific Gravity	Y	
ase Absolute Density		KG/M3	Base Specific Gravity	0.8508406		
lowing Absolute Density	0.0000	KG/M3	Flowing Specific Gravity	0.998999		
liscosity		cP	Viscosity	0.010268	æ	
Density.	nmended procedure	own, use the same value as for Flow for this liquid type is to use 1.0 cP, be at flowing temperature.	ina			
Clear New Data	Copy From Currer	t Load Default Params				
Note			Note			
e Interface User Manuals						
			USB 4.0.	0.446 <pc< td=""><td>rt 1 Default&gt;</td><td>1/18/2010 12:59 PM</td></pc<>	rt 1 Default>	1/18/2010 12:59 PM

- Note When the Flowing Density Calculation method is set to "Manual Entry," the density source, base density, and viscosity parameters can be populated with a set of default parameters which are the values for water. While the default values are specific to water, they indicate the value range that is applicable for these parameters. To load the default values, click *Load Default Params* near the bottom of the screen.
- 7. In the Density Source field, select a source to be used for the density value: Absolute Density or Specific Gravity.
- 8. Enter the Base Density (Absolute or Specific Gravity) value of the liquid. If the base density of the liquid is unknown, enter the flowing density into both the Base Density and Flowing Density fields.
- 9. Enter the Flowing Density (Absolute or Specific Gravity) value, if applicable. If the Flowing Density Calculation method is set to Individual Applications, this field will be displayed as "Alpha" and the user will enter the appropriate thermal expansion coefficient that has been provided for his specific application, or experimentally determined to be suitable (Figure C.7, page C-7). Thermal expansion coefficients must be derived in accordance with API-2540, Section 11.1.6. Click the *Select Alpha* button to select a predetermined alpha value (Figure C.8, page C-7).
- 10. Enter the viscosity of the liquid. Viscosity is assumed to be at flowing temperature. If the viscosity is unknown, a value of 1.0 cP (viscosity of water) is recommended.
- 11. Enter a note in the Note field, if desired (for example, to identify the liquid parameters for future reference). The note will be stored with the liquid parameter settings.
- 12. Click *Save Changes* in the upper right corner of the screen. The changes will be saved as the Current API Liquid Parameters and will be put into effect when the user exits the Maintain Flow Run screen.
- 13. To perform a new maintenance task without leaving the screen, click on *Change Task* and make a new selection.
- 14. To exit the Maintain Flow Run screen and return to the Main Display screen, click *Exit Maintenance Mode* in the upper right corner of the screen.



Figure C.7

ModWorX Pro	
Select An Iten	
Select an alpha value:	
Ethanol (>99%): 0.000	0630/Deg F
Ethanol (>99%): 0.000 Gasohol (10% ethanol,	630/Deg F 90% gasoline): 0.000714/Deg F
	OK Cancel

Figure C.8

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