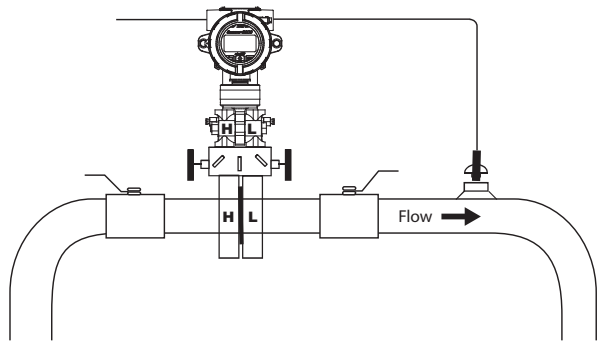# Scanner® 2000 microEFM
# *QuickStart*

Installing the Scanner 2000

Direct Mount

To install the Scanner 2000 microEFM using a direct mount to an orifice or cone meter run, perform the following steps:

1. Determine the best location for the Scanner 2000.
   a. For horizontal meter runs, locate process connections at the top of the line, and mount the Scanner 2000 above the pressure connections at the pipe.
   b. For vertical meter runs, make sure pipeline flow is upward.
2. Locate the H and L markings on the Scanner 2000 transmitter designating high-pressure and low-pressure ports, and connect a valve manifold (if desired) to the transmitter.
3. Connect the orifice flanges to the Scanner 2000/manifold assembly, matching the upstream tap to the high-pressure manifold port and the downstream tap to the low-pressure manifold port.

ADJUSTABLE HEAD DESIGN.
When the sensor is oriented appropriately for pressure connections, the position of the Scanner display may need to be adjusted. To change the orientation of the head, loosen the set screw in the MVT adapter, rotate the head no more than 180 degrees and tighten the set screw.

Set screw
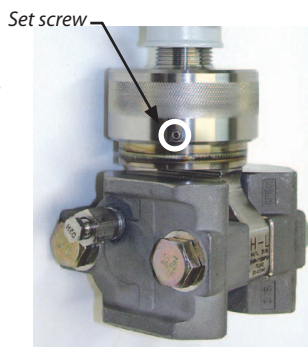
Remote Mount

To install the Scanner 2000 microEFM remotely from the flow run, perform the following steps:

1. Mount the Scanner to a flat, vertical surface, or bolt to a 2-in. pipe using optional pole-mount hardware.
2. Install process tubing between the orifice run and the manifold, making sure that the upstream pressure tap is connected to the high-pressure manifold port and the downstream pressure tap is connected to the low-pressure manifold port. Slope all piping at least 1-inch per linear foot to avoid trapping liquid.
3. Use a suitable compound or tape on all threaded process connections.
4. Position all shutoff and bypass valves so they are accessible from the front of the instrument.
5. Check the manifold for leaks.

POLE-MOUNT OPTION.
An optional pole mount kit (Part No. 9A-30028004) allows the Scanner 2000 to be mounted to a 2-in. vertical or horizontal pipe. The kit includes a mounting bracket, two U-bolts and screws for connecting the bracket to the Scanner 2000 enclosure.
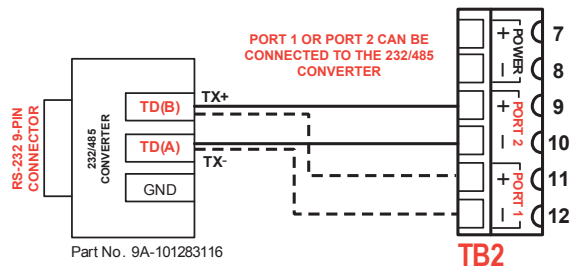
Wiring the Scanner 2000
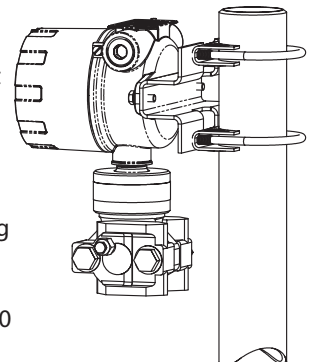
SCANNER 2000
Main Circuit Board
PN: 30160010
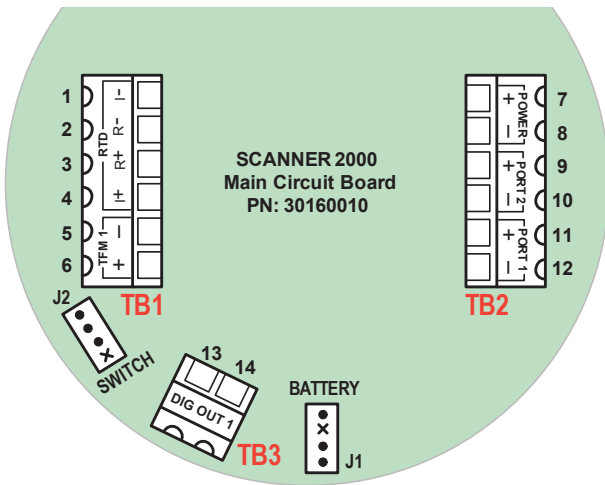
Field wiring enters the Scanner 2000 microEFM through either of two ¾-in. NPT conduit openings in the enclosure and connects to three terminal blocks on the main circuit assembly (TB1, TB2 and TB3). For instructions on wiring an optional expansion circuit board, see the Scanner 2000 Hardware Manual.
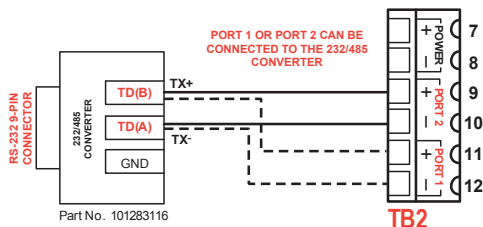
Scanner/Laptop Connection Options

Scanner 2000 microEFMs connect to a laptop three ways:
- *using an optional USB adapter and user-supplied USB cable (external port for easy access)*
- *using an RS-485 to RS-232 converter cable (wires to circuit board)*
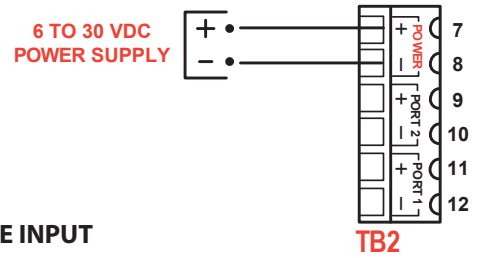- *using an optional COM adapter and RS-485 to RS-232 converter cable (external port for easy access)*
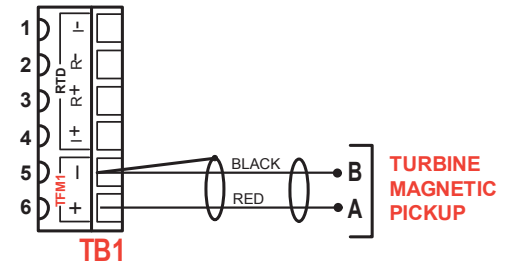
RS-485 TO RS-232 CONVERTER

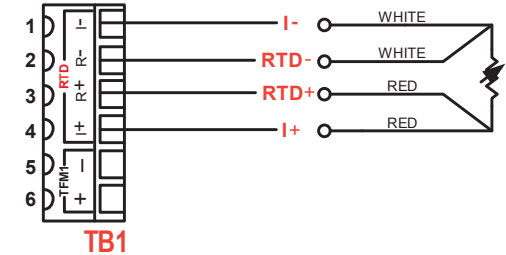PORT 1 OR PORT 2 CAN BE CONNECTED TO THE 232/485 CONVERTER

Part No. 9A-101283116

USB ADAPTER (OPTIONAL)

PORT 1 OR PORT 2 CAN BE CONNECTED TO THE 232/485 CONVERTER

Part No. 101283116

EXTERNAL POWER INPUT

6 TO 30 VDC POWER SUPPLY

TURBINE INPUT

BLACK
RED
TURBINE MAGNETIC PICKUP

RTD INPUT

I- WHITE
RTD- WHITE
RTD+ RED
I+ RED

DIGITAL OUTPUT

PULSE READOUT DEVICE

POWER SUPPLY 5 to 30 VDC

Leave this end of shield disconnected.
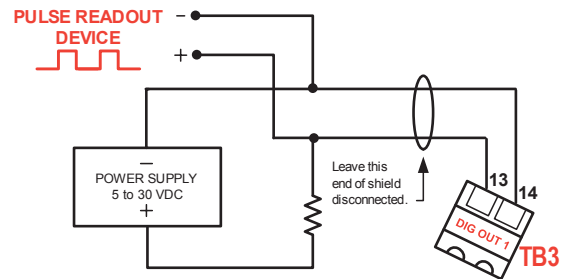
Resistor may be included in pulse readout device. Size the resistor to limit the current to 60 mA.

CAUTION—All field wiring must conform to the National Electrical Code, NFPA 70, Article 501-4(b) for installations within the United States or the Canadian Electric Code for installations within Canada. Local wiring ordinances may also apply. All field wiring must have a wire range of 22 to 14 AWG and terminal block screws must be tightened to a minimum torque of 5 to 7 in-lbs. to secure the wiring within the terminal block. Only personnel who are experienced with field wiring should perform these procedures.

WARNING—To prevent ignition of hazardous atmospheres, do not remove the cover while circuits are alive. Under normal conditions, the Scanner 2000 microEFM poses no hazard when opened in a safe area.

Keypad Configuration & Controls

Remove the instrument cover to access the keypad. Each of the three keys are used for configuration and operation.
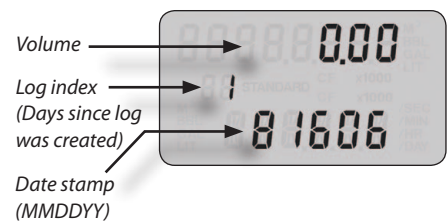
The following illustration defines the functions of each key.

CONFIGURATION:
Move between menus and menu selections

OPERATION:
View next parameter

CONFIGURATION:
Change digits and other menu selections

OPERATION:
View daily logs

CONFIGURATION:
Save configuration settings

OPERATION:
Save totals

PRESS DISPLAY + LOG simultaneously to view time/date, temperature, and battery voltage

PRESS LOG + ENTER/SAVE simultaneously to access Configuration menu

TO CONFIGURE THE INSTRUMENT....
Press the UP ARROW and ENTER buttons simultaneously to configure the following
- *slave address*
- *baud rate*
- *date and time*
- *contract hour*
- *plate size (if security settings allow)*

The following example demonstrates the steps required to enter a slave address.

To Enter a Port 1 Slave Address:

Enter the Configuration menu.	Press UP ARROW (LOG) and ENTER (SAVE) simultaneously. LOG + ENTER/SAVE
Locate the Slave Address setting.	PORT 1 SLAVE ADDRESS will appear in the lower display, and the right-most digit in the top display will begin blinking.
Enter the Slave Address. (range: 1 to 65535, excluding 252 through 255 and 64764)	Press UP ARROW (LOG) until the correct digit is displayed. LOG Press LEFT ARROW (DISPLAY) to select the next digit to the left. DISPLAY Repeat using UP ARROW (LOG) and LEFT ARROW (DISPLAY) to enter all remaining digits. Press ENTER (SAVE). ENTER/SAVE

CONTROL THE PARAMETER DISPLAY...
Press the LEFT ARROW (DISPLAY) button to manually advance the display of parameters in the LCD window.

VIEW DAILY FLOW LOGS....
Press the UP ARROW (LOG) button to view daily logs. The two-digit log index number to the left indicates the number of days that have passed since the log was recorded. A "1'" for example will display yesterday's log value; a "2" will display the log value from 2 days ago. Up to 99 daily logs can be viewed using the keypad.

Volume
Log index (Days since log was created)
Date stamp (MMDDYY)

EXTERNAL SWITCH OPTION....
The external control switch option lets you control the display of parameters on the LCD and view daily logs without removing the cover of the Scanner 2000 microEFM.


- *Press and release the push-button to view the next parameter in the LCD window.*
- *Press and hold the push-button for 4 seconds to view the daily logs screen (shown above). Then press and release the push-button to view the next daily log.*

Up to 99 daily logs can be viewed from the LCD using the keypad or external push-button switch.

Navigating the ModWorX Pro Interface

Main Display Screen
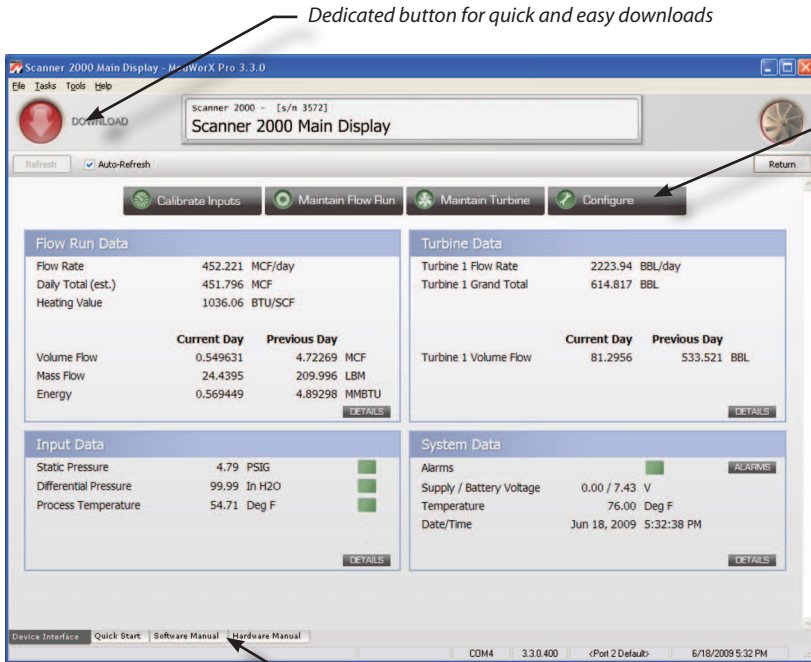
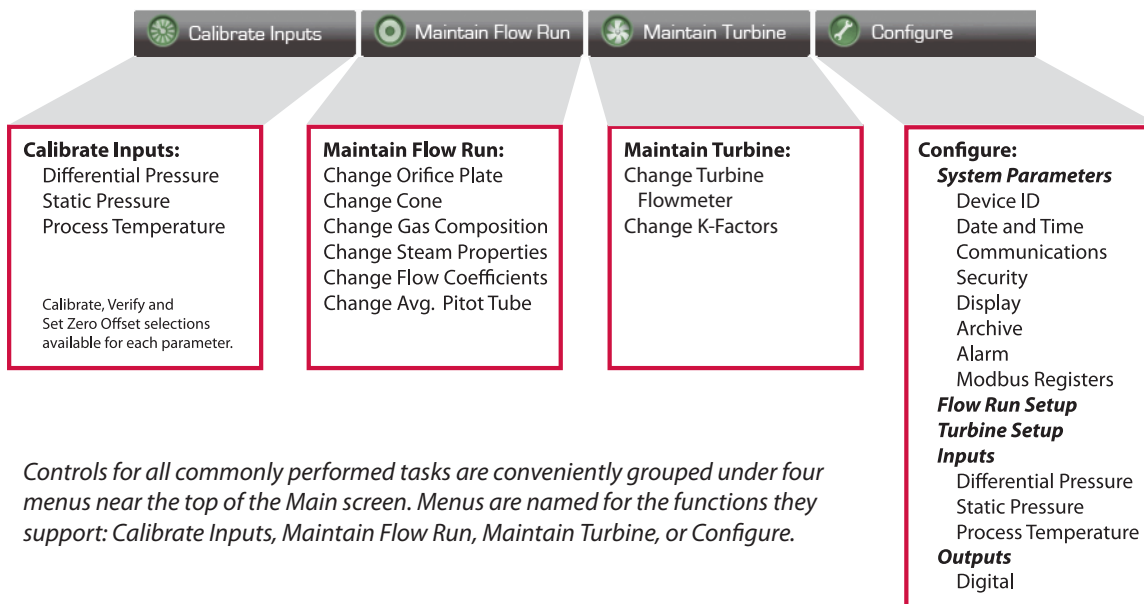*Dedicated button for quick and easy downloads*

Four task-based menus simplify navigation

The Scanner 2000 installation CD provided with the instrument loads the ModWorX Pro interface software for configuring and operating the Scanner 2000.

The Main Display screen (at left) is the control center for the Scanner 2000 and provides quick and easy access to the most commonly performed tasks. From this screen, the user can:
- *view real-time totals and flow rates, input data, and system information*
- *download data*
- *access configuration, calibration, and flow run/turbine maintenance menus*
- *get quick answers to task-specific questions with links to user documents*

Documentation for quick reference

Calibrate Inputs:
Differential Pressure
Static Pressure
Process Temperature

Calibrate, Verify and
Set Zero Offset selections
available for each parameter.

Maintain Flow Run:
Change Orifice Plate
Change Cone
Change Gas Composition
Change Steam Properties
Change Flow Coefficients
Change Avg. Pitot Tube

Maintain Turbine:
Change Turbine
   Flowmeter
Change K-Factors

Configure:
   System Parameters
      Device ID
      Date and Time
      Communications
      Security
      Display
      Archive
      Alarm
      Modbus Registers
   Flow Run Setup
   Turbine Setup
   Inputs
      Differential Pressure
      Static Pressure
      Process Temperature
   Outputs
      Digital

Controls for all commonly performed tasks are conveniently grouped under four menus near the top of the Main screen. Menus are named for the functions they support: Calibrate Inputs, Maintain Flow Run, Maintain Turbine, or Configure.

Calibrate Inputs Menu

From the Calibrate Inputs menu, a user can calibrate differential pressure, static pressure, and process temperature. The user can load a factory calibration, load a previous calibration, or enter new calibration points.

1 *Select the task you want to perform. Then select the parameter you want to calibrate.*

2 *Click Acquire Point to enter a new calibration point and enter the applied calibration value at the prompt. Or click Load Calibration From... to load the data from a factory calibration or previous calibration.*

Click on Change Task to select a new parameter or a new calibration task.

3 *The measured value can be viewed with or without a trend graph. Repeat Step 2 to enter additional calibration points.*
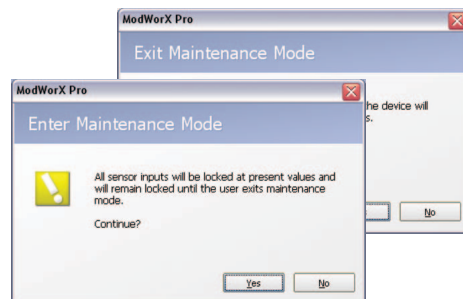
4 *Click Save Changes to save the New Calibration values to memory.*

5 *Click Exit Maintenance Mode to resume live data readings.*

Maintenance Mode

When a user enters a menu in which parameter changes affect volume calculations, the Scanner 2000 is placed in "Maintenance Mode." This locks the input sensor readings at their current values. When the user exits "Maintenance Mode," the inputs are unlocked.

Maintain Flow Run Menu

From the Maintain Flow Run menu, a user can change an orifice plate size, cone meter or averaging pitot tube parameters, cone meter factors, steam properties, or gas composition.

Tasks will vary with the flow calculation method used.

Click Change Task to select a new maintenance task.

1 *Select the task you want to perform.*

2 *Enter new parameters in the fields provided.*
Or click on Copy From Current to load current parameters.

3 *Click Save Changes to save the new parameters to memory.*

4 *Click Exit Maintenance Mode to resume live data readings.*

Maintain Turbine Menu

From the Maintain Turbine menu, a user can change the K-factor or select a different turbine meter.

The user can enter a linear K-factor or a multi-point calibration factor (1 to 12 points allowed).

Click Change Task to select a new turbine meter or a new maintenance task.

1 *Select the task you want to perform.*

2 *Select a new meter or enter a new K-factor using the fields provided.*

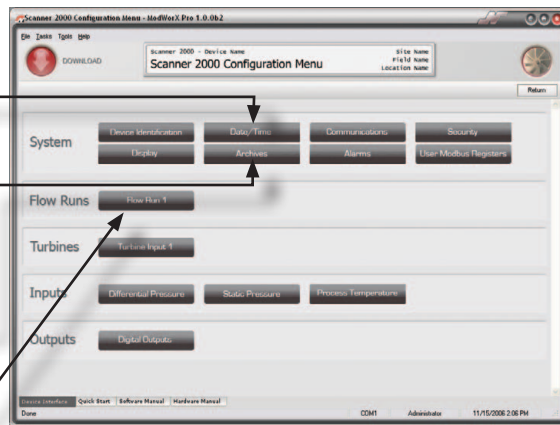**3** *Click Save Changes to save the new selections to memory.*

4 *Click Exit Maintenance Mode to resume live data readings.*

Conﬁgure Menu

From the Conﬁguration menu (right), a user can access every setting required to perform the initial setup for the Scanner 2000.

1 Set the instrument date and time.

2 Establish archive settings
• parameters to be logged
• contract hour
• interval period for saving logs

3 Conﬁgure flow run parameters (as shown below).

4 Set the calculation period.

5 Set the units of measurement used for volume and rate.

6 Click "Change" to select the flow calculation method and fluid property calculation method to be used.

7 Click "Change Plate" to specify plate parameters.

8 Specify pipe parameters.
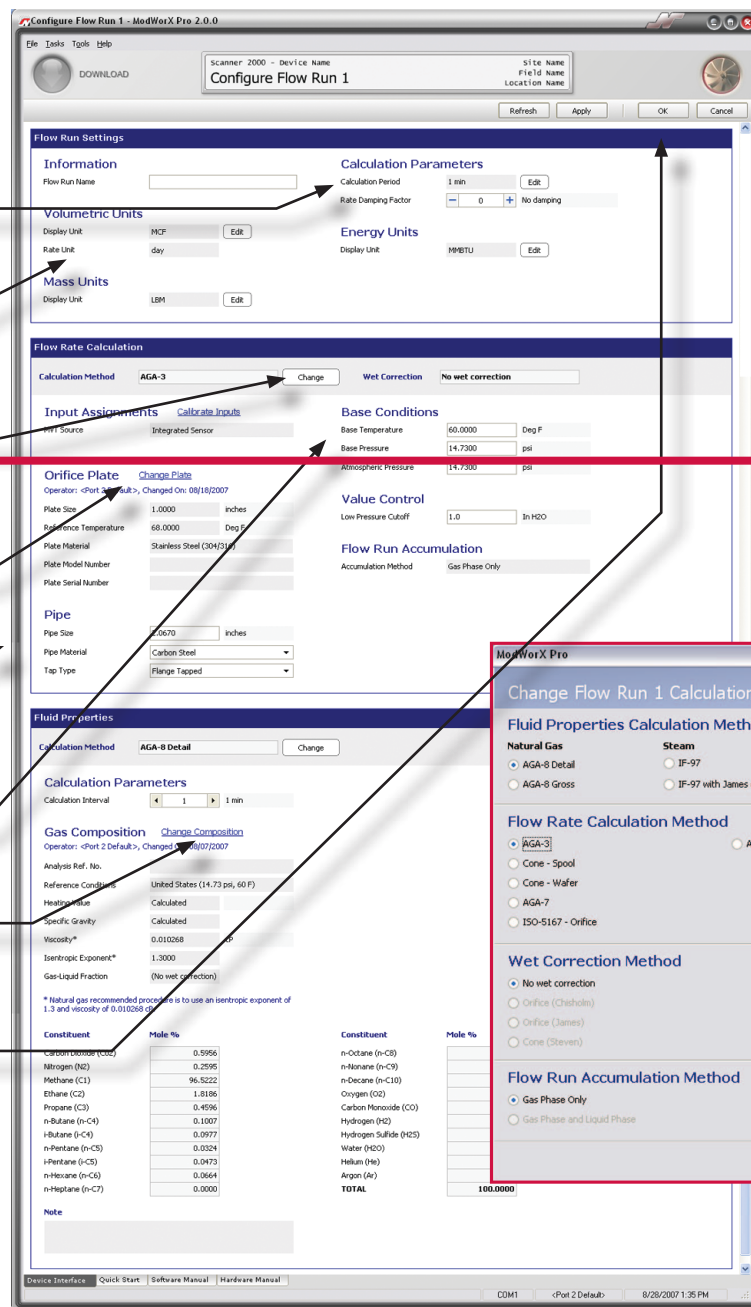
9 Enter base conditions specific to the location.

10 Click "Change Composition" to specify the gas composition. (Percentages must total 100%.)
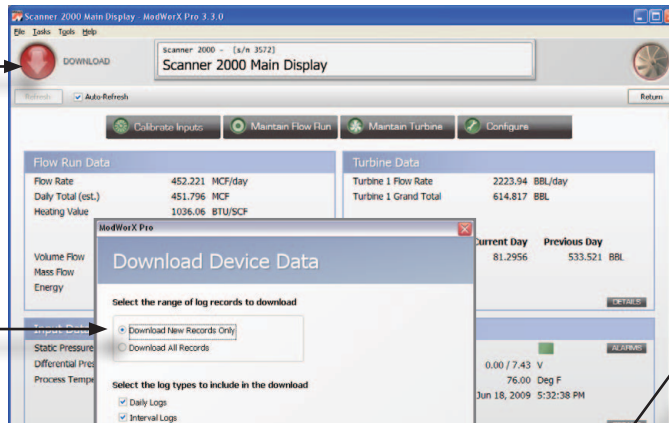
11 Click OK to save the new selections to memory.

The Conﬁgure Flow Run 1 screen below shows conﬁguration settings for an AGA-3 gas run. Required parameters will vary, depending on the flow calculation method selected (step 6).
For information on configuring a steam flow run, see the ModWorX™ Pro User Manual.

If a liquid turbine input will be used in addition to a compensated gas run, click on Turbine Input 1 for conﬁguration options.
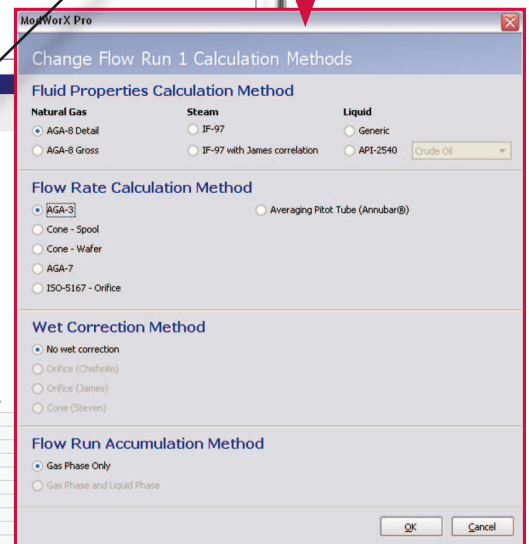
Download Screens

1 Click on the red Download button to download log data.

2 Select the range of data, the type of logs, and any additional settings to be included in the report. Then click Download Now.

3 Downloaded data will appear in a table as shown. Click one of these buttons to:
- export data
- print the tabular data
- view and/or print a trend graph

Export formats:
.cfx (Flow-Cal®)
.ANA, .VOL, and .EVT (PGAS®)
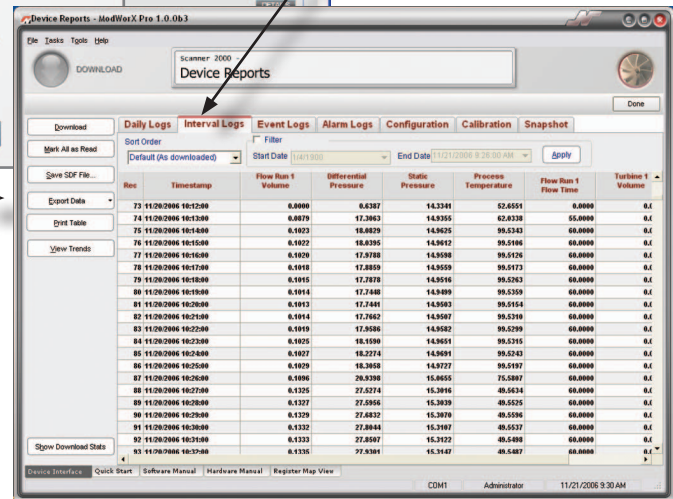.pdf, .xls, .rtf, .csv, and .html

To download data, simply press the Download button and select the range and type of files to be downloaded. Daily and interval logs can be viewed or printed as a table or a trend graph.

Each log type and setting type is displayed under a separate tab.

View all downloaded data (gray box shows range of data displayed in bottom graph).

Select the parameter you want to view.
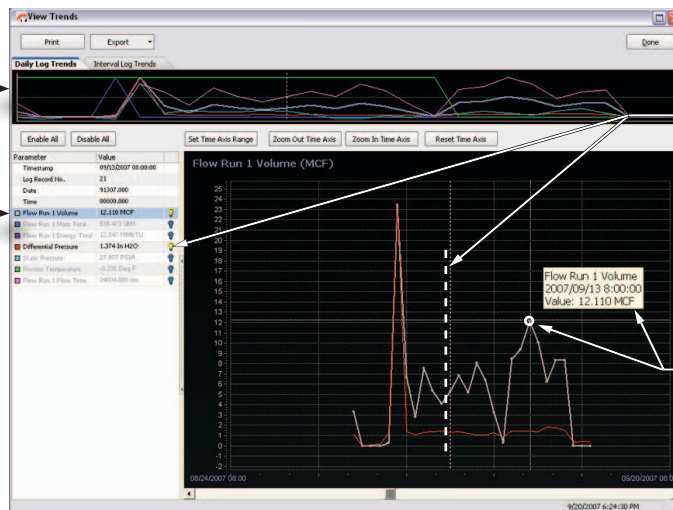
4 The trend view offers two methods of navigation:

(1) Use the scroll bar to move the trend line left or right. The data point that intersects this vertical record index (white dotted) line marks the record being read; the values of all parameters in the record appear in the table at left. Values in the table update automatically as the intersecting data point changes.

(2) Move the mouse to guide the cursor along the trend line. The cursor will snap to the nearest data point. The corresponding parameter, date and time stamp, and parameter value will appear in a pop-up box on the screen.