

Averaging Pitot Tube (Annubar[®]) Calculations

Averaging Pitot Tubes

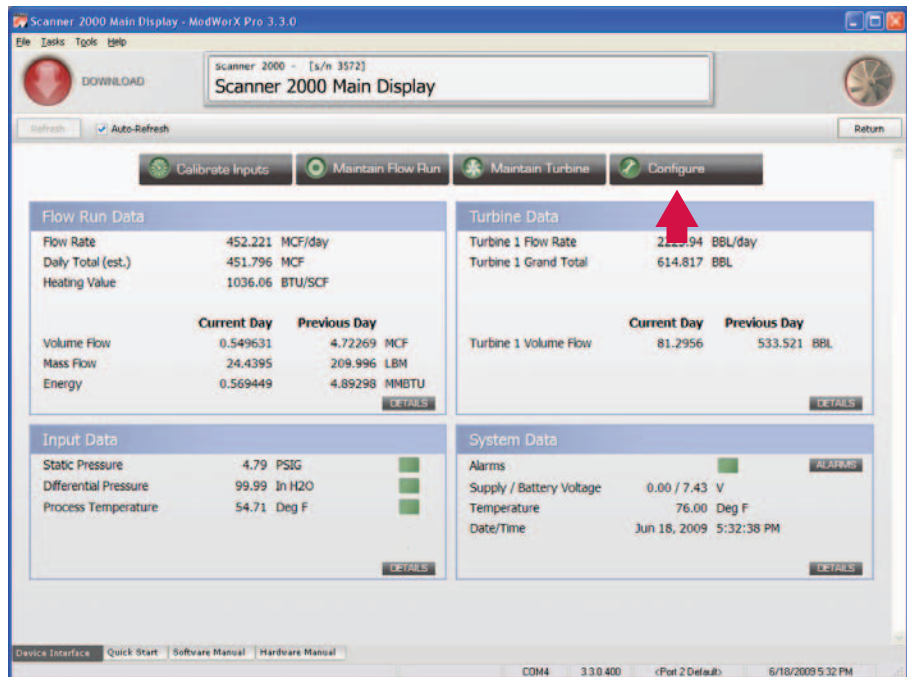
The NuFlo™ Scanner® 2000 microEFM has been successfully implemented in a variety of applications around the world for use with liquid and gas turbine meters, orifice meters, and cone meters. Now the same measurement accuracy and low-power functionality is available for use with averaging pitot tube (Annubar®) meters.

An averaging pitot tube flow run is easily configured with ModWorX® Pro software provided free of charge with all Scanner 2000 purchases. ModWorX Pro comes preloaded with the parameters for a dozen of the most commonly used meters, greatly simplifying the setup process.

An averaging pitot tube measures flow by averaging the pressure at various ports along the length of a probe. A typical meter features two chambers with multiple ports drilled into each. The ports in one chamber face upstream and the ports in the other face downstream. The probe's insertion into the flow stream creates dynamic and static pressures. The upstream ports sample and average the dynamic pressure. The downstream ports sample and average the static pressure. A readout device measures the differential pressure between the chambers.

The Scanner 2000 supports the flow calculations defined in ASME MFC-12M. Devices that utilize these calculations, and are therefore supported by the Scanner 2000, include Preso's Ellipse, Meriam's Accutube, the Torbar from Torbar Flowmeters Limited and Hitrol's HAPT. Devices that utilize other equations for determining the discharge coefficient and/or expansion factor are not supported by the Scanner 2000.

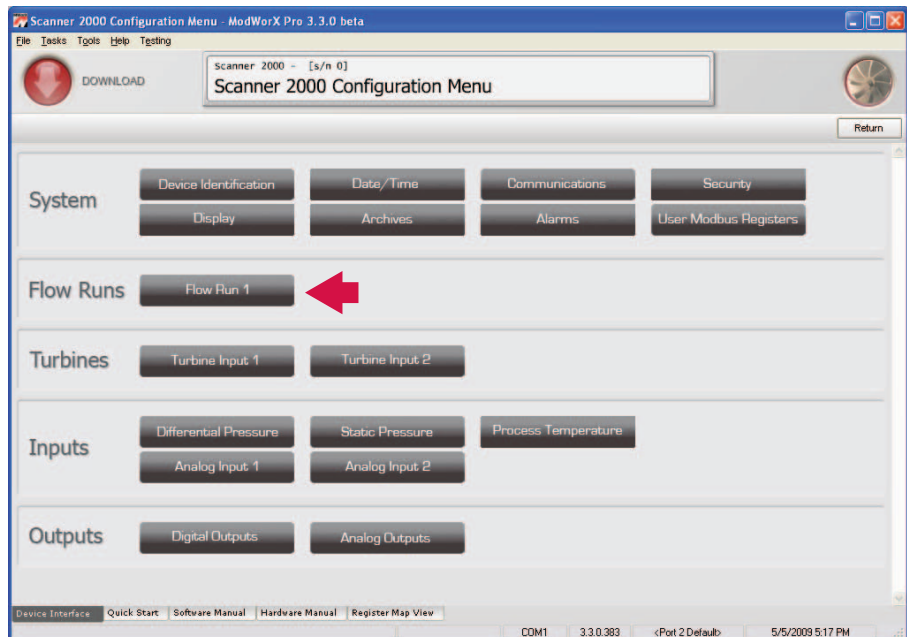
The Scanner 2000 mounts directly to the block manifold that connects to the averaging pitot tube. Orientation and location of the Scanner 2000/meter assembly with respect to piping will vary, depending on piping configurations and the type of fluid being measured. For installation instructions, follow the recommendations of the averaging pitot tube manufacturer.



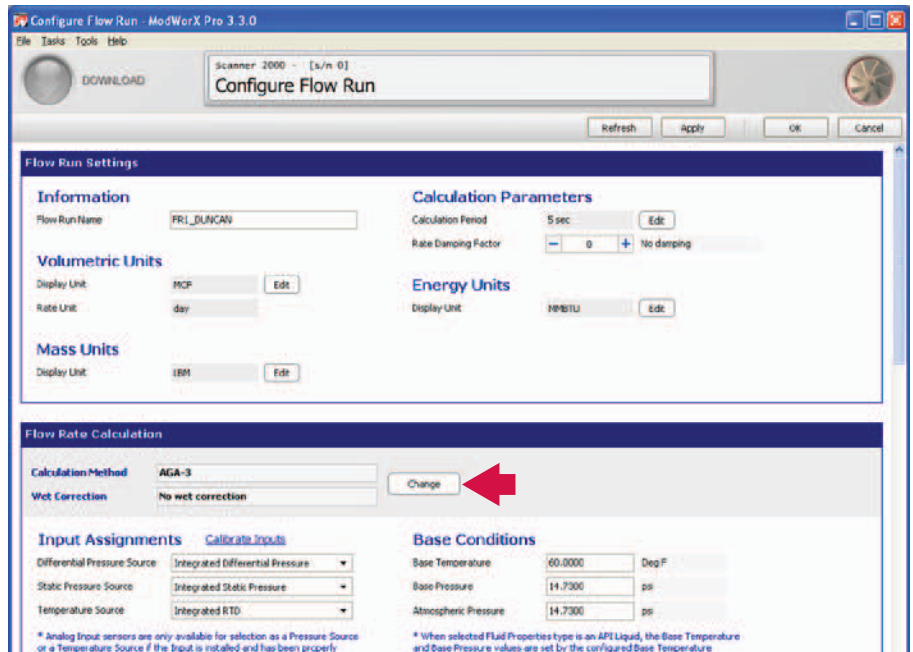
Configuring a Flow Run

An averaging pitot tube flow run may be configured for gas, liquid or steam measurement (without wet gas correction).

1. From the ModWorX Pro main screen, click the **Configure** menu button.
2. Click **Flow Run 1** on the Configuration Menu screen. The Configure Flow Run screen will appear.



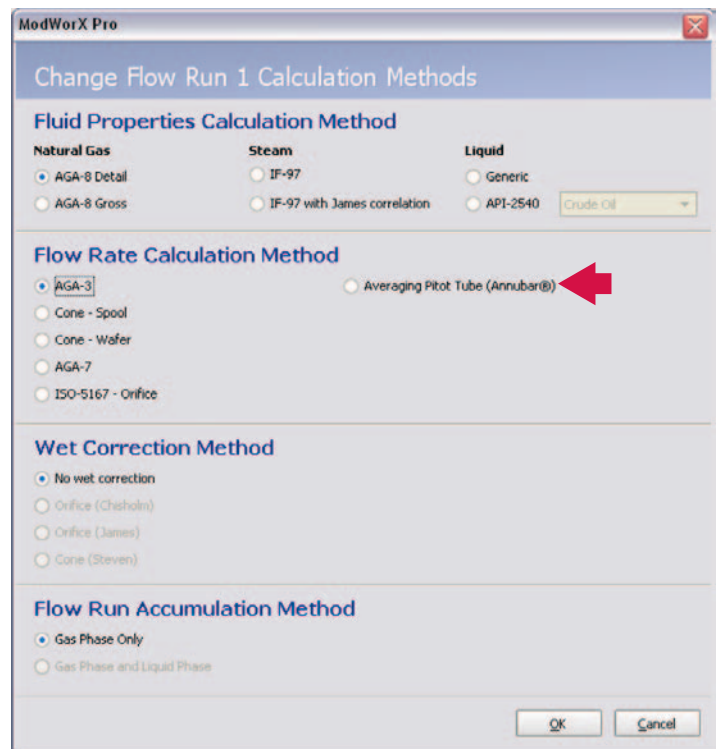
3. Enter a name for the flow run and enter unit settings and calculation parameters as applicable in the Flow Run Settings section of the screen.
4. In the Flow Rate Calculation section, click the **Change** button near the top of the screen.



5. From the Change Flow Run Calculation Methods screen, select the Fluid Properties Calculation Method that is appropriate for the type of fluid being measured.

IMPORTANT: When measuring steam, DO NOT select IF-97 with James correlation; wet gas correction is not supported by averaging pitot tube calculations.

6. Click **Averaging Pitot Tube (Annubar®)** in the Flow Rate Calculation Method section of the screen.
7. Click **OK** to save your selections and return to the Configure Flow Run screen.



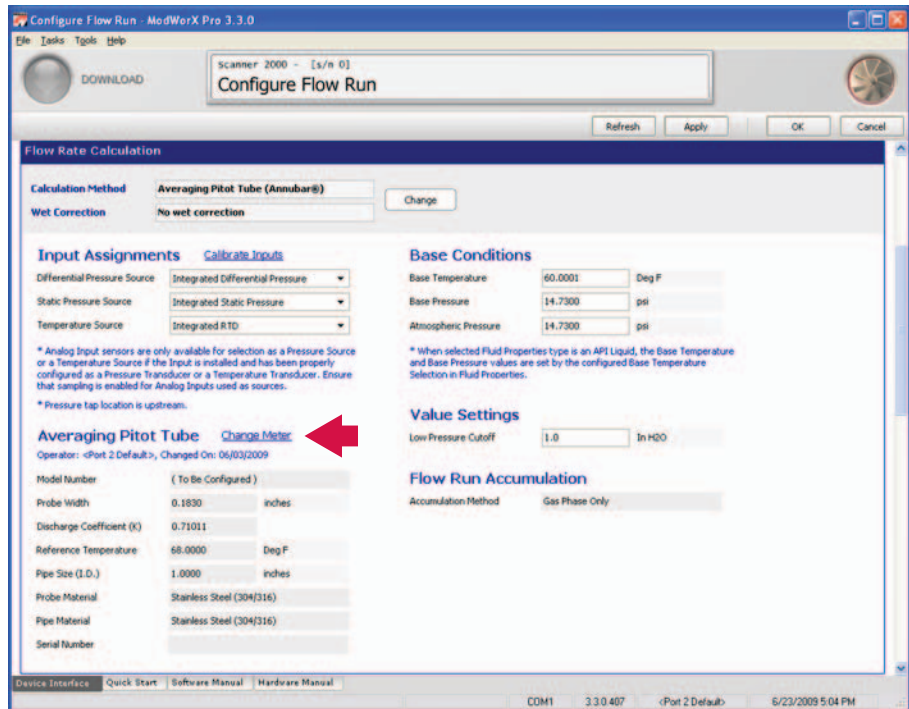
Meter Selection

Default parameters for an averaging pitot tube meter are displayed on the Configure Flow Run screen in the Flow Rate Calculation section.

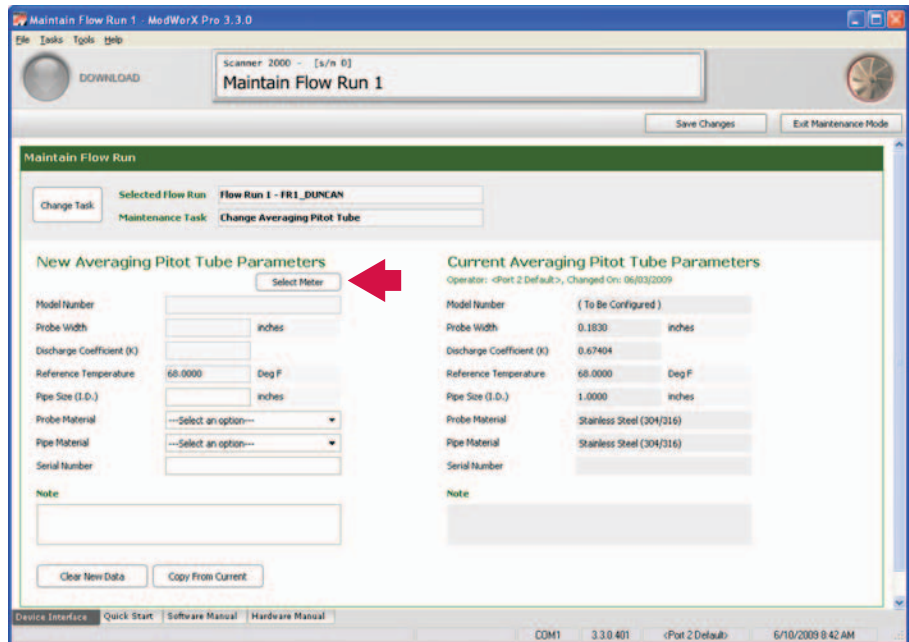
To set up a new meter, perform the following steps:

1. Click the **Change Meter** link in the Averaging Pitot Tube section of the Configure Flow Run screen. The software will prompt you for permission to lock all sensor inputs and enter the Maintenance Mode. Click **Yes** to proceed.

The Maintain Flow Run screen will appear.



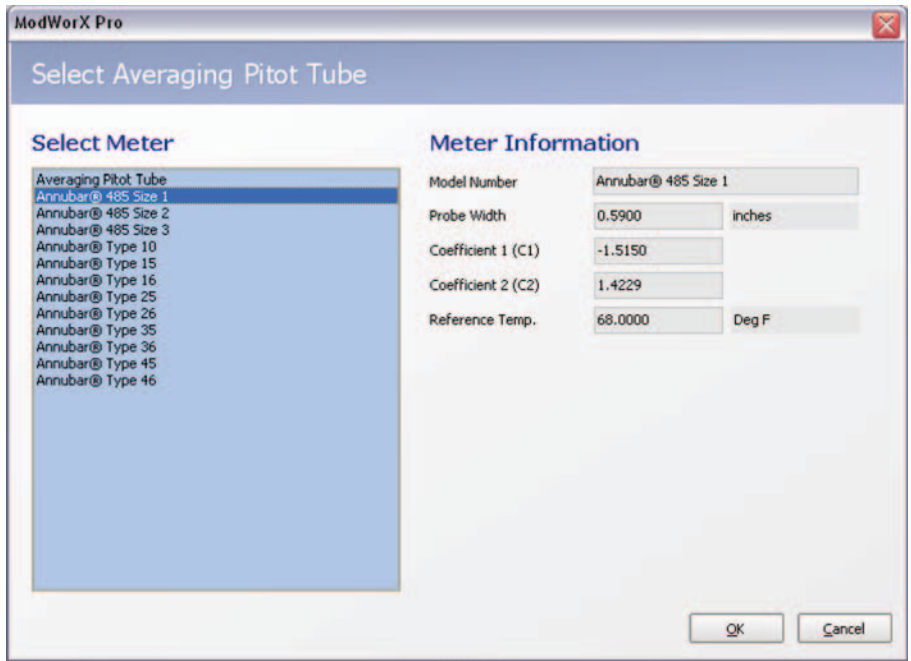
2. Click the **Select Meter** button to display the Select Averaging Pitot Tube dialog.



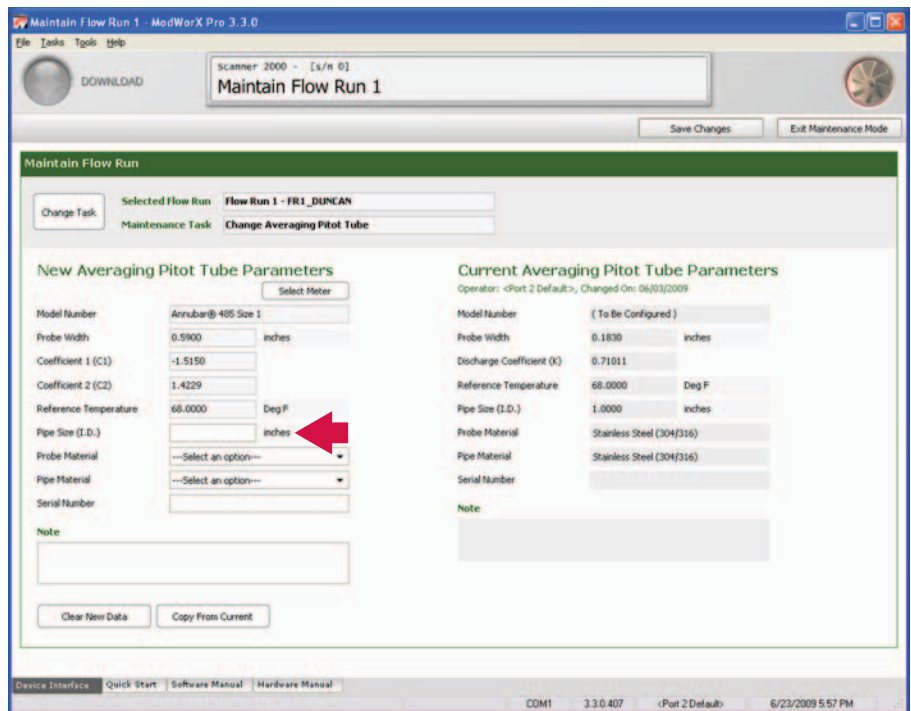
- Click on a meter in the left column to select it. Parameter values corresponding to your selection will appear in the Meter Information block on the right.

The first selection allows the user to enter specifications for any averaging pitot tube (model number, probe width, coefficients and reference temperature) in the Meter Information block. If an Annubar® meter is in use, the user can select the meter model or type from the selections provided.

- Click **OK**. Your meter parameter selections will appear as New Averaging Pitot Tube Parameters on the Maintain Flow Run screen.



- Enter the pipe size for your installation.
- Select the appropriate probe material from the dropdown menu.
- Select the appropriate pipe material from the dropdown menu.
- Enter a serial number, if desired.
- Click **Save Changes**. The new parameters will automatically move to the right side of the screen as Current Averaging Pitot Tube Parameters.
- Click **Yes** on the confirmation dialog to write the data to the Scanner 2000. You may now exit the Maintenance Mode.



Changing the Flowmeter or Meter Parameters

Once a flow run is configured for use with an averaging pitot tube meter, the user can change the meter or edit the parameters of an existing meter by clicking the Maintain Flow Run menu at the top of the main screen.

The user is prompted for permission to lock all sensor inputs and enter the Maintenance Mode. Click **Yes** to proceed.

A maintenance task dialog appears with optional maintenance tasks to select. The content of this dialog will vary, depending on the fluid properties and flow rate calculation method selected for the flow run.

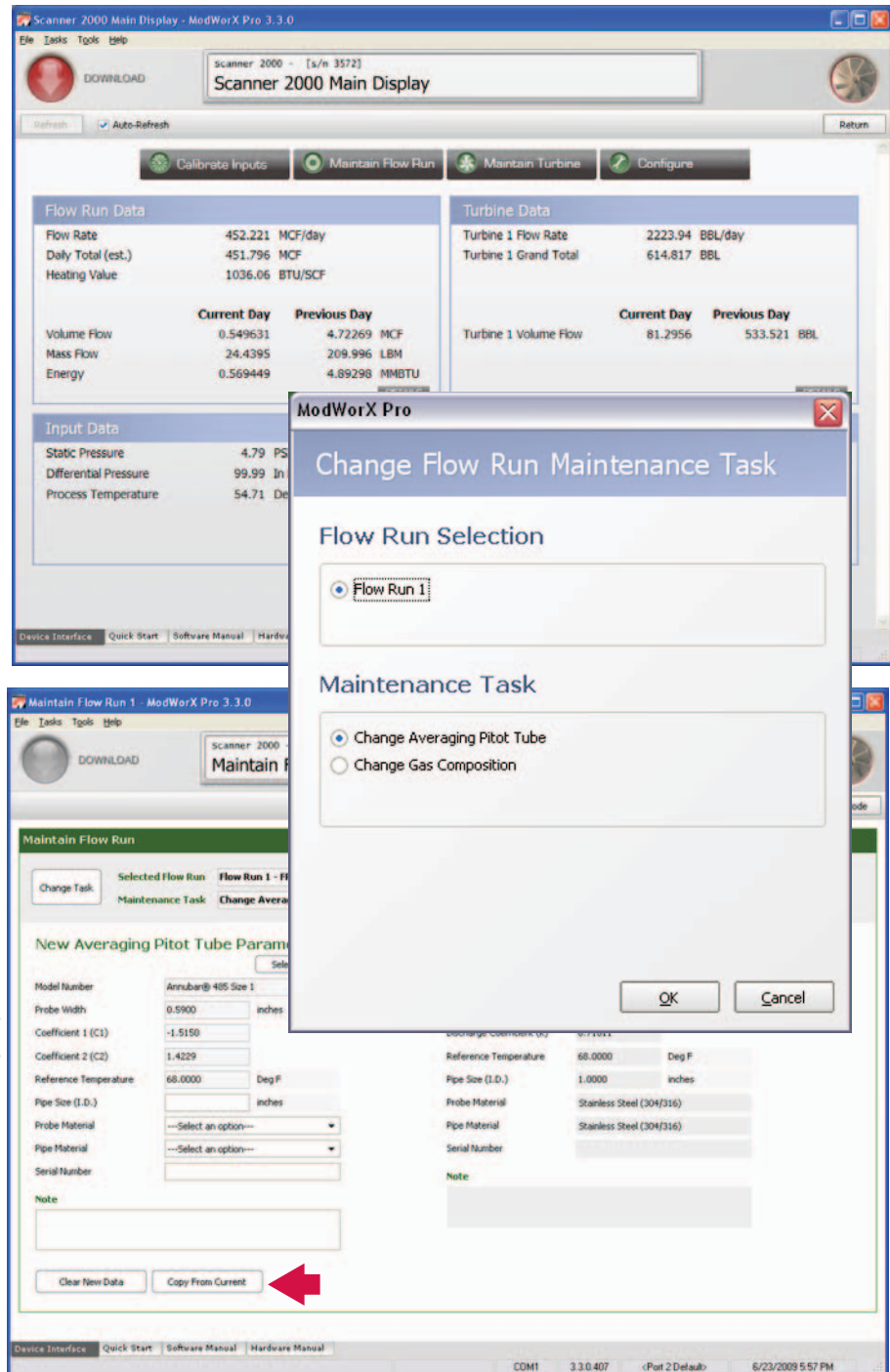
1. To select a new meter, or to change a parameter of an existing meter, click **Change Averaging Pitot Tube**.

The Maintain Flow Run screen will appear.

2. Select a new meter or modify existing parameters as required.

If updating parameters of the current meter, you may copy the current parameters into the New Averaging Pitot Tube Parameters block by clicking the **Copy from Current** button at the bottom of the screen.

3. Make any change necessary and click **Save Changes**.



*ModWorX is a registered trademark of Cameron International Corporation.
NuFlo is a trademark of Cameron International Corporation.
Annubar is a registered trademark of Rosemount Inc.*