

# NUFLO

# ModWorX Pro Software User Manual

for use with Scanner 2000 Series Flow Computers

# **Important Information**

Symbols and Terms Used in this Manual

$\underline{\mathbb{N}}$	WARNII	NG This symbol identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss.
Cautio	n	Indicates actions or procedures which if not performed correctly may lead to personal injury or incorrect function of the instrument or connected equipment.
IMPO	RTANT	Indicates actions or procedures which may affect instrument operation or may lead to an instrument response which is not planned.
Note	Indicat operat	es additional information about specific conditions or circumstances that may affect instrument ion.

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• •	
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# 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/flowcomputers. 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.
- Follow the onscreen prompts, editing the program filepath if desired. By default, program files will be stored at C:\NuFlo\ModWorX Pro 4.2.0\.
- Edit the data logs folder filepath, if desired, at the prompt provided. By default, data logs will be stored at C:\NuFlo Log Data\ModWorX 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 4.2.0>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 4.2.0>ModWorX Pro 4.2.0>ModWorX Pro 4.2.0*. The Welcome screen will appear (Figure 1.1).





2. Click Connect. The Connection Settings screen will appear (Figure 1.2, page 9).

Note If prompted to select a COM Port, see Changing Connection Settings, page 13 for more information.

💏 Welcome - ModWorX Pro 4.0.5			- • •
Elle Iasks Tools Help			
			Return
Connection Settings			
Connection Method			
Select Method			
Express Connect		Automatically connect to a single device without	
Discover Devices Specify Parameters		knowing its slave address or baud rate settings.	
Slave Address: 1			
Baud Rate: 9600 baud 👻			
Timeout (ms): 1000			
Retries 2			
Use default permissions of connected device	port		
User Name		Use these settings to automatically connect next time	
Password			
Save User Name and Password between Ses	sions	Connect Now	
Desice Interface User Manuals			
	_	COM1 4.0.5.455	12/15/2011 11:11 AM

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 10). 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 10).
- Specify Parameters 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
З 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 🔻



 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 9) 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, page 11).

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.

nodWorX Pro 4.0.5 77 Welcome - ModWorX Pro 4.0.5		
<u>File I</u> asks T <u>o</u> ols <u>H</u> elp		
		Return
Connection Settings		
Connection Method		
Select Method		
Express Connect	Automatically connect to a single device without knowing its slave address or baud rate settings.	
Connection Parameters		
Slave Address: 1		
Baud Rate: 9600 baud 👻		
Timeout (ms): 1000		
Retries 2		
Use default permissions of connected device port User Name Password Seve User Name and Password between Sessions	these settings to automatically connect next time	
Device Interface User Manuals	COM1 4.0.5.455 1	2/15/2011 11:28 AM
	COMI 4.0.0.400 I	Choire and

Figure 1.5

- 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 12). 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 41.
- 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 12). 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 4.0.5		
Ele Iasks Tools Help		
		Return
Connection Settings		
Connection Method		
Select Method		
Express Connect	Automatically connect to a single device without knowing its slave address or baud rate settings.	
Connection Parameters		
Slave Address: 1		
Baud Rate: 9600 baud 👻		
Timeout (ms): 1000		
Retries 2		
✓ Use default permissions of connected device port		
User Name	Use these settings to automatically connect next time	
Password		
Save User Name and Password between Sessions	Connect Now	
Device Interface User Manuals		
	COM1 4.0.5.455	12/15/2011 11:28 AM

Figure 1.6



Figure 1.7

#### **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, page 14) in the task bar at the top of the screen.

m Welcome - ModWorX Pro 4.2.0					
<u>F</u> ile <u>T</u> a	sks T <u>o</u> o	ls <u>H</u> elp			
		View Modbus Holding Registers			
		View All Modbus Registers Shift+Ctrl	+R		
		Manage Configuration			
		Clear Flow Totals			
		Clear Memory			
		Copy EEPROM To File			
		Create Archive Partials			
		Change Power Saving Mode			
		Reset User Security			
		Modbus Statistics			
		Select COM Port			
		Options Shift+Ctrl-	+0		



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."

NodWor			
Selec	t COM Port		
Select fro	m available serial port	s:	
COM1 COM3	Serial Port Serial Port		
COM4	NuFlo USB Adapte	í de la compañía de l	

Figure 1.9

To change the connection method, a user can select *Return to Welcome Page* from the *Tasks* menu (Figure 1.10, page 15) in the task bar.

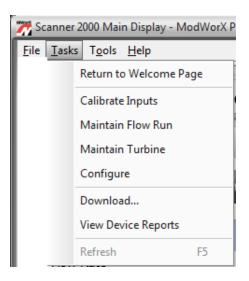


Figure 1.10

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.

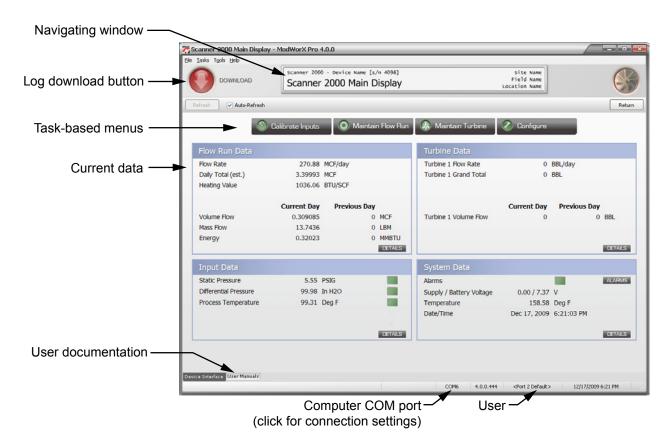


Figure 2.1

If an optional expansion board is installed in a Scanner 2000, 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 18.

If a Scanner 2200 is installed, the navigating window will display "Scanner 2200 Main Display" (Figure 2.3, page 18). 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 2.2



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 20).

- <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

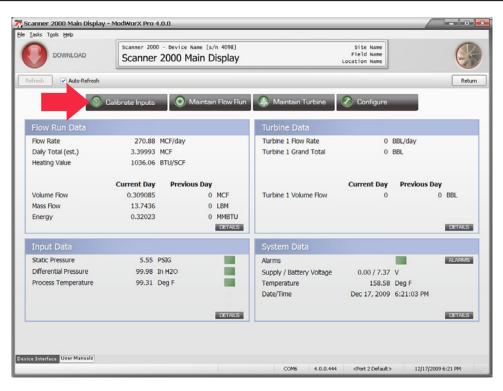


Figure 2.4

## **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, 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).

Easks Tools Help							
DOWNLOAD		0 - Device Name [s 2000 Main E			Site Name Field Name Location Name		0
fresh 🗸 Auto-Refresh							Re
	Calibrate Inputs	O Maintai	n Flow Run	🛞 Maintain Turbine	Configure		
Flow Run Data				Turbine Data			
Flow Rate	270.88	MCF/day		Turbine 1 Flow Rate	0	BBL/day	
Daily Total (est.)	3.39993	MCF		Turbine 1 Grand Total	0	BBL	
Heating Value	1036.06	BTU/SCF					
	Current Day	Previous Day			Current Day	Previous Day	
Volume Flow	0.309085	0	MCF	Turbine 1 Volume Flow	0	0	BBL
Mass Flow	13.7436	0	LBM				
Energy	0.32023	0	MMBTU DETAILS				DETAIL
Input Data				System Data			
Static Pressure	5.55	PSIG		Alarms			ALARM
Differential Pressure	99.98	In H2		Supply / Battery Voltage	0.0 1.37	v	
Process Temperature	99.31	Deg F		Temperature		Deg F	
				Date/Time	Dec 17, 2009	6:21:03 PM	
			DETAILS				DETAIL
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, 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



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 75 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 23). If no alarms are active (or no alarms are configured), a green diagnostic indicator will appear in the System Data grid.

Scanner 2000 Main Display	- ModWorX Pro	4.0.0	_				
e Iasks Tgols Help DOWNLOAD		0 - Device Name [s, 2000 Main D			Site Name Field Name Location Name		(F
Refresh Auto-Refresh							Return
	Calibrate Inputs	O Maintai	n Flow Run	🛞 Maintain Turbine	Configure		
Flow Run Data				Turbine Data			
Flow Rate Daily Total (est.) Heating Value	3.39993	MCF/day MCF BTU/SCF		Turbine 1 Flow Rate Turbine 1 Grand Total		BBL/day BBL	
-	Current Day	Previous Day			Current Day	Previous Day	
Volume Flow Mass Flow Energy	0.309085 13.7436 0.32023	0	MCF LBM MMBTU	Turbine 1 Volume Flow	0	U	BBL
Input Data			DETAILS	System Data			DETAILS
Static Pressure Differential Pressure Process Temperature	5.55 99.98 99.31	In H2O		Alarms Supply / Battery Voltage Temperature Date/Time	0.00 .37 158.58 Dec 17, 2009	Deg F	ALARMS
			DETAILS				DETAILS
ice Interface User Manuals				COM6 4.0.0.44	4 <port 2="" default:<="" td=""><td>&gt; 12/17/2009</td><td>6:21 PM</td></port>	> 12/17/2009	6:21 PM

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 terminal blocks on the main board. The battery voltage is the measured voltage supplied by the lithium battery.

The values will vary, depending on whether the Scanner is powered by lithium battery only, by external power only, or by external power with a lithium battery for backup power.

#### Table 2.1—Supply and Battery Voltage Measurements

	Supply Voltage	Battery Voltage
Lithium Battery Only	0	6.5 to 7.5
External Power Only	(voltage rating for external power supply)	0.5
External Power + Lithium Battery	(voltage rating for external power supply)	6.5 to 7.5

Note If an optional expansion board is installed in a Scanner 2000, 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	OK
<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 26) 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 26 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.

low Run I	Detail						
		Grand Total	Flow Rate (/day)	Current Day	Previous Day	Current Interval	Previous Interval
¥olume	MCF	57.0013	269.944	4.92271	0	4.01404	0.90866
Mass	LBM	2534.58	12003.2	218.89	0	178.486	40.404
Energy	MMBTU	59.0566	279.678	5.10021	0	4.15878	0.94143
Run Time	SEC			1610	0	1319	29
alculated Variab	les			Flow Rate Para	meters (AGA-3)		
Daily Estimated Vo	lume	14.7681	MCF	Plate Size (unco	rected)	1.0000	inches
Monthly Volume		52.0786	MCF	Plate Size (corre	cted)	1.000064	inches
Previous Month Vo	lume	0	MCF	Pipe Size (correc	ted)	2.067089	inches
Static Pressure		0	PSIG	Beta Ratio (corr	ected)	0.483803	
Differential Pressu	re	150	In H2O	Reynolds Numbe	r (Re)	148826.171875	
Process Temperatu	ure	74.902	Deg F	Expansion Facto	r (Y)	0.878763	
luid Properties P	arameters (A	CA-8 Detail)		Discharge Coeff	icient (Cd)	0.605395	
				Stability Index		0.0000	%
Mass Heating Value	e	23300.340399	BTU/LBM	Velocity of Appro	bach Factor (Ev)	1.028573	
Compressibility		0.998063		Average Sqrt (D	P)	12.247449	
Density		0.043218	LBM/CU FT	Web Connection	Davage about (No	wet correction)	
Base Compressibili	ty	0.997858		wetcorrection	Parameters (no	wet correction)	
Base Density		0.044465	LBM/CU FT				
Average Molecular	-	16.798923	LBM/LBM+MOL				
Molar Fraction Sum		1.0000					
Isentropic Exponen	nt	1.3000					
Specific Gravity		0.581027					
Viscosity		0.010268	cP				

Figure 2.9

low Run D	etail						
		Grand Total	Flow Rate (/day)	Current Day	Previous Day	Current Interval	Previous Interval
Volume (CWE)	BBL	0.256085	245.867	2.5149	0	0.0426853	0.170726
Mass	LBM	89.6671	86089.4	880.581	0	14.9461	59.7789
Energy	MMBTU	0.104367	100.202	1.02494	0	0.0173963	0.0695787
Run Time	SEC			898	0	20	60
alculated ¥ariable	5			Flow Rate Para	neters (AGA-3)		
Daily Estimated Volu	me (CWE)	52.8129	BBL	Plate Size (uncor	rected)	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 (corre	ected)	0.484498	
Differential Pressure		111.895	In H2O	Reynolds Numbe	r (Re)	576423.8750	
Process Temperatur	e	546.431	Deg F	Expansion Facto	r (Y)	0.998633	
				Discharge Coeffi	cient (Cd)	0.603818	
uid Properties Pa	rameters (IF	-97)		Stability Index		0.0000	%
Enthalpy Change		1163.934241	BTU/LBM	Velocity of Appre	oach Factor (Ev)	1.028745	
Liquid Heating Value		516.742002	BTU/LBM	Average Sqrt (D	P)	10.578053	
Vapor Flowing Densi	ty	2.27874	LBM/CU FT				
Liquid Flowing Densil	τy.	46.183495	LBM/CU FT	Wet Correction	Parameters (Ori	fice - Chisholm)	
Cold Water Density		62.363613	LBM/CU FT	Steam Quality/D	ryness	100.0	%
Isentropic Exponent		1.249115		Est. Liquid Mass	Flow Rate	0.0000	LBM/day
Specific Gravity		0.0000		Apparent Mass F	low Rate	86089.4	LBM/day
Viscosity		0.018959	cP	Mass Flow Rate	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, page 26) includes current interval and previous interval volumes, calculations used to determine flow rate, and parameters used in those calculations.

urbine D	etall							
		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	OK
	SEC			1591	4911	1591	1311	
urbine 1 (T1) C	alculated V		1 00 BPI				1311	
urbine 1 (T1) Cr Daily Estimated Tr	alculated V	454	1.09 BBL 2.46 BBL	Daily	Estimated Tota		1311	
rti Run Time Irbine 1 (T1) Co Daily Estimated Tr Monthly Total Previous Month T	alculated V	454	1.09 BBL 2.46 BBL 0 BBL	Daily Mori		d	1311	
<b>urbine 1 (T1) C</b> Daily Estimated Tr Monthly Total	alculated V	454	2.46 BBL	Daily Moni Prev	r Estimated Tota	d	1311	

Figure 2.11

Note If an optional expansion board is installed in a Scanner 2000, 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 22.

	Unit	Current Value	Current Day	Previous Day	Current Interval	Previous Interval	Status
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	OK

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 micro-processor. 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.

ystem Information		Expansion Board Information		
Device Type	Scanner 2000	Board Type	Standard EFM Expansion	
Main Board Serial Number	0	Board Serial Number	210439	
Device Serial Number	0	Board Manufacture Date	05-2009	
Product Code	\$00C0	Board Sales Date	05-2009	
Firmware Version	3.86	Expansion Board Options Installed		
Register Table Version	15			
Manufacture Date	01-2000	Interval Archive Expansion	+ 4088 interval records	
Sales Date	01-2000	Analog Input 1	Active	
Slave Address	1	Analog Input 2	Active	
Baud Rate	9600	Digital Input 2	Active	
Connected Device Port	2	Turbine Input 2	Active	
Device Seal engaged	False	Analog Output 1	Not Active	
Power Saving enabled	True			

Figure 2.13

Note If an optional expansion board is installed in a Scanner 2000, 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.

## 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 4.2.0>Documents*.

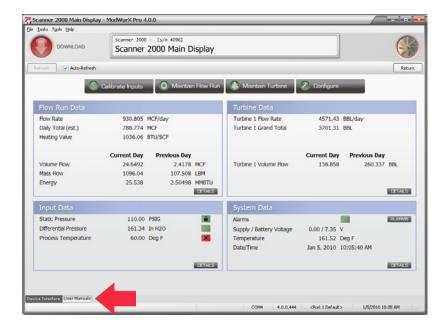


Figure 2.14



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).

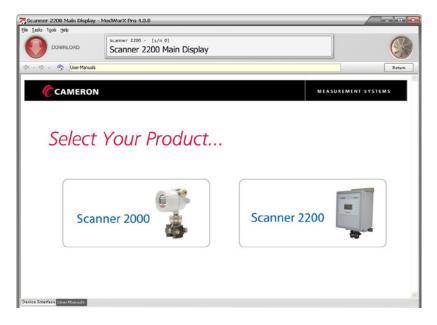


Figure 2.16

- 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 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.

# 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).

Iasks Tools Help							
		0 - Device Name [s 2000 Main D			Site Name Field Name Location Name		E
efresh 🛛 Auto-Refresh							Ret
	Calibrate Inputs	O Maintai	n Flow Run	🛞 Maintain Turbine	2 Configure		
Flow Run Data				Turbine Data			
Flow Rate	270.88	MCF/day		Turbine 1 Flow Rate	0	BBL/day	
Daily Total (est.)	3.39993	MCF		Turbine 1 Grand Total	0	BBL	
Heating Value	1036.06	BTU/SCF					
	Current Day	Previous Day			Current Day	Previous Day	
Volume Flow	0.309085	0	MCF	Turbine 1 Volume Flow	0	0	BBL
Mass Flow	13.7436	0	LBM				
Energy	0.32023	0	MMBTU				DETAILS
Input Data				System Data			
Static Pressure	5.55	PSIG		Alarms			ALARM
Differential Pressure	99.98	In H2O		Supply / Battery Voltage	0.00 / 7.37	v	
Process Temperature	99.31	Deg F		Temperature	158.58	Deg F	
				Date/Time	Dec 17, 2009	6:21:03 PM	
			DETAILS				DETAILS
e 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 32).

7 Scanner 2000 Conf	figuration Menu - ModWorX Pro 4.0.0
Elle Iasks Tools Help	
	ND Scanner 2000 - Device Name [s/n 0] Site Name Scanner 2000 Configuration Menu Field Name Location Name
System	Device Identification         Date/Time         Communications         Security           Display         Archives         Alarms         User Modbus Registers
Flow Runs	Flow Run 1
Turbines	Turbine Input 1
Inputs	Differential Pressure Static Pressure Process Temperature
Outputs	Digital Outputs

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).

m Scanner 2000 Configuration N	lenu - ModWorX Pro 4.0.0	
Ele Iasks Tools Help		
	Scanner 2000 - Device Name [s/n 0]         Site Name           Scanner 2000 Configuration Menu         Field Name           Location Name         Location Name	
System		cunity bus Registers
Flow Runs	ow Run 1	
Turbines Turb	pine Input 1	
Inputs Differe	ntial Pressure Process Temperature	
Outputs Digit	tal Outputs	



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

Configure Device Identification	- ModWorX Pro 4.2.0		
<u>F</u> ile <u>T</u> asks T <u>o</u> ols <u>H</u> elp			
DOWNLOAD		<sup>370428]</sup> ce Identification	
		Refresh Apply	OK Cancel
Device Identification Se	ettings		
Identification Para         Device/Meter Name         Company Name         Site/Well Name         Field/Lease Name         Location Name         Legal Description	ameters	Data Storage Directories         Files are saved in paths configured through the Options screen based upon information entered on this screen defined as:         C:\/WiFlo log data\/ModWorX Pro\         Filed, Name\         Site_Name\         Device_Name_TimeStamp         Data from this device will be saved here:         C:\/WiFlo log data\/ModWorX Pro\Field_Name\Site_Name\Device_Name_T	īmeStamp.*
Device Interface User Manuals		COM1 4.2.0.485 <port 1="" defa<="" th=""><th>ult&gt; 2/14/2017 4:32 PM</th></port>	ult> 2/14/2017 4:32 PM

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 34). The serial number of the Scanner is also displayed in this window.

<u>T</u> asks T <u>o</u> ols <u>H</u> elp			
DOWNLOAD		vice Name [s/n 370428]	Site Name Field Name Location Name
			Refresh Apply OK C
evice Identificatio	on Settings		
Identification	Parameters	Data Storage Direct	tories
Device/Meter Name	Device Name	Files are saved in paths configure	red through the Options screen
Company Name	Company Name	based upon information entered	
Site/Well Name	Site Name	C:\NuFlo log data\ModWo Field_Name\	/orX Pro\
Field/Lease Name	Field Name	Site_Name\ Device_Name_TimeSta	tamp
Location Name	Location Name		
Legal Description	Legal Description	Data from this device will be C: WuFlo log data ModWorX ProVe	e saved here: \Field Name\Site Name\Device Name_TimeStamp.*
ce Interface User Manu	als		
		COM	M1 4.2.0.485 <port 1="" default=""> 2/14/2017 4:28 PM</port>

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).

77 Scanner 2000 Configuration	n Menu - ModWorX Pro 4.0.0	
Ele Iasks Tools Help		
DOWINLOAD	Scanner 2000 - Device Name [s/n 0] Scanner 2000 Configuration Menu	Site Name Field Name pocation Name
	4	Return
System	ce Identification Date/Time nunications Display Archives Alarms	Security User Modbus Registers
Flow Runs	Flow Run 1	
Turbines Tu	rbine Input 1	
Inputs Differ	rential Pressure Process Temperature	
Outputs De	gital Outputs	
Device Interface User Manuals	USB 4.0.0.444	<port 2="" default=""> 12/31/2009 10:53 AM</port>

Figure 3.6

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

n Configure Date and Time	- ModWorX Pro 4.0.0		
Elle Itasks Tools Help			
DOWNLOAD	scanner 2000 - Device Name [s/n 0] Configure Date and Time		
			Refresh Done
Date and Time Setting	s		
Information Device Date Device Time	12/31/2009 Edk 11:13:43 am Edk		
Sync with Computer Time	Click to save the date and time shown above to the device. Click to save the current computer date and time to the device. ne are within 2 seconds of the computer time.		
·			]
Device Interface User Manuals		U58 4.0.0.443 <port 2="" default:<="" td=""><td>&gt; 12/31/2009 11:13 AM</td></port>	> 12/31/2009 11:13 AM



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.

Wor	XPro	С				
lect	date					
ct new	date:					
Sun	Mon	Decer	mber 20 Wed	JU9 Thu	Fri	► Sat
29	30	1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	- 31	1	2
3	4	5	6	7	8	9
Today						
		_			_	
			OK		C	ancel

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 38, for details. If a Scanner 2100 wireless device is installed, you will be prompted to enter the Network ID.

T Scanner 2000 Configuration M	lenu - ModWorX Pro 4.0.0	
Elle Iasks Tools Help		
	Scanner 2000 - Device Name         Site Name           Scanner 2000 Configuration Menu         Field Name           Location Name         Location Name	
		Return
System	o Identification Date/Time Communications ecunity Display Archives Alarms User Modbus Regis	sters
Flow Runs	low Run 1	
Turbines Turbi	bine Input 1	
Inputs Differen	ntial Pressure Static Pressure Process Temperature	
Outputs Digit	tal Outputs	
Device Interface User Manuals		
	USB 4.0.0.444 <port 2="" default=""> 12</port>	/31/2009 10:53 AM

Figure 3.9

Tasks Tools Help	nications - ModWorX			
Dominico		er 2000 - Device Name [s/n 0] figure Communications	Site Name Field Name Location Name	S
			Refresh Apply	OK Cano
ort 1 Settings				
Port Usage	Modbus Slave	Change		
Port Setting	s			
Slave Address	1			
Baud Rate	9600 baud	•		
Bus Delay	10	msec		
Bus Timeout	50			
	50	nsec		
ort 2 Settings	S0 Modbus Slave	Change		
ort 2 Settings Port Usage	Modbus Slave	Change		
ort 2 Settings ort Usage Port Setting		Change		
ort 2 Settings ort Usage Port Setting Slave Address	Modbus Slave	Change		
ort 2 Settings Port Usage	Modbus Slave s (currently co	Change nnected)		

Figure 3.10

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, page 37.

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.

- 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.
- 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 communications device, the device must be wired to the Power Out terminal block (TB1) of the Scanner 2200. If a 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 3.11, page 38).

Iasks Tools Help				-
DOWNLO	DAD Scanner 2200 - Device		Site Name Field Name	84
	Configure Confi	nunications	Location Name	-
			Refresh Apply OK C	Cance
ort 1 Settings				
ort Usage	Modbus Slave	Change		
Port Setting	gs			
Slave Address	1			
Baud Rate	9600 baud 👻			
Bus Delay	10 msec			
Bus Timeout	50 msec			
	au Insec			
ort 2 Settings				
ort 2 Settings	Modbus Slave with Radio Controller	Change		
ort 2 Settings ort Usage		Change Radio Settings		
ort 2 Settings ort Usage Port Setting	Modbus Slave with Radio Controller		On/Off Times •	
ort 2 Settings ort Usage Port Setting Slave Address	Modbus Slave with Radio Controller	Radio Settings	0n/Off Times • 6:00:00 AM Edt	
ort 2 Settings ort Usage Port Setting Slave Address Baud Rate	Modbus Slave with Radio Controller gs (currently connected)	Radio Settings Power Mode		
ort 2 Settings ort Usage Port Setting Slave Address Baud Rate Bus Delay	Modbus Slave with Radio Controller gs (currently connected)	Radio Settings Power Mode Power On Time	6:00:00 AM	
ort 2 Settings Fort Usage Port Setting Slave Address Baud Rate Bus Delay	Modbus Slave with Radio Controller gs (currently connected)	Radio Settings Power Mode Power On Time Power Off Time	6:00:00 AM Edk 6:00:00 PM Edk	
ort 2 Settings Fort Usage Port Setting Slave Address Baud Rate Bus Delay	Modbus Slave with Radio Controller gs (currently connected)	Radio Settings Power Mode Power On Time Power Off Time Enable Sleep Control	6:00:00 AM Edt 6:00:00 PM Edt No	
ort 2 Settings Port Usage	Modbus Slave with Radio Controller gs (currently connected)	Radio Settings Power Mode Power On Time Power Off Time Enable Sleep Control Awshe Time	6:00:00 AM Edt 6:00:00 PM Edt No  Cdt Disabled Edt Disabled Edt	
ort 2 Settings ort Usage Port Setting Slave Address Baud Rate Bus Delay	Modbus Slave with Radio Controller gs (currently connected)	Radio Settings Power Mode Power On Time Power Off Time Enable Sleep Control Awshe Time Sleep Time	6:00:00 AM Edit 6:00:00 PM Edit No Deabled Deabled Colt Deabled Edit Colt	

Figure 3.11

- 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 3.12, page 39. 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 3.12, page 39. 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.

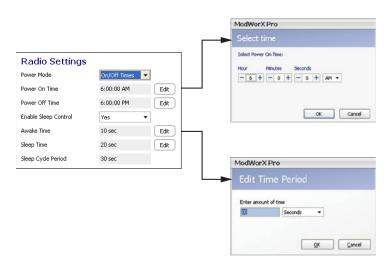


Figure 3.12

# 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:

Click the *Configure* button on the Main Display screen. Then, click the *Security* button on the Configuration Menu screen (Figure 3.13, page 40). The Configure Security screen (Figure 3.14, page 40) will appear.

77 Scanner 2000 Configuratio	n Menu - ModWorX Pi	ro 4.0.0			
Ele Iasks Tools Help					-
DOWINLOAD		Device Name [s/n 0] 100 Configuration Me	nu	Site Name Field Name ocation Name	(
-					Return
System	ice Identification Display	Date/Time Archives	Communications Alarms	Security	
Flow Runs	Flow Run 1				
Turbines	urbine Input 1				
Inputs Diffe	erential Pressure	Static Pressure	Process Temperature		
Outputs	igital Cutputs				
Device Interface User Manuals			USB 4.0.0.444	<port 2="" default=""> 12/31/200</port>	19 10:53 AM

Figure 3.13

Configure Security - I	ModWorX Pro 4.0	0.0			- 0
Iesks Tools Help				225 S	
DOWINLOAD		er 2000 - Device Name [s/n figure Security	0]	Site Name Field Name Location Name	(
				Refresh Apply OK	Cano
ecurity Settings					
Keypad Securi	ty			Access Levels	
Keypad Lock Enable	No	•		Administrator: total access	
Keypad Lock Code	0000	-		Configuration: total access less security configuration	
Strict API Compliance		<ul> <li>Enabling Strict API Compliant</li> </ul>	ce will prohibit access to the Plate Change	Calibration: total access less all config changes	puration
Strict API Compliance	No	menu from the device keypa	d.	Download: download and view report No Access: total lockout	ts only
Custody Trans	for				
Device Seal		When Device Seal is installed	I and enabled, no configuration changes can		
User Login Acc	counts	be made that affect measure Access Level	Modbus User Login Code	Add User	
1 <port 1="" default=""> 2 <port 2="" default=""></port></port>		Administrator Administrator	0	Change User	
2 GPOR 2 Derauk>		Administrator	1	Change Chan	
				Delete User	
				Delete All Users	
				Move Up	
2 of 9 users configured NOTE: Changes made to t		for Port 1 and Port 2 will take effect	t at the next login.	Move Down	
ice Interface User Manua	la				

Figure 3.14

- 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 3.14, page 40). The clearing of flow totals is also prohibited when the device seal is installed and enabled. See the Scanner 2000 User Manual, Part No. 9A-30165023, for instructions on installing the device seal for compliance with Measurement Canada regulations.

The Scanner 2200 has 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.

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	X	X	Х
Configuration	total access less security configuration	Х	Х	X	Х	X	Х
Calibration	total access less all configuration changes		X	X	_	X	Х
Download	download and view reports only	—	—	—	—	X	—
No Access	total lockout	_	—	—	_	—	_

Table 3.1—Security Levels

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.

IMPORTANT To 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 3.15) 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 3.15).





# 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 3.16).

n Scanner 2000 Conf	iguration Menu - Mod	WorX Pro 4.0.0			
Ello Iadio Tgols Help					-
DOWNLOA		2000 - Device Name [s/n 0] er 2000 Configuration	Menu	Site Name Field Name Location Name	
					Return
System	Device Identificat Display	on Date/Time rchives	Communicati Alarms	Security User Modbus R	_
Flow Runs	Flow Run 1	-			
Turbines	Turbine Input 1	-			
Inputs	Differential Press	ure Static Pressure	Process Temper	rature	
Outputs	Digital Outputz				
Device Interface User Ma	wale				
			US8 4.0	.0.444 <port 2="" default=""></port>	12/31/2009 10:53 AM

Figure 3.16

The Configure Display screen will appear (Figure 3.17, page 43).

jesks Tgols Help						
DOWNLOAD	Scanner 2000 - Device Configure Displa				Site Name Field Name Location Name	C
					Refresh Apply	ок Саг
splay Settings						
CD Settings kiplay Togde Period Kiplay Contrast light Display Items	S + sec	yk.				
Display Item	Description	Decimals	Update	Text Displayed		
Display Item 1 Text Message	\$C2000	0	no updating	Description Only	Add Item	
Display Item 1 Text Message 2 Static Pressure (Gauge)	\$C2000 \$P	0	no updating no updating	Description Only Units Only		
Display Item 1 Text Message 2 Static Pressure (Gauge) 3 Differential Pressure	\$C2000 \$P DP	0 2 2	no updating no updating no updating	Description Only Units Only Units Only	Add Rem Change Iten	
Display Rem 1 Text Message 2 Stakic Pressure (Gauge) 3 Differential Pressure 4 Process Temperature	8C2000 SP DP TEMP	0 2 2 2 2	no updating no updating no updating no updating	Description Only Units Only Units Only Units Only		
Display Item 1 Text Message 2 Static Pressure (Gauge) 3 Differential Pressure 4 Process Temperahure 5 How Run 1 How Rate	BC2000 SP DP TEMP PATI	0 2 2 2 1	no updating no updating no updating no updating no updating	Description Only Units Only Units Only Units Only Description Only	Change Iten Delete Item	
Display Item 1 Text Message 2 Static Pressure (Gauge) 3 Differential Tressure 4 Process Temperature 5 How Run 1 How Rate 6 How Run 1 Current Day CWE	SC2000 SP DP TEMP PATI TTOTAL	0 2 2 2 1 1	no updating no updating no updating no updating no updating no updating	Description Only Units Only Units Only Units Only Description Only Description Only	Change Iten	
Display Item 1 Text Message 2 Static Pressure (Gauge) 3 Differential Pressure 4 Process Temperahure 5 How Run 1 How Rate	BC2000 SP DP TEMP PATI	0 2 2 2 1	no updating no updating no updating no updating no updating	Description Only Units Only Units Only Units Only Description Only	Change Iten Delete Item	
Display Rem 1 Text Message 2 Stab Pressure (Gauge) 3 Offerential Pressure 4 Process Temperahare 5 How Run 1 How Rate 6 How Run 1 Current Day CWE 7 How Run 1 Previous Day CWE	SP 5P 5P TEMP PATI TTOTAL YTOTAL	0 2 2 1 1 1	no updating no updating no updating no updating no updating no updating no updating	Description Only Units Only Units Only Units Only Description Only Description Only Description Only	Change Iten Delete Item	
Display Rem 1 Text Message 2 Stab Pressure (Gauge) 3 Offerential Pressure 4 Process Temperahare 5 How Run 1 How Rate 6 How Run 1 Current Day CWE 7 How Run 1 Previous Day CWE	SP 5P 5P TEMP PATI TTOTAL YTOTAL	0 2 2 1 1 1	no updating no updating no updating no updating no updating no updating no updating	Description Only Units Only Units Only Units Only Description Only Description Only Description Only	Change Item Delete Item Delete All Items	
Display Rem 1 Text Message 2 Stab Pressure (Gauge) 3 Offerential Pressure 4 Process Temperahare 5 How Run 1 How Rate 6 How Run 1 Current Day CWE 7 How Run 1 Previous Day CWE	SP 5P 5P TEMP PATI TTOTAL YTOTAL	0 2 2 1 1 1	no updating no updating no updating no updating no updating no updating no updating	Description Only Units Only Units Only Units Only Description Only Description Only Description Only	Change Iten Change Iten Delete Item Delete All Rems Move Up	

#### Figure 3.17

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 3.18). 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 item to display Flow Run 1 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 + no updating Display Text Format Description Only	Description GRAND TOTAL Decimal Places 2 Update Period 0 + no updating Display Text Format Units Only	Description GRAND TOTAL Decimal Places 2 Update Period - 0 + no updating Display Text Format Description and Units
Example CRAND TOTAL * Text longer than 6 characters will scroll in display.	Example TCF * Text longer than 6 characters will scroll in display.	Example GRAND TOTAL - HCF * Text longer than 6 characters will scroll in display.
QKCancel	QKCancel	QKCancel



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 3.19).

Scanner 2000 Configuration N	lenu - ModWorX Pri	4.0.0				
Ele Iasks Tgols Help						
		vice Name [s/n 0] 00 Configuration Me	nu		Site Name Field Name ation Name	<b>\$</b>
						Return
System	e Identification Display	Date/Time Archives	Communic Alarm		Security User Modbus F	
Flow Runs	low Run 1					
Turbines Turb	oine Input 1					
Inputs Differe	ential Pressure	Static Pressure	Process Tem	perature		
Outputs Digit	tal Outputs					
Device Interface User Manuals			USB	4.0.0.444	<fort 2="" default=""></fort>	12/31/2009 10:53 AM

Figure 3.19

The Configure Archive screen will appear (Figure 3.20).

	WorX Pro 4.0.0				•
Iasks Toois Help					
DOWNLOAD	Scanner 2000 - Device Configure Archi		Site Name Field Name Location Name	6	V
			Refresh Apply	) ск с	ance
chive Settings					
Archive Control		Archive Size			
Contract Hour	8:00 AM 👻	Number of Daily Records	768 total (768 days)		
Interval Period	1 hour Edt	Number of Interval Records	2304 total (96 days, 0.0 hrs)		
Enable Partials	No -	Number of Event Records	1152 total		
Data Item  Real Date			Add Parameter	n –	
2 Real Time			Hour and inclusion		
2 Real Time 3 Flow Run 1 CWE			Change Parameter	า้	
			Change Parameter		
3 Flow Run 1 CWE					
<ol> <li>Flow Run 1 CWE</li> <li>Flow Run 1 Mass Total</li> <li>Flow Run 1 Energy Total</li> <li>Differential Pressure</li> </ol>			Change Parameter		
Silver Run 1 CWE     Flow Run 1 CWE     Flow Run 1 Mass Total     Flow Run 1 Energy Total     Offerential Pressure     Static Pressure (Absolut)			Change Parameter Delete Parameter		
3 Flow Run 1 CWE 4 Flow Run 1 Mass Total 5 Flow Run 1 Energy Total 6 Differential Pressure 7 Static Pressure (Absolut 8 Process Temperature			Change Parameter Delete Parameter		
3 Flow Run 1 CWE 4 Flow Run 1 Mass Total 5 Flow Run 1 Energy Total 6 Differential Pressure 7 Static Pressure (Absolut 8 Process Temperature 9 Flow Run 1 Flow Time			Change Parameter Delete Al Parameter		
3 Flow Run 1 CWE 4 Flow Run 1 Mass Total 5 Flow Run 1 Energy Total 6 Differential Pressure 7 Static Pressure (Absolut 8 Process Temperature 9 Flow Run Flow Time 10 Turbine 1 Volume			Change Parameter Delete Parameter		
3 Flow Run 1 CWE 4 Flow Run 1 Mass Total 5 Flow Run 1 Energy Total 6 Differential Pressure 7 Static Pressure (Absolut 8 Process Temperature 9 Flow Run 1 Flow Time			Change Parameter Delete Al Parameter Delete Al Parameters Move Up		
3 Flow Run 1 CWE 4 Flow Run 1 Mass Total 5 Flow Run 1 Energy Total 6 Differential Pressure 7 Static Pressure (Absolut 8 Process Temperature 9 Flow Run Flow Time 10 Turbine 1 Volume			Change Parameter Delete Al Parameter		
3 Flow Run 1 CWE 4 Flow Run 1 Mass Total 5 Flow Run 1 Energy Total 6 Differential Pressure 7 Static Pressure (Absolut 8 Process Temperature 9 Flow Run Flow Time 10 Turbine 1 Volume			Change Parameter Delete Al Parameter Delete Al Parameters Move Up		

#### Figure 3.20

Archive settings control which parameters are logged by the Scanner, and the frequency of those logs. The standard Scanner 2000 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 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 3.21).

			_		
dit Synchroni	zed T	ime F	Periods		
chive Logging	g Peric	bd			
Interval Archive	- 1	+	Hours	▼ 24 periods	per day
ow Run Calcul	lation	Perio	Ŀ		
Flow Run	- 1	+	Minutes	▼ 60 periods	per interval log period
put Paramete	er Sam		Periods Seconds	<ul> <li>60 periods</li> </ul>	_
		+			
Static Pressure	- 1	+	Seconds	▼ 60 periods	per flow run calculation perk



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 3.20, page 46). 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-12.

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 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 3.22, page 48).

ModWorX Pro	X
Archive Para	meter #10
Select value to log	
Flow Run 1 Plate Diamet	er 🔽
The following text will ap in the presentation of do Flow Run 1 Plate Size	bear as the column heading for this data parameter wnloaded data.
	QK <u>Cancel</u>



- 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 3.23, page 49).

TScanner 2000 Configuration	Menu - ModWorX Pro 4.0.0			
Elle Iasks Tools Help				
DownLOAD	Scanner 2000 - Device Name [ Scanner 2000 Config		Site Name Field Name Location Name	<b>S</b>
				Return
System		e/Time Commun chives Alan		egisters
Flow Runs	Tow Run 1			
Turbines Tur	bine Input 1			
Inputs Differ	ential Pressure Static	Pressure Process Ter	mperature	
Outputs Dig	ital Outputs			
Davice Interface User Manuals		USB	4.0.0.443 <port 2="" default=""></port>	12/31/2009 11:59 AM

Figure 3.23

The Configure Alarms screen will appear (Figure 3.24).

asks Tools Help									-
DOWNLOAD	scanner 2000 - Configure			e [s/n 409	M6]			Site Name Field Name Location Name	
							R	tefresh Apply	OK Car
arm Settings									
Alarm Parameters									
Alarm Item		High Alarn	1	Low Alarm D	Deadband	Units	Туре	Change Parameter	
1 Flow Run 1 Grand Total	н	100000	L	500	0	MCF	Non-Latching		
2 Flow Run 1 Flow Rate	HH	1000	LL	50		MCF/day	Non-Latching	Clear Parameter	
3 Static Pressure (Gauge)	н	50	L	5	0	PSIG	Non-Latching	Clear All Parameters	
4 Differential Pressure	н	180	L	-10	0	In H2O	Latching		
5 Process Temperature	н	150	L	Disabled		Deg F	Latching		
7 <unassigned></unassigned>								Move Up	
9 <unassigned></unassigned>					0			Move Down	
11 <unassigned></unassigned>									
12 <unassigned></unassigned>									
13 <unassigned></unassigned>									
14 <unassigned></unassigned>									
15 <unassigned></unassigned>					0				
of 16 items assigned									



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:

- 1. Click in an Alarm Item space in the Alarm Parameters table and click *Change Parameter*. The Alarm Item dialog (Figure 3.25) 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

ModWorX Pro				$\mathbf{X}$
Alarm Item				
Select alarm parameter				
Flow Run 1 Grand Tota	ıl			-
		_		
Alarm Type	High/Low 💌			
High Alarm Setpoint	High/Low High-High/Low-Low	MCF		Disabled 🔻
Low Alarm Setpoint	0.000	MCF		Disabled 🔻
Dead Band	0.000	MCF		
Output Type	Non-latching 🔹	]		
			<u>O</u> K	



- 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 3.26).

77 Scanner 2000 Configuration M	lenu - ModWorX Pro 4.0.0			
Ele Tasks Tools Help				
	scanner 2000 - Device Name [s Scanner 2000 Config			name Name Name
				Return
System			nunications Alarms U:	Security ser Modbus Registers
Flow Runs	w Run 1			
Turbines Turbi	ine Input 1			
Inputs Differen	ntial Pressure Static I	Pressure Proces	s Temperature	
Outputs Digit	al Outputs			
Device Interface User Manuals		USE	4.0.0.444 <port< td=""><td>2 Default&gt; 12/31/2009 10:53 AM</td></port<>	2 Default> 12/31/2009 10:53 AM

Figure 3.26

The Configure User Modbus Registers screen will appear (Figure 3.27, page 52).

Tasks	Tools Help						
0	DOWNLOA		canner 2000 - Device Name [s/n 4096] Site Name Configure User Modbus Registers Location Name				
				Refresh	Apply	ок	Can
ier Me	odbus Reg	isters Settings					
User	Modbus	Registers					
A	idress	Holding Register	Source Modbus Address				
1	9100	Flow Run 1 Grand Total	8026	Char	ge Register		
2	9102	Flow Run 1 Flow Rate	8028				
3	9104	Flow Run 1 Current Day CWE	8030	Cle	ar Register		
4	9106	Flow Run 1 Previous Day CWE	8036	Char	All Registers		
5	9108	Flow Run 1 Grand Energy Total	8058	Cear	All 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		love Up		
9	9116	Static Pressure (Gauge)	8336				
10	9118	Differential Pressure	8380	M	we 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 Ma	Analog Input 2	8512				
		19419					



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.

# 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)
- Section 10—Flow Run Maintenance for Cone Meter Input
- Section 11—Flow Run Maintenance for Averaging Pitot Tube (Annubar) Input, page 161

To set up a flowrun:

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

∐asks Tools <u>H</u> elp							
		0 - Device Name [s, 2000 Main D	Site Name Field Name Location Name		E		
efresh 🗸 Auto-Refresh							Re
8	Calibrate Inputs	O Maintai	n Flow Run	🛞 Maintain Turbine	Configure		
Flow Run Data				Turbine Data			
Flow Rate	270.88	MCF/day		Turbine 1 Flow Rate	0	BBL/day	
Daily Total (est.)	3.39993	MCF		Turbine 1 Grand Total	0	BBL	
Heating Value	1036.06	BTU/SCF					
	Current Day	Previous Day			Current Day	Previous Day	
Volume Flow	0.309085	0	MCF	Turbine 1 Volume Flow	0	0	BBL
Mass Flow	13.7436	0	LBM				
Energy	0.32023	0	MMBTU DETAILS				DETAIL
Input Data				System Data			
Static Pressure	5.55	PSIG		Alarms			ALARM
Differential Pressure	99.98	In H2O		Supply / Battery Voltage	0.00 / 7.37	v	
Process Temperature	99.31	Deg F		Temperature	158.58	Deg F	
				Date/Time	Dec 17, 2009	6:21:03 PM	
			DETAILS				DETAIL

Figure 4.1

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

🎢 Scanner 2000 Configuration 1	n Menu - ModWorX Pro 4.0.0	
Ele Iasks Tools Help		
	scanner 2000 - Device Name [s/n 4096]         Site Name           Scanner 2000 Configuration Menu         Field Name           Location Name         Location Name	
		Return
System	Ce Identification         Date/Time         Communications         Security           Display         Archives         Alarms         User Modbus Re	gisters
Flow Runs	Flow Run 1	
Turbines Tur	arbine Input 1	
Inputs Differe	rential Pressure Process Temperature	
Outputs Dig	gital Outputs	
Device Interface User Manuals	COM4 4.0.0.444 <port default="" i=""></port>	1/5/2010 11:01 AM



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

🎢 Configure Flow Run - ModW	orX Pro 4.1.0			
<u>Eile T</u> asks T <u>o</u> ols <u>H</u> elp				
DOWNLOAD	scanner 2000 - [s/n 0] Configure Flow Run			
			Refresh Apply	OK Cancel
Flow Run Settings				<u>^</u>
Information		Calculation Parar	neters	
Flow Run Name		Calculation Period	1 min Edit	
		Rate Damping Factor	- 0 + No damping	≡.
Volumetric Units				
	ICF Edit	Energy Units		
Rate Unit d	ay	Display Unit	MMBTU Edit	
Mass Units Display Unit LE	BM Edit			
Flow Rate Calculation				
	iid Orifice, AGA-3 (1992)	Change		
Input Assignments	Calibrate Inputs	Base Conditions		
Differential Pressure Source	ntegrated Differential Pressure 🔹	Base Temperature	60.0000 Deg F	
Static Pressure Source N	lot Applicable	Base Pressure	14.7300 psi	
Temperature Source N	lot Applicable	Atmospheric Pressure	14.7300 psi	~
Device Interface User Manuals		USB	4.1.0.468 <port 1="" default=""> 7/</port>	23/2013 9:17 AM

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.

ModWorX Pro	
Edit Display Un	it - Flow Run Volume
Base Unit	MCF
Display Unit	MCF per day -
Display Label Text	MCF
Units Conversion Factor	1.0
Units Conversion Offset	0.0
	QK <u>Cancel</u>

#### 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 56). 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.

rchive Loggin	g Per	riod						
Interval Archive	-	1	+	Hours	Ŧ	24 periods	P	er day
low Run Calcu	Ilatio	n Per	ioc	I				
Flow Run	-	1	+	Minutes	•	60 periods	P	er interval log period
nput Paramet	er Sa	amplir	ng l	Periods				
		1	+	Seconds	•	60 periods	-	1
Static Pressure	_				•	60 periods		
Static Pressure Differential Pressure	-	1	+	Seconds				
	-	1 5	++	Seconds Seconds	•	12 periods		per flow run calculation period
Differential Pressure		-	_		•	12 periods 15 periods	-	per flow run calculation period
Differential Pressure Process Temperature	-	5	+	Seconds	_			per flow run calculation perio



- 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, page 57).

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 - M	odWorX Pro 4.1.	0					
<u>Eile T</u> asks T <u>o</u> ols <u>H</u> elp							
DOWNLOAD		igure Flow Run					
Flow Rate Calculation				Refresh	Apply	ОК	Cancel
	Liquid Orifice, AGA	-3 (1992)	Change				
Wet Correction	No wet correction						
Input Assignme	nts <u>Calibrate</u>	Inputs	Base Conditions				
Differential Pressure Source	Integrated Differ	ential Pressure 🔻	Base Temperature	60.0000	Deg F		
Static Pressure Source	Not Applicable		Base Pressure	14.7300	psi		
Temperature Source	Not Applicable		Atmospheric Pressure	14.7300	psi		
* Analog Input sensors are or a Temperature Source if the configured as a Pressure Trathat sampling is enabled for	he Input is installed a ansducer or a Temper	nd has been properly ature Transducer. Ensure					=
* Pressure tap location is up	stream.		Value Control				
Orifice Plate	<u>Change Plate</u>		Low Pressure Cutoff	1.0	In H2O		
Operator: None, Changed C	in:						
Plate Size	1.0000	inches	Flow Run Accum	nulation			
Reference Temperature	68.0000	Deg F	Accumulation Method	Liquid Phase Only			
Plate Material	Stainless Steel (30	04/316)					
Plate Model Number							
Plate Serial Number							
Pipe							
Pipe Size	2.0670	inches					
Pipe Material	Carbon Steel	•					
Тар Туре	Flange Tapped	•					
Device Interface User Manuals							~
			USB	4.1.0.468	<port 1="" default=""></port>	7/23/2013	9:23 AM:

Figure 4.6

#### **Natural Gas**

If the flowrun is configured for gas measurement, the selections will appear as shown in Figure 4.7, page 58. 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 59. 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

59. 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		<b>X</b>	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
<ul> <li>AGA-8 Detail</li> </ul>	IF-97	🔿 Generic	🔿 AGA-8 Detail	IF-97	O Generic
AGA-8 Gross	<ul> <li>IF-97 with James correlation</li> </ul>	O MPM5 Ch. 11.1 Crude Oil V	AGA-8 Gross	<ul> <li>IF-97 with James correlation</li> </ul>	O MPM5 Ch. 11.1 Crude Oil V
Flow Rate Calcu	ulation Method		Flow Rate Calcu	ation Method	
<ul> <li>Orifice, AGA-3 (1992)</li> </ul>	Orifice, AGA-	3 (2012)	<ul> <li>Onifice, AGA-3 (1992)</li> </ul>	<ul> <li>Orifice, AGA</li> </ul>	3 (2012)
Cone - Spool	Small Bore Or	fice, ASME MFC-14M (2003)	Cone - Spool	🔵 Small Bore O	rifice, ASME MFC-14M (2003)
🔿 Cone - Wafer	Averaging Pit	ot Tube (Annubar®)	🔿 Cone - Wafer	Averaging Pi	tot Tube (Annubar®)
O Turbine, AGA-7 (2006)			<ul> <li>Turbine, AGA-7 (2006)</li> </ul>		
<ul> <li>Orifice, ISO-5167 (2003)</li> </ul>	)		<ul> <li>Onifice, ISO-5167 (2003)</li> </ul>		
Wet Correction	Method		Wet Correction	Method	
<ul> <li>No wet correction</li> </ul>			<ul> <li>No wet correction</li> </ul>		
O Orifice (Chisholm-Steven			Onifice (Chisholm-Steven)		
Orifice (James)			Onfice (James)		
O Cone (Chisholm-Steven)			Cone (Chisholm-Steven)		
Flow Run Accun	nulation Method		Flow Run Accum	ulation Method	
<ul> <li>Gas Phase Only</li> </ul>			<ul> <li>Gas Phase Only</li> </ul>		
Gas Phase and Liquid Pha	ase		Gas Phase and Liquid Phase	ie	
		QK Cancel			QK Cancel

Fluid Property: Natural Gas (AGA-8 Detail)

Fluid Property: Natural Gas (AGA-8 Gross)

Figure 4.7

#### ModWorX Pro

		ods		in 1 Calculation Meth			
Fluid Properties	s Calculation Method		Fluid Properties (	Calculation Method			
Natural Gas	Steam	Liquid	Natural Gas	Steam	Liquid		
🔿 AGA-8 Detail	<ul> <li>IF-97</li> </ul>	O Generic	🔿 AGA-8 Detail	○ IF-97	🔘 Generic		
AGA-8 Gross	<ul> <li>IF-97 with James correlation</li> </ul>	O MPM5 Ch. 11.1 Crude Oil	O AGA-8 Gross	• IF-97 with James correlation	O MPM5 Ch. 11.1 Crude Oil		
Flow Rate Calc	ulation Method		Flow Rate Calcula	ation Method			
<ul> <li>Onifice, AGA-3 (1992)</li> </ul>	<ul> <li>Orifice, AGA-</li> </ul>	3 (2012)	<ul> <li>Orifice, AGA-3 (1992)</li> </ul>	<ul> <li>Orifice, AGA-</li> </ul>	3 (2012)		
🔿 Cone - Spool	🔵 Small Bore Or	ifice, ASME MFC-14M (2003)	O Cone - Spool	Small Bore Orifice, ASME MFC-14M (2003)			
🔵 Cone - Wafer	Averaging Pil	ot Tube (Annubar®)	🔘 Cone - Wafer	<ul> <li>Averaging Pitot Tube (Annubar®)</li> </ul>			
O Turbine, AGA-7 (2006)			O Turbine, AGA-7 (2006)				
<ul> <li>Orifice, ISO-5167 (2003)</li> </ul>	3)		<ul> <li>Onifice, ISO-5167 (2003)</li> </ul>				
Wet Correction	Method		Wet Correction M	lethod			
No wet correction			No wet correction				
Orifice (Chisholm-Stever	n)		Onifice (Chisholm-Steven)				
O Orifice (James)			<ul> <li>Onifice (James)</li> </ul>	Onifice (James)			
Cone (Chisholm-Steven)			Cone (Chisholm-Steven)				
Flow Run Accu	mulation Method		Flow Run Accumu	lation Method			
Vapor Phase Only			Vapor Phase Only				
Vapor Phase and Liquid	Phase		<ul> <li>Vapor Phase and Liquid Pha</li> </ul>	se			

Fluid Property: Steam (IF-97)

Fluid Property: Steam (IF-97 + James)

Figure 4.8

ModWorX Pro			ModWorX Pro					
Change Flow F	Run 1 Calculation Meth	ods	Change Fl	ow Run 1 Calculation N	lethods			
Fluid Properties	Calculation Method		Fluid Prope	erties Calculation Method				
Natural Gas	Steam	Liquid	Natural Gas	Steam	Liquid			
🔿 AGA-8 Detail	IF-97	Generic	🔿 AGA-8 Detail	○ IF-97	<ul> <li>Generic</li> </ul>			
AGA-8 Gross	<ul> <li>IF-97 with James correlation</li> </ul>	O MPM5 Ch. 11.1 Crude Oil	AGA-8 Gross	<ul> <li>IF-97 with James correl</li> </ul>	ation   MPMS Ch. 11.1 Crude Oil  Crude Oil			
Flow Rate Calcu	lation Method		Flow Rate	Calculation Method	Refined Products Lube Oils			
<ul> <li>Liquid Orifice, AGA-3 (19</li> </ul>	92) 🔷 Liquid Orifice,	AGA-3 (2012)	Liquid Orifice, A	GA-3 (1992) 🔷 Liquid	Orifice, AGA-3 (2012) Special Products			
O Cone - Spool	Small Bore Or	ifice, ASME MFC-14M (2003)	Cone - Spool	🔾 Small	Bore Onifice, ASME MFC-14M (2003)			
🔵 Cone - Wafer	Averaging Pit	ot Tube (Annubar®)	🔿 Cone - Wafer	Avera	ging Pitot Tube (Annubar®)			
🔿 Liquid Turbine			<ul> <li>Liquid Turbine</li> </ul>					
<ul> <li>Liquid Orifice, ISO-5167</li> </ul>	(2003)		C Liquid Orifice, IS	50-5167 (2003)				
Wet Correction	Method		Wet Corre	ction Method				
<ul> <li>No wet correction</li> </ul>			<ul> <li>No wet correction</li> </ul>	on				
O Orifice (Chisholm-Steven			O Orifice (Chisholn	Orifice (Chisholm-Steven)				
Onfice (James)			O Orifice (James)	O Orifice (James)				
Cone (Chisholm-Steven)			O Cone (Chisholm	Cone (Chisholm-Steven)				
Flow Run Accun	nulation Method		Flow Run A	Accumulation Method				
<ul> <li>Liquid Phase Only</li> </ul>			Liquid Phase On	ly				
O N/A			O N/A					

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, page 61) 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 89 for details.
- 1. Under Input Assignments, select the type of sensor(s) used.
  - <u>Differential Pressure Source</u>—If using the MVT, select *Integrated Diffential 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 - M	AodWorX Pro 4.1	0			
DOWNLOAD		r 2000 - [s/n 0] figure Flow Run			S
				Refresh Apply	OK Cano
ow Rate Calculatio	Orifice, AGA-3 (20	112)			
Vet Correction	No wet correction	1	Change		
Input Assignme	te Integrated Diffe	rential Pressure 💌	Base Condition	60.0000 Deg F	
Static Pressure Source Temperature Source	Integrated Stati	Pressure •	Base Pressure Atmospheric Pressure	14.7300 psi 14.7300 psi	
* Analog Input sensors are or a Temperature Source if configured as a Pressure Ti that sampling is enabled for * Pressure tap location is u	the Input is installed i ransducer or a Tempe r Analog Inputs used a	ature Transducer, Ensure	Value Control		
Orifice Plate Operator: None, Changed	Change Plate		Low Pressure Cutoff	1.0 In H20	
Plate Size	1.0000	inches	Flow Run Accu	mulation	
Reference Temperature	68.0000	Deg F	Accumulation Method	Gas Phase Only	
Plate Material	Stainless Steel (3				
Plate Model Number Plate Serial Number	( To Be Configure	ed )			
Pipe					
Pipe Size	2.0670	inches			
Pipe Material	Carbon Steel	-			
Тар Туре	Flange Tapped	-			
vice Interface User Manua	ls		U	58 4.1.0.468 <port 1="" default=""></port>	7/23/2013 9:43 AM

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 161—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 161 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 66.
- 8. Proceed to the Fluid Properties section of the screen. See Configuring Fluid Properties, page 64.

#### 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.

Under Uncorrected Volume Source, select the turbine source (Turbine 1), as shown in Figure 4.11, page 62. If an optional expansion board is installed in a Scanner 2000, 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 - ModWe	orX Pro 4.1.0							- 0 **
Eile <u>T</u> asks T <u>o</u> ols <u>H</u> elp								
DOWNLOAD	scanner 2000 - [s/n 0] Configure Flow Run							
				Refresh	Apply		ок	Cancel
Flow Rate Calculation								~
	nne, AGA-7 (2006) Net correction	Change						
Uncorrected Volum	ne Source	Base Conditi	ons					_
Turbine Source T	urbine 1 👻	Base Temperature	60.000	0	Deg F			
		Base Pressure	14.730	0	psi			
Turbine 1 Informa	tion <u>Configure Turbine</u>	Atmospheric Pressure	14.730	10	psi			
Meter Model Number								Ξ
Meter Serial Number								
		Flow Run Ac	cumulatio	on				
Input Assignments		Accumulation Method	Gas Ph	ase Only				
	ntegrated Static Pressure 🔹							
* Analog Input sensors are only a or a Temperature Source if the In	valiable for selection as a Pressure Source put is installed and has been properly cer or a Temperature Transducer. Ensure g Inputs used as sources.							
Device Interface User Manuals			USB 4	.1.0.468	<port 1="" default:<="" td=""><td>&gt; 7</td><td>/23/2013 9:4</td><td>18 AM</td></port>	> 7	/23/2013 9:4	18 AM



 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 63). 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 89, 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.

💏 Configure Flow Run - ModWorX F	Pro 4.1.0				
Eile Tasks Tools Help					
DOWNLOAD	scanner 2000 - [s/n 0] Configure Flow Run				
			Refresh Apply	ок	Cancel
Flow Rate Calculation					<u>~</u>
Calculation Method Liquid Tu Wet Correction No wet co		Change			
Uncorrected Volume S Turbine Source Turbine Turbine 1 Information Meter Name Meter Model Number NuFlo 2	Configure Turbine	Base Conditions Base Temperature Base Pressure Atmospheric Pressure	60.0000         Deg F           0.0000         psi           14.7300         psi		=
Pressure Source Integra Temperature Source Analog	ted RTD Input 1 Installed and has been properly a Temperature Transducer. Ensure	Flow Run Accum	ulation Liquid Phase Only		
Device Interface User Manuals		USB	4.1.0.468 <port 1="" defau<="" th=""><th>lt&gt; 7/23/2013</th><th>11:02 AM</th></port>	lt> 7/23/2013	11:02 AM

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 64). 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.

normal configure Flow Run - Moo	lWorX Pro 4.0.0					
Ele Tasks Tools Help						
DOWNLOAD	DOWNLOAD Scanner 2000 - Device Name [s/n Configure Flow Run				te Name Id Name on Name	
				Refresh	Apply	OK Cancel
Fluid Properties						
Calculation Method AC	5A-8 Detail		Change			
Calculation Paran	neters					
Calculation Interval	<b>◀</b> 1 ►	1 min				
Gas Composition Operator: None, Changed On:	Change Compo	sition				
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 pro 1.3 and viscosity of 0.010268 c	ocedure is to use an is P.	entropic exponent of				
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						
			US	B 4.0.0.444 <po< td=""><td>rt 1 Default&gt; 1/</td><td>5/2010 11:49 AM</td></po<>	rt 1 Default> 1/	5/2010 11:49 AM

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 65). 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 66). 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 66). 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 -	ModWorX Pro 4.0	.0					
e <u>T</u> asks T <u>o</u> ols <u>H</u> elp					_		
		scanner 2000 - Device Name [s/n 4096] Configure Flow Run		Site Name Field Name Location Name			
				Refresh Apply		ОК	Cancel
Fluid Properties							
Calculation Method	AGA-8 Gross		Change				
Calculation Pa Calculation Interval		▶ 1 min					
Gross Method Operator: None, Change		Change Parame	eters				
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	сP					
Isentropic Exponent*	1.3000						
* Natural gas recommend 1.3 and viscosity of 0.010	led procedure is to use a 0268 cP.	n isentropic exponent (	of				
Gas Constituent	Mole %						
Carbon Dioxide (CO2)	0.59	56					
Nitrogen (N2)	0.25	95					
Note							

Figure 4.14

n - Me Run - Me	odWorX Pro 4.0	0						
Elle Iasks Tools Help								
DOWNLOAD		2000 - Device Name [s/ igure Flow Run	n 4096]			Site Name Field Name ation Name		
					Refresh	Apply	ОК	Cancel
Fluid Properties	tr-97		Change					
Calculation Para Calculation Interval		• 1 min						
Steam Propertie Operator: None, Changed Or		erties						
Analysis Ref. No.								
Enthalpy	Calculated							
Specific Gravity	Calculated							
Viscosity	Calculated	cP						_
Isentropic Exponent	Calculated							
Steam Quality/Dryness	100.0	percent						
Note								1
								*
Device Interface User Manuals				U58	4.0.0.444	<port 1="" default=""></port>	1/5/2010	11:52 AM

Figure 4.15

🎢 Configure Flow Run - Me	odWorX Pro 4.1.0						×
Eile Tasks Tools Help							
		2000 - [s/n 152621] gure Flow Run					
				Refresh	Apply	ОК	Cancel
Pipe Size	2.0670	inches					^
Pipe Material	Carbon Steel	-					
Тар Туре	Flange Tapped	•					
Fluid Properties							
Finite Properties							
Calculation Method	MPMS Crude Oil		Change				
Calculation Para	ameters						
Calculation Interval	↓ 1 ▶	1 min					
MPMS Liquid Pa		Change Parameters					
Operator: None, Changed O	n:						
Analysis Ref. No.							
Specific Gravity	0.85084						
Viscosity	0.010268	cP					
* A typical viscosity of this li the actual flowing viscosity	quid is about 6.0 cp. Ho should be determined.	wever, for accurate results					
* Note that the Density or S Viscosity parameter is at fl	pecific Gravity paramet owing temperature.	er is at base temperature and i	he				-
Note							1
Device Interface User Manuals							

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).

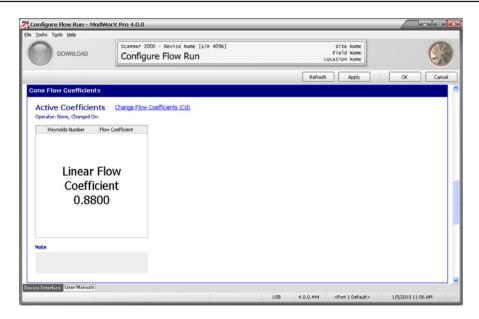


Figure 4.17

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 supports a single turbine input for measuring gas or uncompensated liquid. When an optional expansion board is installed in a Scanner 2000, 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 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 Mod-WorX 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).

Iasks Tools Help							
		0 - Device Name 2000 Main			Site Name Field Name Location Name		0
Refresh 🔽 Auto-Refresh							Re
	Calibrate Inputs	O Main	tain Flow Run	🛞 Maintain Turbine	🕐 Configure		
Flow Run Data				Turbine Data			
Flow Rate	270.88	MCF/day		Turbine 1 Flow Rate	0	BBL/day	
Daily Total (est.)	3.39993	MCF		Turbine 1 Grand Total	0	BBL	
Heating Value	1036.06	BTU/SCF					
	Current Day	Previous D	ay		Current Day	Previous Day	,
Volume Flow	0.309085		0 MCF	Turbine 1 Volume Flow	0		BBL
Mass Flow	13.7436		0 LBM				
Energy	0.32023		0 MMBTU				
			DETAILS				DETAILS
Input Data				System Data			
Static Pressure	5.55	PSIG		Alarms			ALARM
Differential Pressure	99.98	In H2O		Supply / Battery Voltage	0.00 / 7.37	v	
Process Temperature	99.31	Deg F		Temperature	158.58	Deg F	
				Date/Time	Dec 17, 2009	6:21:03 PM	
			DETAILS				DETAILS
			0417465				DETA

Figure 5.1

 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, 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 2000 Configuration	n Menu - ModWorX Pro 4.0.0	
Ele Iasks Tools Help		
	Scanner 2000 - Device Name [s/n 4096]         Site Name           Scanner 2000 Configuration Menu         Field Name           Location Name         Location Name	
		Return
System	ice Identification Date/Time Communications Secu Display Archives Alarms User Modbur	
Flow Runs	Flow Run 1	
Turbines	urbine Input 1	
Inputs Diffe	erential Pressure Process Temperature	
Outputs	ligital Outputs	
Device Interface User Manuals		
Of West Interneter Oser Manuals	US8 4.0.0.445 <port 1="" default=""></port>	1/7/2010 4:46 PM

Figure 5.2

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

77 Configure Turbine Input 1 - ModWorX Pro	a 4.0.0		
Elle Iasks Tools Help			
	2000 - Device Name [s/n 4096] gure Turbine Input 1	Site Na Field Na Location Na	Inc
		Refresh Ap	ply OK Cancel
Turbine Input Settings			î
Information Change meter. Meter Name NulFio 2º Liquid Meter Serial Number Unifio 2º Liquid Meter Serial Number Units Display Unit BBL Rote Unit day	Edit Override Value	S sec         Edit           0         +         No dam           Low (20mV)             5.0         Hz            17.1429         BBL/dsg            0.0         8BL/dsg	,
Meter K-Factors Active K-Factors Operator: None, Calibrated On: Calibration Working Units pulses/GAL Prequency Factor Device Intereface User Manuals	<b>275</b>		
Device Interate User manuals	US8	4.0.0.445 <port 1="" d<="" td=""><td>efault&gt; 1/7/2010 4:48 PM</td></port>	efault> 1/7/2010 4:48 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 if a Scanner 2200 is installed.
- 1. Enter turbine input settings (Figure 5.3, page 70).
  - 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.

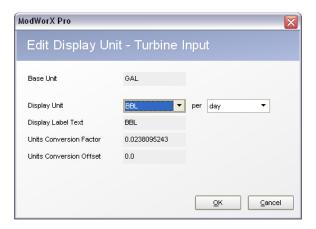


Figure 5.4

- 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 72).
  - 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.

Interval Archive - 1 + Hours 24 periods per day  Flow Run Calculation Period  Flow Run - 1 + Minutes 60 periods per interval log period  Input Parameter Sampling Periods  Static Pressure - 1 + Seconds • 60 periods  Differential Pressure - 1 + Seconds • 60 periods  Process Temperature - 5 + Seconds • 12 periods  Turbine Input 1 - 4 + Seconds • 15 periods	Archive Logging	g Per	riod					
Flow Run       -       1       Minutes       60 periods       per interval log period         Input Parameter Sampling Periods         Static Pressure       -       1       +       Seconds       60 periods         Differential Pressure       -       1       +       Seconds       60 periods         Process Temperature       -       5       +       Seconds       12 periods       per flow run calculation periods	Interval Archive	-	1	+	Hours	*	24 periods	per day
Input Parameter Sampling Periods Static Pressure - 1 + Seconds • 60 periods Differential Pressure - 1 + Seconds • 60 periods Process Temperature - 5 + Seconds • 12 periods Process Temperature - 5 + Seconds • 12 periods	low Run Calcu	Ilatio	n Pe	rioc	1			
Static Pressure     1     +     Seconds     60 periods       Differential Pressure     1     +     Seconds     60 periods       Process Temperature     5     +     Seconds     12 periods	Flow Run	-	1	+	Minutes	•	60 periods	per interval log period
Static Pressure     1     +     Seconds     60 periods       Differential Pressure     1     +     Seconds     60 periods       Process Temperature     -     5     +     Seconds     12 periods								
Process Temperature - 5 + Seconds 12 periods per flow run calculation per								
Process Temperature - 5 + Seconds • 12 periods		er Sa		+			60 periods	1
Turbine Input 1 - 4 + Seconds - 15 periods	Static Pressure	er Sa	1	+	Seconds	•		per flow run calculation peri
	Static Pressure Differential Pressure	er Sa	1	+	Seconds Seconds	•	60 periods	per flow run calculation peri
	Static Pressure Differential Pressure Process Temperature	er Sa - -	1 1 5	+ + +	Seconds Seconds Seconds	• •	60 periods 12 periods	per flow run calculation peri



- 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 WITH EXPANSION BOARD. A single pulse input is available when an expansion board is installed on a Scanner 2000. 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).

Tasks Tools Help							
DOWNLOAD		nner 2000 - Device Nat Infigure Turbine			Site Name Field Name Location Name		C
				Refres	h Apply	OK	Can
irbine Input Settin	ngs Change meter		Input Settings				
Meter Name			Sampling Period	5 sec	Edk		
Meter Model Number			Rate Damping Factor	- 0	+ No damping		
Meter Serial Number			Enable Pulse Input	No	-		
			Input Threshold	No Yes			
Units			Low Input Frequency Cutoff	5.0	Hz		
Display Unit	BBL	Edit	Low Flow Rate Cutoff	17.1429	BBL/day		
Rate Unit	day		Enable Override	No	•		
			Override Value	0.0	BBL/day		
eter K-Factors							
Active K-Facto	rs <u>Change k</u>	-Factors					
Operator: None, Calibrate	d On:						
Calibration Working Units	pulses/GAL						
Frequency	Factor						
ce Interface User Manua							



- 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. *This page is left blank intentionally*.

# Section 6—Configuring Inputs

The standard Scanner 2000 supports inputs for differential pressure, static pressure, and process temperature. If an optional expansion board is installed in a Scanner 2000, 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 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).

Scanner 2000 Main Display	- ModWorX Pro	4.0.0					
Iasks Tools Help							
		10 - Device Name [s r 2000 Main [			Site Name Field Name Location Name		(F
Refresh Auto-Refresh							Return
	Calibrate Inputs	O Maintai	n Flow Run	🛞 Maintain Turbine	Configure		
Flow Run Data				Turbine Data			
Flow Rate	270.88	MCF/day		Turbine 1 Flow Rate	0	BBL/day	
Daily Total (est.)	3.39993	MCF		Turbine 1 Grand Total	0	BBL	
Heating Value	1036.06	BTU/SCF					
	Current Day	Previous Day	<i></i>		Current Day	Previous Da	Y
Volume Flow	0.309085	0	MCF	Turbine 1 Volume Flow	0		BBL
Mass Flow	13.7436	0	LBM				
Energy	0.32023	0	MMBTU DETAILS				DETAILS
Input Data				System Data			
Static Pressure	5.55	PSIG		Alarms			ALARMS
Differential Pressure	99.98	In H2O		Supply / Battery Voltage	0.00 / 7.37	v	
Process Temperature	99.31	Deg F		Temperature	158.58	Deg F	
				Date/Time	Dec 17, 2009	6:21:03 PM	
			DETAILS				DETAILS
vice Interface User Manuals				COM6 4.0.0.444	<port 2="" default:<="" td=""><td>12/17/200</td><td></td></port>	12/17/200	

Figure 6.1

2. Then, click the appropriate input in the Inputs section of the Configuration Menu screen (Figure 6.2, page 76).

💏 Scanner 2000 Configuration !	a Menu - ModWorX Pro 4.0.0	
Elle Iasks Tools Help		
	Scanner 2000 - Device Name [s/n 4096]         Site Name           Scanner 2000 Configuration Menu         Field Name           Location Name         Location Name	
		Return
System	ce Identification Date/Time Communications Security Display Archives Alarms User Modbus Registers	
Flow Runs	Flow Run 1	
Turbines Tur	arbine Input 1	
Inputs	rential Pressure Process Temperature	
Outputs Dig	igital Outputs	
Device Interface User Manuals	U58 4.0.0.445 <port 1="" default=""> 1/7/2010 &lt;</port>	4:46 PM

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).

🎢 Configure Differential Press	ure - ModWorX Pro 4.0.0					*
Elle Iasks Tools Help						
DOWNLOAD	scanner 2000 - Device Name [s/r Configure Differential		Lo	Site Name Field Name ocation Name		
Differential Pressure Sett	No an		Refresh	Apply	ок	Cancel
Information Sensor Name		Input Settings Sampling Period Damping Factor	1 sec	Edit No damping		
Sensor Serial Number MB Sensor Range Low 0.0		Failure Value Low Pressure Cutoff	60.0 0.1	In H2O In H2O		
Sensor Range High 20	0.0 In H2O	Enable Override Override Value	No • 150.0	In H2O		
Display Unit In	H2O Edk					
Sensor Calibration Saved Calibration Operator: None, Calibrated On:	<u>Calbrate</u>	Saved Verificatio				
	in H2O	Verification Working Units	In H2O			
	asured	Applied	Measured			
Device Interface User Manuals		USB	4.0.0.445	<port 1="" default=""></port>	1/7/2010 4:54	4 PM 3

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.

	it - Differential Pressu	
Base Unit	In H2O	
Display Unit	In H2O	
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:
    - i. Click *Edit.* The Edit Synchronized Time Periods dialog will appear, and an arrow will point to Differential Pressure (Figure 6.5, page 78).

odWorX Pro								X
Edit Synchron	izec	l Tin	ne P	eriods				
Archive Loggin	g Pe	eriod						
Interval Archive	-	1	+	Hours	-	24 periods	P	er day
Flow Run Calcu	latio	on Pe	erioo	ł				
Flow Run	_	1	+	Minutes	•	60 periods	р	er interval log period
Input Paramet	er S	ampl	ling	Periods				
Static Pressure	-	1	+	Seconds	•	60 periods	-	1
≽ Differential Pressure	-[]	1	+	Seconds	•	60 periods		per flow run calculation period
Process Temperature	-	5	+	Seconds	•	12 periods		per now run calculation period
Turbine Input 1	-	4	+	Seconds	•	15 periods	-	]
								OK Cancel



- 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.

<u>T</u> asks T <u>o</u> ols <u>H</u> elp					
DOWNLOAD		fice Name [s/n 370428] Ferential Pressure		Site Name Field Name Location Name	(Second
				Save Changes	Exit Maintenance Mode
Change Task Calibration		sure			
New Calibration Calibration Working Units	In H20  Change (% of PS)	Acquire Point Recalibrate Point Clear Point Clear All Points Load Calibration From,	Current Calibration Operator: None, Calibrated On: Applied/As Left Factory Calibratic	As Found Opt As Found Colu	bending on the tions settings and the calibration, the umns may read plied/Measured" or Left/As Found".
Note			Note		
ice Interface User Manuals					

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 Pres	sure - ModWorX I	Pro 4.0.0				
∐asks Tools Help						
		r 2000 - Device Na figure Static I		L	Site Name Field Name ocation Name	S
				Refresh	Apply	OK Cancel
tatic Pressure Sett	ings					
Information			Input Settings			
Sensor Name			Sampling Period	1 sec	Edit	
Sensor Model Number			Damping Factor	- 0 +	No damping	
Sensor Serial Number	MB25C1716B		Failure Value	0.0	PSIG	
Sensor Range Low	0.0	PSIG	Low Pressure Cutoff	0.5	PSIG	
Sensor Range High	1500.0	PSIG	Enable Override	No 👻		
			Override Value	110.0	PSIG	
Units						
Display Unit	PSIG	Edit				
ensor Calibration						
Saved Calibrat Operator: None, Calibrate			Saved Verificat Operator: None, Calbrate			
Calibration Working Units	PSIG		Verification Working Units	PSIG		
Zero Offset	0.000					
Applied	Measured		Applied	Measured		
ice Interface User Manua	le l					

Figure 6.7

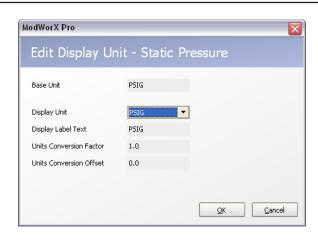
## Procedure: Configuring Static Pressure

## 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 81). 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.





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	a Pei	riod				
Interval Archive	_	1	+	Hours	▼ 24 periods	per day
Flow Run Calcu	ulatio	n Pe	erioc	ł		
Flow Run		1	+	Minutes	▼ 60 periods	per interval log period
	or St					
input Paramet	er Sa				✓ 60 periods	
input Paramet	er Sa	ampl	ing	Periods	<ul> <li>60 periods</li> <li>60 periods</li> </ul>	1
input Paramet	er Sa	ampl	ing  +	Periods Seconds		per flow run calculation perio



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.

Iasks Tools Help				
	evice Name [s/n 370428] atic Pressure	Fi	ite Name eld Name ion Name	S
			Save Changes	Exit Maintenance Mo
Change Task Calibration Task Calibration	e			
New Calibration Calibration Working Units PSEG Applied/As Left As Found Change (% of FS)	Acquire Point     Recalibrate Point     dear Point	Current Calibration Operator: None, Calibrated On: Appled(As Left As For Factory	Ind Colu "Ap	bending on the tions setting and th calibration, the umns may read plied/Measured" of Left/As Found."
	Clear All Points	Calibration		
Note		Note		
ce Interface User Manuals				

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 calibraion, 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).

n Configure Process Ter	nperature - Moo	WorX Pro 4.0.0					
Eile ∐asks Tools Help							
		er 2000 - Device Nar figure Process	<sup>me [s/n 4096]</sup> s Temperature	L	Site Name Field Name ocation Name		
				Refresh	Apply	ОК	Cancel
Process Temperatur	re Settings						
Information			Input Settings				
Sensor Name			Sampling Period	5 sec	Edit		
Sensor Model Number			Damping Factor	- 0 +	No damping		
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			
			Enable Override	No 🔻	]		
Units			Override Value	0.0	Deg F		
Display Unit	Deg F	Edit					
· · · · · · · · · · · · · · · · · · ·							
Sensor Calibration							
Saved Calibrati			Saved Verification Operator: None, Calibrated C				
Calibration Working Units	Deg F		Verification Working Units	Deg F			
Zero Offset	0.000						
Applied	Measured		Applied	Measured			
Device Interface User Manua	ls						
			USE	4.0.0.445	<port 1="" default=""></port>	1/7/201	0 5:23 PM

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 84). 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.

ModWorX Pro		
Edit Display Ur	nit - Process Temperature	
Base Unit	Deg F	
Display Unit Display Label Text Units Conversion Factor Units Conversion Offset	Deg F Deg F Deg C K Deg R «custom»	
	QK Can	cel

Figure 6.12

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).

Interval Archive		iod	+	Hours	-	24 periods	p	er dav
Flow Run Calcu	Ilatio	n Pe	erio	ł				
Flow Run	-	1	+	Minutes	•	60 periods	р	er interval log period
Static Pressure	-	1	+	Seconds	•	60 periods	-	1
Differential Pressure	-	1	+	Seconds	•	60 periods		
	-	5	+	Seconds	•	12 periods		per flow run calculation perio
Process Temperature			+	Seconds	•	15 periods	-	]
Process Temperature Turbine Input 1	-	4		Jeconda				

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.
- 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 83). 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 (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 Temperature	e - ModWorX Pro 4.0.0				
Eile Iasks Tools Help					
DOWNLOAD	Scanner 2000 - Device Name [s/n 40 Configure Process Temp		Lo	Site Name Field Name ocation Name	
			Refresh	Apply	OK Cancel
Process Temperature Setting	gs				
Information Sensor Name Sensor Model Number Sensor Serial Number Sensor Serial Number Sensor Range High 800.0 Units Display Link Deg F	Deg F Deg F Edk	Input Settings Samping Period Damping Factor Falure Value Low Temperature Cutoff Input Source Enable Override Override Value	5 sec 0 + 60.0 -150.0 Flow Run 1 Calculate Yes 0.0	Edk No damping Deg F Deg F d Temperature • Deg F	
Operator: None, Calbrated On: Calbration Working Units Deg F Zero Offset 0.000 Applied Measure		Saved Verificatio Operator: None, Calibrated C Verification Working Units			
Device Interface User Manuals		US8	4.0.0.445	<port 1="" default=""></port>	1/7/2010 5:35 PM

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 - N Eile Iasks Tgols Help	ModWorX Pro 4.2.0				
DOWNLOAD		ice Name [s/n 370428] Cess Temperature		Site Name Field Name ation Name	<b>(</b>
				Save Changes	Exit Maintenance Mode
Colibrate Inputs  Change Task Change Task Calibration T  New Calibration Calibration Calibration Working Units  Appled/As Left As Found	Task Calibration	Acquire Point Recalibrate Point Clear Point Clear Al Points Load Calibration From	Current Calibration Operator: None, Calibrated On: Appled/Asteft Ast Factory Calibration	Found 1	Depending on the Options setting and the last calibration, the columns may read "Applied/Measured" or "As Left/As Found."
Note			Note		
Device Interface User Manuals					

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 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 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 88). The Configure Analog Input screen will appear (Figure 6.17, page 89).

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.

Scanner 2000 Configuration	n Menu - ModWorX Pro 4.0.0		
Ele Iasks Tools Help			
	Scanner 2000 - Device Name [s/n 4096] Scanner 2000 Configuration Me	Site Name Field Name Location Name	<b>S</b>
			Return
System	ce Identification Date/Time Display Archives		curity bus Registers
Flow Runs	Flow Run 1		
Turbines Turbines	urbine Input 1 Turbine Input 2		
Inputs	rential Pressure Static Pressure nalog Input 1 Analog Input 2	Process Temperature	
Outputs	igital Outputs Analog Outputs		
Davice Interface User Manuals		US8 4.0.0.445 <port 1="" default=""></port>	9 1/7/2010 12:03 PM

Figure 6.16

7	Configure Analog Inpu	ıt 1 - ModWorX	Pro 4.0.0							. • · ·
E	ile <u>T</u> asks T <u>o</u> ols <u>H</u> elp									
l			ner 2000 - Device nfigure Anal			Lo	Site Name Field Name ocation Name			
						Refresh	Apply		ж	Cancel
l	Analog Input Setting	]s								<u> </u>
	Transducer Signal Type Transducer Type	1 to 5 Volt Differential Pres	sure Transducer	Change	)					
l	Information				Sensor Paramet	ers				
L	Sensor Name				Transducer Range Low (1V)	0.0	In H2O			
L	Sensor Model Number				Transducer Range High (5V)	0.0	In H2O			
l	Sensor Serial Number									
L	Units				Input Settings					
L	Display Unit	In H2O	Edit		Sampling Period	1 sec	Edit			
L					Damping Factor	- 0 +	No damping			
L					Failure Value	0.0	In H2O			
L					Low Pressure Cutoff	0.0	In H2O			
L					Enable Override	No 🔻				
L					Override Value	0.0	In H2O			
	Sensor Calibration									
L	Saved Calibrati	on <u>Calbrate</u>			Saved Verification	on <u>Verify</u>				
	Operator: None, Calibrated	l On: 01/07/2010			Operator: None, Calibrated O	n:				
	Calibration Working Units	In H2O			Verification Working Units	In H2O				~
	evice Interface User Manual	\$				1				
L					US8	4.0.0.445	<port 1="" default=""></port>	1/7/2	010 12:08	PM 🦼

Figure 6.17

#### Procedure: Configuring an Analog Input

- 1. 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 93 for further instruction on recalibrating.

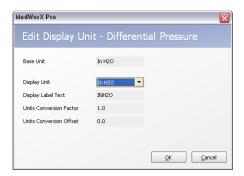


Figure 6.18

- 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).





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).

nput 1 - Mo	dWorX Pro 4.0.0			_	
<u>File Tasks Tools H</u> elp					
DOWNLOAD	scanner 2000 - Device Name [s/n 44 Configure Analog Input		Site Field Location		
-			Refresh	Apply OK	Cancel
Analog Input Settings					
Transducer Signal Type     1 to 5 Vo       Transducer Type     Custom	Sensor Type	)			
Information Sensor Name Sensor Model Number Sensor Serial Number Sensor Parameters Display Label Text V Transducer Range Liow (1V) 1.0 Transducer Range High (5V) 5.0	Edit V	Input Settings Samping Period Damping Pector Pailure Value Low Reading Cutoff Enable Override Override Value	Disabled Edit 1.0 V 1.0 V No V 1.0 V	)	2
Sensor Calibration Saved Calibration Operator: None, Calibrated On: 01/07, Calibration Working Units NCC- Zero Offset 0.00 Appled Measure	H 10	Saved Verificatio Operator: None, Calbrated Or Verification Working Units Applied			
Device Interface User Manuals		US8	4.0.0.445 <port< td=""><td>1 Default&gt; 1/7/201</td><td>0 12:21 PM</td></port<>	1 Default> 1/7/201	0 12:21 PM



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

Display Unit	<custom></custom>	-	
Display Label Text	V		
Transducer Range Low	1.0	v	
Transducer Range High	5.0	v	

Figure 6.21

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).

💏 Configure Analog Input :	1 - ModWorX Pro 4.0.0				
<u>E</u> lle <u>T</u> asks T <u>o</u> ols <u>H</u> elp					
DOWNLOAD	scanner 2000 - Device Name [s/ Configure Analog Inp		Lo	Site Name Field Name cation Name	
			Refresh	Apply	OK Cancel
Analog Input Settings	;				
	4 to 20 mA Chang	e			
Information		Sensor Paramet	ers		
Sensor Name		Trans. Range Low (4mA)	0.0	In H2O	
Sensor Model Number		Trans. Range High (20mA)	0.0	In H2O	
Sensor Serial Number		Shunt Resistance	250.00	Ohms	
Units		Input Settings			
Display Unit	In H20 Edit	Sampling Period	Disabled	Edit	
		Damping Factor	- 0 +	No damping	
		Failure Value	0.0	In H2O	
		Low Pressure Cutoff	0.0	In H2O	
		Enable Override	No 👻		
		Override Value	0.0	In H2O	
Device Interface User Manuals					×
Device Interface Of ar Mandala		US8	4.0.0.445	<port 1="" default=""></port>	1/7/2010 1:13 PM

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 91).
- 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 93).
    - 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.

Edit Synchron	ized Ti	me F	Periods		
Archive Loggin	g Perio	d			
Interval Archive	- 1	+	Hours	✓ 24 periods	per day
-low Run Calcu	Ilation I	Perio	d		
Flow Run	- 1	+	Minutes	✓ 60 periods	per interval log period
	or Com	nling	Doriodo		
Input Paramet Static Pressure Differential Pressure	er Sam	pling + +	Periods Seconds	<ul> <li>60 periods</li> <li>60 periods</li> </ul>	1
	- 1	+	Seconds	← 60 periods	1
Static Pressure Differential Pressure	- 1	+ + +	Seconds Seconds	<ul><li>60 periods</li><li>60 periods</li></ul>	per flow run calculation period
Static Pressure Differential Pressure Process Temperature		+ + + +	Seconds Seconds Seconds	<ul> <li>60 periods</li> <li>60 periods</li> <li>12 periods</li> </ul>	per flow run calculation period
Static Pressure Differential Pressure Process Temperature Analog Input 1		+ + + + + + + + + +	Seconds Seconds Seconds Seconds	<ul> <li>60 periods</li> <li>60 periods</li> <li>12 periods</li> <li>12 periods</li> </ul>	per flow run calculation period
Static Pressure Differential Pressure Process Temperature Analog Input 1 Analog Input 2	- 1 - 1 - 5 - 5	+ + + + + +	Seconds Seconds Seconds Seconds Seconds	<ul> <li>60 periods</li> <li>60 periods</li> <li>12 periods</li> <li>12 periods</li> <li>12 periods</li> <li>12 periods</li> </ul>	per flow run calculation period
Static Pressure Differential Pressure Process Temperature Analog Input 1 Analog Input 2 Turbine Input 1	- 1 - 1 - 5 - 5 - 5	+ + + + + + + + + + + +	Seconds Seconds Seconds Seconds Seconds Seconds	60 periods     60 periods     60 periods     12 periods     12 periods     12 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 cali bration. 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 94). To calibrate the sensor, click on the blue *Calibrate* hyperlink in the Sensor Calibration section and follow the screen prompts.

🔭 Calibrate Analog Input 1 - ModWorX Pro 4.2.0			_	
<u>F</u> ile <u>T</u> asks T <u>o</u> ols <u>H</u> elp				
DOWNLOAD Calibrate Ana	ice Name [s/n 370428] alog Input 1	Site N Field N Location N	ame	
		Save Ch	anges	Exit Maintenance Mode
Change Task Input Parameter Analog Input 1 Change Task Calibration Task Calibration				
New Calibration Calbration Working Units Appled/As Left As Found Change (% of PS)	Acquire Point Recalibrate Point Clear Point Clear Al Points Load Calibration From	Current Calibration Operator: None, Calibrated On: Appled/As Left As Found Factory Calibration	Op las col "Ap	pending on the tions setting and the t calibration, the umns may read splied/Measured" or s Left/As Found."
Note		Note		_
Device Interface User Manuals		COM1 4.2.0.485 <port 1="" der<="" td=""><td>fault&gt;</td><td>2/17/2017 8:02 AM</td></port>	fault>	2/17/2017 8:02 AM

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.

# Section 7—Configuring Outputs

The standard Scanner 2000 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

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

Note If an optional expansion board is installed, the Scanner 2000 also supports an analog output. The Scanner 2200 supports an analog output as standard. For instructions on configuring an analog output, see Analog Output, page 105.

# **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 2000 Main Display	- ModWorX Pro	4.0.0					
Ele Iasks Tools Help							
		10 - Device Name [s. r 2000 Main D			Site Name Field Name Location Name		
Refresh 🗸 Auto-Refresh							Return
	Calibrate Inputs	O Maintai	n Flow Run	🛞 Maintain Turbine	Configure		
Flow Run Data				Turbine Data			
Flow Rate	270.88	MCF/day		Turbine 1 Flow Rate	0	BBL/day	
Daily Total (est.)	3.39993	MCF		Turbine 1 Grand Total	0	BBL	
Heating Value	1036.06	BTU/SCF					
	Current Day	Previous Day			Current Day	Previous Da	iy 🛛
Volume Flow	0.309085	0	MCF	Turbine 1 Volume Flow	0		0 BBL
Mass Flow	13.7436	0	LBM				
Energy	0.32023	0	MMBTU DETAILS				DETAILS
Input Data				System Data			
Static Pressure	5.55	PSIG		Alarms			ALARMS
Differential Pressure	99.98	In H2O		Supply / Battery Voltage	0.00 / 7.37	v	
Process Temperature	99.31	Deg F		Temperature	158.58	Deg F	
				Date/Time	Dec 17, 2009	6:21:03 PM	
			2				
			DETAILS				DETAILS
Device Interface User Manuals							
Device Inchine Oser Manuals				COM6 4.0.0.444	<port 2="" default=""></port>	12/17/20	09 6:21 PM
			1	1		Teluteo	

Figure 7.1

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

	Ienu - MadWorX Pro 4.0.0
Scanner 2000 Configuration M Ele Iasks Tools Help	lenu - Moaworx Pro 4.0.0
DOMNLOAD	Scanner 2000 - Device Name [s/n 4096]         Site Name           Scanner 2000 Configuration Menu         Field Name           Location Name         Image: Configuration Network
Device	Return
System	Display Archives Alarms User Modbus Registers
Flow Runs	aw Run 1
Turbines Turb	vine Input 1
Inputs Differen	ntial Pressure Process Temperature
Outputs Digit	ial Outputs
Device Interface User Manuals	US8 4.0.0.445 <port 1="" default=""> 1/7/2010 4:46 PM #</port>



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

🎢 Configure Digital Outputs - Mo	odWorX Pro 4.0.0					×.
Ele Iasks Tools Help						
DOWNLOAD	scanner 2000 - Device Name [s/n 4096. Configure Digital Outputs	]	Fie	ite Name Id Name ion Name		
			Refresh	Apply	OK Cancel	ב
Digital Output 1 Settings						
Output Mode Disable	d Change					
Digital Output is Disa The output is inactive.	bled					
Device Interface, User Manuals						
State Internet Ster Manuals		U58	4.0.0.445 <p< td=""><td>ort 1 Default&gt;</td><td>1/7/2010 5:40 PM</td><td>.d</td></p<>	ort 1 Default>	1/7/2010 5:40 PM	.d



To enable a digital output, click *Change*. The Change Digital Output Mode dialog (Figure 7.4, page 97) will appear, displaying all of the possible configuration options.

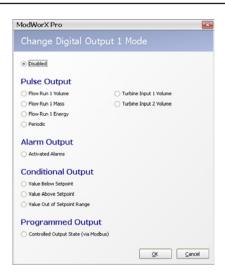


Figure 7.4

## 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 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 98).

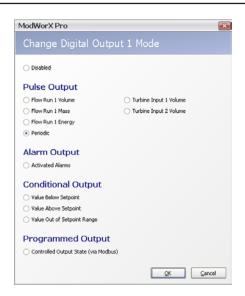
🎢 Configure Digital Outputs	s - ModWorX Pro	4.0.0		
Ele Iasks Tools Help				
DOWINLOAD		Scanner 2000 - Device Name [s/n 4096] Configure Digital Outputs		ite Name eld Name ion Name
			Refresh	Apply OK Cancel
Digital Output 1 Settin	gs			<u>^</u>
Output Mode Fl	low Run 1 Volume		Change	
Output Settings The output pulses once for eac Output Scaling Pulse Duration Output State	ch integer increment of 0.0 10      Normally Closed	f the Flow Run 1 volu MCF per pulse msec	ne divided by the Output Scaling factor.	
Other Parameter	rs			
Minimum Pulse Period	20	msec		
Maximum Output Frequency	50.0	Hz		
Maximum Uncached Flow Rate	0.0	MCF/DAY	(Pulses are cached above this flow rate)	
				v
Device Interface User Manuals			U58 4.0.0.445 <	Port 1 Default> 1/7/2010 5:43 PM :



- 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).



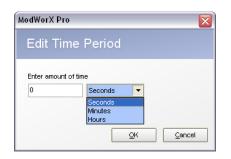


2. Click **OK** to save the setting and return to the Configure Digital Outputs screen (Figure 7.8, page 99).

Configure Digital Outputs - M	odWorX Pro 4.0.0	
DownLoad		e Name j Name
	Refresh	Apply OK Cancel
Digital Output 1 Settings		
Output Mode Periodi	C Change	
Output Settings Pulses are output with programmed P Output Period 0 see Pulse Duration • Output State Norm	• <b></b> •	
Device Interface User Manuals	US8 4.0.0.445 <port< td=""><td>: 1 Default&gt; 1/7/2010 5:45 PM</td></port<>	: 1 Default> 1/7/2010 5:45 PM



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.



#### Figure 7.9

- 4. 4. Click OK to save the setting and return to the Configure Digital Outputs screen.
- 5. 5. Adjust the pulse duration using the -/+ buttons (default is 10 msec).
- 6. 6. Change the output state, if necessary. Options are Normally Open and Normally Closed.
- 7. 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 102.

1. From the Change Digital Output screen, select *Activated Alarms* (Figure 7.10, page 100).



Figure 7.10

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

anfigure Digital O Iasks Tools Help	utputs - ModWorX Pro 4.0.0			
Taska i doie Gelb				-
DOWNLOA		vice Name [s/n 4096]	Site Name Field Name	A.
Domicor	Configure D	igital Outputs	Location Name	E
			Refresh Apply	OK Cance
gital Output 1 S	ettings			
great output x o	occury o			
utput Mode	Activated Alarms	Change		
Output Setti	oas			
	any of the trigger conditions below are en from the Configure Alarms screen.	abled and the corresponding alarm conditions	exist.	
		(11)		
Parameter	Either High or Low Alarm	Select		
Trigger Conditions	Flow Run Alarms	10 bish suchladites suchiad		
		H/L) - high enabled/low enabled		
	2. Turbine 1 Flow Rate (H)			
	3. Analog Input 1 (HH/LL)	<ul> <li>high enabled/low enabled</li> </ul>		
	4 Unassigned -			
	5 Unassigned -			
	6 Unassigned -			
	7 Unassigned -			
	9 Unassigned -			
	10 Unassigned -			
	11 Unassigned -			
	12 Unassigned -			
	13 Unassigned -			
	14 Unassigned -			
	-			
	16 Unassigned -			
Alarm Trigger Hold-Off	10 sec Edit			
	Normally Closed 💌			
Output State				
Output State Output Latching	Non-latching 👻			
	Non-latching -			

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, page 101).
  - 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 Out	put Parameter	
Select register to assign		
Either High or Low Alarm		•
Either High or Low Alarm		
Low Alarm Status		
High Alarm Status Diagnostic 1		
Diagnostic 2		
Diagnostic 3		
Diagnostic 4		
	QK Cance	ł
		_

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.

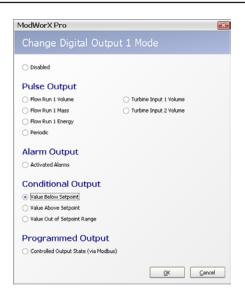
- 4. To enable the trigger conditions that will generate a digital output, check the appropriate selections in the Trigger Conditions field.
  - If one of the top three selections was chosen in step 3, only parameters that are configured as alarms will appear in the Trigger Conditions field (Figure 7.11, page 101). To add a parameter, configure a new alarm in the Configure Alarms menu. See Archive Parameter Setup, page 47, 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). Up to 16 diagnostic bits can be selected as triggers for each diagnostic parameter.
- 5. Click *Apply* to save the new settings.

DOWNLOAD Scamer 2000 - (s/n 4963) Configure Digital Outputs	Iasks Tools Help	utputs - ModWorX Pro 4.0.5			
Oligital Output 1 Settings         Output Node       Activated Alarma         Change         Output Settings         The output a sche if any of the trigger conditions below are enabled and the corresponding alarm conditions exist.         Alarma are configured from the Configure Alarma science.         Parameter         Vegoritic Bits         Output 1 Settings         Troger Conditions         Output 1 Settings         Output 1 Settings         Output 1 Settings         Output 1 Settings         Browned -         Troger Conditions         Output 1 Settings         Generation         Output 2 Pail         Sake Rescue Fall         Output 1 Settings         Analog Input Pail         Output 2 Pail         Sake Rescue Fall         Output 2 Override         Sake Rescue Override         Other 2 Override         Sake Rescue Override         Output 2 Verride         Analog Input Override	0				P
Dutput Mude:     Attivated Alarms     Orange       Output Settings       Trade Set active Fave of the trade conductors below are enabled and the corresponding alarm conditions exit.       Parameter     Vagnotic 1       Trade Conductor from the Confuse Alarms scenee.       Parameter     Vagnotic 1       Trade Conductor from the Confuse Alarms scenee.       Parameter     Vagnotic 1       Trade Conductor     Setext       Trade Conductor     Flow Run 1 Fall       In Unbie 1 Fall     Setext Pall       In Other 1 Fall     Setext Pall				Refresh Apply OK	Cano
Output Settings         The obst is active if any of the trigger conditions below are enabled and the corresponding alarm conditions exist.         Remains are conditionable for alarms science.         Parameter       Vagnotic 1         Parameter       Vagnotic 1         Bomstan 1 Fal       Select         Bomstan 1 Fal       Bomstan 1 Fal	igital Output 1 §	Settings			
Troger Conditions       Select         Select Persone Fal       Select Persone Fal         Select Persone Select Persone Fal       Select Persone Select Persone Fal         Select Persone	Output Mode	Activated Alarms	Change		
Trigger Conditions       Diagnosite Bits         Information       Nom Run 1 Fall         Information       Turbine 1 Fall         Information       Turbine 2 Fall         Information       Off. Pressure Override         Information       Ov	The output is active if	any of the trigger conditions below are e	nabled and the corresponding alarm condition	s exist.	
Alum Trigger Hold-Off  Alum Trigger Hold-Off	Parameter	Xagnostic 1	Select		
Output State Normally Closed	Trgger Conditions	Plow Run 1 Pal     Inserved -     Turbine 2 Pal     Turbine 2 Pal     Static Pressure Fal     Off - Inserved -     Analog Input Fal     Process Temperature Fal     Process Temperature Fal     Row Run 1 Override     Turbine 2 Override     Turbine 2 Override     Diff. Pressure Override     Process Temperature Override			
Output Latching *					
	Output Latching	Non-latching ~			

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





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.

n Configure Digital Outp Ele Iasks Tools Help	outs - ModWorX Pro 4.0.0				
	Scanner 2000 - Devi Configure Dig			Site Name Field Name Location Name	
				Refresh Apply	OK Cancel
Digital Output 1 Set	tings				
Output Mode	Value Below Setpoint	Change			
Output Setting The output is active while to Parameter	IS the Parameter value is less than the Low Flow Run 1 Flow Rate				
Low Setpoint	0.0 MCF/day	Select			
Alarm Trigger Hold-Off	0 sec Edit				
Output State Output Latching	Normally Closed 👻 Non-latching 👻				
Device Interface User Manua	le l				
Over reality over mailes			US8	4.0.0.445 <port 1="" default=""></port>	1/7/2010 5:48 PM

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.

1odWorX Pro			E.
Select Digital	Output	Paramete	
Select register to assign			
Flow Run 1 Flow Rate			•
Source Modbus Address	8028		
		ОК	Cancel

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.

odWorX P	ro 🛛 🔀
Edit Ti	me Period
Enter amou	nt of time
0	Seconds -
	Seconds Minutes
	Hours



- 7. Change the output state, if necessary (Figure 7.15, page 103). Options are Normally Open and Normally Closed.
- 8. Change the Output Latching setting, if necessary (Figure 7.15, page 103). 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).

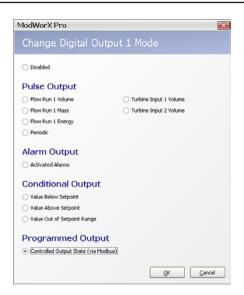


Figure 7.18

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

🎢 Configure Digital Outputs - M	odWorX Pro 4.0.0		
Ele Iasks Tools Help			
DOWNLOAD	Scanner 2000 - Device Name [s/n 4096] Configure Digital Outputs	Site Name Field Name Location Name	
		Refresh Apply	OK Cancel
Digital Output 1 Settings			
Output Mode Control	led Output State Change		
	ut. 1 Pulses holding register value is non-zero. ally Open 👻		
Device Interface User Manuals			
Concentrative Over Halitans		US8 4.0.0.445 <port 1="" default=""></port>	1/7/2010 5:56 PM

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. 5lick *Apply* to save the new settings.

# **Analog Output**

An analog output is standard on all Scanner 2200 devices, and optionally available for a Scanner 2000 when an expansion board is installed. 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 by an external power supply. 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).

				Site Name Field Name Location Name		C
						Rel
Calibrate Inputs	O Maintai	n Flow Run	🛞 Maintain Turbine	Configure		
			Turbine Data			
934.868	MCF/day		Turbine 1 Flow Rate	4571.43	BBL/day	
893.617	MCF		Turbine 1 Grand Total	13934.9	BBL	
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	
10.6383	11.9291	MCF	Turbine 1 Volume Flow	41.0155	4571.54	BBL
473.036	633005	LBM	Turbine 2 Volume Flow	0	0	BBL
11.0219	0	MMBTU				
		DETAILS				DETAILS
			System Data			
6.22	PSIG		Alarms			ALARM
164.62	In H2O		Supply / Battery Voltage	0.00 / 7.33	v	
28.98	Deg F		Temperature	164.47	Deg F	
374.75	PSIG		Date/Time	Jan 7, 2010	4:01:38 PM	
56.24	Deg F		Analog Output	Disabled		
		DETAILS				DETAILS
	Scanner Coltrate Inputs 934.868 893.617 1036.06 Current Day 10.6333 473.03 11.0219 6.22 164.62 18.98	Scanner 2000 Main I           Calbrate Inputs         Q         Martan           934.868         MCF/Gay         893.617         MCF           1036.06         BTU/SCF         Eurrent Day         Previous Day           10.6383         11.9291         11.9291           473.036         633005         633005	934.868 MCF/Gay 933.617 MCF 1036.06 BTU/SCF Current Day Previous Day 10.6383 11.9291 MCF 473.036 633005 LBM 11.0219 0 MMBTU 0 MMBTU 0 EXECTS 6.22 PSIS 164.62 In H2D 28.98 Deg F	Scanner 2000 Main Display         Colorate Input:       Mantan Flow Fau       Mantan Turbine         934.858       MCF/Gay       B33.617       Martan Flow Fau       Martan Turbine         934.858       MCF/Gay       B33.617       MCF       Turbine 1 Flow Rate         1035.06       BTU/SCF       Turbine 1 Grand Total       Turbine 2 Grand Total         Current Day       Previous Day       Turbine 2 Grand Total         10.6383       11.5291       MCF         403.036       633005       LBM         11.0219       0       MMBTU         Current Pay       0       MMBTU         Curbine 2 Flow Rate       Turbine 2 Grand Total         Turbine 2 Flow Rate       Turbine 2 Grand Total         Turbine 2 Flow Rate       Marma         6.22       PSIG       Marma         6.22       PSIG       Marma         6.22       PSIG       Marma         16.46.2       In H20       Marma         28.98       Deg F       Marma	Scanner 2000 Main Display         Field have Location have           Colorate Input         Maritain Display         Previous Day           934.856         MCF/day         B93.617         MCF           934.856         MCF/day         B93.617         MCF           934.856         MCF/day         B93.617         MCF           1036.06         BTU/SCF         Turbine 1 Grand Total         13934.9           1036.36         G33005         LBM         O           11.0219         O         MMBTU         Turbine 1 Grand Total         13934.9           11.0219         O         MMBTU         Current Day         Ourthine 2 Grand Total         13934.9           11.0219         O         MMBTU         Turbine 1 Grand Total         13934.9           11.0219         O         MMBTU         Turbine 1 Grand Total         0           11.0219         O         MMBTU         Turbine 2 Volume Flow         0           6.22         PSI5         MBTU         Marms         Supply / Battery Voltage         0.00 / 7.33           16.46.2         In H20         Temperature         10.404.7         10.47	Scanner 2000 Main Display         Field Name Location Name           Colbrate Inputz         Mantan Row Run         Maintain Turbine         Configure           934.868         MCF/Gay         BB//Gay         Turbine 1 Fow Rate         4571.43         BB//Gay           934.868         MCF/Gay         BB//Gay         Turbine 1 Fow Rate         4571.43         BB//Gay           934.868         MCF/Gay         BB//Gay         Turbine 1 Fow Rate         0         BB//day           1036.06         BTU/SCF         Turbine 2 Grand Total         13934.9         BB//day           106.833         11.9291         MCF         Turbine 2 Grand Total         0         0           10.6333         11.9291         MCF         Turbine 2 Volume Flow         41.0155         4571.54           11.0219         0         MHBTU         Execution         0         0         0           66.22         PSIG         Maintain Supply / Battery Voltage         0.00 / 7.33 V         Temperature         164.47         Deg F

Figure 7.20

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

77 Scanner 2000 Config	iguration Menu - ModWorX Pro 4.0.0	
Ele Iesks Tools Help		
	D Scanner 2000 - Device Name (L/n 4096) Site Name Scanner 2000 Configuration Menu Location Name	
		Roturn
System	Device Identification Date/Time Communications Security Display Archives Alarms User Modbus Re	gisters
Flow Runs	Row Run 1	
Turbines	Turbine Input 1 Turbine Input 2	
Inputs	Differential Pressure Static Pressure Process Temperature Analog Input 1 Analog Input 2	
Outputs	Digital Cutputs Analog Cutputs	
Device Interface User Man	nuda USB 4.0.0.445 <port1default></port1default>	1/7/2010 12:03 PM



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

DOWNEDAD       Scamer 2000 - Device Name [s/n 40%]       Site Name Location Nam			 				ks Tgols Help
nalog Output Settings Durput Mode Disabled Analog Output is Disabled	(F		Field Name	1.0			2
Analog Output is Disabled	Cancel	СК	Apply	Refresh			
Analog Output is Disabled							og Output Settings
					Change	abled	out Mode Dis
ce Droefese   User Manuals			 		 		



To enable an analog output, click *Change*. The Change Analog dialog will appear (Figure 7.23, page 107).

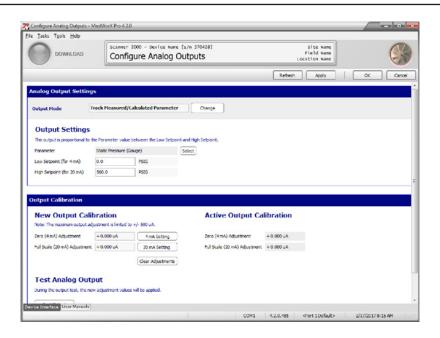
dWorX Pro	
Change Ana	log Output Mode
Disabled	
) Track Measured/Cak	ulated Parameter
	QK Cancel



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.





2. Click *Select* to choose a parameter from the Select Analog Output Parameter dialog (Figure 7.25, page 108).

1odWorX Pro		
Select Analog Out	out Parameter	
Select register to assign		
Flow Run 1 Flow Rate		-
Flow Run 1 Flow Rate Flow Run 1 Mass Flow Rate		^
Flow Run 1 Energy Flow Rate Turbine 1 Flow Rate		
Turbine 2 Flow Rate Static Pressure (Gauge) Differential Pressure		
Differential Pressure		*



- 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 precalibrated at the factory and field calibration is not required prior to use.

#### ModWorX Pro

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

Figure 7.26

- 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).
- 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, page 109, left).

ModWorX Pro 🛛 🔀	ModWorX Pro 🔤
Full Scale (20 mA) Adjustment	Full Scale (20 mA) Adjustment
Enter measured output current:	Enter measured output current:
OK Cancel	OK Cancel

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).

onfigure Analog Outp	uts - ModWorX	Pro 4.0.0				
Iaska Toola Help						
DOWNLOAD		er 2000 - Device Nam figure Analog		Le	Site Name Field Name cation Name	(S)
				Refresh	Acpiy	CK Cancel
nalog Output Settir	igs					
Jutput Mode	Track Measured	/Calculated Parameter	Change			
Output Settings						
The output is proportional b	the Parameter valu	e between the Low Selpoin	it and High Setpoint.			
Parameter	Flow Run 1 Flow	Rate	Select			
Low Setpoint (for 4 mA)	0.0	MCF/day				
High Setpoint (for 20 mA)	0.0	MCF/day				
utput Calibration New Output Ca Note: The maximum output		to ±/- 100 uQ.	Active Outpu	t Calibration		
Zero (4 mA) Adjustment	+ 1.880 uA	1 mA Setting	A) Adjustmen	Au 000.0 + 0.000 uA		
Full Scale (20 mA) Adjustme		20 mA Setting		stment + 0.000 uA		
		Clear Adjustments				
Test Analog Ou During the output test, the Test Output		es will be applied.				

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).

ModWorX Pro	
Test Analog Output	:
Output Value (mA): 4000	Apply
	Done



- 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.

# 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).

asks Tools Help								
DOWNLOAD		Scanner 2000 - Device Name [s/n 4098] Scanner 2000 Main Display			Site Name Field Name Location Name		E	
resh 🗸 Auto-Refresh							Ret	
	Calibrate Inputs	O Main	tain Flow Run	🛞 Maintain Turbine	Configure			
Flow Run Data				Turbine Data				
Flow Rate	270.88	MCF/day		Turbine 1 Flow Rate	0	BBL/day		
Daily Total (est.)	3.39993	MCF		Turbine 1 Grand Total	0	BBL		
Heating Value	1036.06	BTU/SCF						
	Current Day	Previous D	ay		Current Day	Previous Day	Y	
Volume Flow	0.309085		0 MCF	Turbine 1 Volume Flow	0	(	0 BBL	
Mass Flow	13.7436		0 LBM					
Energy	0.32023		0 MMBTU DETAILS				DETAILS	
Input Data				System Data				
Static Pressure	5.55	PSIG		Alarms			ALARMS	
Differential Pressure	99.98	In H2O		Supply / Battery Voltage	0.00 / 7.37	v		
Process Temperature	99.31	Deg F		Temperature	158.58	Deg F		
				Date/Time	Dec 17, 2009			
			DETAILS				DETAILS	

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 112). 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 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."

Junorada	on Task		
Calibrate (	Multi-point)		
O Set Zero C	ffset		
○ Verify			
<ul> <li>Differentia</li> </ul>			
Static Pres			
Process Te			
AI1_SPTra			
AI2_Temp			

Figure 8.2

# 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 113).
- Note For more information about the appearance of column headings on the Calibrate screen, see Change Format of Newly-Saved Calibrations, page A-17.

DOWNLOAD		ce Name [s/n 370428] erential Pressure	Lo	Site Name Field Name cation Name	9
				Save Change	s Exit Maintenance Mode
ibrate Inputs					
Change Task		ure			
Calibration Ta	ask Calibration				
New Calibration	In H20 V		Current Calibration Operator: None, Calibrated On:		Depending on the Options settings and the last calibration, the
Applied/As Left As Found	Change (% of FS)	Acquire Point Recalibrate Point	Appled/As Left A	s Found	columns may read "Applied/Measured" or "As Left/As Found".
		Clear Point Clear All Points	Factory Calibratior		
		Load Calbration From	Calibration		
ote			Note		

Figure 8.3

- 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 8.4). An Enter Applied Value dialog will appear (Figure 8.5, page 114).

ModWorX Pro	×
Enter Applie	d Value
Applied differential p	ressure:
2\$	In H2O
	OK Cancel



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.

1odWorX	Pro				
Acquir	e Differe	ntial Press	ure - (25.00	00 In H2	20)
Live Value	24.948	In H2O	Measured Value	24.939	In H2O
Stability					Show Irend >>
				(	<u>o</u> K <b>⊆</b> ancel



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).

cquir	e Differe	ential Press	ure - (25.00	00 In H2	20)
ve Value	24.938	In H2O	Measured Value	22.777	In H2O
ability					Hide <u>T</u> rend <
read: 10.03	6 In H2O (Tolerand	ce: 0.200 In H2O)			Samples: 1
44.0					
42.0					
40.0					
38.0					
36.0					
34.0					
32.0					
28.0					
26.0					
24.0					
22.0					
20.0					
18.0					
16.0					
14.0					
12.0					
10.0					
0.0					

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).

/lodWorX	Pro				
Acquir	e Differen	tial Press	ure - (25.00	00 In H2O	)
Live Value	24.947	In H2O	Measured Value	24.952	In H2O
Stability					Hide <u>I</u> rend <<
Spread: 0.065	In H2O (Tolerance: 0.)	200 In H2O)			Samples: 17
44.0 42.0					
40.0 38.0					
34.0 32.0					
30.0 28.0	Mea	sured	Value: 2	4.952 I	n H2O
24.0 22.0					
20.0 18.0					
14.0 12.0					
10.0 8.0 6.0					
Force Lock	On				OK Cancel



- Note Should the Scanner fail to lock on to a calibration value within a reasonable time period, the user can terrminate 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 117). 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.

Calibra	te Differe	ntial Pressure	e - ModWorX P	ro 4.0.0			
le <u>T</u> asks	Tools Help						
0	DOWNL	QAD		0 - Device Name [s/n 4098] e Differential Press		Site Name Field Name Location Name	
0.111						Save Changes	Exit Maintenance Mode
Calibra	ate Input	s					
Chang	ge Task	Input Paramet		al Pressure			
		calibración ras	calibration	•			
	v Calibr		20 <b>•</b>		Current Calibra Operator: None, Calibrated		
A	pplied /	Measured Char	nge (% of FS)		Applied	Measured	
1	25.000	24.952	-0.02	Acquire Point			
2	50.000	49.988	-0.01				
3	75.000	74.978	-0.01	Recalibrate Point			
•	100.000	99.992	0.00	Clear Point			
				Clear All Points	Fac	tory	
					Calibr	ration	
				Load Calibration From			
					100		
Note					Note		
evice Inte	orface User	Manuals					2
					COM6 4	4.0.0.444 <port 2="" default=""></port>	12/17/2009 6:10 PM



- 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			2
Select An Item			
Calibration to copy from:			
1: Factory Defaults			-
1: Factory Defaults			
2: Current Calibration (01/:	15/2010 7:07:3	31 pm)	
	ОК		Cancel

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.

- 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.

	n Task		
🔿 Calibrate (Mu	lti-point)		
<ul> <li>Set Zero Offs</li> </ul>	et		
Verify			
<ul> <li>Differential Pr</li> <li>Static Pressure</li> </ul>	e		
<ul> <li>Static Pressur</li> </ul>			
Static Pressur     Process Temp     AI1_SPTrans			



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 119).

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.

t Zero Offset - Static Press	ure - ModWorX Pro 4.0.0				
asks Tools Help					
DOWNLOAD	scanner 2000 - Device Name [s/n 4098 Set Zero Offset - Static Pr		Site Name Field Name Location Name	S	
			Save Changes	Exit Maintenance Mod	
librate Inputs					
Change Task Calibration Tas					
New Zero Offset	•	Current Zero Offset Operator: None, Calibrated On:			
ero Offset	Acquire Zero Offset Clear Zero Offset	Zero Offset	0.000		
Interface 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	×
Enter Applied Value	
Applied static pressure:	
OK Car	ncel

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	Static P	ressure -	(0.000 PSIC	5)	
Live Value	-0.125	PSIG	Measured Value	-0.061	PSIG
Stability					Show <u>Trend &gt;&gt;</u>
				[	OK <u>C</u> ancel

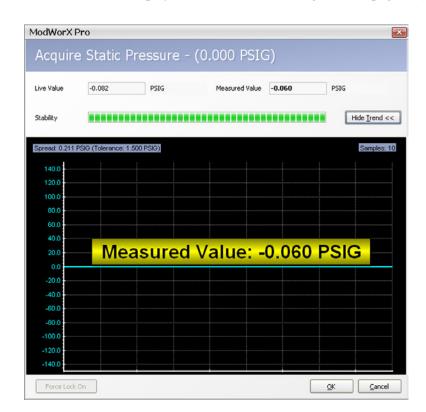
Figure 8.13

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 P	ro				×
Acquire	static	Pressure -	(0.000 PSIC	G)	
Live Value	-0.039	PSIG	Measured Value	-0.050	PSIG
Stability					Hide <u>I</u> rend <<
Spread: 0.211 F	SIG (Tolerance:	1.500 PSIG)			Samples: 8
140.0 120.0 100.0 80.0 40.0 20.0 -20.0 -20.0 -20.0 -40.0 -80.0 -80.0 -100.0 -120.0					
-140.0	Dn				OK <u>C</u> ancel

Figure 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, page 121).





- 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.

asks Tools Help						
DOWNLOAD		0 - Device Name [s/n 4098] Offset - Static Pr		Site Name Field Name Location Name	Ć	
				Save Changes	Exit Maintenance Mor	
librate Inputs						
Change Task Calibration Ta						
New Zero Offset			Current Zero Offset	t.		
albration Working Units PSI ero Offset	0.060	Acquire Zero Offset	Operator: None, Calibrated On: Zero Offset	0.000		
ote		Clear Zero Offset	Note			



- 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.

	Task
Calibrate (Multi-	point)
O Set Zero Offset	
<ul> <li>Verify</li> </ul>	
Differential Pres	sure
O Differential Pres	sure
<ul> <li>Differential Pres</li> <li>Static Pressure</li> </ul>	sure
-	
O Static Pressure	ature

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).

jesks Tgols Help	100					
DOWNLOAD			0 - Device Name [s/n 4098 rocess Temperatu		Site Name Field Name Location Name	C
					Save Changes	Exit Maintenance Mo
librate Inputs						
Change Task. Calibration		Process To Verificatio	emperature			
Calibration	Task	Verificatio	en			
New Verification				Current Verificatio	n	
erification Working Units	Deg F	•		Operator: None, Verfied On:		
Applied Measured	Error (% o	vf FS)	Acquire Point	Applied Me	asured	
			Re-verify Point			
			Clear Point	Factor		
			Clear All Points	Verificat		
				verificat	ion	
iote				Note		
Interface User Manuals						

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 Applied Value
Applied temperature: 50 Deg F
OK Cancel

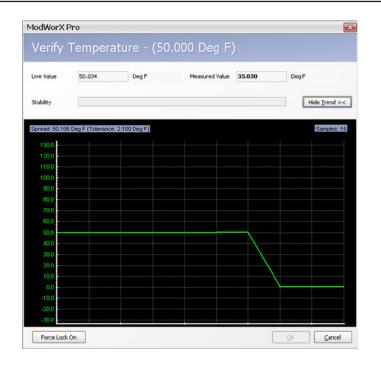


6. Enter the applied temperature value (for example, 50) in this field, and click **OK**. A screen will appear, showing the live value, the measured value, and a stability bar showing the progression of the verification (Figure 8.20). The live value is the instantaneous reading of the temperature input,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

1odWorX	Pro	_			
Verify	Tempera	iture - (50	).000 Deg F	)	
Live Value	49.954	Deg F	Measured Value	49.971	Deg F
Stability					Show Irend >>
				[	KCancel

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).





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 125).

ive Value	49.872	Deg F	Measured Value	49.993	Deg F
tability					Hide Irend <
pread 0.308	Deg F (Tolerance:	2.100 Deg F)			Samples: 1
130.0					
120.0					
100.0					
90.0					
70.0					
60.0	Me	asured	Value: 4	19.993	Deg F
50.0 40.0					
30.0					
20.0					
10.0					

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, page 126). 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.

Verify Process Temper	ature - ModWe	orX Pro 4.	0.0			
Tesks Tools Help						
DOWINLOAD			cess Temperatur		Site Name Field Name Location Name	S
					Save Changes	Exit Naintenance Mode
Calibrate Inputs						
Input	arameter Pr	ocess Tem	perature			
Change Task. Calibra	tion Task Ve	rification				
New Verification Verification Working Units	Deg F	•		Current Verification Operator: None, Verified On:	n	
Applied Measure				Applied Me	sasured	
		0.00	Acquire Point			
2 100.000 99. 3 150.000 150	.963 .045	0.00	Re-verify Point			
			Clear Point			
			Clear All Points	Factor Verificat		
				vernicat		
Note				Note		
ice Interface User Manuals						
				COM6 4.0.0.4	44 <port 2="" default=""></port>	12/17/2009 6:44 PM

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.

# 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, page 128).

canner 2000 Main Display	- ModWorX Pro 4	.0.0					
∐asks Tools <u>H</u> elp							
		- Device Name [5, 2000 Main	n 4096]		Site Name Field Name Location Name		S
Refresh 🗸 Auto-Refresh							Return
	Calibrate Inputs	O Maintai	n Flow Run	🛞 Maintain Turbine	Configure		
Flow Run Data				Turbine Data			
Flow Rate	1.39485	MCF/day		Turbine 1 Flow Rate	4571.89	BBL/day	
Daily Total (est.)	341.278	MCF		Turbine 1 Grand Total	14323	BBL	
Enthalpy	1128.98	BTU/LBM					
	Current Day	Previous Day			Current Day	Previous Day	
Volume Flow	34.1278	11.9291	MCF	Turbine 1 Volume Flow	429.12	4571.54	BBL
Mass Flow	3269.2	633005	LBM				
Energy	37.3084	0	MMBTU				
			DETAILS				DETAILS
Input Data				System Data			
Static Pressure	6.25	PSIG		Alarms			ALARMS
Differential Pressure	163.55	In H2O		Supply / Battery Voltage	0.00 / 7.36	v	
Process Temperature	230.31	Deg F		Temperature	163.00	Deg F	
				Date/Time	Jan 7, 2010	6:03:55 PM	
			DETAILS				DETAILS
ce Interface User Manuals							
				U58 4.0.0.445	<port 1="" default<="" td=""><td>&gt; 1/7/2010 6</td><td>03 PM</td></port>	> 1/7/2010 6	03 PM



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

Change Flow Run	Maintenance Task
-low Run Selection	1
• Flow Run 1	
Maintenance Task	
Change Orifice Plate     Change Gas Composition	
	QK

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, page 129).

Maintain Flow Run 1 - Mod	IWorX Pro 4.0.0				
Iasks Tools Help	C				
DOWNLOAD	Scanner 2000 - Device Name [s/n Maintain Flow Run 1	4096]	Fie	te Name 1d Name on Name	
				Save Changes	Exit Maintenance Mode
1aintain Flow Run					
Selected F	low Run Flow Run 1				
Change Task. Maintenan	nce Task Change Orifice Plate				
New Orifice Plate	Parameters	Current Orifice		ameters	
Plate Size	inches	Plate Size	1.0000	inches	
Reference Temperature	Deg F	Reference Temperature	68.000	Deg F	
Plate Material	Select an option	Plate Material	Stainless Steel	(304/316)	
Model Number		Model Number	( To Be Config	ured )	
Serial Number		Serial Number			
Note		Note			
Clear New Data	Copy From Current				
ce Interface User Manuals		U58 4	.0.0.445 <p< td=""><td>ort 1 Default&gt;</td><td>1/7/2010 6:11 PM</td></p<>	ort 1 Default>	1/7/2010 6:11 PM

#### 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-17.

### Procedure: Change Plate Parameters

 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 129). 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, page 130.

ModWorX Pro	ModWorX Pro	ModWorX Pro
Change Flow Run Maintenance Task	Change Flow Run 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 Orfice Flate Change Gas Composition	Change Online Plate Change Gross Method Parameters	Change Orifice Plate  Change Steam Properties
QK Cancel	QK Gancel	QK Gancel

Natural Gas (AGA-8 Detail)

Natural Gas (AGA-8 Gross)

Steam (IF-97 or IF-97+James)

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 Orifice Plate  Change Generic Liquid Parameters	Change Orifice Plate Change MPMS Liquid Parameters
QK Cancel	<u>o</u> k

Liquid (Generic)

Liquid (MPMS)

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 131).

🎢 Maintain Flow Run 1 - M	lodWorX Pro 4.0.	0				
Ele Tasks Tools Help						
DOWNLOAD		2000 - Device Name ain Flow Run		Fie	te Name Id Name on Name	
					Save Changes	Exit Maintenance Mode
Maintain Flow Run						
	d Flow Run Flow F	tun 1				
Change Task Mainter	nance Task Chang	e Orifice Plate				
New Orifice Plat	e Paramete	'S	Current Orifice		ameters	
Plate Size		inches	Plate Size	1.0000	inches	
Reference Temperature		Deg F	Reference Temperature	68.000	Deg F	
Plate Material	Select 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					
L						
Device Interface User Manuals						
			USB 4	.0.0.445 <p< td=""><td>ort 1 Default&gt;</td><td>1/7/2010 6:11 PM</td></p<>	ort 1 Default>	1/7/2010 6:11 PM

#### Figure 9.5

- 2. 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

 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, page 132).

odWorX Pro	
Change Flow Run	Maintenance Task
Flow Run Selection	
• Flow Run 1	
Maintenance Task	
Change Orifice Plate     Change Gas Composition	
	ОК



- 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 133).
- 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 this method, see Configuring Fluid Properties, page 64.
- 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 Tools Help				ame [s/n 4096]			Site Na		(
DOWNLOAD Maintair		Flow R	un 1			Field Na Location Na		E	
					_		Save	Thanges	Exit Maintenance Mo
intain Flow Run	_	_			_				
Select	ed Flow R	In Flow Run	1						
Change Task Majob	enance Ta	chappe 6	as Compositio	0					
	chance ra	sk change o	as composicio						
					<i>c</i>				
lew Gas Comp						rrent Gas Con ator: None, Changed On			
uid Properties Calculation	AGA-8	Detail			Oper	ator: None, Changed On			
nalysis Ref. No.					Analy	sis Ref. No.			
eference Conditions	United	States (14.73 ps	, 60 F)	•	Refe	ence Conditions	United States (14.73	psi, 60 F)	
eating Value	Calcula		alculated)		Heat	ng Value	Calculated	(calculated)	
pecific Gravity	Calcula	ted 🔻 (c	alculated)			fic Gravity	Calculated	(calculated)	
scosity	Manua	entry		cP	Visco	sity	Manual entry	0.010268	æ
entropic Exponent	Manua	entry			Isent	ropic Exponent	Manual entry	1.3000	
as Fraction	(No we	t correction)			Gas F	raction	(No wet correction)		
d	-								
Clear New Data	Copyr	rom Current							
Constituent		Mole %	Chan	e Mole %		Constituent	Mole %	1	
1 Carbon Dioxide (CO	2)		Chang	e 190/e 36	1	Carbon Dioxide (CO2)	0.5956		
2 Nitrogen (N2)			Clear	Mole %	2	Nitrogen (N2)	0.2595		
3 Methane (C1)			Class	W Mole %	3	Methane (C1)	96.5222		
4 Ethane (C2)			Cicar		4	Ethane (C2)	1.8186		
5 Propane (C3)			( under		5	Propane (C3)	0.4596		
6 n-Butane (n-C4) 7 i-Butane (i-C4)			Load Co	mposition	6	n-Butane (n-C4) i-Butane (i-C4)	0.1007		
8 n-Pentane (n-C5)					8	n-Pentane (n-C5)	0.0324		
9 i-Pentane (i-C5)					9	i-Pentane (i-C5)	0.0473		
10 n-Hexane (n-C6)					10		0.0664		
11 n-Heptane (n-C7)					11		0.0000		
12 n-Octane (n-C8)					12		0.0000	)	
13 n-Nonane (n-C9)					13	n-Nonane (n-C9)	0.0000	)	
14 n-Decane (n-C10)					14	n-Decane (n-C10)	0.0000		
15 Oxygen (O2)					15		0.0000		
16 Carbon Monoxide (C	:0)				16				
17 Hydrogen (H2) 18 Hydrogen Sulfide (H					17		0.0000		
<ol> <li>Hydrogen Sulfide (H</li> <li>Water (H2O)</li> </ol>	23/				18	Hydrogen Sulfide (H2S) Water (H2O)	0.0000		
20 Helium (He)					20		0.0000		
21 Argon (Ar)					21	Aroon (Ar)	0.0000		
	Total %	0.0000					otal % 100.0000		
					_			1	
ote					Note				
mportant: Total of all o	constituen	ts must be 100	%.						

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

 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).

Aaintenance Task	low Run Selec	tion	
Change Orifice Plate	Flow Run 1		
	Aaintenance T	ask	
Change Gross Method Parameters	Change Orifice Plate		
	Change Gross Method	Parameters	

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 135).
- 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 64.
- 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 - ModW	orX Pro 4.0	.0					
Ele Iasks Tools Help							
DOWNLOAD		2000 - Device I tain Flow R			Site Field Location		
					San	ve Changes	Exit Maintenance Mode
Maintain Flow Run							^
Change Task Selected Flow Maintenance		Run 1 ge Gross Method I	Parameters				
New Gross Method Fluid Properties Calculation AGA Analysis Ref. No.	Paramet A-8 Gross	ters		Current Gross Operator: None, Changed Analysis Ref. No.		ameters	
Reference Conditions Unit	ted States (14.)	73 psi, 60 F)	•	Reference Conditions	United States (14	.73 psi, 60 F)	
Heating Value Mar	nual entry	1	BTU/SCF	Heating Value	Manual entry	1031.4260	BTU/SCF
Specific Gravity Mar	nual entry		1	Specific Gravity	Manual entry	0.600000	-
Viscosity Mar	nual entry		cP	Viscosity	Manual entry	0.010268	cP
Isentropic Exponent Mar	nual 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 Cop	by From Curren	t		Note			
Device Interface User Manuals							×
		_		USB 4	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.

 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 136).

1odWorX Pro	
Change Flow Run Maintenance Task	
Flow Run Selection	
• Flow Run 1	
Maintenance Task	
Change Orifice Plate	
Change Steam Properties	
	el



- 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).

		.0.0				
∐asks Tools <u>H</u> elp						
DOWNLOAD		er 2000 - Device Name [s/n ntain Flow Run 1	4096]		e Name d Name n Name	
				St	ve Changes	Exit Maintenance Mode
aintain Flow Run						Â
Change Task Selected I Maintena		w Run 1 ange Steam Properties				
		ange steam Properties				
New Steam Prop	erties		Current Steam	Properties		
Fluid Properties Calculation	IF-97		Operator: None, Changed	Dn:		
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 Curre	ent				
Note			Note			
						_
						~
ice Interface User Manuals			US8 4	.0.0.446 <port< td=""><td>1 Default&gt;</td><td>1/18/2010 12:48 PM</td></port<>	1 Default>	1/18/2010 12:48 PM

Figure 9.11

- 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.
- 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 64.
- 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).

low Run Selection	
• Flow Run 1	
Maintenance Task	
<ul> <li>Change Orifice Plate</li> <li>Change MPMS Liquid Parameters</li> </ul>	

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 139).

Maintain Flow Run 1 - ModWor	X Pro 4.1.0				
DOWNLOAD	scanner 2000 - [s/n 152621] Maintain Flow Run 1				
			Save	Changes	Exit Maintenance Mode
Maintain Flow Run Change Task Maintenance T					
Analysis Ref. No.	arameters 5 Grude Oil Iute Density •	Current MPMS L Operator: None, Changed O Analysis Ref. No. Density Source		eters	
Base Absolute Density Viscosity	KG/M3 cP	Base Specific Gravity Viscosity	0.85084	сP	
* Note that the Density or Specific Gr Viscosity is at flowing temperature.	out 6.0 cp. However, for accurate results the etermined. avity is at base temperature and the / From Current Load Default Params				
Note		Note			
evice Interface User Manuals		USB 4.	1.0.466 <port 2="" [<="" td=""><td>Default&gt;</td><td>6/24/2013 12:05 PM</td></port>	Default>	6/24/2013 12:05 PM

Figure 9.13

- 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 Configuring Fluid Properties, page 64.
- 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 140) 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.

E Jasks Tgols Help	Scanner 2000 - [s/n ] Maintain Flow F					
DOWNLOAD						
				Sa	ve Changes	Exit Maintenance Mode
laintain Flow Run						
Channe Tark Selected Fi	low Run Flow Run 1 - Flow Run	1				
Change Task Maintenan	ce Task Change MPMS Liquid	Parameters				
New MPMS Liquid	Parameters		Current MPMS		neters	
Fluid Properties Calculation N	IPMS Special Products		Operator: None, Changed	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	ళ		Viscosity	0.010268	ø	
* A typical viscosity of this liquid is flowing viscosity should be detered.	is about 1.0 cP. However, for accurate	e results the actual				
* Note that the Viscosity paramet	ter is at flowing temperature.					
Clear New Data	Copy From Current	ult Params				
Note			Note			
vice Interface User Manuals			US8 4	2.0.485 <port 2<="" td=""><td>Default&gt;</td><td>5/16/2017 2:32 PM</td></port>	Default>	5/16/2017 2:32 PM

Figure 9.14

- 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, page 141).

aintenance Task	low Run Selectio	on
) Change Orifice Plate	Flow Run 1	
	Naintenance Tas	ik
	<ul> <li>Change Orifice Plate</li> <li>Change Generic Liquid Pate</li> </ul>	rameters

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 142).
- 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 64.
- 4. In the Analysis Reference No. field, enter a reference number from the liquid analysis report, if desired.

🎢 Maintain Flow Run 1 - Mo	dWorX Pro 4.1.0						
<u>Eile T</u> asks T <u>o</u> ols <u>H</u> elp							
DOWNLOAD	scanner 2000 - [s/n 152621] Maintain Flow Run 1						
			Save Changes	Exit Maintenance Mode			
Maintain Flow Run				<u>^</u>			
Change Task	Flow Run         Flow Run 1           ance Task         Change Generic Liquid Parameters						
New Generic Liq Fluid Properties Calculation	uid Parameters Generic Liquid	Operator: None, Changed On:	Liquid Parameters				
Analysis Ref. No.		Analysis Ref. No.					
Flowing Density Calculation	Manual Entry of Flowing Density	Flowing Density Calculation	Manual Entry of Flowing Density				
Density Source	Absolute Density 👻	Density Source	Specific Gravity	<b>=</b>			
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				
* The Base Density value is required. If it is not known, use the same value as for Flowing Density. * A typical viscosity of this liquid is about 1.0 cp. However, for accurate results the actual flowing viscosity 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.	D.466 <port 2="" default=""></port>	6/24/2013 12:08 PM			

Figure 9.16

- 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.

# 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).

anner 2000 Main Display	- ModWorX Pro 4	0.0.	_				
∐asks Tools <u>H</u> elp							
DOWNLOAD		2000 Main	/n_4096] play		Site Name Field Name Location Name		C
efresh 🗹 Auto-Refresh							Re
	Calibrate Inputs	O Maintai	n Flow Run	🛞 Maintain Turbine	Configure		
Flow Run Data				Turbine Data			
Flow Rate	1.39485	MCF/day		Turbine 1 Flow Rate	4571.89	BBL/day	
Daily Total (est.)	341.278	MCF		Turbine 1 Grand Total	14323	BBL	
Enthalpy	1128.98	BTU/LBM					
	Current Day	Previous Day			Current Day	Previous Day	
Volume Flow	34.1278	11.9291	MCF	Turbine 1 Volume Flow	429.12	4571.54	BBL
Mass Flow	3269.2	633005	LBM				
Energy	37.3084	0	MMBTU				
			DETAILS				DETAILS
Input Data				System Data			
Static Pressure	6.25	PSIG		Alarms			ALARM
Differential Pressure	163.55	In H2O		Supply / Battery Voltage	0.00 / 7.36	V	
Process Temperature	230.31	Deg F	6	Temperature	163.00	Deg F	
				Date/Time	Jan 7, 2010	6:03:55 PM	
			DETAILS				DETAILS
e Interface User Manuals				US8 4.0.0.445	<port 1="" default<="" td=""><td>&gt; 1/7/2010 6</td><td></td></port>	> 1/7/2010 6	

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 144).

aintenance Task	low Run Selectio	on
	Flow Run 1	
Change Cone Meter	laintenance Tas	ik
	Change Cone Meter	
Change Flow Coefficients (Cd)	Change Flow Coefficients	; (Cd)
Change Gas Composition	Change Gas Composition	



- 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).

🎢 Maintain Flow Run 1 - M	lodWorX Pro 4.0.0			
Ele Iasks Tools Help				
DOWNLOAD	scanner 2000 - Device Name [ Maintain Flow Run 1		Site Name Field Name Location Name	
_			Save Changes	Exit Maintenance Mode
Maintain Flow Run				^
Change Task	rd Flow Run 1 nance Task Change Cone Meter			
New Cone Mete	er Parameters	Current Cone N Operator: None, Changed (	Meter Parameters	
Model Number		Model Number	( To Be Configured )	
Beta Ratio		Beta Ratio	0.875	
Meter Size (I.D.)	inches	Meter Size (I.D.)	2.067	
Flow Coefficient (Cd)	Refer to Change Flow Coefficient task	Flow Coefficient (Cd)	Refer to Change Flow Coefficient task	
Reference Temperature	68.000 Deg F	Reference Temperature	68.000	
Cone Material	Select an option	Cone Material	Stainless Steel (304/316)	
Meter Material	Select an option	Meter Material	Carbon Steel	
Serial Number		Serial Number		
Note		Note		
Clear New Data	Copy From Current			
Device Interface User Manuals				<b>X</b>
		US8 4	.0.0.446 <port 1="" default=""> 1</port>	/18/2010 1:20 PM

Figure 10.3

# Procedure: Change Cone Parameters

 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.

ModWorX Pro	ModWorX Pro	ModWorX Pro
Change Flow Run Maintenance Task	Change Flow Run Maintenance Task	Change Flow Run Maintenance Task
Flow Run Selection	Flow Run Selection	Flow Run Selection
How Run 1	• Flow Run 1	Flow Run 1
Maintenance Task	Maintenance Task	Maintenance Task
Change Cone Meter Change Flow Coefficients (Cd)	Change Cone Meter  Change Flow Coefficients (Cd)	Change Cone Meter Change Flow Coefficients (Cd)
Change Gas Composition	Change Gross Method Parameters	Change Steam Properties
QKCancel	QK	Keancel

Natural Gas (AGA-8 Detail)

Natural Gas (AGA-8 Gross)

Steam (IF-97 or IF-97+James)

ModWorX Pro
Change Flow Run Maintenance Task
Flow Run Selection
• Flow Run 1
Maintenance Task
Change Cone Meter
Change Flow Coefficients (Cd)
Change MPMS Liquid Parameters
QK

Liquid (Generic)

Liquid (MPMS)

#### Figure 10.4

- a. Under the Maintenance Task heading, click Change Cone Meter.
- b. Click **OK** to save your selections and return to the Maintain Flow Run screen (Figure 10.5, page 146).

asks T <u>o</u> ols <u>H</u> elp					
DOWNLOAD		000 - Device Name [s/n 4 ain Flow Run 1	096]	Site Name Field Name Location Name	S
				Save Changes	Exit Maintenance Mode
intain Flow Run					
Change Task	ed Flow Run Flow Ru nance Task Change	ın 1 : Cone Meter			
New Cone Mete	er Parameters		Current Cone N Operator: None, Changed (	Neter Parameters	
odel Number			Model Number	( To Be Configured )	
eta Ratio			Beta Ratio	0.875	
eter Size (I.D.)		inches	Meter Size (I.D.)	2.067	
low Coefficient (Cd)	Refer to Change Flow	v Coefficient task	Flow Coefficient (Cd)	Refer to Change Flow Coefficient task	
eference Temperature	68.000	Deg F	Reference Temperature	68.000	
one Material	Select an option	•	Cone Material	Stainless Steel (304/316)	
eter Material	Select an option	•	Meter Material	Carbon Steel	
erial Number			Serial Number		
ote			Note		
Clear New Data	Copy From Current	)			
a Interface User Manuals	J				

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 147, for details.

# Procedure: Change Flow Coefficients (Cd)

 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.

ModWorX Pro	ModWorX Pro	ModWorX Pro	X
Change Flow Run Maintenance Task	Change Flow Run 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 Cone Meter     Change Flow Coefficients (Cd)	Change Cone Meter     Change Flow Coefficients (Cd)	Change Cone Mater     Change Flow Coefficients (Cd)	
Change Gas Composition	Change Gross Method Parameters	Change Steam Properties	
QK Cancel	QK Cancel	QK Çance	el

Natural Gas (AGA-8 Detail)

Natural Gas (AGA-8 Gross)

Steam (IF-97 or IF-97+James)

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 Cone Meter	Change Cone Meter
Change Flow Coefficients (Cd)	<ul> <li>Change Flow Coefficients (Cd)</li> </ul>
Change Generic Liquid Parameters	Change MPMS Liquid Parameters
QK	<u>Ok</u>

Liquid (Generic)

Liquid (MPMS)



- 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 148).

🎢 Maintain Flow Run 1 - ModWorX Pro 4.0.	0		
Ele Iasks Tgols Help			
	2000 - Device Name [s/n 4096] ain Flow Run 1	Site N Field N Location N	lame
		Save	Changes Exit Maintenance Mode
Maintain Flow Run			<u>^</u>
Change Task Selected Flow Run How Run Maintenance Task Change			
New Flow Coefficients		Current Flow Coefficients Operator: <port 1="" default="">, Calbrated On: 01/18/2</port>	2010
Reynolds Number Flow Coefficient	Entry Mode     Entry Mode     Unear Flow Coefficient     Multi-point Flow Coefficient     Enter Linear Coefficient     Load Coefficients From	Reynolds Number         Flow Coefficient           1         50.0         100.000           2         100.0         150.000	
Note	]	Note	
Device Interface User Manuals		US8 4.0.0.446 <port 11<="" th=""><th>Default&gt; 1/18/2010 1:37 PM</th></port>	Default> 1/18/2010 1:37 PM



- 2. 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

 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).

-low Run Selection
Flow Run 1
Maintenance Task
Change Cone Meter
Change Flow Coefficients (Cd)
Change Gas Composition

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 150).
- 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 this method, see Configuring Fluid Properties, page 64.
- 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. 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.

	- rearried	ain Flow Ru	in 1			Site N Field N Location N	ane	
	<u></u>			_		Save	Changes	Exit Maintenance Mod
intain Flow Run								
Change Task Selected	Flow Run Flow R	un 1						
Maintena	nce Task Change	Gas Composition						
New Gas Compos					rrent Gas Corr ator: None, Changed On:	position		
luid Properties Calculation	AGA-8 Detail			oper	stort none, changed on.			
nalysis Ref. No.				Analy	sis Ref. No.			
eference Conditions	United States (14.73	psi, 60 F) 🔹	]	Refe	ence Conditions	United States (14.7	3 psi, 60 F)	
leating Value	Calculated 👻	(calculated)		Heat	ng Value	Calculated	(calculated)	
pecific Gravity	Calculated •	(calculated)		Spec	fic Gravity	Calculated	(calculated)	
iscosity	Manual entry		cP	Visco		Manual entry	0.010268	(P
		L	1					
sentropic Exponent	Manual entry				ropic Exponent	Manual entry	1.3000	
as Fraction	(No wet correction)			Gas I	iraction	(No wet correction)		
1         Carbon Dioxide (CO2)           2         Nitrogen (N2)           3         Methane (C1)           4         Ethane (C2)           5         Propane (C3)           6         n-Butane (n-C4)           8         n-Pentane (n-C5)           9         I-Pentane (n-C5)           10         n-Pentane (n-C5)           10         n-Heraten (n-C5)		Clear A	Mole %	1 2 3 4 5 6 7 8 9 10	Carbon Dioxide (CO2) Nitrogen (N2) Methane (C1) Ethane (C2) Propane (C3) n-Butane (n-C4) i-Butane (i-C4) i-Pentane (n-C5) i-Pentane (i-C5) n-Hexane (n-C6)	0.595 0.259 96.522 1.818 0.459 0.100 0.097 0.032 0.047 0.047	5 2 5 7 7 4 3	
11 n-Heptane (n-C7)				11		0.000		
12 n-Octane (n-C8)				12	n-Octane (n-C8)	0.000		
13 n-Nonane (n-C9)				13		0.000		
14 n-Decane (n-C10)					n-Decane (n-C10)	0.000		
15 Oxygen (O2) 16 Carbon Monoxide (CO)				15	Oxygen (O2) Carbon Monoxide (CO)	0.000		
17 Hydrogen (H2)				17		0.000		
18 Hydrogen Sulfide (H25)				18	Hydrogen Sulfide (H2S)	0.000	0	
19 Water (H2O)				19	Water (H2O)	0.000		
20 Helium (He)				20	Helium (He)	0.000		
21 Argon (Ar)	tal % 0.0000			21		0.000 otal % 100.0000	1	
		]				100.0000		
iote				Note				
mportant: Total of all con	itituents must be 1	00%.	1					

Figure 10.9

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

 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).

Flow Run 1 Maintenance Task Change Cone Meter     Change Flow Coefficients (Cd)     Change Gross Method Parameters	Flow Run Selection	
Change Cone Meter Change Flow Coefficients (Cd)	• Flow Run 1	
Change Flow Coefficients (Cd)	Maintenance Task	
	Change Cone Meter	
Change Gross Method Parameters	<ul> <li>Change Flow Coefficients (Cd)</li> </ul>	
	Change Gross Method Parameters	
		QK <u>C</u> ance

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 152).
- 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 64.
- 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.

🎢 Maintain Flow Run 1 - M	lodWorX Pro 4.0	).0					
Ele Iasks Tools Help							
DOWNLOAD		tain Flow F	Name [s/n 4096] Run 1		Site Field Location		
					San	ve Changes	Exit Maintenance Mode
Maintain Flow Run							^
Change Task		Run 1 nge Gross Method	Parameters				
New Gross Meth Fluid Properties Calculation Analysis Ref. No.	nod Parame AGA-8 Gross	ters		Current Gross Operator: None, Changed Analysis Ref. No.		ameters	
Reference Conditions	United States (14	.73 psi, 60 F)	•	Reference Conditions	United States (14	.73 psi, 60 F)	
Heating Value	Manual entry		BTU/SCF	Heating Value	Manual entry	1031.4260	BTU/SCF
Specific Gravity	Manual entry	1	_	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 Curren	t					
Note			_	Note			
							~
Device Interface User Manuals							
				US8	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 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 153).

low Run Selection	
• Flow Run 1	
1aintenance Task	
<ul> <li>○ Change Cone Meter</li> <li>● Change Flow Coefficients (Cd)</li> </ul>	D
Change Steam Properties	



- 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).

Maintain Flow Run 1 - M	lodWorX Pro 4	.0.0				
ie <u>T</u> asks T <u>o</u> ols <u>H</u> elp						
		er 2000 - Device Name [s/n 4096] ntain Flow Run 1			Name Name Name	
				Sa	ve Changes	Exit Maintenance Mode
Maintain Flow Run						Î
	d Flow Run Flo	w Run 1				
Change Task Mainter	nance Task Ch	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				
Note			Note			
evice Interface User Manuals			U58 4	.0.0.446 <port< td=""><td>1 Default&gt;</td><td>1/18/2010 12:48 PM</td></port<>	1 Default>	1/18/2010 12:48 PM



- 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.
- 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 64.
- 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.

 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).

ModWorX Pro	
Change Flow Run Maintenance	e Task
Flow Run Selection	
• Flow Run 1	
Maintenance Task	
Change Cone Meter	
Change Flow Coefficients (Cd)	)
Change MPMS Liquid Parameters	
	<u>Ο</u> Κ



- 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 156).

🂏 Maintain Flow Run 1 - ModWorX	( 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 Flow R Maintenance Ta				
New MPMS Liquid Par		Current MPMS	Liquid Parameters	
Fluid Properties Calculation MPMS	Crude Oil	Operator: <port 1="" derault;<="" td=""><td>, changed Un: 07/23/2013</td><td></td></port>	, changed Un: 07/23/2013	
Analysis Ref. No.		Analysis Ref. No.		
Density Source Absolu	ute 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 cP. However, for accurate results the termined. wity is at base temperature and the 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

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 64.
- 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.

 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).

odWorX Pro	
Change Flow Run Mai	ntenance Task
Flow Run Selection	
• Flow Run 1	
Maintenance Task	
O Change Cone Meter	
<ul> <li>Change Flow Coefficients (Cd)</li> </ul>	
Change Generic Liquid Parameters	
	QK Cancel



- 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 158).
- 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 64.
- 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	odWorX Pro 4.1.0				
Eile Tasks Tools Help					
DOWNLOAD	scanner 2000 - [s/n 0] Maintain Flow Run 1				
			Sav	e Changes	Exit Maintenance Mode
Maintain Flow Run					
Change Task	I Flow Run 1 ance Task Change Generic Liquid Parameters				
New Generic Liq		Current Generic			
Fluid Properties Calculation	Generic Liquid		changed on ovyzoy	2013	
Analysis Ref. No.		Analysis Ref. No.			
Flowing Density Calculation	Manual Entry of Flowing Density	Flowing Density Calculation	Manual Entry of F	lowing 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	
* The Base Density value is re Density.	quired. If it is not known, use the same value as for Flowing				
* A typical viscosity of this liquid flowing viscosity should be of	uid is about 1.0 cP. However, for accurate results the actual letermined.				
* Note that the Viscosity para	meter 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< td=""><td>1 Default&gt;</td><td>7/23/2013 11:58 AM 🔰 🔐</td></port<>	1 Default>	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).

		n 4096]		Site Name Field Name Location Name		0
						Re
Calibrate Inputs	O Maintair	n Flow Run	🛞 Maintain Turbine	Configure		
			Turbine Data			
1.39485	MCF/day		Turbine 1 Flow Rate	4571.89	BBL/day	
341.278	MCF		Turbine 1 Grand Total	14323	BBL	
1128.98	BTU/LBM					
Current Day	Previous Day			Current Day	Previous Day	
34.1278	11.9291	MCF	Turbine 1 Volume Flow	429.12	4571.54	BBL
3269.2	633005	LBM				
37.3084	0	MMBTU				
		DETAILS				DETAILS
			System Data			
6.25	PSIG		Alarms			ALARM
163.55	In H2O		Supply / Battery Voltage	0.00 / 7.36	v	
230.31	Deg F	8	Temperature	163.00	Deg F	
			Date/Time	Jan 7, 2010	6:03:55 PM	
		DETAILS				DETAILS
	Scanner Collorate Inputs 1.39485 341.278 1128.98 Current Day 34.1278 3269.2 37.3084 6.25 163.55	Scanner 2000 Main Calibrate Inputs Maintai 1.39485 MCF/day 341.278 MCF 1128.98 BTU/LBM Current Day Previous Day 341.278 11.9291 3269.2 633005	Calibrate Inputs         Mantain Flow Run           1.39485         MCF/day           341.278         MCF           1128.98         BTU/LBM           Current Day         Previous Day           34.1278         11.9291           34.1278         11.9291           3.3.1278         0           3.3.3084         0           0         MMBTU           Certers         6.25           6.25         PSIG           163.55         In I20           230.31         Deg F	Scanner 2000 Main       Day         Calibrate Inputs       Maintain Flow Run       Maintain Turbine         1.39485 MCF/day       Maintain Flow Run       Maintain Turbine         1.39485 MCF/day       Turbine I flow Rate       Turbine I flow Rate         1.128.98 BTU/LBM       Turbine 1 Grand Total       Turbine I flow Rate         24.1276 MCF       11.9291 MCF       Grand Total         34.1276 MCF       633005 LBM       Turbine 1 Volume Flow         32.69.2       633005 LBM       Turbine 1 Volume Flow         37.3084       0 MMBTU       System Data         6.25 PSIG       Maintain Turbine       Alarms         163.55 In H2O       Image:	Field Name Location Name         Scanner 2000 Main blay         Field Name Location Name         Calibrate Inputs       O Maintain Flow Run       Field Name Location Name         Calibrate Inputs       O Configure         Calibrate Inputs       Configure         1.39485 MCF/day 341.278 MCF 1128.98 BTU/LBM       Turbine 1 Flow Rate       4571.89 Turbine 1 Grand Total         Current Day 32.569.2       Current Day 33.3084       O MMBTU         Exercise       Current Day Turbine 1 Volume Flow       429.12         System Data         Alarms       Supply / Battery Voltage       0.00 / 7.36 Temperature         Location Name	Field Name Location Name         Calibrate Inputs       Maintain Flow Rur       Maintain Turbine       Configure         1.39485       MCF/day 341.278       Turbine Data       Sconfigure         1.39485       MCF/day 341.278       Turbine 1 Flow Rate       4571.89       BBL/day         1128.98       BTU/LBM       Turbine 1 Flow Rate       4571.89       BBL/day         236.9.2       633005       LBM       Turbine 1 Volume Flow       429.12       4571.54         526.9.2       633005       LBM       Turbine 1 Volume Flow       429.12       4571.54         6.25       PSIG       MBTU       Aarms       Supply / Battery Voltage       0.00 / 7.36       V         6.25       PSIG       Image       Image       Date/Time       Jan 7, 2010       6.03:55 PM

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 162).

-low Run Selection	
• Flow Run 1	
Maintenance Task	
Change Averaging Pitot Tube     Change Gas Composition	

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).

Iasks Tools Help						
DOWNLOAD		ner 2000 - Device Name [s/n 4 intain Flow Run 1	4096]	Fie	te Name Id Name on Name	
					Save Changes	Exit Maintenance Moo
aintain Flow Run						
Selecte	d Flow Run Fl	ow Run 1				
Change Task		hange Averaging Pitot Tube				
New Averaging	Pitot Tube	Parameters	Current Averag		ube Param	eters
		Select Meter	Operator: None, Changed C	in:		
Model Number			Model Number	( To Be Config.	.red )	
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 op	tion 🔻	Probe Material	Stainless Steel	(304/316)	
Pipe Material	Select an op	tion 🔻	Pipe Material	Carbon Steel		
Serial Number			Serial Number			
Note			Note			
Clear New Data	Copy From Cur	rent				



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-17.

# Procedure: Change Averaging Pitot Tube Parameters

1. 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 162). 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.

ModWorX Pro 📧	ModWorX Pro 🔀	ModWorX Pro
Change Flow Run Maintenance Task	Change Flow Run Maintenance Task	Change Flow Run Maintenance Task
Flow Run Selection	Flow Run Selection	Flow Run Selection
Flow Run 1	Elow Run 1	• Flow Run 1]
Maintenance Task	Maintenance Task	Maintenance Task
Change Averaging Pkot Tube     O change Gas Composition	Change Averaging Pitot Tube  Change Gross Method Parameters	Change Averaging Rick Tube  Change Steam Properties
QK Gancel	QK Cancel	QK Cancel

#### Natural Gas (AGA-8 Detail)

Natural Gas (AGA-8 Gross)

Steam (IF-97)

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 Averaging Pitot Tube	Change Averaging Pitot Tube
Change Generic Liquid Parameters	Change MPMS Liquid Parameters
<u>QK</u> <u>Cancel</u>	QK

Liquid (Generic)

Liquid (MPMS)



- 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 164).

Iasks Tools Help						
DOWNLOAD		ntain Flow Run 1	4096]	Fie	te Name Id Name on Name	S
					Save Changes	Exit Maintenance Mode
aintain Flow Run						
Selecte	d Flow Run Flo	w Run 1				
Change Task		ange Averaging Pitot Tube				
		onge Hveruging Proc Fube				
New Averaging	Pitot Tube	Parameters	Current Averag	ing Pitot T	ube Parame	eters
		Select Meter	Operator: None, Changed O	n:		
Model Number			Model Number	( To Be Configu	red)	
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 opti	ion 🕶	Probe Material	Stainless Steel	(304/316)	
Pipe Material	Select an opt	ion 👻	Pipe Material	Carbon Steel		
Serial Number			Serial Number			
Note			Note			
Clear New Data	Copy From Curr	ent				

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).

elect Meter	Meter Informa		
reraging Pitot Tube inubar® 485 Size 1	Model Number	Averaging Pitol	t Tube
nubar® 485 Size 2 nubar® 485 Size 3	Probe Width	0.0000	inches
nubar® Type 10 nubar® Type 15	Discharge Coefficient (K)	0.7500	
nubar® Type 16 nubar® Type 25	Reference Temp.	68.0000	Deg F
inubar® Type 26 inubar® Type 35			
nubar® Type 36			
nubar® Type 45 inubar® Type 46			

Figure 11.6

- 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 preconfigured 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).

Flow Run 1	Change Flow Run I	namenance rask
Change Averaging Pitot Tube		
	Maintenance Task	
		QK Cance

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 166).
- 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.

asks Tools Help							
DOWNLOAD		2000 - Device	Name [s/n 4096] Cun 1		Site Field Location	iame .	6
					Cocación	vame	
					Save	Changes	Exit Maintenance M
intain Flow Run							
Change Task Selecter	d Flow Run Flow	Run 1					
Mainten	ance Task Chan	je Gas Compositi	on				
New Gas Compo	sition			Current Gas	Composition		
				Operator: None, Chang			
luid Properties Calculation	AGA-8 Detail				900 0111		
nalysis Ref. No.				Analysis Ref. No.			
eference Conditions	United States (14.2	'3 psi, 60 F)	-	Reference Conditions	United States (14.)	'3 psi, 60 F)	
leating Value	Calculated •	(calculated)		Heating Value	Calculated	(calculated)	
pecific Gravity	Calculated •	(calculated)		Specific Gravity	Calculated	(calculated)	
iscosity		]	¢P	Viscosity	Manual entry	0.010268	c0
	Manual entry		02				02
sentropic Exponent	Manual entry			Isentropic Exponent	Manual entry	1.3000	
as Fraction	(No wet correction)			Gas Fraction	(No wet correction)		
Clear New Data	Copy From Current	_					
	copy from content						
Constituent	Mole	% Chan	ge Mole %	Constituent	Mole		
1 Carbon Dioxide (CO2)		Cha	ar Mole %	1 Carbon Dioxide	(CO2) 0.59 0.25		
2 Nitrogen (N2) 3 Methane (C1)			x 19040 10	2 Nitrogen (N2) 3 Methane (C1)	96.52		
4 Ethane (C2)		Clear	All Mole %	4 Ethane (C2)	1.81	-	
5 Propane (C3)				5 Propane (C3)	0.45		
6 n-Butane (n-C4)		Load Co	omposition	6 n-Butane (n-C4)	) 0.10	07	
7 i-Butane (i-C4)				7 i-Butane (i-C4)	0.09	77	
8 n-Pentane (n-C5)				8 n-Pentane (n-CS	5) 0.03	24	
9 i-Pentane (i-C5)				9 i-Pentane (i-C5)			
10 n-Hexane (n-C6)				10 n-Hexane (n-C6			
11 n-Heptane (n-C7)				11 n-Heptane (n-C			
12 n-Octane (n-C8) 13 n-Nonane (n-C9)				12 n-Octane (n-C8) 13 n-Nonane (n-C9)			
13 n-Nonane (n-C9) 14 n-Decane (n-C10)				14 n-Decane (n-C1			
15 Oxygen (02)				15 Oxygen (O2)	0.00		
16 Carbon Monoxide (CO)	)			16 Carbon Monoxid			
17 Hydrogen (H2)				17 Hydrogen (H2)	0.00		
18 Hydrogen Sulfide (H2S	)			18 Hydrogen Sulfid			
19 Water (H2O)				19 Water (H2O)	0.00		
20 Helium (He)				20 Helium (He)	0.00		
21 Araon (Ar)	otal % 0.000	D		21 Araon (Ar)	0.00 Total % 100.000		
				Naba			
ate				Note			
ote							
lote							
ote mportant: Total of all co	nstituents must be	100%.					



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 this method, see Configuring Fluid Properties, page 64.

- 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

 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).

-low Run Se	election	
• Flow Run 1		
Maintenance	e Task	
Change Averagi	ng Pitot Tube	 
Change Gross M	ethod Parameters	



- 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).
- 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 64.
- 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.

Maintain Flow Run 1 - M	lodWorX Pro 4.0	).0					
e ∐asks Tools <u>H</u> elp							
DOWNLOAD		tain Flow	e Name [s/n 4096] Run 1			Name Name Name	<b>S</b>
					Sa	ve Changes	Exit Maintenance Mode
Maintain Flow Run							
	d Flow Run Flow	Run 1					
Change Task Mainter	nance Task Char	nge Gross Metho	d Parameters				
New Gross Meth Fluid Properties Calculation Analysis Ref. No.	AGA-8 Gross	ters		Current Gross Operator: None, Changed Analysis Ref. No.		ameters	
Reference Conditions	United States (14	.73 psi, 60 F)	•	Reference Conditions	United States (14	4.73 psi, 60 F)	
Heating Value	Manual entry		BTU/SOF	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 Curren	at III		Note			
vice Interface User Manuals							
				U58 4	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 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.

 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).

ModWorX Pro
Change Flow Run Maintenance Task
Flow Run Selection
• Flow Run 1
Maintenance Task  Change Averaging Pitot Tube
Change MPMS Liquid Parameters
<u>o</u> k



- 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 171).
- 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 64.
- 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 - ModW	/orX Pro 4.1.0			
<u>File 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
				A
Maintain Flow Run				
Change Task Selected Flo	w Run Flow Run 1			
Maintenanc	e Task Change MPMS Liquid Parameters			
New MPMS Liquid I	Parameters		Liquid Parameters	
Fluid Properties Calculation M	PM5 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	
* A typical viscosity of this liquid is	about 6.0 cP. However, for accurate results the e determined.			
* Note that the Density or Specific	: Gravity is at base temperature and the			
Viscosity is at flowing temperatu	re.			
Clear New Data C	opy 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

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.

 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, page 172).

low Run Selec	tion	
• Flow Run 1		
Maintenance T	ask	
Change Averaging Pit	ot Tube	 
Change Generic Liquid	Parameters	



- 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 - Me	odWorX Pro 4.1.0			
<u>E</u> ile <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	d Flow Run 1 ance Task Change Generic Liquid Parameters			
New Generic Liq Fluid Properties Calculation	uid Parameters Generic Liquid	Current Generic Operator: <port 1="" default="">, (</port>	Liquid Parameters Thanged 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	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.	equired. If it is not known, use the same value as for Flow	-		
A typical viscosity of this liq flowing viscosity should be in	uid is about 1.0 cP. However, for accurate results the ac determined.	tual		
* Note that the Viscosity para	meter 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

- 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 64.
- 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.

# 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).

∐asks Tools <u>H</u> elp							
		2000 Main	/n_4096] play		Site Name Field Name Location Name		C
fresh Auto-Refresh							Re
- 53	Calibrate Inputs	O Mainta	in Flow Run	🛞 Maintain Turbine	Configure		
Flow Run Data				Turbine Data			
Flow Rate	1.39485	MCF/day		Turbine 1 Flow Rate	4571.89	BBL/day	
Daily Total (est.)	341.278	MCF		Turbine 1 Grand Total	14323	BBL	
Enthalpy	1128.98	BTU/LBM					
	Current Day	Previous Day	,		Current Day	Previous Day	
Volume Flow	34.1278	11.9291	MCF	Turbine 1 Volume Flow	429.12	4571.54	BBL
Mass Flow	3269.2	633005	LBM				
Energy	37.3084	0	MMBTU				
			DETAILS				DETAIL
Input Data				System Data			
Static Pressure	6.25	PSIG		Alarms			ALARM
Differential Pressure	163.55	In H2O		Supply / Battery Voltage	0.00 / 7.36	V	
Process Temperature	230.31	Deg F	6	Temperature	163.00	Deg F	
				Date/Time	Jan 7, 2010	6:03:55 PM	
			DETAILS				DETAILS
e Interface User Manuals							

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 176). 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	Change Gross Method Parameters
Ōĸ	QK



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

2		2000 - Device Na				Site N Field N		6
DOWNLOAD	Maint	ain Flow Ru	n 1			Location N		Q
						Save	Changes	Exit Maintenance Mo
intain Flow Run								
	Flow Run Flow R	un 1						
Change Task Mainten	ance Task Chang	e Gas Composition						
lew Gas Compo	sition			Cu	rent Gas Com	position		
id Properties Calculation	AGA-8 Detail				tor: None, Changed On:			
alysis Ref. No.				Anabe	is Ref. No.			
			1					
eference Conditions	United States (14.7		1		ence Conditions	United States (14.7		
sating Value	Calculated •	(calculated)		Heatir	ig Value	Calculated	(calculated)	
ecific Gravity	Calculated •	(calculated)		Specif	ic Gravity	Calculated	(calculated)	
scosity	Manual entry		ďP	Viscos	tγ	Manual entry	0.010268	cP
entropic Exponent	Manual entry			Isenti	opic Exponent	Manual entry	1.3000	
is Fraction	(No wet correction)	-	Č	Gas F	action	(No wet correction)		
1 Carbon Dioxide (CO2) 2 Nitrogen (N2)		Change Clear M		1 2	Carbon Dioxide (CO2) Nitrogen (N2)	0.595	5	
3 Methane (C1)				3	Methane (C1)	96.522		
4 Ethane (C2)		Clear Al	Mole %	4	Ethane (C2)	1.818		
5 Propane (C3)				5	Propane (C3)	0.459		
6 n-Butane (n-C4) 7 i-Butane (i-C4)		Load Com	position	6	n-Butane (n-C4) i-Butane (i-C4)	0.100		
8 n-Pentane (n-C5)				8	n-Pentane (n-C5)	0.097		
9 i-Pentane (i-C5)				9	i-Pentane (i-C5)	0.047		
10 n-Hexane (n-C6)					n-Hexane (n-C6)	0.066		
11 n-Heptane (n-C7)				11	n-Heptane (n-C7)	0.000	0	
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 (02)				14	n-Decane (n-C10) Oxygen (O2)	0.000		
16 Carbon Monoxide (CO)					Carbon Monoxide (CO)	0.000		
17 Hydrogen (H2)					Hydrogen (H2)	0.000		
18 Hydrogen Sulfide (H2S)				18	Hydrogen Sulfide (H2S)	0.000		
19 Water (H2O)				19	Water (H2O)	0.000		
20 Helium (He)				20	Helium (He)	0.000		
21 Aroon (Ar)	otal % 0.0000			21	Aroon (Ar)	0.000 otal % 100.0000		
	0.0000	·		_	10	nai % 100.0000	'	
ote				Note				
nportant: Total of all cor	stituents must be	100%.	1					

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 176).
  - 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 176).
- 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 this method, see Configuring Fluid Properties, page 64.
- 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 176).
  - 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).

🎢 Maintain Flow Run 1 - M	odWorX Pro 4.0	1.0					
Eile Iasks Tools Help							
DOWNLOAD		tain Flow f	Name [s/n 4096] Run 1			Name Name Name	
					Sa	ve Changes	Exit Maintenance Mode
Maintain Flow Run							<u>^</u>
Change Task		Run 1 Ige Gross Method	l Parameters				
New Gross Meth Fluid Properties Calculation Analysis Ref. No.	nod Parame AGA-8 Gross	ters		Current Gross Operator: None, Changed Analysis Ref. No.		ameters	
Reference Conditions	United States (14.	73 psi, 60 F)	•	Reference Conditions	United States (14	1.73 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	œ
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 Curren	Ł		Note			
Device Interface User Manuals							<u>×</u>
				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 12.4

- 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 64.
- 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).

aska Tools Help						
DOWINLOAD		Scanner 2000 - [s/n 0] Maintain Flow Run 1				
				s	ave Changes	Exit Maintenance Mod
intain Flow Run						
Change Task.	d Flow Run Flow I	tun 1 je MPMS Liquid Parameters				
New MPMS Liqu	id Paramete	rs	Current MPMS Operator: <port 1="" default<="" td=""><td></td><td></td><td></td></port>			
luid Properties Calculation	MPPIS Crude OI	1	Analysis Ref. No.	.,,.		
ensity Source	Absolute Density	•	Density Source	Specific Gravity		
ase Absolute Density		KG/M3	Base Specific Gravity	1.000		
iscosity		ø	Viscosity	6.000000	ď	
A typical viscosity of this lic actual flowing viscosity sho Note that the Density or 5p Viscosity is at flowing temp	uld be determined. recific Gravity is at bas	wever, for accurate results the etemperature and the				
Clear New Data	Copy From Current	Load Default Params				
ote			Note			

Figure 12.5

- 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.
- 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 64.
- 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 - ModWo	orX Pro 4.1.0				
<u>File 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 Maintenance					
New Generic Liquid Fluid Properties Calculation Ger Analysis Ref. No.	Parameters neric Liquid	Current Generic Operator: <port 1="" default="">, Analysis Ref. No.</port>			
Flowing Density Calculation Ma	nual Entry of Flowing Density	Flowing Density Calculation	Manual Entry of Flo	wing Density	
Density Source Ab:	solute 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	сP	
Density.					
	py From Current Load Default Params				
Note		Note			
Device Interface User Manuals		USB 4.1	.0.468 <port 1<="" td=""><td>Default&gt;</td><td>7/23/2013 11:58 AM</td></port>	Default>	7/23/2013 11:58 AM



- 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: 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 64.
- 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.

# 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 69.

A single turbine input is available with the standard Scanner 2000. If an optional expansion board is installed in a Scanner 2000 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).



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 184).

	Turbine Flowmeter 1  Aaintenance Task      Change Turbine Flowmeter		
Change Turbine Flowmeter	Change Turbine Flowmeter		
		Maintenance Task	
		-	



- 3. Select the appropriate flowmeter, if applicable. If an optional expansion board is installed in the Scanner 2000 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).

77 Maintain Turbine Flowmeter 1 -	ModWorX Pro 4.0.0			
Ele Iasks Tools 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 Turbine				
Maintenance Ta New Flowmeter Infor			neter Information	
Meter Model Number Meter Serial Number		Meter Model Number Meter Serial Number	NuFlo 2" Liquid	
Nominal K-Factor		Nominal K-Factor	55.0 pulses/GAL	
Clear New Data Copy F	rom Current			
Device Interface User Manuals		US8	4.0.0.446 <port 1="" default=""></port>	1/19/2010 7:03 PM

Figure 13.3

### Procedure: Change Turbine Flowmeter Model

 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).

ModWorX Pro 💽
Change Turbine Maintenance Task
Turbine Flowmeter Selection
• Turbine Flowmeter 1
Maintenance Task
Change Turbine Flowmeter
Change K-Factors
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).

asks Tools Help					
DOWNLOAD	scanner 2000 - Device Name [s/n 409 Maintain Turbine Flowme		Fi	ite Name eld Name ion Name	(
				Save Changes	Exit Maintenance Mode
Change Task Selected Turbine Maintenance Tas					
New Flowmeter Infor	mation Select Meter	Current Flown Operator: <port 1="" default<="" td=""><td></td><td></td><td></td></port>			
eter Model Number		Meter Model Number Meter Serial Number	NuFlo 2" Liqu	d	
ominal K-Factor		Nominal K-Factor	55.0	pulses/GAL	
ote		Note			
Clear New Data Copy F	rom Current				
Interface User Manuals					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 - 3/8"	Meter Name	NuFlo Liquid -	1"
NuFlo Liquid - 1/2" NuFlo Liquid - 3/4" NuFlo Liquid - 7/8" NuFlo Liquid - 1"	Meter Model No. Meter Serial No.	NuFlo 1" Liqui	1
NuFlo Liquid - 1-1/2" NuFlo Liquid - 2" NuFlo Liquid - 3"	Low Flow Rate	5.0	GAL/MIN
NuFlo Liquid - 4" NuFlo Liquid - 6"	High Flow Rate	50.0	GAL/MIN
NuFlo Liquid - 8" Series 1000 - 1/4" Series 7100 - 3/6" Series 7100 - 3/6" Series 7100 - 3/6" Series 7100 - 5/8" Series 7100 - 3/4" Series 7100 - 1-1/2" Series 7100 - 1-1/2" Series 7100 - 3" Series 7100 - 6" Series 7100 - 6" Series 7100 - 6"	Nominal K-Factor	900.0	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**

 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, page 187).

Furbine Flowme	ter Selection	
• Turbine Flowmeter 1		
Maintenance Ta	sk	
<ul> <li>Change Turbine Flowm</li> <li>Change K-Factors</li> </ul>	ter]	

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).

Maintain Turbine Flowmeter Tasks Tools Help	1 - ModWorX P	ro 4.0.0			
DOWNLOAD		0 - Device Name [s/n 4096] n Turbine Flowmete	r 1	Site Name Field Name Location Name	
				Save Changes	Exit Maintenance Mode
Change Task Selected Tur Maintenance		lowmeter 1 -Factor			
New K-Factors Calibration Working Units	pulses/GAL 👻	Entry Mode	Current K-Factors Operator: None, Calibrated On: Prequency Pact	or	
		Multi-point K-Factors	Linear K-Fa 900.000		
		Load K-Factors From	pulses/G		
Note			Note		
ice Interface User Manuals					
Contracting of the mandata			USB 4.0.0.444	<pre>&gt; </pre>	1/20/2010 10:39 AM

Figure 13.8

- 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.

# 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, 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 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).

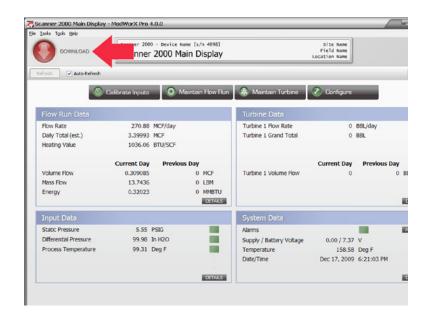


Figure 14.1

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

ModWorX Pro
Download Device Data
Select the range of log records to download
Download New Records Only
O Download All Records
Select the log types to include in the download   Daily Logs
✓ Interval Logs ✓ Event Logs and Alarm Logs
Select additional device data to include in the download
✓ Configuration Settings
Calibration Settings
Holding Registers Data Snapshot



- 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 47, 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 194.

### Procedure: Configuring an Automatic Download

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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).

💏 W	elcome	- Mod\	WorX Pro 4.2.0	
<u>F</u> ile	<u>T</u> asks	T <u>o</u> ols	<u>H</u> elp	
			View Modbus Holding Regist	ers
			View All Modbus Registers	Shift+Ctrl+R
			Manage Configuration	
			Clear Flow Totals	
			Clear Memory	
			Copy EEPROM To File	
			Create Archive Partials	
			Change Power Saving Mode.	
			Reset User Security	
			Modbus Statistics	
			Select COM Port	
			Options	Shift+Ctrl+O



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 Optic	ns	
Options General Communications Commetcon Auto-Download Download Directories	Auto-Download Options  Automatically begin downloading device data after connecting  Select the range of log records to auto-download  Download All Records Only  Download All Records  Select the log types to include in the auto-download  Maily Logs  Maily Logs  Select additional device data to include in the auto-download  Configuration Settings  Calibration Settings  Calibration Settings  Holding Registers Data Snapshot	
		QK Cancel



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.

ile <u>T</u> asks T <u>o</u> ols <u>H</u> elp									
	DAD	Scanner 2000 Device Re	- Device Name [s. eports	/n 4096]		Site Field Location		S	シン
						_		Do	ne
Download	Daily L	ogs Interval Logs Eve		s Configuration C	alibration Snapshol	t			_
	Sort O	rder	Filter?						
Mark All as Read	Defa	ult (As downloaded) 🛛 👻	🕼 Filter by M	Ionth/Day None sele	cted *	Start Date 1/7/2	010 4:00:00 PM		
Save SDF File			😰 Filter by D	ate Range		End Date 1/20/	2010 1:00:00 PM 🔹 👻	Apply	
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	
Print Table			(MCF)	(LBM)	(MMBTU)	(In H2O)	(PSIA)	(Deg F)	
	238	01/17/2010 13:00:00	29.6750	1362.6005	30.6076	32.4890	124.7300	28.9288	
View Trends		01/17/2010 14:00:00	36.0724	1656.3531	37.2060	36.0025	124.7300	28.9289	
	_	01/17/2010 15:00:00	34.3540	1577.4515	35.4337	35.2601	124.7300	28.9337	
Email SDF File	_	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	
Email Data 🔹		01/17/2010 18:00:00	55.1505	2532.3723	56.8837	56.4557	124.7300	28.9545	
		01/17/2010 19:00:00	50.5169	2319.6116	52.1045	49.8941	124.7300	28.9485	
		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	
	-	01/17/2010 22:00:00	39.4872	1813.1536	40.7282	40.5340	124.7300	28.9330	
		01/17/2010 23:00:00	33.6254	1543.9969	34.6822	34.5113	124.7300	28.9247	
		01/18/2010 00:00:00	21.4190	983.5075	22.0921	29.3295	124.7300	28.9263	
		01/18/2010 01:00:00	16.5581	760.3083	17.0785	23.0018	124.7300	28.9261	
	_	01/18/2010 02:00:00	13.6644	627.4376	14.0939	23.2466	124.7300	28.9088	
		01/18/2010 03:00:00	11.3266	520.0875	11.6825	20.4143	124.7300	28.9152	
		01/18/2010 04:00:00	13.0180	597.7539	13.4271	21.5941	124.7300	28.9089	
	_	01/18/2010 05:00:00	10.4574	480.1787	10.7861	20.4229	124.7300	28.9104	
	_	01/18/2010 06:00:00	8.7488	401.7230	9.0237	19.5141	124.7300	28.9096	
Show Download Stats		01/18/2010 07:00:00	12.3795	568.4362	12.7686	22.0659	124.7300	28.9126	
STOM DOMINGAD SCACE	257	01/18/2010 08:00:00	18.3597	843.0321	18.9367	24.3392	124.7300	28.9204	

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 193). 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.

∐asks Tools Help	)							
		0 - Device Name [s. Reports	/n 4096]		Site Field Location		Ó	R
							Do	one
Download	Daily Logs Interval Logs Ev		s Configuration C	alibration Snapshot	t			_
Mark All as Read	Sort Order Default (As downloaded)	Filter?	Ionth/Day None sele	cted *	Start Date 1/7/2	010 4:00:00 PM 👻		
Save SDF File	Default (As downloaded) Date/Time - Earliest First Date/Time - Latest First	Filter by D	late Range		End Date 1/20/	2010 1:00:00 PM 🔹	Apply	
Export Data	Record Number - Ascending Record Number - Descending Rec Timestamp	Flow Run 1 Volume	Flow Run 1 Mass Total	Flow Run 1 Energy Total	Differential Pressure	Static Pressure (A)	Process Temperature	
Print Table		(MCF)	(LBM)	(MMBTU)	(In H2O)	(PSIA)	(Deg F)	
View Trends	238 01/17/2010 13:00:00	29.6750 36.0724	1362.6005	30.6076	32.4890 36.0025	124.7300	28.9288 28.9289	
Tent mentos	239 01/17/2010 14:00:00 240 01/17/2010 15:00:00	34.3540	1656.3531 1577.4515	37.2060 35.4337	35.2601	124.7300 124.7300	28.9289	
Email SDF File	240 01/17/2010 15:00:00	46,7047	2144.5627	48.1725	46,8249	124.7300	28,9431	
	242 01/17/2010 17:00:00	51.6578	2371.9973	53.2813	52,5439	124,7300	28,9442	
Email Data	243 01/17/2010 18:00:00	55.1505	2532.3723	56.8837	56.4557	124.7300	28,9545	
-	244 01/17/2010 19:00:00	50.5169	2319.6116	52.1045	49.8941	124.7300	28.9485	
	245 01/17/2010 20:00:00	48.0860	2207.9910	49.5973	47.3365	124.7300	28.9393	
	246 01/17/2010 21:00:00	46.8044	2149.1414	48.2753	46.7750	124.7300	28.9437	
	247 01/17/2010 22:00:00	39.4872	1813.1536	40.7282	40.5340	124.7300	28.9330	
	248 01/17/2010 23:00:00	33.6254	1543.9969	34.6822	34.5113	124.7300	28.9247	
	249 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	
yow Download Stats	257 01/18/2010 08:00:00	18.3597	843.0321	18.9367	24.3392	124.7300	28.9204	

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 194). 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.

le <u>T</u> asks T <u>o</u> ols <u>H</u> elp									
DOWNLO	DAD	Scanner 2000 Device Re	- Device Name (s. Ports	/n 4096]		Site Field Location		6	R
-								Dor	10
Download	Daily I	logs Interval Logs Ever		s Configuration Calibrati	on Snapshot				
	Sort C	inder	Filter?						
Mark All as Read	Defa	uit (As downloaded) 🛛 🖛	Filter by M	orth/Day None selected		Start Date 1/7/2	010 4:00:00 PM ·		
Save SDF File			C Filter by D	ate Range January 2010 Jan 7, 2010 Jan 8, 2010	î	End Date 1/20/	2010 1:00:00 PM 👻	Apply	
Export Data ·	Rec	Timestamp	Flow Run 1 Volume (MCF)	Flow Ru Mass Tc (1.8M) Jan 9, 2010 Jan 10, 2010 Jan 11, 2010	1	Differential Pressure (In H20)	Static Pressure (A) (PSIA)	Process Temperature (Deg F)	1
Elar Japan		01/17/2010 13:00:00	29,6750	Jan 12, 2010		32,4890	124,7300	20.9200	
View Trends		01/17/2010 14:00:00	36,0724	1656,3531	37,2060	36,0025	124,7300	28,9289	
-		01/17/2010 15:00:00	34,3540	1577.4515	35,4337	35,2601	124,7300	28,9337	
Ernal SDF Ele	241	01/17/2010 16:00:00	46.7047	2144.5627	48.1725	46.8249	124,7300	28.9431	
	242	01/17/2010 17:00:00	51.6578	2371.9973	53.2813	52.5439	124.7300	28.9442	
Email Data -	243	01/17/2010 18:00:00	\$5,1505	2532.3723	56.8837	56,4557	124,7300	28.9545	
	244	01/17/2010 19:00:00	50.5169	2319.6116	52.1045	49.8941	124.7300	28.9485	
	245	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	
		01/17/2010 22:00:00	39.4872	1813.1536	40.7282	40.5340	124.7300	28.9330	
Show Download Stats		01/17/2010 23:00:00	33.6254	1543.9969	34.6822	34.5113	124.7300	28.9247	
argon promisodo stats	249	01/18/2010 00:00:00	21.4190	983.5075	22.0921	29.3295	124.7300	28.9263	
evice Interface User I									

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									
DOWNLO	AD	Scanner 2000 Device Re	- Device Name [s,	/n 4096]		Site Field Location		6	
								Dor	xxe
Download	Daily Lo	gs IntervalLogs Ever	t Logs Alarm Logs	Configuration	alibration Snapshot				
Jark All as Read	Sort On	der It (As downloaded) 👻	Fiter?	and Day		-	/2010 04:00:00 PM 💌		
ave SOF File	Ceres		<ul> <li>Filter by D</li> </ul>	onth/Day None sele ate Range	cted *	Start Date 1/20/		Apply	
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		THILESCOND	(MCF)	(LBM)	(MMBTU)	(In H2O)	(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	
⊻iew Trends	239	01/17/2010 14:00:00	36.0724	1656.3531	37.2060	36.0025	124.7300	28.9289	
	240	01/17/2010 15:00:00	34.3540	1577.4515	35.4337	35.2601	124.7300	28.9337	SMTWTFS
nal SDF Ele	241	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 •	243	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
	244	01/17/2010 19:00:00	50.5169	2319.6116	52.1045	49.8941	124.7300	28.9485	
	245	01/17/2010 20:00:00	48.0860	2207.9910	49.5973	47.3365	124.7300	28.9393	10 11 12 13 14 15 16
	246	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
vy Download Stats		01/17/2010 23:00:00	33.6254	1543.9969	34.6822	34.5113	124.7300	28.9247	04.00.00 PM
	0.00	01/18/2010 00:00:00	21.4190	983.5075	22.0921	29.3295	124.7300	28.9263	- 31 1 2 3 4 5 6 04:00:00 PM

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, page 195. 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-21.

e Iasks Tools Help		[						-	
DOWNL	DAD	Device Re							
<u> </u>		-						Dor	ne
Download	Daily L	ogs Interval Logs Ever	t Logs Alarm Log	s Configuration C	alibration Snapshot	1			
	Sort O	rder	Filter?						
Mark All as Read	Defa	uit (As downloaded)	🖉 Filter by M	Ionth/Day None sele	cted -	Start Date 2/4/2	010 2:14:00 PM +	Apply	
Save SDF File			🖲 Filter by D	ate Range		End Date 2/4/2	010 2:14:00 PM +		
Export Data	Rec	Timestamp	Flow Run 1 Yolume (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)	
0	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	2.1636	96.2072	2.2417	170.3627	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	
	1867	02/04/2010 13:50:00	2.1643	96.2348	2.2423	170.4685	1014.7300	28.9685	
	1868	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 13:56:00	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	
		02/04/2010 14:00:00	2.1656	96.2936	2.2437	170.6764	1014.7300	28.9639	
bow Download Stats	1878	02/04/2010 14:01:00	2.1657	96.2993	2.2438	170.6901	1014.7300	28.9447	
	4								•

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).

e <u>I</u> ad	sks Tools Help		
1	Return to Welcome Page	Scanner 2000 - Device	Name [s/n 4096]
	Calibrate Inputs Maintain Flow Run	Scanner 2000 M	lain Display
F	Maintain Turbine		
	Configure		
	Download	librate Inputs 🛛 💽 N	Vlaintain Flow Ru
	View Device Reports		
н	Refresh P5		
F	low Rate	0 MCF/day	
D	ally Total (est.)	0 MCF	

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, page 196).



### 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 file-name to view the .sdf files.

Open Scanner	2000/2200 Data File	23
Look jn:	🗀 ModWolX Pro 🗨 🗲 🖝 💷 -	
My Recent Documents Desktop	C Auto-Logging Files Field_Name	
My Documents		
My Computer		
My Network Places	File name:     Image: Ima	

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).

Open Scanner	2000/2200 Data File	23
Look jn:	🔁 Site_Name 💌 🗢 🖻 📸 📰 -	ModWorX Data File
My Recent Documents Desktop My Documents My Computer	Device_Name_20001217_1747.sdf     Device_Name_20100114_1354.sdf     Device_Name_20100114_1356.sdf     Device_Name_20100120_1327.sdf	Vertin: SDF 1.0 Creator: McMorX Pro 4.0.0 Pirsware: 3.06 Download: 12/17/2009 17:47:49 - Daily Logs Interval Logs Configuration (Basic) - Range - 12/15/2009 12:00:00 12/17/2009 16:00:00
My Network Places	File pame:         Device_Name_20031217_1747.sdf         Open           Files of type:         Scanner 2000/2200 Data Files (*.sdf)         Cancel	

Figure 14.13

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. If an optional expansion board is installed in a Scanner 2000 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, page 198.

🏹 View Trends					=
Print Daily Log Trends In	Export •				Done
Daily cog menos III	icerval Log Trends				
Enable All Disab		Set Time Axis Range	Zoom Out Time Axis Zoom In Time Axi	is Reset Time Axis	
Timestamp	Value 01/06/2010 13:23:00	Differential P	Pressure (In H2O)		Differential Pressure
Log Record No.	53				2010/01/06 13:29:00
Date	10610.000	210			2010/01/06 13:29:00 Value: 196.770 In H2O
Time	132300.000	200		<u>ر</u> ا	
Flow Run 1 Volume		190 -			
Flow Run 1 Mass Total				in the second se	
Flow Run 1 Energy Total					
		160			
Differential Pressure		140			
Static Pressure (A) Process Temperature		130			
		120			
Flow Run 1 Flow Time	60.000 sec	110			
Turbine 1 Volume	0.762 BBL	100 -			
Turbine 1 Flow Time	60.000 sec	90 -			
		80			
		70			
		60 - 50 -			
		40			
		30 -			
		20			
		10			
		0			
		-10 -			
		01/06/2010 13:06			01/06/2010 13
		•			
					1/6/2010 5:03:43 PM



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, page 199, 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).

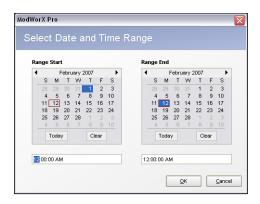


Figure 14.15

- 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). 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 lightbulb icon indicates that the parameter trend line is enabled for display (Figure 14.16).
  - 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.

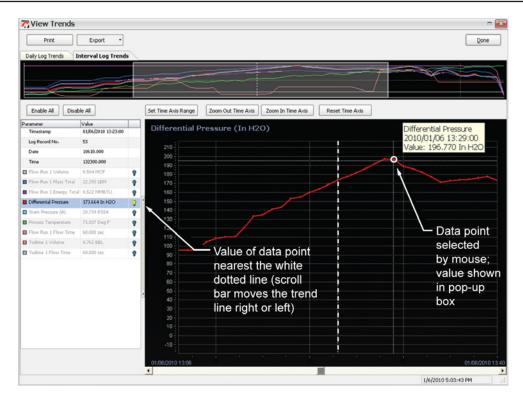
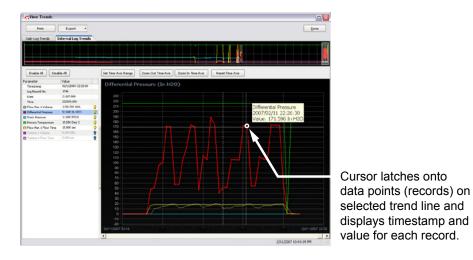


Figure 14.16

- 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, page 200). This Record Index line remains in a fixed location, and marks the record being read. In Figure 14.16, page 200, 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). 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.



#### Figure 14.17

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 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.

le <u>T</u> asks T <u>o</u> ols <u>H</u> elp	· · · · · · ·						
DOWNLO	DAD	Scanner 2000 - Device Re				6	R.
						Do	ne
Download	Daily Logs	Interval Logs Even	t Logs Alarm Logs Configu	ration Calibration Snapshot			
Mark All as Read	Sort Order		Fiker?				
Mark All as Read	Default (As	downloaded) -	Filter by Month/Day	None selected •	Start Date 1/21/2010 8:44:41 AM	•	
Save SDF File			n Hiter by Date Range		End Date 2/3/2010 5:34:01 FM	* Apoly	
Export Data •	Rec T	imestamp	Register Name	Old Value	New Yalue	Units	
	919 01/2	1/2010 16:45:22 Pc	ort 1 Login	<port 1="" default<="" td=""><td>&gt; <port 1="" default=""></port></td><td></td><td></td></port>	> <port 1="" default=""></port>		
Brint Table	920 01/2	2/2010 08:27:48 Pc	ort 1 Login	<port 1="" default<="" td=""><td>&gt; <port 1="" default=""></port></td><td></td><td></td></port>	> <port 1="" default=""></port>		
	921 01/2	2/2010 14:22:57 Pc	ort 1 Login	<port 1="" default<="" td=""><td>&gt; <port 1="" default=""></port></td><td></td><td></td></port>	> <port 1="" default=""></port>		
Yew Trends	922 01/2	2/2010 14:32:58 Pc	ort 1 Login	<port 1="" default<="" td=""><td>&gt; <port 1="" default=""></port></td><td></td><td></td></port>	> <port 1="" default=""></port>		
	923 01/2	5/2010 08:31:29 Pc	ort 1 Login	<port 1="" default<="" td=""><td>&gt; <port 1="" default=""></port></td><td></td><td></td></port>	> <port 1="" default=""></port>		
Email SOF File	924 02/0	3/2010 16:46:30 Pc	ort 1 Login	<port 1="" default<="" td=""><td>&gt; <port 1="" default=""></port></td><td></td><td></td></port>	> <port 1="" default=""></port>		
	925 02/0	3/2010 16:47:42 FR	1 Calculation Period	1 m	in 15 sec		
Email Data •		3/2010 16:48:38 D			0 50	In H20	
		3/2010 16:49:17 5			io Yes		
		3/2010 16:49:17 5			0 1000	PSIG	
		3/2010 16:52:27 TI		17.142		BBL/day	
		3/2010 17:16:58 A			1 0	v	
		3/2010 17:17:05 A		PSI			
		3/2010 17:17:05 A		Disable			
			I - Input Signal Type	1 to 5 Vo	It 4 to 20 mA provide to 20 mA		
		3/2010 17:17:06 A	1 - Transducer Type 1 - Sensor Range High	Static Pressure Transduce 100		In H20	
			I - Input Signal Type	4 to 20 m		111120	
			L - Sensor Range High	4 to 20 m		In H20	
		3/2010 17:25:19 A		5 50		In the o	
		3/2010 17:29:15 A		Disable			
			I - Input Signal Type	1 to 5 Ve			
Show Download Stats		3/2010 17:30:34 A		5 50			
		3/2010 17:34:01 In		1 ho	r 1 min		
exice Interface Uper I	Manuals						

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 202).

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

llasks Tools Help							Don
Qpen SDF File	Daily L		vent Logs Alarm Log	Sapple Configuration Calibration Snapsho	×		
Export Data				Month/Day None selected •	Dearc Date 1		Apply
Print Table			n Filter by	Date Range	End Date 1/20/2010	11:17:07 AM *	
Yew Trends	Rec	Timestamp	Status	Register Name	Value	Units	
	663	01/20/2010 10:13:29	Low Alarm Reset	DP Instant Reading	34.0714	In H2O	
Email SDF Elle	664	01/20/2010 10:13:52	Low Alarm Set	DP Instant Reading	-47.2009	In H2O	
	665	01/20/2010 10:13:55	Low Alarm Reset	DP Instant Reading	8.32056	In H2O	
Email Data •	666	01/20/2010 10:19:23	Low Alarm Set	DP Instant Reading	-42.5757	In H2O	
	667	01/20/2010 10:19:25	Low Alarm Reset	DP Instant Reading	1.74335		
	668	01/20/2010 10:20:43	Low Alarm Set	DP Instant Reading	-41.4621	In H2O	
	669	01/20/2010 10:20:44	Low Alarm Reset	DP Instant Reading	48.6339	In H2O	
	670	01/20/2010 10:24:26	Low Alarm Set	DP Instant Reading	-56.5406	In H2O	
	671	01/20/2010 10:24:27	Low Alarm Reset	DP Instant Reading	44.5575		
	672	01/20/2010 10:36:05	Low Alarm Set	DP Instant Reading	-46.7817	In H2O	
	673	01/20/2010 10:36:06	Low Alarm Reset	DP Instant Reading	42.5395	In H2O	
	674	01/20/2010 10:38:09	Low Alarm Set	DP Instant Reading	-50.7733		
	675	01/20/2010 10:38:10	Low Alarm Reset	DP Instant Reading	49.5939		
	676	01/20/2010 10:39:59	Low Alarm Set	DP Instant Reading	-41.5789		
	677	01/20/2010 10:40:00	Low Alarm Reset	DP Instant Reading	37.0141		
	678	01/20/2010 10:43:54	Low Alarm Set	DP Instant Reading	-44.9271		
	679	01/20/2010 10:43:55	Low Alarm Reset	DP Instant Reading	33.1537	In H2O	
	600	01/20/2010 10:46:54	Exit Maintenance	Special event			
	682	01/20/2010 10:48:30	Low Alarm Set	DP Instant Reading	-40.6185		
	683	01/20/2010 10:48:31	Low Alarm Reset	DP Instant Reading	26.4858		
	684	01/20/2010 10:48:49	Low Alarm Set	DP Instant Reading	-42.7194		
	685	01/20/2010 10:48:50	Low Alarm Reset	DP Instant Reading	13.4744		
	686	01/20/2010 11:15:48	Low Alarm Set	DP Instant Reading	-43.1508		
	687	01/20/2010 11:15:49	Low Alarm Reset	DP Instant Reading	68.9905		
	688	01/20/2010 11:17:06	Low Alarm Set	DP Instant Reading	-59.9784		
	689	01/20/2010 11:17:07	Low Alarm Reset	DP Instant Reading	39.2015	In H2O	

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.

Itine Reports - Mo Iasks Tools					
					D
Open SDF File	Daily Logs Interval Logs Ev	ent Logs Alarm Logs Configuration Ca	libration Snaps	shot	
-	Description	Value	Units		
Export Data •	Base Conditions				
	Base Temperature	60	Deg F		
Print Report	Base Pressure	14.73	psi		
	Atmospheric Pressure	14.73	psi		
Yew Trends	Pipe				
	Pipe Size	2.067	inches		
Email SDF Ele	Pipe Material	Carbon Steel			
	Tap Type	Flange Tapped			
Email Data	Orifice Plate				
	Plate Size	1	inches		
	Plate Material	Stainless Steel (304/316)			
	Plate Model Number				
	Plate Serial Number				
	Reference Temperature	68	Deg F		
	Low Pressure Cutoff	1	In H2O		
	Reference Conditions	United States (14.73 psi, 60 F)			
	Isentropic Exponent	1.3			
	Viscosity	0.010268	æ		
	Specific Gravity	Calculated			
	Heating Value	Calculated			
	Gas Fraction	No wet correction			
	Gas Composition				
	Analysis Ref. No.				
	Carbon Dioxide (CO2)	0.5956	16		
	Nitrogen (N2)	0.2595	96		
	Methane (C1)	96.5222	%		
	Ethane (C2)	1.8186	%		
	Propane (C3)	0.4596	75		
	n-Butane (n-C4)	0.1007	%		
	i-Butane (i-C4)	0.0977	%		
	n-Pentane (n-C5)	0.0324	96		
	i-Pentane (I-C5)	0.0473	%		
	n-Hexane (n-C6)	0.0664	%		
oorts User Manuals					
			USB	4.2.0.485	3/6/2017 10:51 AM

Figure 14.20

# **Calibration Settings Report**

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

gourses reason	Ny Logs Interval Logs erential Pressure Zero Offset On: Operator: Absolute Offset 			evention Calibration Snapphot +235 DP Zero Offset 16 460 0 DP Yer JJ 460	Dor
Export Data • Diffe Eyint Report View Trends Email SDF Ele	Verified On: Verif	11/24/2016 <port 1default=""> 0 </port>	14:51:23 In H2O	+235 DP Zero Offset 16 480	
Bint Report	Zero Offset On: Operator: Absolute Offset 	<port 1default=""> 0 </port>	In H20		
Brint Report	Operator: Absolute Offset  Verification (Current) Verified Operator:	<port 1default=""> 0 </port>	In H20		
View Trends Email SDF Ele	Absolute Offset 	0 		0 DP Ver 13 480	
Email SDF Ele	Verification (Current) Verified On: Verified Operator:	11/24/2016 «Port 1 Default»		0 DP Ver 13 480	
	Verification (Current) Verified On: Verified Operator:	11/24/2016 <port 1="" default=""></port>		0 DP Ver 13 480	
	Verified On: Verified Operator:	«Port 1 Default>	16:00:38	0 DP Ver 13 480	
Email Data •	Verified On: Verified Operator:	«Port 1 Default>	16:00:38	0 DP Ver 1J 480	
	Verified Operator:	«Port 1 Default>	10.00.00	V0+ 10 10 10	
	Applied				
	Applied				
	1 38.1000	35.0850	In H2O		
	2 51.1000	48.1113			
1	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			
6	8 129.1000	126.1459			
9	9 142.0000	138.9945			
1	10 155.0000	151.9858			
1	11 168.0000	165.0180			
1	12 181.0000	177.9277			
		**********			
	Verification (Previous)				
	Verified On:	11/24/2016	15:16:08	0 DP Ver 1H 480	
	Verified Operator:	«Port 1 Default>			
	Applied	Measured			
	1 32,1000	38.8443	In H2O		
	2 45.0000	\$1.6937			
	3 58.1000	64.7713			
ports User Manuals					

Figure 14.21

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.

e Iasks Tools Help					
Open SDF File	Daily Logs Interval Logs Ev	ent Logs Alarm Logs Cor	figuration Calibration	Snapshot	
gpen sor rie	Description	Value	Units		
Export Data	Base	and the second sec			
	Snapshot Date/Time	01/20/2010 13:27:13			
Print Report	Flow Run #1				
-	Volume: Rate and Totals				
Yew Trends	Grand Total	77831.3	MCF		
	Flow Rate	0	MCF/day		
mai SOF file	Current Day	0	MOF		
	Previous Day	2.40502	MCF		
Email Data •	Current Interval	0	MCF		
g	Previous Interval	0	MOF		
	Mass: Rate and Totals				
	Grand Total	5546526.5	LDM		
	Flow Rate	0	LBM/day		
	Current Day	0	LBM		
	Previous Day	27952	LBM		
	Current Interval	0	LBM		
	Previous Interval	0	LDM		
	Energy: Rate and Totals				
	Grand Total	80590.4	MMBTU		
	Flow Rate	0	MMBTU/day		
	Current Day	0	MMBTU		
	Previous Day	1.9459	MMBTU		
	Current Interval	0	MMBTU		
	Previous Interval	0	MMBTU		
	Run Times				
	Current Day	0	SEC		
	Previous Day	8080	SEC		
	Current Interval	0	SEC		
	Previous Interval	0	SEC		
	Calculated Variables				
	Daily Estimated Volume	0	MCF		

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*.

le Iasks Tools Hei	þ							
DOWN		- Device Name (s, eports	/n 4096]			Name Name Name		A
	Daily Logs Interval Logs Eve	at Long Allows Long	. Continuation (	allbaation Teasachai			Do	ne
Download		Fiter?	s comparación c	alloration shapsho				
Mark All as Read	Sort Order							
-	Default (As downloaded) -	Filter by M	forth None sele	cted *	Start Date 1,60/2	• MA 00:00:8 010	Apply	
Save SDF File		C Filter by D	ate Range		End Date 1/20	• MA 00:00:5 0105		
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 H
Print Table		(MCF)	(LBM)	(MMBTU)	(In H2O)	(PSIA)	(Deg f)	
in the stands	01/08/2010 08:00:00	47.8223	5662.9248	\$1.7191	163.8913	28.9477	52.8514	
Yew Trends	2 01/09/2010 08:00:00	51.6500	2371.6399	53.2732	0.0000	14.7300	28.9374	
Email SDF Ele	3 01/10/2010 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7369	28.8930	
Euroai sola. Elie	4 01/11/2010 08:00:00 5 01/12/2010 08:00:00	0.0000	0.0000	0.0000	0.0011	14.7318	28.9057 28.9292	
Email Data	<ul> <li>6 01/13/2010 08:00:00</li> </ul>	0.0000	0.0000	0.0000	0.0000	14,7300	28.9407	
Fuer care	7 01/14/2010 08:00:00	0.0000	0.0000	0.0000	0.0000	14,7300	28.9146	
	8 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	
	11 01/18/2010 08:00:00	702,1481	32240.8945	724,2148	37,0818	124,7300	28,9305	
	12 01/19/2010 08:00:00	76527.7734	3423317.0000	79281.1172	62.3303	124.7300	43.8674	
		2,4050	27951.9668	1.9459	11.0850	124,7300	28.9386	

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-22 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		? 🔀
Save in:	🔁 Site_Name 🔽 🔶 🖆 🎫	
My Recent Documents Desktop My Documents	Device_Name_20100114_1354.sdf Device_Name_20100114_1358.sdf Device_Name_20100120_1327.sdf Device_Name_20100120_1516.sdf	
My Network Places	File name:     Device_Name_20091217_1747.sdf     Save       Save as type:     SDF Files (*.sdf)     Cancer	_

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 195.

### 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 207). 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 207).

e Iasks Tools Help									
DOWNE	OAD	Scanner 2000 Device Re	- Device Name [s. eports	/n 4096]		Site Field Location		6	A
							_	Do	ne
Download	Daily	Logs IntervalLogs Eve	nt Logs Alarm Log Fiter?	s Configuration C	alibration Snapshol	t			
Mark All as Read	Sort C	Order auit (As downloaded) 🛛 👻	cted *	Start Date 1/5/2	010 8:00:00 AM 👻				
Save SDF File				Jear Coace	• MA 00:00:5 0105	Apply			
Export Data -	Rec Timestamp		Flow Run 1 Yolume	Flow Run 1 Mass Total	Flow Run 1 Energy Total	Differential	Static Pressure (A)	Process Temperature	R
Print Table		minescamp	(MCF)	(1.011)	(MMBTU)	(In H20)	(PSIA)	(Deg f)	
View Trends	1	01/08/2010 08:00:00	47.8223	5662.9248	51.7191	163.8913	28.9477	52.8514	
Tions regions		01/09/2010 08:00:00	51.6500	2371.6399	53.2732	0.0000	14.7369	28.9374 28.8930	
Email SDF Ele		010 08:00:00	0.0000	0.0000	0.0000	0.00011	14,7318	28.9057	
curde ser Gesti		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	
		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	
		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	
	11	01/18/2010 08:00:00	702.1481	32240.8945	724.2148	37.0818	124,7300	28,9305	
	12	01/19/2010 08:00:00	76527.7734	3423317.0000	79281.1172	62.3303	124.7300	43.8674	
		01/20/2010 08:00:00	2,4050	27951.9668	1.9459	11.0850	124,7300	28,9386	

Figure 14.25

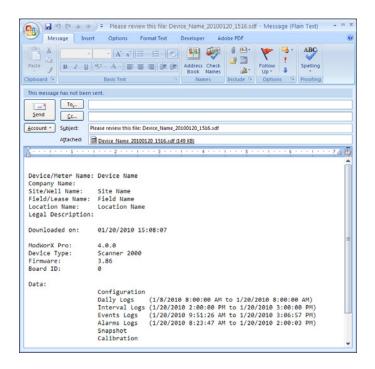


Figure 14.26

### **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.

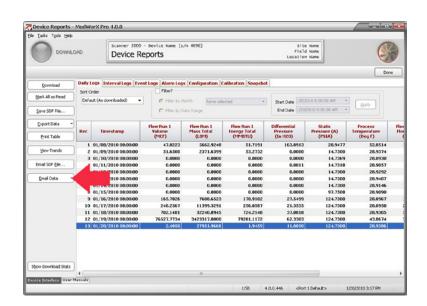
• Email All to PGAS allows a user to email all data in PGAS files.

#### 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) 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 209, for further instruction.



#### 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-22 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	og Download t	o XLS				2 🛛
Save jn:	Site_Name		•	← 🗈 🕯	* 💷 •	
My Recent Documents Desktop My Documents	Device_Name	_20100120_1508_1	D.xds			
My Computer						
My Network Places	File <u>pame</u> : Save as <u>lype</u> :	Excel Files (*.xls)	20100120_1508_D. I		•	<u>Save</u> 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.

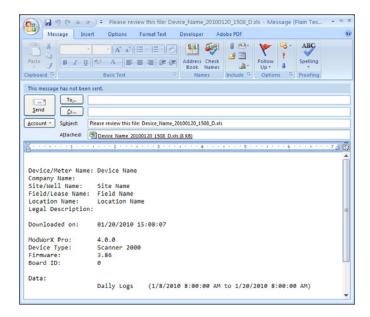


Figure 14.29

#### Email Selected Data (Multiple Log Types)

To email logs of multiple log types,

 Click the *Email Data* button at the left of the screen and select *Email Selected* from the dropdown list (Figure 14.30, page 210).

le <u>T</u> asks T <u>o</u> ols <u>H</u> elp									
DOWNLO	AD	Scanner 2000 Device Re				e			
Download	Daily L	ogs Interval Logs Eve	nt Logs Alarm Log	s Configuration C	alibration Snapsho	1		Do	
Mark All as Read	Sort Order Default (As downloaded)		Sort Order			Start Date 4/14/	2010 8:00:00 AM -	Acciv	
Save SDF 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)	
	-	04/14/2010 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28,8921	
Yew Trends	2	04/15/2010 00:00:00	0.0000	0.0000	0.0000	0.0000	14,7300	20.9110	
	3	04/16/2010 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28,9096	
Email 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	
Erral Data -	6	04/23/2010 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28,9088	
Email Al 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	23.8300	
Email Selected	10	04/27/2010 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.8932	
Email XLS 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	
Email POF File	13	04/30/2010 00:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	20.9110	
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	20.0991	
	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 00:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	20.9512	
	25	05/12/2010 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.9510	
	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	
	4								
Device Interface User M	aruals								



- 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-22 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.

ent (RTF)
ument (HTML)
Report (_C)
port (_S)
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6
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1

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.

Message Inse	rt Options Format Text Developer Adobe PDF	
Paste J Ipboard G	Basic Feet	
This message has not been	sent.	
To		
Send Cc.		
ccount · Sybject:	Yease review these files	
	Device Name 20100121 1515 D.XLS @ KB); 🗮 Device Name 20100121 1515 H.XLS (11 KB);	
	Device Name 20100121 1515 E.XLS (9 KB)	
		_
* * * * * * * * * * * *	1 * * * 2 * * * 1 * * * 3 * * * 1 * * * 4 * * * 1 * * * 5 * * * 1 * * * 6 * * * 1 * * *	70
	1 2 1 2 1 4 1 5 1 6 1 6	7.0
	· · · · · · · · · · · · · · · · · · ·	7 0
]		7 0
Device/Meter Name		7 0
Device/Meter Name Company Name:		7.0
Device/Meter Name Company Name: Site/Well Name:	: Device Name Site Name	7.0
Device/Meter Name Company Name: Site/Well Name: Field/Lease Name:	: Device Name Site Name	7.0
Device/Meter Name Company Name: Site/Well Name: Field/Lease Name: Location Name:	: Device Name Site Name Field Name Location Name	7.0
Device/Meter Name Company Name: Site/Well Name: Field/Lease Name: Location Name: Legal Description	: Device Name Site Name Field Name Location Name	7
Device/Meter Name Company Name: Site/Well Name: Field/Lease Name: Location Name: Legal Description	: Device Name Site Name Field Name Location Name	7
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	7
Device/Meter Name Company Name: Site/Well Name: Location Name: Legal Description Downloaded on: ModWorX Pro:	: Device Name Site Name Field Name Location Name : 01/21/2010 15:15:13	7
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 : 01/21/2010 15:15:13 4.0.0	7
Device/Meter Name Company Name: Site/Well Name: Field/Lease Name: Location Name: Legal Description Downloaded on: ModWorX Pro: Device Type: Firmware:	: Device Name Site Name Field Name Location Name 01/21/2010 15:15:13 4.0.0 Scanner 2000	7.0
Device/Meter Name Company Name: Site/Well Name: Location Name: Legal Description Downloaded on: ModWorX Pro: Device Type: Firmware: Board ID: Data:	: Device Name Site Name Field Name : 01/21/2010 15:15:13 4.0.0 Scanner 2000 Scanner 2000	7.0
Device/Meter Name Company Name: Site/Well Name: Field/Lease Name: Location Name: Legal Description Downloaded on: ModNorX Pro: Povice Type: Firmware: Board ID:	: Device Name Site Name Field Name : 01/21/2010 15:15:13 4.0.0 Scanner 2000 Scanner 2000	7.0
Device/Meter Name Company Name: Site/Well Name: Field/Lease Name: Location Name: Legal Description Downloaded on: ModNorX Pro: Povice Type: Firmware: Board ID:	: Device Name Site Name Field Name Location Name 01/21/2010 15:15:13 4.0.0 Scanner 2000 3.86 0	7.0

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,

1. 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*.

Device Reports - M	odilas)	K Pro 4.0.5						-	
Se jasks tools Beb									
COMPLE	AD	Scamer 2000 Device R	eports					E	AN
								00	
Devriced		ogs IntervalLogs Eve	nt Logs Alarm Log	s Configuration C	albration Snapshot				
Bark All as Read	Sot O	rder alt (As dowrikoaded) 🛛 💌	C riter by F	with Nore sele	v beb	Start Date 4/14	2010 BIODIOC AM -		
Save SCF File Export Data			C Filter by D	C Filter by Date Range			End Date 12/15/2011 8-00-00 AM		
	Rec	Timestamp	Flow Run 1 Volume (MCF)	Flow Run 1 Mass Total (LIPH)	Flow Run 1 Energy Total (MPMITLD)	Differential Pressure (In 101)	Static Pressare (A) (PS1A)	Process Temperature (Deg F)	ł
(Inclusion)	-	0471452010-00:00	0.0000	0.0000	0.0000	0.0000	14.7200	29, 1921	
Yew Trends	2	04/15/2010-00:00	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 SCP (Re	- 4	04/21/2010 18:00:00	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	
Enal Data -	- 6	04/23/2910-08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.9003	
Divisit All As Flow-Call File	7	04/24/2919-08-00-00	0.0000	0.0000	0.0000	0.0000	14.7300	28.9952	
Email All As PGAS Place		04/25/2910-08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.8833	
Enal Selected		04/26/2910-08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.8800	
Lines belocked	10	04/27/2910-08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.9932	
Enal XLS Re	11	04/29/2912-08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.8993	
Enal CSV file	12	04,129,12910-08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.9029	
Email PD# File	13	04/30/2910-08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.9118	
Enal RTF Fie	24	05/01/2010 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.9094	
Enal HTML File	15	05,02,0910 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.9811	
	- 16	05/03/2910 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.8814	
	17	05,04,2913 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.8991	
	18	05,05,2912-28.00.00	0.0000	0.0000	0.0000	0.0000	14.7300	28.9167	
	29	05/06/2913-08:08:08	0.0000	0.0000	0.0000	0.0000	14.7300	28.8222	
	29	05/07/2919-08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.9162	
	21	05/08/2913 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.9129	
	22	05/03/2010 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	05/11/2910-08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.9512	
	25	05/12/2910-08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.9613	
	26	05/13/2010-08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.9305	
Stym Download Stats	27	05/14/2010-08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.9157	

Figure 14.33

- An Export All to Flow-Cal File or Export All to PGAS Files window will appear (Figure 14.34, page 212). 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-22 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).

Export All to Fl	low-Cal File	2 🛛
Save in:	🔁 Site_Name 📼 🔶 🖻 📸 📰 -	
My Recent Documents Desktop		
My Documents		
My Computer		
<b>(</b>		
My Network Places	File name:         Device: Name: 20100120: 1508 cfv         Image: Control of the second secon	<u>S</u> ave Cancel



- 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.

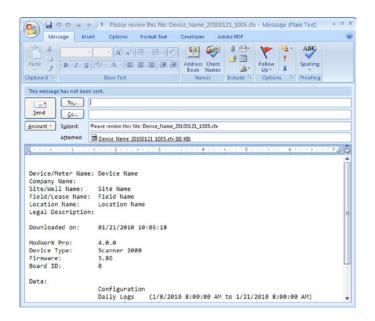


Figure 14.35

# **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).
- 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 214, for further instruction.

Tasks Tools Help									
$\bigcirc$		Scanner 2000	- Device Name [s	/n 4096]			Name	6	2
DOWNL	OAD	Device R	eports			Field Location	Name		
								Dor	ne
Download	Daily Logs Inte	rval Logs Ev	ent Logs Alarm Log	Configuration C	alibration Snapshol	1			
-	Sort Order		Filter?						
Mark All as Read	Default (As down	vloaded) 👻	Filter by M	onth None sele	cted *	Start Date 1/8/2	010 8:00:00 AM -		
		,				Juli Date		Apply	
Save SDF File			C Filter by D	ate Range		End Date 1/20/	2010 8:00:00 AM -		
Export Data			Flow Run 1	Flow Run 1	Flow Run 1	Differential	Static	Process	F
Print Table	k nmes	tamp	Volume (MCF)	Mass Total (LBM)	Energy Total (MMBTU)	Pressure (In H2O)	Pressure (A) (PSIA)	Temperature (Deg F)	1
	1 01/08/20	10 08:00:00	47.8223	5662,9248	51,7191	163,8913	28,9477	52.8514	_
View Trends	2 01/09/20	10 08:00:00	51.6500	2371.6399	53.2732	0.0000	14.7300	28.9374	
	3 01/10/20	10 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7369	28.8930	
Email SDF File	4 01/11/20	10 08:00:00	0.0000	0.0000	0.0000	0.0011	14.7318	28.9057	
	5 01/12/20	10 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.9292	
Email Data 🔹	6 01/13/20	10 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.9407	
	7 01/14/20	10 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.9146	
	8 01/15/20	10 08:00:00	0.0000	0.0000	0.0000	0.0000	97.7508	28.9090	
	9 01/16/20	10 08:00:00	165.7026	7608.6523	170.9102	27.5499	124.7300	28.8967	
	10 01/17/20	10 08:00:00	248.2567	11399.3291	256.0587	21.3535	124.7300	28.8950	
	11 01/18/20	10 08:00:00	702.1481	32240.8945	724.2148	37.0818	124.7300	28.9305	
	12 01/19/20	10 08:00:00	76527.7734	3423317.0000	79281.1172	62.3303	124.7300	43.8674	
bow Download Stats	13 01/20/20	10 08:00:00	2.4050	27951.9668	1.9459	11.0850	124.7300	28.9386	

### Figure 14.36

3. An Export... window will appear (Figure 14.37, page 214). 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-22 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 - h	(odWor)	X Pro 4.0.5							
jile <u>T</u> asks T <u>o</u> ols <u>H</u> elp									
0		Scanner 2000	- [s/n 4096]						5
DOWNLO	DAD	Device R							
		Device R	eports						
								Do	ne
Download	Daily L	ogs Interval Logs Eve	nt Logs Alarm Log	s Configuration C	alibration Snapshol	E			
Ermuter	Sort Or	rder	Filter?						
Mark All as Read		ult (As downloaded) -	Filter by M			atest	2010 8:00:00 AM 🔹		
	Dera	uic (AS UUWI IUducu) +	Filter by M	None sele	cted *	Start Date		Apply	
Save SDF File	Filter by Date Range     End Date 12/15/2011 8:00:								
Export Data •			Flow Run 1	Flow Run 1	Mass Total Energy Total	Differential Pressure (In H2O)	Static	Process Temperature	-
Export All To Flow-Cal	Rec	Timestamp	Volume (MCF)	Mass Total (LBM)			Pressure (A)		
Export All To PGAS							(PSIA)	(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	0.0000	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	



2. An Export Selected window will appear (Figure 14.39, page A-1). 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-22 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 Selected						
Selection Options						
Select File Format						
• Excel Spreadsheet (XLS)	O Word Document (RTF)					
<ul> <li>Comma Delimited File (CSV)</li> </ul>	<ul> <li>Internet Document (HTML)</li> </ul>					
<ul> <li>Acrobat Reader (PDF)</li> </ul>						
<ul> <li>Daily Logs (_D)</li> </ul>	Configuration Report (_C)					
Reheard Long ( H)	Collection Depart (1)					
✓ [Interval Logs (_H)]	Calibration Report (_L)					
Event Logs (_E)	Calbration Report (_L) Snapshot Report (_S)					
C						
Event Logs (_E) Alarm Logs (_A)	Snapshot Report (_5)					
Event Logs (_E) Alarm Logs (_A) File Save Directory C:\WuFlo log data\ModWorX Pro\Fil	Snapshot Report (_5)					

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*.

jie Iasks Tgols Help		0							_	
DOWNLOAD Scanner 2000 - Device Rep										
-								Do	ne	
Qownicad	Daily Lo	195 Interval Logs Ever	t Logs Alarm Log	Configuration C	alibration   Snapsho	t)				
1	Sort Order Sort Sort Order Default (As downloaded)		Piker?							
Mark All as Read			Filter by N	Filter by Nonth None selected      Filter by Date Range			Start Date 4/14/2010 8:00:00 AM +			
Save SDF File							End Date 12/15/2011 0:00:00 AM -			
Export Data	_								_	
Export AI To Flow-Col	Rec	Timestamp	Flow Run 1 Volume (MCF)	How Run 1 Mass Total (URM)	Flow Run 1 Energy Total (MMBTU)	Differential Pressure (In H20)	Static Pressure (A) (PSLA)	Process Temperature (Deg F)	1	
Export All To PGAS		04/14/2010 08:00:00	0.0000	0.0000	0.0000	0.0000	14,7300	28,8921		
Export Selected	2	04/15/2010 08:00:00	0.0000	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	28.0974		
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 HITML 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	04/26/2010 08:00:00	0.0000	0.0000	0.0000	0.0000	14.7300	28.0993		
	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	28.0814		
	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		
	4									

Figure 14.40

- An Export All to Flow-Cal File or Export All to PGAS Files window will appear (Figure 14.41, page A-2). 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-22 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								22
Save in:	Site_Name			• +	•	ĊŤ	•		
My Recent Documents									
My Documents									
My Computer									
My Network	File name:	Device_Name	20100120_150	18.cfx		•		Sav	•
Places	Save as type:	Flow-Cal Files (	".cfx)		_	-	Ī	Cano	;el



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.

Site_Name			
Eile Edit View Favorites	Iools Help		A.
🌀 Back 🝷 🕥 🕤 🏂	🔎 Search 💫 Folders 🔛 🗸		
Address 🗀 C:\NuFlo log data\Mo	dWorX Pro\Field_Name\Site_Name		💌 🄁 Go
File and Folder Tasks Make a new folder Publish this folder to the Web Share this folder	Name Device_Name_20111207_1640.ANA	Size Type 1 KB ANA File 1 KB EVT File 191 KB SDF File 322 KB VOL File	Date Modified 12/12/2011 2:36 PM 12/12/2011 2:36 PM 12/7/2011 4:40 PM 12/12/2011 2:36 PM

Figure 14.42

This page is left blank intentionally.

# 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).

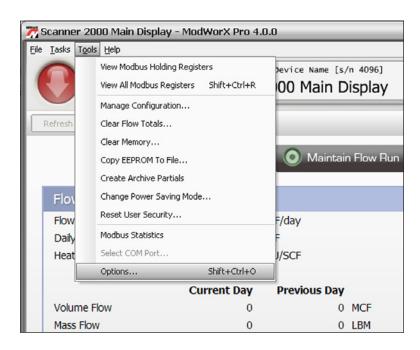


Figure A.1

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-5). 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-22.

- 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.

ModWorX Pro	
Manage Configuration	
Save Configuration	
Create a configuration backup file that contains all Scanner 2000 configuration data. This file may be used to transfer configuration items to another Scanner 2000.	
Save Configuration	
Load Configuration	
Open a Scanner 2000 configuration backup file and select configuration items to load. Existing configuration will be overwritten.	
Load Configuration	
Done	

Figure A.2

### Uploading a Configuration File

To upload the configuration file to another Scanner device, perform the following steps:

1. Click on *Tools>Manage Configuration* (Figure A.1, page A-5) 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.

odWorX Pro			
Load Configuration			
Select Items to Restore			
O All (Board Replacement)			
O Configuration and Current Calibration			
Configuration Only			
Calibration Only			
O Gas Composition Only			
O Custom (choose from list)			
	< Back	Next >	⊆ancel
	< Dack	⊡ext >	Gancer

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-8). 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	$\mathbf{\overline{X}}$			
Load Configur	ation			
Device Settings	;			
The following parameters a with the upload.	re unique to each device. Update as required before proceeding			
Device/Meter Name	Device Name			
Site/Well Name	Site Name			
Synchronize Device Time				
Set device time to computer time after upload				
	< Back Mext > Cancel			



6. 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.

ModWorX Pro
Load Configuration
Device Communications Settings
Communications settings have been selected to be loaded. Please specify how you would like to set the slave address and baud rate for each port in the device.
Port 1 Settings
$\odot$ Leave the settings as currently set in device (address 1, 9600 baud)
O Use the settings in the configuration file (address 1, 9600 baud)
Specify the settings to store
Port 2 Settings
• Leave the settings as currently set in device (address 1, 9600 baud)
O Use the settings in the configuration file (address 1, 9600 baud)
◯ Specify the settings to store 1 9600 baud ▼
(processing)
< 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.

ModWorX Pro	X
Load Configuration	
Progress	
=== Begin uploading to device === * Entering maintenance mode on device • Writing Device Identification Done • Writing Security Configuration Done • Writing Siguration Done • Writing Alarms Configuration Done • Writing Alarms Configuration Done • Writing Ver Modbus Registers configuration Done • Writing Flow Run 1 Gas Composition Done • Writing Flow Run 1 Configuration Done • Writing Turbine Input 1 Configuration Done • Writing Turbine Input 2 Configuration Done • Writing Static Pressure Configuration Done • Writing Differential Pressure Configuration Done • Writing Digital Input Configuration Done • Writing Digital Input Configuration Done • Writing Digital Output Configuration Done • Writing Digital Output Configuration Done • Writing Manago Output Configuration Done • Writing Manago Output Configuration Done • Writing Digital Output Configuration Done • Writing durbate Configuration Done • Writing Manago Output Configuration Done	
< Back	⊆ancel

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-10).
- 2. In the Clear Flow Totals window, select the totals that are to be reset.
- 3. Click **OK** to clear the totals.

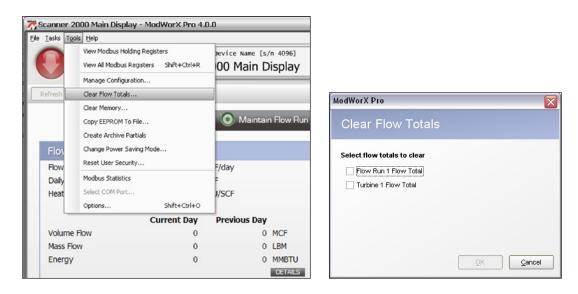


Figure A.7

### **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.

Tasks Tg	ols Help				ModWorX Pro
0	View Modbus Holding R View All Modbus Regist		oevice Name [s		Clear Memory
Refresh	Manage Configuration Clear Flow Totals				Select memory sections to clear
	Clear Memory				✓ Device Settings
et.	Copy EEPROM To File. Create Archive Partials Change Power Saving	;	O Maintai	in Flow Run	V Device Archive
Flov					Please Note
Flow Daily	Reset User Security Modbus Statistics		F/day F		This operation may take several minutes to run. When the procedure completes the program will return to the Welcome screen.
Heat	Select COM Port Options	Shift+Ctrl+O	J/SCF		DO NOT press any buttons on the faceplate of the device during this operation!
		Current Day	Previous Day	·	
Volume	Flow	0	0	MCF	
Mass Fl	ow	0	0	LBM	
Energy	1	0	0	MMBTU	OK Cancel

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).

§Scanner 2	000 Main Display - ModWor	X Pro 4.0.	.0		
le <u>T</u> asks T <u>o</u> o	ols <u>H</u> elp				
0	View Modbus Holding Registers View All Modbus Registers Shift	t+Ctrl+R	Device Name [s/m 100 Main Di		
Refresh	Manage Configuration Clear Flow Totals Clear Memory				ModWorX Pro
	Copy EEPROM To File		O Maintain	Flow Run	Conv EEDDOM To File
	Create Archive Partials				Copy EEPROM To File
Flo\ Flow	Change Power Saving Mode Reset User 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.
Daily	Modbus Statistics		F		
Heat	Select COM Port		J/SCF		Status:
	Options Shift	+Ctrl+O			
	Curren	t Day	Previous Day		Progress:
Volume	Flow	0	0	MCF	Elapsed Time:
Mass Fk	w	0	0	LBM	
Energy		0		DETAILS	

Figure A.9

- 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, EEPROM\_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-12).
- 2. Click **OK** at the confirmation prompt.
- 3. Download daily and/or interval logs to view the results.

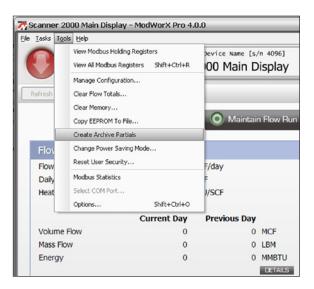


Figure A.10

# **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 require-

ments. 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-13).
- 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,

#### Appendix A

- Click Tools>Reset User Security in the task bar (Figure A.13). The Reset User Security screen shown in Figure A.14, page A-15, 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.

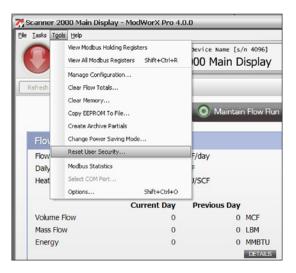


Figure A.13

scription			Device Information	
operation will reset the Scanner 20		is to factory defaults. Any existing user	Device Type	Scanner 2000
ounts will be deleted and the default ess level. You will be logged out and		and Port 2 will be set to Administrator to the Welcome screen.	Main Board Serial Number	0
must call tech support at the number			Device Serial Number	4096
pared to provide your device information			Product Code	\$00C0
			Firmware Version	4.00
chnical Support Contact Inf	formation		Register Table Version	15
	_	-	Manufacture Date	04-2009
For technical support in the US 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	5, contact the support	center nearest you:	Enter Provided	Reset Code
Canada	Asia Pacific	Europe, Middle East	Key Code IM5G	
1.877.891.6540 (toll-free) +603.5569.0501 & Africa 403.291.4814 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.

			ModWorX	Pro	
			Selec	t COM Port	
	ne - ModWorX Pro 4.0.0			m available serial ports:	
Die Tasks			COM1	Serial Port	
Car Tapk2	View Modbus Holding Registers	1	COM3 COM5	Serial Port NuFlo USB Adapter	
	View All Modbus Registers Shift+Ctrl+R				
	Manage Configuration				
	Clear Flow Totals				
	Clear Memory				
	Copy EEPROM To File				
	Create Archive Partials				
	Change Power Saving Mode				
	Reset User Security	🖅 N			
	Modbus Statistics				
	Select COM Port				
	Options Shift+Ctrl+O				
		bdWor			QK <u>C</u> ancel

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**.

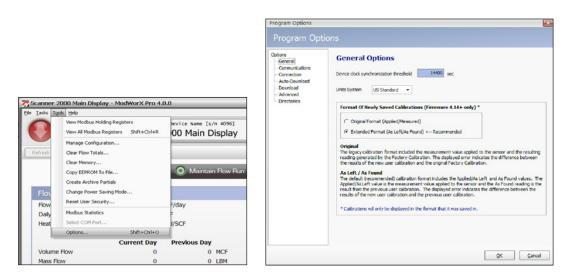


Figure A.16

# 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-17).
- 2. Click on the Units System dropdown menu in the General Options screen and select Metric.
- 3. Click **OK**.

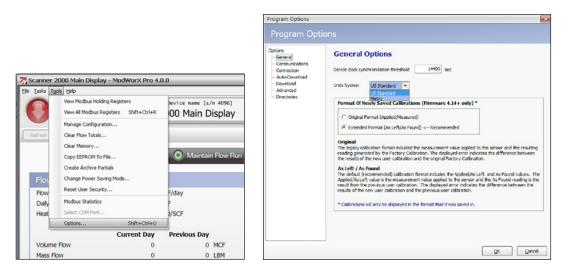


Figure A.17

# **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.

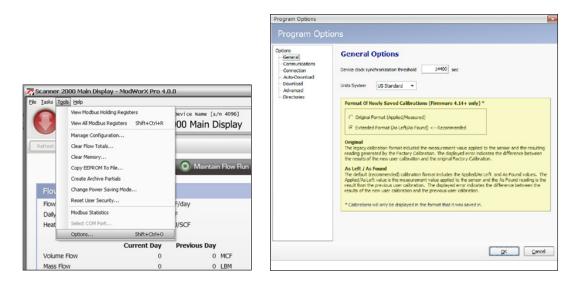


Figure A.18

# **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-18).
- 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.**

			Program Options	
			Program Opti	
Scanner 2	2000 Main Display – ModWorX Pro 4.0	.0	Options - Centre al - Connection - Auto-Operitod - Operitod - Advanced - Directories	Communications Options       Image RTS live for RS-485 adapter transmit control       Timing Parameters       Presend Delay       50       meec
0	View Modbus Holding Registers	bevice Name [s/n 4096]		Number of Retries 3
	View All Modbus Registers Shift+Ctrl+R	00 Main Display		Timeout Period 5000 msec
	Manage Configuration			
Refresh	Clear Flow Totals			
	Clear Memory			
	Copy EEPROM To File	Maintain Flow Run		
	Create Archive Partials			
Flov	Change Power Saving Mode			
Flow	Reset User Security	F/day		
Daily	Modbus Statistics	F		
Heat	Select COM Port	J/SCF		
	Options Shift+Ctrl+O			
-	Current Day	Previous Day		
Volume	e Flow 0	0 MCF		QK Gancel
Mass Fi	low 0	0 LBM		

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, page 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 8, 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.

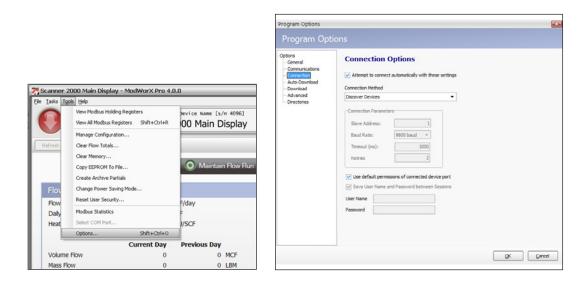


Figure A.20

## 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).
- 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.

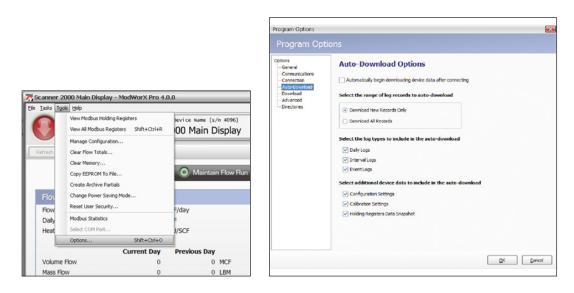


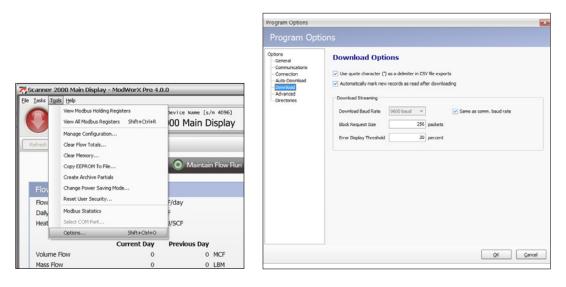
Figure A.21

# **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, page A-21).
- 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%.





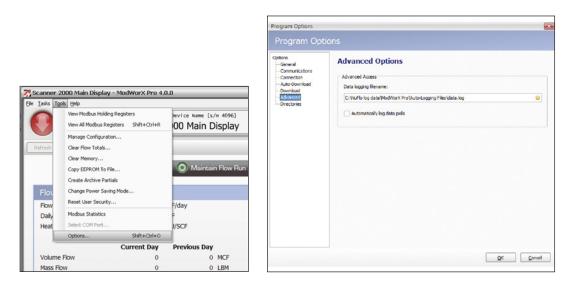
# **Enable Automatic Logging of Data Polls**

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, page A-22).
- 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 user-configured 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-5).
- 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-23).

Options General Communications Connection Auto Download Download Advanced Directories	Directorie Data Directory						
	C: WuFlo log	ata WodWorX Pro\			8		
	Configuration S Root Configur	ave Directory ation Save Directory					
	C:\NuFlo log	C:\WuFlo log data\WodWorX Pro\					
	Save Conf	figuration Files only in the	root directory - ign	oring subdirectory path opti	ons		
	Directory Settin	ngs					
	Subdirectory S	Storage Path	File Name				
	✓ Include?	Field/Lease Name	✓ Indude?	Device/Meter Name 💌	Default storage		
	Include?	Site/Well Name 👻	Indude?	×	path and filename		
	Include?		Indude?	-	will be used when		
			Indude?	Time Stamp	nothing is selected.		

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.

General Communications	Directorie	25			
- Connection	Data Directory				
Auto-Download Download	Root Data Dire	ectory			
Advanced Directories	C: WuFlo log	data\ModWorX Pro\			8
	Configuration S Root Configur	ave Directory ation Save Directory			
	C:\NuFlo log	data\ModWorX Pro\			۵
	Save Conf	figuration Files only in the r	oot directory - ign	oring subdirectory path of	ptions
	Directory Settin	ngs			
	Subdirectory S	Storage Path	File Name		
	✓ Include?	Field/Lease Name 🔹	Include?	Device/Meter Name	Default storage
	Include?	Site/Well Name 🔻	Include?	-	path and filename
	Include?	·······································	Indude?	-	will be used when
			✓ Indude?	Time Stamp	nothing is selected.
	Example				

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-24) and type the desired filepath or click the Folder icon to browse to the desired directory.

Options — General — Communications	Directorie	25						
- Connection - Auto-Download	Data Directory							
Download	Root Data Dir							
- Advanced Directories	C: WuFlo log	data\ModWorX Pro\			8			
	C: WuFlo log	ation Save Directory data (ModWorX Pro) figuration Files only in the	root directory - ign	oring subdirectory path o	ptions			
	Subdirectory S	Storage Path	File Name					
	Include?	Field/Lease Name	Include?	Device/Meter Name	Default storage			
	Include?	Site/Well Name 🔻	Indude?	1	path and filename			
	Include?		Include?		will be used when			
			✓ Indude?	Time Stamp	nothing is selected.			

Figure A.26

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-5).
- 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.28, page A-26), 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	Directories							
Connection Auto-Download	Data Directory							
- Download - Advanced Directories	Root Data Directory				8			
	Configuration Save D Root Configuration S							
	C:\NuFlo log data\ModWorX Pro\							
	Save Configurati	ion Files only in the r	oot directory - ign	oring subdirectory path o	ptions			
	Directory Settings			oring subdirectory path o	ptions			
-	Directory Settings Subdirectory Storage		File Name	Device/Meter Name	Default			
	Directory Settings Subdirectory Storage	e Path	File Name		Default storage path and			
	Directory Settings Subdirectory Storage	e Path I/Lease Name 💌	File Name		Default			

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 sitess, 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 32, 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-26.

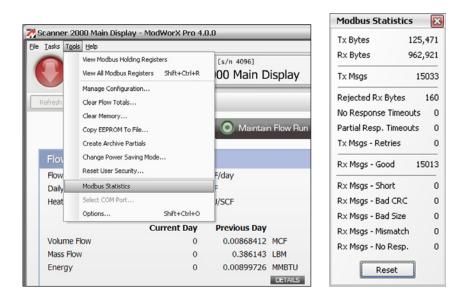


Figure A.28

## 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-27). 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.

0	OWNLOAD	scanner 2000 - De Fixed Modb	us Registers		Site Name Field Name Location Name		S
Fynort Grid	To Excel 🦪 Export Gr	id To Text 🕞 Log Data 🖨	Print List 🔽 Octions 🔸				Done
Address	Register Name		Data Type	Hex	Data Value	-	Turbine2 Calibration
000	Enron Hourly Poin	nter	Double (32-bit Float)	43 9D 80 00	315		Ratic Pressure Config
3002	Enron Daily Point		Double (32-bit Float)	41 50 00 00	13		
1004	Enron Event Cour	iter	Double (32-bit Float)	44 31 80 00	710		Static Pressure Cal.
006	Real Date		Double (32-bit Float)	46 38 A8 00	12010		RTD Configuration
8008	Real Time		Double (32-bit Float)	48 35 42 CO	105611		RTD Calibration
010	HStatus_FR Alan	ms	Double (32-bit Float)	00 00 00 00	0		Diff Pressure Config
012	HStatus_FR Alan	m Low	Double (32-bit Float)	00 00 00 00	0		Diff Pressure Cal.
014	HStatus_FR Alan	n High	Double (32-bit Float)	00 00 00 00	0		Analog Input 1 Config
016	HStatus_Diagn1		Double (32-bit Float)	42 80 00 00	64	_	
018	HStatus_Diagn2		Double (32-bit Float)	00 00 00 00	0		Analog Input 1 Cal.
1020	HStatus_Diagn3		Double (32-bit Float)	45 80 00 00	4096		Analog Input 2 Config
022	HStatus_Diagn4		Double (32-bit Float)	00 00 00 00	0		Analog Input 2 Cal.
1024	Polling Index		Double (32-bit Float)	00 00 00 00	0		Digital Input Config
026	FR1 Grand Total		Double (32-bit Float)	47 98 03 AA	77831.328125		FlowRun 1 Config
028	FR1 Instant Flow	Rate	Double (32-bit Float)	00 00 00 00	0	F	lowRun 1 Calibration
030	FR1 Daily Total		Double (32-bit Float)	00 00 00 00	0		Flow Run Alarms
1032	FR1 Interval Tota	al de la constante de la const	Double (32-bit Float)	00 00 00 00	0		
034	FR1 Polling Total		Double (32-bit Float)	00 00 00 00	0		Output Configuration
1036	FR1 Previous Day	r	Double (32-bit Float)	00 00 00 00	0	PIC	D Control Configuration
1038	FR1 Previous Int	erval	Double (32-bit Float)	00 00 00 00	0	Mode	bus Master Configuratio
040	FR1 Previous Pol	ling Total	Double (32-bit Float)	00 00 00 00	0	Pub	sish Data Configuration
042	FR1 Grand Mass	Total	Double (32-bit Float)	4A A9 44 3D	5546526.5		Holding Registers
044	FR1 Instant Mas	s Flow Rate	Double (32-bit Float)	00 00 00 00	0		
046	FR1 Daily Mass T	Fotal	Double (32-bit Float)	00 00 00 00	0	•	~ ~
1048	FR1 Interval Mas		Double (32-hit Float)	00.00.00.00	n		
ddressing m	ode: word 🗌 Rev	verse Decode Byte Orde	t).	Last polle	ed: 2010/01/20 19:05:03	710 regis	sters
Get All Dat	Set All Data	Get Datum Set I	Auto Set on	Auto Polling Interv	al - 2 + sec		

Figure A.29

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 integrated PID control can be configured and tuned via controls build into the ModWorX 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 must be purchased with optional PID firmware and expansion board.

The Scanner 2000 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 acheived (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.

Scanner 2000 Configuration Me	enu - ModWorX Pro 3.3.0 beta			
Elle Iasks Tools Help				
	Scanner 2000 - [s/n 0] Scanner 2000 Configuration M	lenu Locat	ion Name	
				Return
System	Identification Date/Time	Communications Alarms	Secunty User Modbus Registers	~
Flow Runs	w Run 1			
Turbines Turbi	ine Input 1 Turbine Input 2			
Inputs	ntal Pressure Static Pressure og Input 1 Analog Input 2	Process Temperature		
Outputs Digite	al Outputs Analog Outputs	PID Control		
Device Interface Quick Start Softwa	ve Manual Hardware Manual	COM1 330.381 <	Port 2 Defaulto 5/1/2009 3 f	a PM

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>.

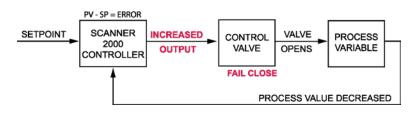


Figure B.3

#### **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>.

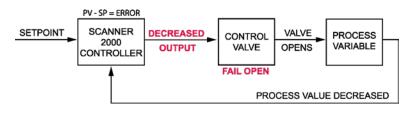


Figure B.4

### Independent Flow and Pressure Controls

When configuring the Scanner 2000 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 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 75 for information about configuring an analog input.

				ModWorX Pro		×		
				Change Cor				
onfigure PID Control - M	fodWorX Pro 4.2.0			PID Control	er Type			
<u>T</u> asks T <u>o</u> ols <u>H</u> elp	(			Disabled     Simple FID Control	-			-
DOWNLOAD			[s/n 120427] PID Control	Plow Controller will				A.
	Ľ	Johngure	PID COntrol					
				100			OK Cancel	
ID Control Setting	s				24	Gencel		
				<u> </u>				
ontroller Type	Simple PID Control	er	Change	J				
Controller Pro	perties		Con	trol Loop	Tune			
Controller Name	Flow Rate Control 4	¥1	Gain (K	φ)	1.0			
Action	Reverse 👻	]	Integra	al (K)	0.5			
			Deriva	tive (Kd)	0.0			
Process Variat	Flow Run 1 Flow Ra		Output	Mode	Auto 👻			
Execution Period	1 min	1	Select Manua	Value Override	0.0	percent		
Range Low (0%)	0.0	MCF/day	ModWorX Pro		*	Parameter	1	
Range High (100%)	200.0	MCF/day	Select Proc			selection		
Setpoint (within range)	121.0	MCF/day	Select register to ass	ign		dropdown - available		
		- Second Second	Row Run 1 Row Rat Row Run 1 Row Rat	•	-	parameters		
			Flow Run 1 Mass Flo Flow Run 1 Energy F Turbine 1 Flow Rate Turbine 2 Flow Rate	w Rate Iow Rate	=	shown		
ontroller Diagram			Static Pressure (Gau Differential Pressure	ge)				
Simple Flow Co	ontroller		Process Temperatur	e				
	SP				QK Gencel			
	$\downarrow$		ModWorX Pro		×	Descenter	1	
	(FC)			ess Variable		Parameter selected -		
	$\times$					source		
	(」)		Select register to ass Static Pressure (Gau	ign (22)	•	Modbus address		
	FT		Source Modbus Addr	8336		shown		
	$\bigcirc$							
	TÓ	1						
		1.0			QK Cancel			
		1						
		1						
ce Interface User Manua								

#### 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, 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 wil 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 to provide flow rate control and maintain static pressure below a user-defined setpoint,

- 1. From the Scanner 2000 Configuration Menu, click the *PID Control* button to access the Configure PID Control screen (Figure B.5, page B-5).
- 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 69 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<sub>p</sub>) 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 wil 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."

Configure PID Control - ModWo	orX Pro 4.2.0		_					
e <u>I</u> asks T <u>o</u> ols <u>H</u> elp								
DOWNLOAD		2000 - [s/n 12042 igure PID Con						
	<u></u>				Refresh	Apply	ОК	Cancel
ID Control Settings								
Controller Type Flow	w Controller wi	th Pressure Override	Cha	ng#				
Controller Propert	ties							
Controller Name	Safety Flow Co	ntrol						
Action	Reverse	•						
Process Variable				Control Loop	Tune	)		
Parameter	Flow Run 1 Flow	v Rate	Select	Gain (Kp)	1.0	]		
Execution Period	1 min			Integral (Ki)	0.5	]		
Range Low (0%)	0.0	LIT/hour		Derivative (Kd)	0.0			
Range High (100%)	100000.0	LTT/hour		Output Mode	Auto 👻	]		
Setpoint (within range)	75000.0	LIT/hour		Manual Value Override	0.0	percent		
Process Variable (	Override		1	Override Contr	ol Loop	٦		
Static Pressure Source	Integrated Sta	tic Pressure -	1	Gain	5.0	12		
Sampling Period	1 sec			Integral (Ki)	0.0			
Range Low (0%)	0.0	PSIG		Derivative (Kd)	0.0			
Range High (100%)	1500.0	PSIG		Action	Direct -	1		
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-8).

#### 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.



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.

- 1. From the Scanner 2000 Main Display screen, click *Manage PID*. Figure B.8, page B-9 shows a Manage PID Controller screen for a simple controller and Figure B.9, page B-9 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**.

<u>T</u> asks T <u>o</u> ols <u>H</u> elp				=1	
	Scanner 2000 - [s/n 120427] Manage PID Controlle	er			(
nage PID Contr	ollar				Don
ID Controlle		New PID Setting:	5		
ontroller Name	Flow Rate Control #1	Setpoint Flow R	tun 1 Flow Rate	Valve Position	
xecution Period	1 min	100	200.00	100	
		90	180.00	90	
rocess Varia		80	160.00	80	
rocess Variable	Flow Run 1 Flow Rate	70	140.00	70	
etpoint Scale	percent -	60	120.00	60	
urrent PID S	ettings	50	100.00	50	
etpoint Value	60.5 percent	40	80.00	40	
urrent PID Mode	Auto	30	60.00	- 30	
alve Position*	100.0 percent	20	40.00	- 20	
	20010 percent	10	20.00	10	
		- <b>U</b> - o	0.00	- <b>U</b> - o	
		60.5	0.0	100.0	Auto
Note: The PID output ( D Controller's Executio	valve position) will only update at the rate of the n Period.	percent	MCF/day	percent O	Manual
				Refresh Appl	<

Figure B.8

🎢 Manage PID Controller - Mo	dWorX Pro 4.2.0				_ <b>_</b> <del>_</del>
<u>F</u> ile <u>T</u> asks T <u>o</u> ols <u>H</u> elp					
	scanner 2000 - [s/n 1204 Manage PID Cont				
					Done
Manage PID Controlle	er				i i i
PID Controller		New PID Se	ettings		
Controller Name	Safety Flow Control	Setpoint	Flow Run 1 Flow Rate	Valve Position	
Execution Period	1 min	100	100000.00	- 100	
		90	90000.00	90	E
Process Variable	2	80	80000.00		
Process Variable	Flow Run 1 Flow Rate	70	70000.00	- 70	
Setpoint Scale	percent 🔻	60	60000.00	- 60	
Current PID Set	tinas	50	50000.00	50	
Setpoint Value	75.0 percent	40	40000.00	- 40	
Current PID Mode	Manual	30	30000.00	- 30	
Valve Position*	87.0 percent	20	20000.00	20	
Pressure Test Range	0 to 1500 PSIG	10	10000.00	10	
Pressure Setpoint	1000.0 PSIG	- <b>U</b> - o	0.00	- <b>U</b> - o	
		75.0	0.0	87.0 O Auto	
* Note: The PID output (valve PID Controller's Execution Per	e position) will only update at the rate of the riod.	percent	LIT/hour	percent   Manua	ei 👘
			R	efresh Apply	
Device Interface User Manuals		USB	4.2.0.485 <port 2="" def<="" td=""><td>fault&gt; 5/12/2017 4:</td><td>34 PM</td></port>	fault> 5/12/2017 4:	34 PM

Figure B.9

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# Appendix C—Configuring Liquid Parameters Using Scanner Firmware 4.10 and Earlier

Scanner 2000s 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.

🏹 Configure Flow Run -	ModWorX	Pro 4.0.0							
Ele Iasks Tools Help	_								
DOWNLOAD			2000 - Device Name Jure Flow Rur		1		Site Name Field Name Location Name		
							Refresh Apply	OK	Cancel
Flow Rate Calculation	on								
Calculation Method	AGA-3				inge				
Wet Correction	No wet co	rrection			ange				
Input Assignm	ents	Calibrate I	inputs	в	ase Condition	าร			
Differential Pressure Source	e Integrat	ed Differen	tial Pressure 👻	Ba	se Temperature	60.0000	Deg F		
Static Pressure Source	Integrat	ted Static Pr	essure 💌	Ba	se Pressure	14.7300	psi		
Temperature Source	Integrat	ted RTD	-	At	mospheric Pressure	14.7300	psi		
* Analog Input sensors are or a Temperature Source i configured as a Pressure T that sampling is enabled for	f the Input is in Transducer or a for Analog Input	nstalled and a Temperati	has been properly are Transducer. Ensure	an	When selected Fluid Pro id Base Pressure values lection in Fluid Propertie	are set by the c	n API Liquid, the Base Tempera onfigured Base Temperature	ture	2
* Pressure tap location is u	upstream.			v	alue Control				
Orifice Plate	Change Pl	ate		Lo	w Pressure Cutoff	1.0	In H2O		
Operator: None, Changed	On:								
Plate Size	1.0000		inches	F	low Run Accu	imulation			
Reference Temperature	68.0000		Deg F	Ac	cumulation Method	Gas Phase	Only		
Plate Material	Stainless	s Steel (304)	(316)						
Plate Model Number									
Plate Serial Number									
Pipe									
Pipe	2.0670		inches						
Pipe Material	Carbon	Staal	-						
Tap Type	Flange 1		-						
Calc 13 but	riange	appea	•						
Device Interface User Manua	ls								
		_			0	OM4 4.0.	0.444 <port 1="" default=""></port>	1/5/201	10 11:22 AM

Figure C.1

If the flow run is configured for liquid measurement, the selections will appear as shown in Figure C.2, page 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 I	Maintenance Task
Flow Run Selection	
• Flow Run 1	
Maintenance Task	
<ul> <li>Change Orifice Plate</li> </ul>	
Change API Liquid Parameters	
	<u>OK</u> <u>Cancel</u>



- 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).

Maintain Flow Run 1 - Mo	dWorX Pro 4.0.0			
e ∐asks Tgols <u>H</u> elp				_
DOWNLOAD	scanner 2000 - Device Name [s/n Maintain Flow Run 1	4096]	Site Name Field Name Location Name	
			Save Chan	ges Exit Maintenance Mode
1aintain Flow Run				
Change Task	Flow Run 1 Ence Task Change API Liquid Parameters			
New API Liquid F Fluid Properties Calculation Analysis Ref. No.	Parameters API-2540 Crude Ol	Current API Liqu Operator: None, Changed On: Analysis Ref. No.		
Base Temperature Reference	United States (14.73 psi, 60 F)	Base Temperature Reference	United States (14.73 psi,	60 F)
Density Source	Absolute Density -	Density Source	Specific Gravity	
Base Absolute Density	KG/M3	Base Specific Gravity	0.85084	
Viscosity	cP	Viscosity	0.010268 cP	
* Note that the Density param	this liquid type is to use a viscosity of 6.0 cP. eter is assumed to be at base temperature and the ed to be at flowing temperature. Copy From Current Load Default Params			
Note		Note		
ce Interface User Manuals				
		U58 4.0.	0.446 <port 1="" defau<="" td=""><td>it&gt; 1/18/2010 12:52 PM</td></port>	it> 1/18/2010 12:52 PM

Figure C.3

- 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 64.
- 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).

ModWorX Pro	×
Change Flow Run Maintenanc	e Task
Flow Run Selection	
Flow Run 1	
Maintenance Task	
Change Orifice Plate     Change Generic Liquid Parameters	
QK	⊆ancel



- 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 64.

- 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.

∐asks Tools <u>H</u> elp	dWorX Pro 4.0.0				
DOWNLOAD	Scanner 2000 - Device Name Maintain Flow Run		Site Na Field Na Location Na	me	Ø
			Save C	hanges	Exit Maintenance Mod
aintain Flow Run					
Selected	Flow Run 1				
Change Task Maintena	ance Task Change Generic Liquid Para	ameters			
New Generic Liqu	uid Parameters	Current Generic		neters	
Fluid Properties Calculation	Generic Liquid	Operator: None, Changed Or	10		
Analysis Ref. No.		Analysis Ref. No.			
Base Temperature Reference	United States (14.73 psi, 60 F)	Base Temperature Reference	United States (14.73	psi, 60 F)	
Flowing Density Calculation	Manual Entry of Flowing Density	Flowing Density Calculation	Manual Entry of Flow	ing 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	
* The Base Density value is rec Density.	quired. If it is not known, use the same value	as for Flowing			
	mmended procedure for this liquid type is to u	se 1.0 cP.			
* Note that the Viscosity param	neter is assumed to be at flowing temperature	h.			
Clear New Data	Copy From Current Load Default Pa	rams			
Note		Note			
ce Interface User Manuals					

Figure C.5

- 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).

Maintain Flow Run 1 - Mo	odWorX Pro 4.0.0				
jle Iasks Tgols Help					
DOWNLOAD	Scanner 2000 - Device Name Maintain Flow Run		Site Field Location I	ame	
			Save	Changes	Exit Maintenance Mode
Maintain Flow Run					
Change Task. Selected	Flow Run Flow Run 1				
	ance Task Change Generic Liquid Para	ameters			
New Generic Liqu Fluid Properties Calculation	uid Parameters Generic Liquid	Current Generic Operator: None, Changed On		meters	
Analysis Ref. No.		Analysis Ref. No.			
Base Temperature Reference	Canada and UK (101.325 kPa, 15 C) 🔹	Base Temperature Reference	United States (14.3	73 psi, 60 F)	
Flowing Density Calculation	Manual Entry of Flowing Density	Flowing Density Calculation	Manual Entry of Flo	wing Density	
Density Source	Manual Entry of Flowing Density Individual Applications (Table 6C)	Density Source	Specific Gravity		
Base Absolute Density	KG/M3	Base Specific Gravity	0.8508406		
Flowing Absolute Density	0.0000 KG/M3	Flowing Specific Gravity	0.998999		
Viscosity	Ø	Viscosity	0.010268	æ	
Density. * If Viscosity is unknown, recor	quired. If it is not known, use the same value a mmended procedure for this liquid type is to us neter is assumed to be at flowing temperature	se 1.0 cP.			
Clear New Data	Copy From Current Load Default Par	rams			
Note		Note			
Device Interface User Manuals					
		USB 4.0	.0.446 <port 1<="" td=""><td>Default&gt;</td><td>1/18/2010 12:59 PM</td></port>	Default>	1/18/2010 12:59 PM

Figure C.6

- 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.

laintain Flow Run 1 - Mo	dWorX Pro 4.0.0		_	_	
Iasks Tools Help					
DOWNLOAD	Scanner 2000 - [s/n 4096] Maintain Flow Run 1				
			51	ive Changes	Exit Maintenance Mode
laintain Flow Run					
Change Task. Selected Maintena	Flow Run Flow Run 1 nce Task Change Generic Liquid Parameters				
New Generic Liqu Fluid Properties Calculation	iid 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 72 oct 60 E)	_
Flowing Density Calculation	Individual Applications (Table 6C)	Flowing Density Calculation	Manual Entry of		
Density Source	Absolute Density	Density Source	Specific Gravity	rioning perioky	
Base Absolute Density	KG/M3	Base Specific Gravity	0.8508406		
Alpha (at 60 deg F)	Select Alpha	Flowing Specific Gravity	0.998999		
Viscosity		Viscosity	0.010268	æ	
Density. * If Viscosity is unknown, recom	uired. If it is not known, use the same value as for Flowing mended procedure for this liquid type is to use 1.0 cP. eter is assumed to be at flowing temperature.				
Clear New Data	Copy From Current Load Default Params				
Note		Note			
ice Interface User Manuals		U58 4.0.	0.447 <port< td=""><td>1 Default&gt;</td><td>2/15/2010 5:36 PM</td></port<>	1 Default>	2/15/2010 5:36 PM

Figure C.7

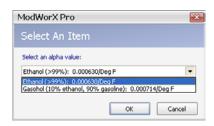


Figure C.8

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