User Manual
Part Number D301686X012
Document Number D5137
October 2014

ControlWave Flow Measurement Applications Guide

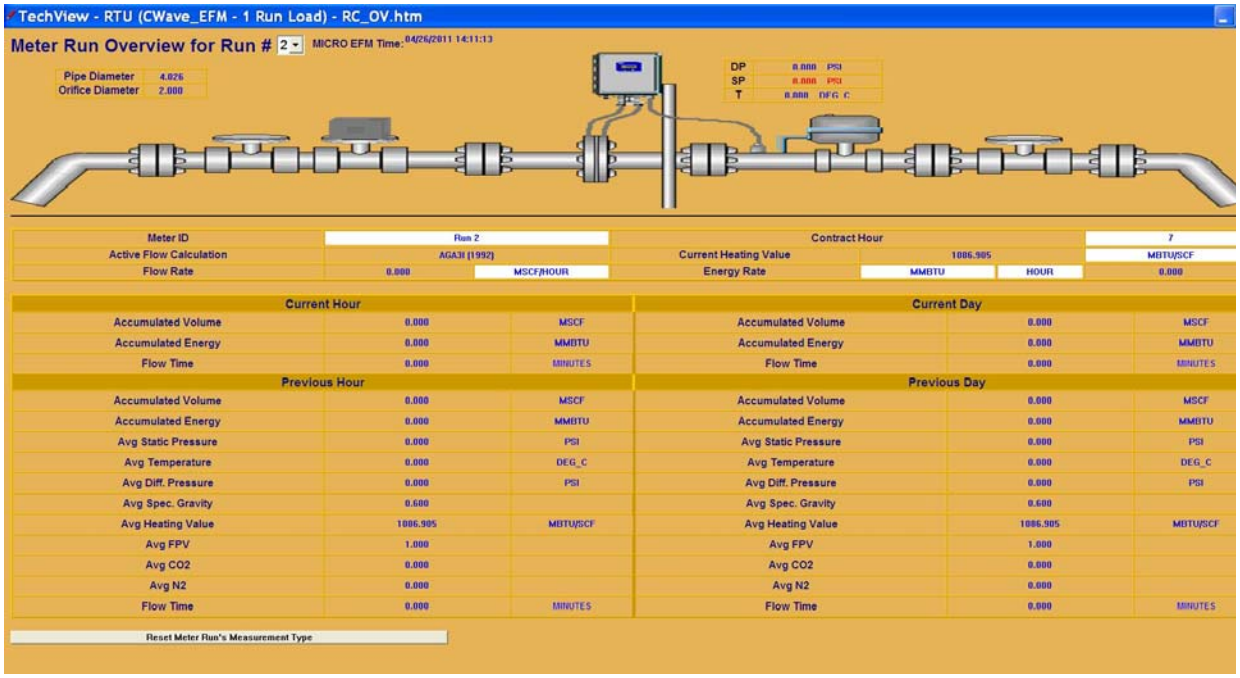
Used with

ControlWave GFC / GFC Plus

ControlWave Corrector

ControlWave EFM

ControlWave XFC



IMPORTANT! READ INSTRUCTIONS BEFORE STARTING!

Be sure that these instructions are carefully read and understood before any operation is attempted. Improper use of this device in some applications may result in damage or injury. The user is urged to keep this book filed in a convenient location for future reference.

These instructions may not cover all details or variations in equipment or cover every possible situation to be met in connection with installation, operation or maintenance. Should problems arise that are not covered sufficiently in the text, the purchaser is advised to contact Emerson Process Management, Remote Automation Solutions for further information.

EQUIPMENT APPLICATION WARNING

The customer should note that a failure of this instrument or system, for whatever reason, may leave an operating process without protection. Depending upon the application, this could result in possible damage to property or injury to persons. It is suggested that the purchaser review the need for additional backup equipment or provide alternate means of protection such as alarm devices, output limiting, fail-safe valves, relief valves, emergency shutoffs, emergency switches, etc. If additional information is required, the purchaser is advised to contact Remote Automation Solutions.

RETURNED EQUIPMENT WARNING

When returning any equipment to Remote Automation Solutions for repairs or evaluation, please note the following: The party sending such materials is responsible to ensure that the materials returned to Remote Automation Solutions are clean to safe levels, as such levels are defined and/or determined by applicable federal, state and/or local law regulations or codes. Such party agrees to indemnify Remote Automation Solutions and save Remote Automation Solutions harmless from any liability or damage which Remote Automation Solutions may incur or suffer due to such party's failure to so act.

ELECTRICAL GROUNDING

Metal enclosures and exposed metal parts of electrical instruments must be grounded in accordance with OSHA rules and regulations pertaining to "Design Safety Standards for Electrical Systems," 29 CFR, Part 1910, Subpart S, dated: April 16, 1981 (OSHA rulings are in agreement with the National Electrical Code).

The grounding requirement is also applicable to mechanical or pneumatic instruments that include electrically operated devices such as lights, switches, relays, alarms, or chart drives.

EQUIPMENT DAMAGE FROM ELECTROSTATIC DISCHARGE VOLTAGE

This product contains sensitive electronic components that can be damaged by exposure to an electrostatic discharge (ESD) voltage. Depending on the magnitude and duration of the ESD, this can result in erratic operation or complete failure of the equipment. Read supplemental document S14006 for proper care and handling of ESD-sensitive components.

Contents

Chapter 1 – Introduction

This manual focuses on how you can configure and use the standard gas measurement application program available with ControlWave flow computer products.

The ControlWave flow computer products include:

- ControlWave Gas Flow Computer (GFC)
- ControlWave Gas Flow Computer Plus (GFC in enclosure)
- ControlWave Gas Flow Corrector
- ControlWave Electronic Flow Meter (EFM)
- ControlWave Explosion Proof Flow Computer (XFC)

This chapter provides an overview of the ControlWave flow computer application and details the structure of this manual.

In This Chapter

1.1 Components of the ControlWave Standard Gas Flow Measurement Application

The ControlWave standard gas flow measurement application consists of:

- A ControlWave project file (*.PRO) pre-programmed for natural gas measurement.
- A customized flash configuration profile (*.FCP) file that configures the ports, memory, audit, and archive parameters of the ControlWave GFC/GFC Plus/EFM/XFC/Corrector.
- A TechView session. This includes the TechView session file (*.TVS), associated *.INI files, and a set of HTM menus customized

for the gas measurement application. You use these menus to configure the application.

1.2 Overview of the Standard Gas Flow Measurement Application

The ControlWave standard gas flow measurement application collects static pressure, differential pressure and temperature data and computes flow, energy, and volume for a station.

A **station** typically refers to a single flow computer and all its associated meter runs. Each **meter run** refers to measurement of natural gas through a single pipeline.

There are certain variations in the application depending upon which ControlWave model you use. For example, the ControlWave EFM supports up to four meter runs, whereas other models are only configured to support one or two meter runs.

Note: If your ControlWave application requires more than four meter runs, you should use the Station Manager application instead. See the *ControlWave Station Manager Configuration Manual* (D5136) for more information.

Similarly, certain input/output (I/O) options only apply to certain models.

Common features for all versions of the application are discussed below:

1.2.1 Data Acquisition – Static Pressure, Differential Pressure, Temperature Variables

The application requires these process inputs for orifice measurement:

- static pressure (SP) collected once per second
- differential pressure (DP) collected once per second
- flowing temperature (T) collected once per second

The application requires these process inputs for measurement using a positive displacement (PD), turbine, or ultrasonic meter:

- static pressure (SP) collected once per second
- frequency input collected once per second
- flowing temperature (T) collected once per second

The application also collects self-test and compensation variables at intervals of four seconds or less.

Pressure data can come from any of the following sources:

- Analog pressure transmitters connected to analog input points on a process I/O module in the ControlWave flow computer.
- Built-in multivariable transducer.
- External multivariable transmitters (Bristol or Rosemount) using BSAP or Modbus communications through an RS-485 communication port.

1.2.2 Flow and Volume Calculations

Flow and volume calculations conform to American Petroleum Institute (API) and American Gas Association (AGA) standards.

Supported flow calculations include:

- AGA3-1985/NX-19
- AGA3-1992 with selectable AGA8 Gross or AGA8 Detail
- AGA7/NX-19
- AGA7 with selectable AGA8 Gross or AGA8 Detail
- Auto-adjust AGA7/NX-19
- Auto-adjust AGA7 with selectable AGA8 Gross or AGA8 Detail

The application performs a complete flow calculation using the process variables every second. Each calculation includes instantaneous rate according to API 14.3, compressibility according to AGA 8 Detail or Gross method, and updates of all volumes, totals, and archive averages.

1.2.3 Flow Rate and Flow Time Calculations (AGA3)

For orifice flow measurement, the application compares the differential pressure value to a low flow cutoff value every second. If the differential pressure falls below the low flow cutoff value, flow is considered to be zero for that second. Hourly and daily flow time is defined to be the number of seconds for which the differential pressure exceeded the cutoff value for the period.

The values for static and differential pressure and temperature are used as inputs to the flow equations. You can select API 14.3 (AGA3, 1992) and AGA8 calculations, with compressibility calculations according to AGA Report No. 8, 1992 (with 1993 errata). The application supports both the detail method and the two gross methods of characterization described in AGA 8. Users may also select the AGA3, 1995 and NX-19 flow equations to calculate the rate of flow.

1.2.4 Flow Rate and Flow Time Calculations (AGA7)

When using PD meters, turbine meters or ultrasonic meters, the application calculates flow rate by applying the correction factor computed by the AGA7 calculations to the frequency of the input pulses. When the frequency drops below 1 Hz, the application sets the flow rate estimate to zero; however, volume calculations still accumulate. The flow time recorded is the time for which the flow rate is non-zero.

1.2.5 Extension Calculation and Analog Averaging

For orifice meters, the application calculates the flow extension every second. The extension is the square root of the product of the absolute upstream static pressure times the differential pressure. This extension is used in the flow rate calculation. When there is no flow, the application reports the arithmetic averages of static pressure and temperature. This allows you to monitor static pressure and temperature during shut-in periods.

1.2.6 Energy Calculation

The application offers the option of using a fixed volumetric heating value or calculating the energy content of the gas according to AGA Report No. 5.

1.2.7 Volume and Energy Integration

The application integrates and accumulates volume and energy at the end of every calculation cycle. The application calculates the volume for a cycle by multiplying the calculated rate by the flow time for that cycle. The application calculates the energy for a cycle by multiplying the volume at base conditions by the heating value.

1.2.8 Downstream Pressure Tap

The multivariable transducer typically measures static pressure from an integral tap on the upstream, high-pressure leg of the differential pressure connection. The transducer can also measure static pressure at the downstream pressure tap, with the measurement taken from the low-pressure side to the high-pressure side. In this installation, the differential signal from the transducer is negative. If, while using the integral smart multivariable transmitter (MVT) or an external MVT, you select the downstream tap location during MVT configuration, the MVT firmware changes the sign of the differential pressure to provide a positive DP value.

1.2.9 Historical Data Storage (Audit Records/ Archive Files)

The ControlWave supports two distinct types of historical data storage – audit records and archive files.

Where feasible, both forms of archive data conform to the requirements of the API Chapter 21. Specifically, the averages of the process variables stored in the data archive are for flowing periods, appropriate to their usage in the equations, and any gas-related parameter designated an event that is changed by an operator either remotely or locally causes an entry in the audit log.

Audit Records (Alarms and Events)

The audit system maintains a history of alarms and certain events that have an impact on the calculated and reported gas flow rates and volumes.

The application stores the most recent 500 alarms and the most recent 500 events. As new alarms/events arrive, they overwrite the oldest entries. Internally, the ControlWave stores alarms and events separately to prevent recurring alarms from overwriting configuration audit data events. The application reports alarms and events in the same log.

The following circumstances generate an audit record:

- Any operator change to a configuration variable
- Any change in the state of an alarm variable
- A system restart
- Certain other system events

You can view audit records on-screen in the audit log.

See the *Supplement to OpenBSI 5.8 Service Pack 1* documentation for help on interpreting audit records.

Archive Files (Averages, totals, and other values)

Archive files store the value of process variables and other calculated variables at specified intervals along with the date and time of each entry. This includes flow rates, volumes and other calculated values. When archive files fill up, new values overwrite the oldest entries in the files.

The application displays archive file data in hourly, data, and periodic logs you can view on screen.

Log Breaks

You can configure the application to support the "breaking" of a log period when an operator-changes a parameter. When this occurs, the log period in process closes out to make a log, and a new log begins.

Hourly Historical Data Log

Each meter run maintains an hourly data log that holds one record for every contract hour. Hourly logs hold 840 entries or 35 days; this ensures that the previous period of hourly data is always resident in flash memory.

The hourly data log stores the following items:

- corrected volume
- uncorrected volume
- accumulated energy
- average static pressure
- average temperature
- average differential pressure

- average specific gravity
- average heating value
- flow time
- uncorrected count

Daily Historical Data Log

Each meter run maintains a daily data log that holds one record for every contract gas day. You can change the contract hour the contract gas day starts at some time other than midnight. The daily log holds 62 entries; this ensures that the previous calendar month of daily data is always resident in flash memory.

The daily data log stores the following items:

- corrected volume
- uncorrected volume
- accumulated energy
- average static pressure
- average temperature
- average differential pressure
- average specific gravity
- average heating value
- flow time
- uncorrected count

Periodic Historical Data Log

Each meter run maintains a periodic data log that holds one record for every log interval. Each log interval is 15 minutes. The periodic historical data log holds 1440 records, or four days of 15 minute data.

The periodic historical data log stores the following items:

- flowing differential pressure
- flowing static pressure
- flowing temperature
- frequency

1.2.10 Run Switching

If you use multiple meter runs in the application, you can configure run switching. Run switching (also known as meter run staging or tube switching) allows changes to the number of meter runs currently active to meet the gas flow demand for the station. See *Section 4.15* for more information.

1.2.11 Sampler and Odorizer

Samplers are external devices which measure the quality of the gas stream.

Because natural gas is odorless and colorless, devices called odorizers inject an additive to the gas stream that allows people to detect the presence of natural gas in the event of a gas leak.

For information on configuring the application to work with a sampler or odorizer, see *Section 4.11*.

1.2.12 Chromatograph Interface

If you use a chromatograph to measure gas component information you can integrate this into the application. You can also specify fixed gas component percentages to use if the chromatograph fails. See *Section 4.10* for more information.

1.2.13 Nominations

Nominations allow you to configure the ControlWave flow computer to allocate precise amounts of gas flow during specific time periods, called nomination periods. See *Section 4.13* for more information.

1.3 Scope of the Manual

This manual contains the following chapters:

Chapter 1 Introduction	Provides an overview of the features supported by the ControlWave standard gas flow measurement application.
Chapter 2 Getting Started	Provides general information on software installation and how to start the application.
Chapter 3 Using the Measurement Group Data tab	Provides information on viewing the summary pages for the station and the meter run.
Chapter 4 Using the Measurement Group Config Tab	Provides information on the various configuration pages.
Chapter 5 Using the Measurement Group Logs Tab	Provides information on viewing archive and audit data on screen.
Chapter 6 – Using the Device Group Config Tab	Provides information on saving/retrieving recipe values.
Chapter 7 – Using the Device Group Comm Tab	Provides instructions for setting up radio communication.

Chapter 8 – Using the Specials Tab	Provides instructions for setting the ControlWave flow computer's clock.

Chapter 2 – Getting Started

This chapter discusses the prerequisites for running the application, and tells you how to start the software.

In This Chapter

2.1 Before You Begin

- You must install the ControlWave flow computer (GFC, GFC Plus, Corrector, EFM, XFC) on site and connect field devices to its I/O module(s) or ports. For information on ControlWave hardware, see the appropriate document:

  CI-ControlWave EFM

  CI-ControlWave GFC

  CI-ControlWave GFC Plus

  CI-ControlWave Corrector

  CI-ControlWave XFC
- You must install OpenBSI software including TechView on your PC workstation. See the *OpenBSI Utilities Manual (D5081),* the *BSI_Config User's Manual* (D5128), and the *TechView User Manual* (D5131) for details.
- You must connect a serial communication cable between the PC workstation and the Control flow computer.
- The ControlWave flow computer (EFM /GFC /GFC Plus /Corrector /XFC) must be running a flash configuration profile file (*.FCP) compatible with the gas measurement application. For information on updating FCP files, see *Chapter 5* of the *OpenBSI Utilities Manual* (D5081).
- The ControlWave flow computer must be running the standard ControlWave project (*.PRO) file configured for the gas measurement application. See *Chapter 7* of the *OpenBSI Utilities Manual* (D5081) for information on downloading a ControlWave project (*.PRO) file.
- If you need to calibrate the pressure/temperature sensors of the ControlWave flow computer, you can do this through TechView. See the *TechView User Manual* (D5131) for details.

Note: If you ordered your ControlWave flow computer with the standard gas measurement application pre-installed, the FCP and PRO files are already loaded when the unit ships from the factory.

2.2 Application Files

If you ordered your ControlWave with the application pre-installed, you can skip to *Section 2.3*.

If you purchased the application **after** you got the ControlWave hardware you will need to download the appropriate PRO and FCP files to your hardware as mentioned in *Section 2.1*. See *Table 2-1* to locate the proper files.

Table 2-1. Application Files

ControlWave Platform	OpenBSI Folder Path	Use this ControlWave Project (*.PRO)	Use this Flash Configuration Profile (*.FCP)	Use this TechView Session File (*.TVS)
ControlWave GFC 	**\openbsi\webGFC\config**	**mgfc*x_xx*.PRO**	**mgfc*x_xx*.FCP**	**CwaveGFC.TVS**
ControlWave GFC Plus 	**\openbsi\webGFC\config**	**mgfc*x_xx*.PRO**	**mgfc*x_xx*.FCP**	**CwaveGFC.TVS**
ControlWave EFM 	**\openbsi\webEFM\config**	**mefm*x_xx*.PRO**	**mefm*x_xx*.FCP**	**CwaveEFM.TVS**
ControlWave Corrector 	**\openbsi\webGFC\config**	**mgfc*x_xx*.PRO**	**mgfc*x_xx*.FCP**	**CwaveGFC.TVS**
ControlWave XFC 	**\openbsi\webXFC\config**	**mxfc*x_xx*.PRO**	**mxfc*x_xx*.FCP**	**CwaveXFC.TVS**

Notes:

- The ControlWave GFC, GFC Plus, and Corrector share the same set of application files.
- You must replace the *x_xx* shown in filenames with the version number. For example, for XFC version 1.58 the mxfc*x_xx*.pro becomes mxfc1_58.pro.

2.3 Starting the Application in TechView

You start the application by accessing the appropriate TVS file from the Start Program menu:

2.3.1 Startup Sequence for ControlWave GFC, GFC Plus, Corrector

Click: **Start>Programs > OpenBSI Tools > Calibration & Configuration> CWave GFC Setup**

2.3.2 Startup Sequence for ControlWave EFM

Click: **Start>Programs > OpenBSI Tools > Calibration & Configuration> CWave EFM Setup**

2.3.3 Startup Sequence for ControlWave XFC

Click: **Start>Programs > OpenBSI Tools > Calibration & Configuration> CWave XFC Setup**

2.4 TechView Screens

Once you start the TVS file for serial operation, TechView opens the Runtime Configuration Parameters dialog box:

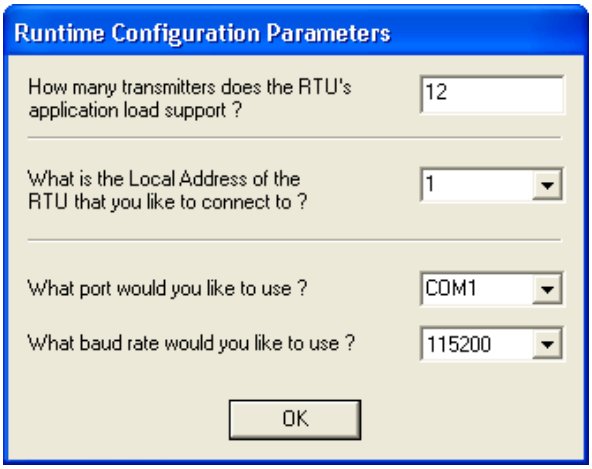


Figure 2-1. Serial Runtime Parameters

1. Leave the number of transmitters at the default of 12.
2. Enter the BSAP local address of the ControlWave flow computer to which you are connected.
3. Select the serial communication port on the PC which you are using to communicate with the ControlWave flow computer.
4. Select the baud rate on the serial communication line.
5. Click **OK**.
6. Log onto the ControlWave flow computer as described in *Section 2.4.1*.

2.4.1 Logging Onto the ControlWave Flow Computer (EFM/GFC/XFC)

In the SignOn to RTU dialog box, enter a **Username / Password** combination that allows full access to the ControlWave flow computer, then click the **SignOn** button.

Figure 2-2. Logging onto the ControlWave Flow Computer

2.5 Accessing Pages of the Flow Measurement Application

The flow measurement application uses two different group icons within TechView – the Measurement Group and the Device Group. By default, the application opens on the Measurement group.

1. To select a group different than the one displayed, click on its icon to bring up the different group menu.
2. On the group menu, click on the desired tab.
3. Click on a button to bring up a page.

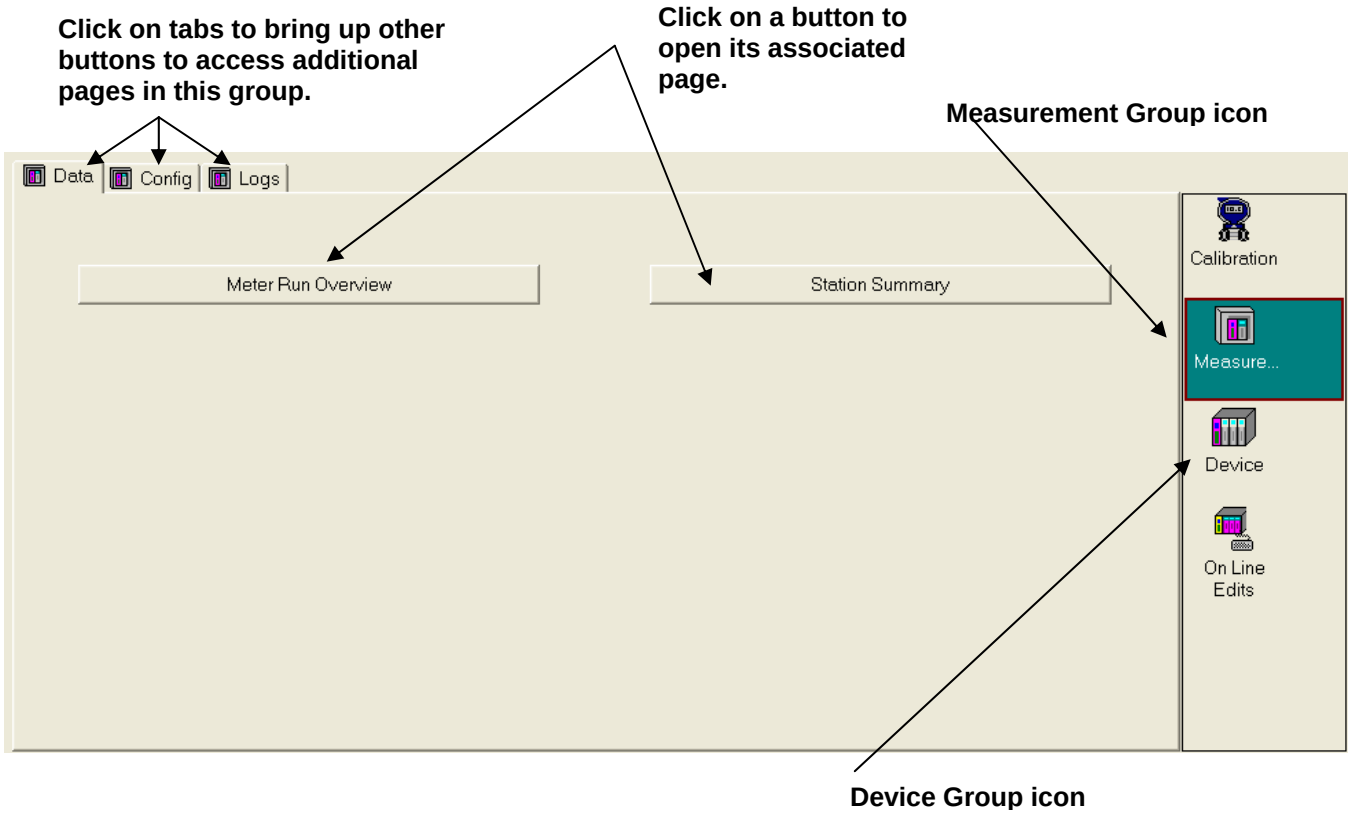


Figure 2-3. Calling Up Menus

Notes:

- The remaining sections of this manual discuss the flow measurement application pages within the Measurement and Device groups.
- For information on other groups (On-Line Edits or Calibration) see the *TechView User Manual* (D5131).

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Chapter 3 – Using the Measurement Group Data Tab

This chapter discusses the **Data** tab in the **Measurement** group. The Data tab lets you view details on the meter run and the station.

In This Chapter

3.1 Accessing the Data Tab

1. Within TechView, if you are in any group other than the Measurement group, click the Measurement group icon.
2. Click the **Data** tab.

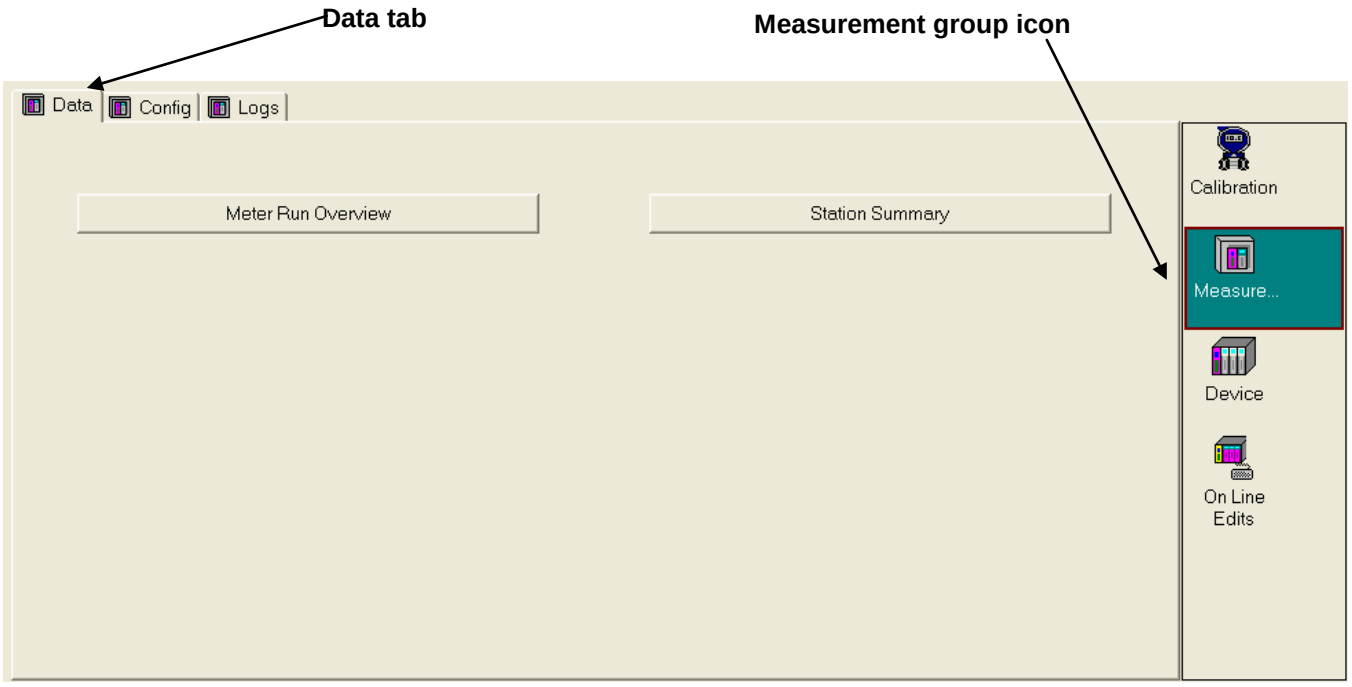


Figure 3-1. Measurement Group Data tab

3.2 Meter Run Overview

The Meter Run Overview page displays current flow and energy rates as well as accumulated volume and energy totals for the current/previous hour and current/previous day.

Calling up this Menu

Click Meter Run Overview

Note: The very first time you click this button after installation; the application prompts you to select the flow measurement equation, and automatically re-directs you to the flow measurement selection and detail pages. See *Section 4.8.*

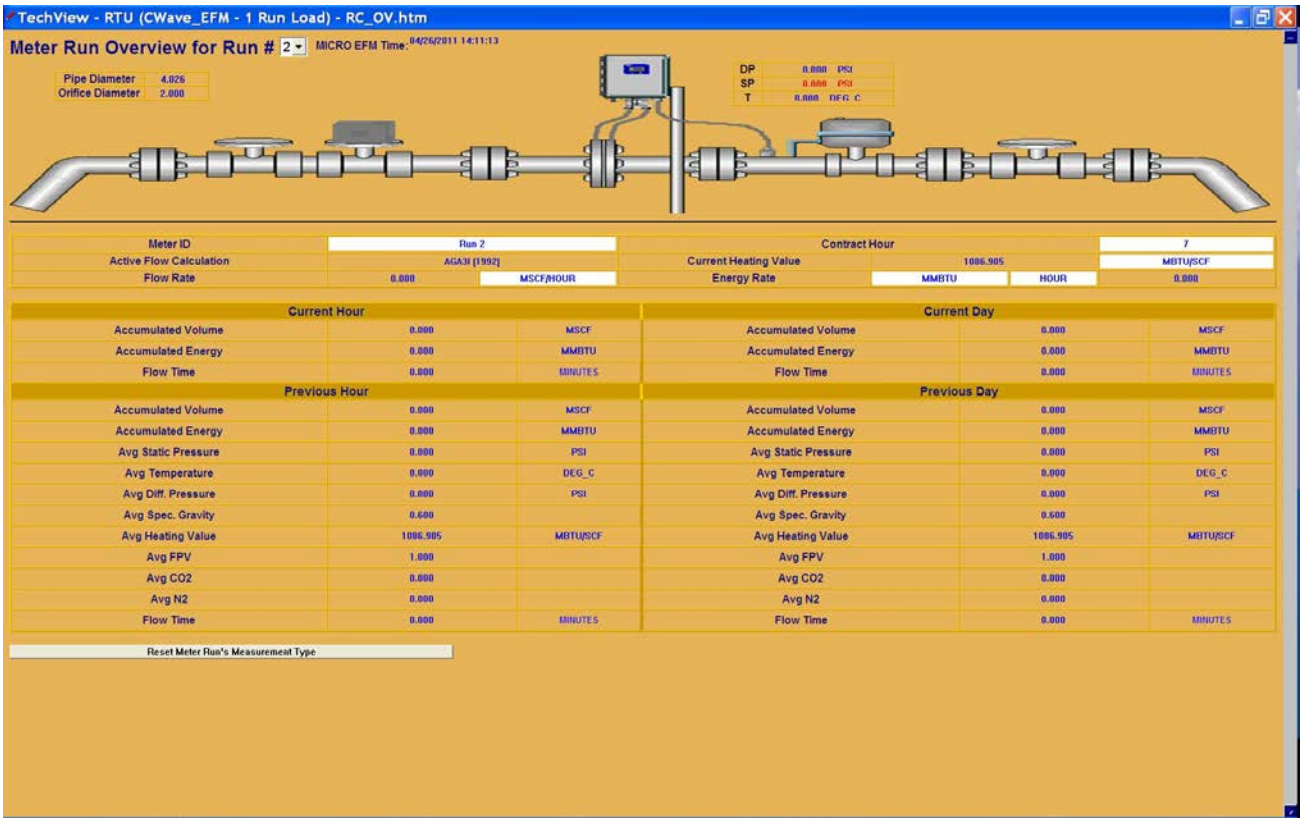


Figure 3-2. Meter Run Overview

Field	Description
Meter Run Overview for Run#	Select the number of the meter run for which you want to view data.
Time	The current time, in 24-hour format, reported by the flow computer.
Pipe Diameter	Shows the diameter of the pipe for this meter run.
Orifice Diameter	Shows the diameter of the orifice for this meter run.

DP	Shows the current differential pressure reading for this meter run.
SP	Shows the current static pressure reading for this meter run.
T	Shows the current temperature reading for this meter run.
Hz	Shows the current frequency reading for this meter run.
Meter ID	Enter an identifying name for the meter (ControlWave flow computer.) Typically this would be the node name, but that is not required.
Active Flow Calculation	Shows the currently selected flow calculation for this meter run.
Flow Rate	Shows the current corrected flow rate of gas for this meter run. (Shown only for orifice type meters.)
Corrected Flow Rate	Shows the current corrected flow rate of gas for this meter run. (Shown only for linear type meters.)
Uncorrected Flow Rate	Shows the current uncorrected flow rate of gas for this meter run. (Shown only for linear type meters.)
Contract Hour	Shows the hour of the day (0 to 23) which marks the beginning of the contract "gas day."
Current Heating Value	Shows the current calculated heating value for the gas for this meter run.
Energy Rate	Shows the current calculated energy rate for the gas for this meter run.
Current Hour	
Accumulated Volume	Shows the accumulated volume of gas for this meter run for the current hour. (Shown only for orifice type meters.)
Corrected Volume	Shows the corrected volume of gas for this meter run for the current hour. (Shown only for linear type meters.)
Uncorrected Volume	Shows the uncorrected volume of gas for this meter run for the current hour. (Shown only for linear type meters.)
Accumulated Energy	Shows the accumulated energy of gas for this meter run for the current hour.

Flow Time	Shows the amount of time gas is flowing for the current hour for this meter run.
Current Day	
Accumulated Volume	Shows the accumulated volume of gas for this meter run for the current day. (Shown only for orifice type meters.)
Corrected Volume	Shows the corrected volume of gas for this meter run for the current day. (Shown only for linear type meters.)
Uncorrected Volume	Shows the uncorrected volume of gas for this meter run for the current day. (Shown only for linear type meters.)
Accumulated Energy	Shows the accumulated energy of gas for this meter run for the current day.
Flow Time	Shows the amount of time gas is flowing for the current day for this meter run.
Previous Hour	
Accumulated Volume	Shows the accumulated volume of gas for this meter run for the previous hour. (Shown only for orifice type meters.)
Corrected Volume	Shows the corrected volume of gas for this meter run for the previous hour. (Shown only for linear type meters.)
Uncorrected Volume	Shows the uncorrected volume of gas for this meter run for the previous hour. (Shown only for linear type meters.)
Accumulated Energy	Shows the accumulated energy of gas for this meter run for the previous hour.
Avg Static Pressure	Shows the average static pressure of gas for this meter run for the previous hour.
Avg Temperature	Shows the average temperature of gas for this meter run for the previous hour.
Avg Diff. Pressure	Shows the average differential pressure of gas for this meter run for the previous hour. (Shown only for orifice type meters.)
Avg Spec. Gravity	Shows the average specific gravity of gas for this meter run for the previous hour.
Avg Heating Value	Shows the average heating value of gas for this meter run for the previous hour.
Avg FPV	Shows the average supercompressibility factor (FPV) of gas for this meter run for the previous hour.

Avg CO2	Shows the average carbon dioxide (CO_2) within the gas for this meter run for the previous hour.
Avg N2	Shows the average nitrogen (N_2) within the gas for this meter run for the previous hour.
Flow Time	Shows the amount of time gas is flowing for the previous hour for this meter run.
Previous Day	
Accumulated Volume	Shows the accumulated volume of gas for this meter run for the previous day. (Shown only for orifice type meters.)
Corrected Volume	Shows the corrected volume of gas for this meter run for the previous day. (Shown only for linear type meters.)
Uncorrected Volume	Shows the uncorrected volume of gas for this meter run for the previous day. (Shown only for linear type meters.)
Accumulated Energy	Shows the accumulated energy of gas for this meter run for the previous day.
Avg Static Pressure	Shows the average static pressure of gas for this meter run for the previous day.
Avg Temperature	Shows the average temperature of gas for this meter run for the previous day.
Avg Diff. Pressure	Shows the average differential pressure of gas for this meter run for the previous day. (Shown only for orifice type meters.)
Avg Spec. Gravity	Shows the average specific gravity of gas for this meter run for the previous day.
Avg Heating Value	Shows the average heating value of gas for this meter run for the previous day.
Avg FPV	Shows the average supercompressibility factor (FPV) of gas for this meter run for the previous day.
Avg CO2	Shows the average carbon dioxide (CO_2) within the gas for this meter run for the previous day.
Avg N2	Shows the average nitrogen (N_2) within the gas for this meter run for the previous day.
Flow Time	Shows the amount of time gas is flowing for the previous day for this meter run.
Reset Meter Run's Measurement Type	If you chose the wrong flow equation type, click this button to re-select the flow equation.

3.3 Station Summary

The Station Summary page presents flow and energy data for the station for the current hour, current day, previous hour, and previous day.

Calling up this Menu

Click Station Summary

Station Summary

Station Identification	Firmware Major/Minor	Station ID	Program Name	Program Revision
	5 20	ORVILLE_JUNCTION	MEFM1_98	1.98
Web Page Version: 1.98	System Voltage Input	23.85	Ram Backup Battery Status	FAILED

Station Totals

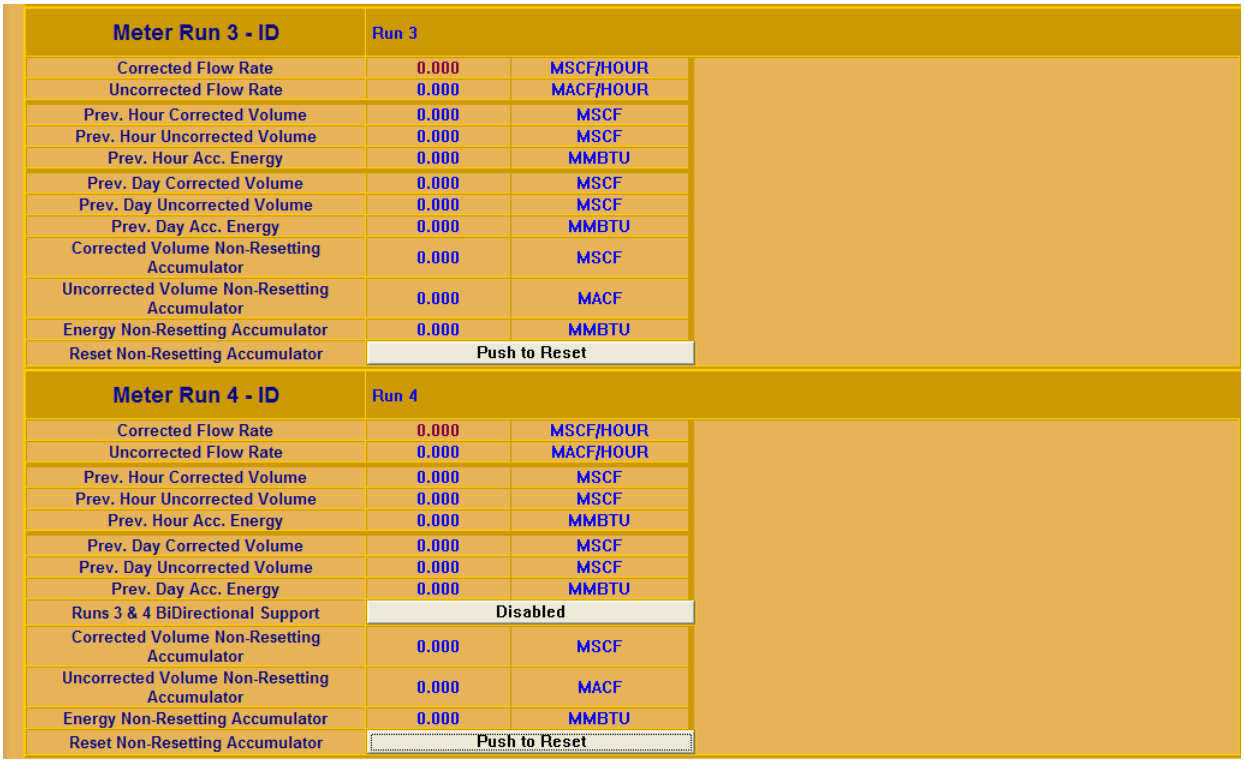
Corrected Flow Rate	0.000	MSCF/HOUR	Corrected Volume Non-Resetting Accumulator	0.000	
Uncorrected Flow Rate	0.000	MACF/HOUR	Uncorrected Volume Non-Resetting Accumulator	0.000	
Energy Rate	0.000	MMBTU/HOUR	Energy Non-Resetting Accumulator	0.000	
Go To Forward/Reverse Totals			Reset Non-Resetting Accumulators	Push to Reset	

Current Hour			Current Day		
Corrected Volume	0.000	MSCF	Corrected Volume	0.000	MSCF
Uncorrected Volume	0.000	MACF	Uncorrected Volume	0.000	MACF
Accumulated Energy	0.000	MMBTU	Accumulated Energy	0.000	MMBTU

Previous Hour			Previous Day		
Corrected Volume	0.000	MSCF	Corrected Volume	0.000	MSCF
Uncorrected Volume	0.000	MACF	Uncorrected Volume	0.000	MACF
Accumulated Energy	0.000	MMBTU	Accumulated Energy	0.000	MMBTU

Meter Run 1 - ID	Run 1	
Corrected Flow Rate	0.000	MSCF/HOUR
Uncorrected Flow Rate	0.000	MACF/HOUR
Prev. Hour Corrected Volume	0.000	MSCF
Prev. Hour Uncorrected Volume	0.000	MACF
Prev. Hour Acc. Energy	0.000	MMBTU
Prev. Day Corrected Volume	0.000	MSCF
Prev. Day Uncorrected Volume	0.000	MACF
Prev. Day Acc. Energy	0.000	MMBTU
Corrected Volume Non-Resetting Accumulator	0.000	MSCF
Uncorrected Volume Non-Resetting Accumulator	0.000	MACF
Energy Non-Resetting Accumulator	0.000	MMBTU
Reset Non-Resetting Accumulator	Push to Reset	

Meter Run 2 - ID	?????	
Corrected Flow Rate	?????	?????
Uncorrected Flow Rate	?????	?????
Prev. Hour Corrected Volume	?????	?????
Prev. Hour Uncorrected Volume	?????	?????
Prev. Hour Acc. Energy	?????	?????
Prev. Day Corrected Volume	?????	?????
Prev. Day Uncorrected Volume	?????	?????
Prev. Day Acc. Energy	?????	?????
Runs 1 & 2 BiDirectional Support	Disabled	
Corrected Volume Non-Resetting Accumulator	?????	?????
Uncorrected Volume Non-Resetting Accumulator	?????	?????
Energy Non-Resetting Accumulator	?????	?????
Reset Non-Resetting Accumulators	Push to Reset	



Meter Run 3 - ID	Run 3	
Corrected Flow Rate	0.000	MSCF/HOUR
Uncorrected Flow Rate	0.000	MACF/HOUR
Prev. Hour Corrected Volume	0.000	MSCF
Prev. Hour Uncorrected Volume	0.000	MSCF
Prev. Hour Acc. Energy	0.000	MMBTU
Prev. Day Corrected Volume	0.000	MSCF
Prev. Day Uncorrected Volume	0.000	MSCF
Prev. Day Acc. Energy	0.000	MMBTU
Corrected Volume Non-Resetting Accumulator	0.000	MSCF
Uncorrected Volume Non-Resetting Accumulator	0.000	MACF
Energy Non-Resetting Accumulator	0.000	MMBTU
Reset Non-Resetting Accumulator	Push to Reset	

Meter Run 4 - ID	Run 4	
Corrected Flow Rate	0.000	MSCF/HOUR
Uncorrected Flow Rate	0.000	MACF/HOUR
Prev. Hour Corrected Volume	0.000	MSCF
Prev. Hour Uncorrected Volume	0.000	MSCF
Prev. Hour Acc. Energy	0.000	MMBTU
Prev. Day Corrected Volume	0.000	MSCF
Prev. Day Uncorrected Volume	0.000	MSCF
Prev. Day Acc. Energy	0.000	MMBTU
Runs 3 & 4 BiDirectional Support	Disabled	
Corrected Volume Non-Resetting Accumulator	0.000	MSCF
Uncorrected Volume Non-Resetting Accumulator	0.000	MACF
Energy Non-Resetting Accumulator	0.000	MMBTU
Reset Non-Resetting Accumulator	Push to Reset	

Figure 3-3. Station Summary page

Field	Description
Station Identification	
Firmware Major	Shows the major version number for the ControlWave system firmware currently installed in the ControlWave flow computer.
Firmware Minor	Shows the minor version number for the ControlWave system firmware currently installed in the ControlWave flow computer.
Station ID	Click in this field and type in a name to the station. This could be the flow computer node name, a geographic location, or other name you decide.
Program Name	Shows the name of the ControlWave project (*.PRO) file executing in the ControlWave flow computer.
Program Revision	Shows the revision level of the ControlWave project (*.PRO) file executing in the ControlWave flow computer.
Web Page Version	Shows the revision level of the ControlWave application HTML pages running on your PC.
System Voltage Input	This field shows the voltage coming to the power supply for the ControlWave EFM, GFC, XFC, or Corrector. **Note:** The ControlWave GFC has two system voltage

	inputs.
Ram Backup Battery Status	Displays the status of the SRAM backup battery in the ControlWave flow computer. If the SRAM backup battery fails and there is a power failure or reboot of the unit, the ControlWave flow computer loses configuration parameters, retain data, static memory data, and pending alarm messages.
Station Totals	Station totals encompass all meter runs for this station.
Corrected Flow Rate	This field displays the current corrected flow rate of gas for this station. Click in the field at right to specify the correct units for the corrected flow rate.
Uncorrected Flow Rate	This field displays the current uncorrected flow rate of gas for this station before any correction factors are applied. Click in the field at right to specify the correct units for the uncorrected flow rate.
Energy Rate	This field displays the current energy rate for gas at this station. Click in the field at right to specify the correct units for the energy rate.
Corrected Volume Non-Resetting Accumulator	This field shows the running total corrected volume since the last the last time you clicked **Push to Reset**.
Uncorrected Volume Non-Resetting Accumulator	This field shows the running total uncorrected volume since the last the last time you clicked **Push to Reset**.
Energy Non-Resetting Accumulator	This field shows the running total energy since the last the last time you clicked **Push to Reset**.
Reset Non-Resetting Accumulators Push to Reset	The accumulators do not reset to zero automatically at the end of the hour or day. They reset only when you manually reset them. Click the **Push to Reset** button to reset the totals to zero for all of this station's non-resetting accumulators.
Go to Forward/Reverse Totals	Click here to go to the *Forward/Reverse Summary* menu.
Current Hour	This section shows readings for the current "gas hour."
Corrected Volume	This field displays the corrected volume of gas for this station for the current hour.
Uncorrected Volume	This field displays the uncorrected volume of gas for this station for the current hour.

Accumulated Energy	This field displays the accumulated energy of gas for this station for the current hour.
Current Day	This section shows readings for the current "gas day."
Corrected Volume	This field displays the corrected volume of gas for this station for the current day.
Uncorrected Volume	This field displays the uncorrected volume of gas for this station for the current day.
Accumulated Energy	This field displays the accumulated energy of gas for this station for the current day.
Previous Hour	This section shows readings for the previous "gas hour."
Corrected Volume	This field displays the corrected volume of gas for this station for the previous hour.
Uncorrected Volume	This field displays the uncorrected volume of gas for this station for the previous hour.
Accumulated Energy	This field displays the accumulated energy of gas for this station for the previous hour.
Previous Day	This section shows readings for the previous "gas day."
Corrected Volume	This field displays the corrected volume of gas for this station for the previous day.
Uncorrected Volume	This field displays the uncorrected volume of gas for this station for the previous day.
Accumulated Energy	This field displays the accumulated energy of gas for this station for the previous day.
Meter Run *x*	The number of meter runs varies depending upon the ControlWave type. ControlWave EFM supports up to four meter runs; ControlWave Corrector/GFC/GFC Plus and XFC default to two meter runs.
ID	This field shows the name assigned to this meter run.
Corrected Flow Rate	This field displays the current corrected flow rate of gas for this meter run.
Uncorrected Flow Rate	This field displays the current uncorrected flow rate of gas for this meter run.
Prev. Hour Corrected Volume	This field displays the corrected volume of gas for this meter run for the previous hour.

Prev. Hour Uncorrected Volume	This field displays the uncorrected volume of gas for this meter run for the previous hour.
Prev. Hour Accumulated Energy	This field displays the accumulated energy of gas for this meter run for the previous hour.
Prev. Day Corrected Volume	This field displays the corrected volume of gas for this meter run for the previous day.
Prev. Day Uncorrected Volume	This field displays the uncorrected volume of gas for this meter run for the previous day.
Prev. Day Accumulated Energy	This field displays the accumulated energy of gas for this meter run for the previous day.
Runs *x* and *y* Bi-Directional Support Enabled/Disabled	This button only shows for even-numbered meter runs. Its label shows the current state for bi-directional support. When you click the button you toggle the state. Click **Disabled** to activate bi-directional support in which gas can flow in both forward and reverse directions through the pipe. The button now displays **Enabled**. Reverse direction only applies to even-numbered meter runs. Click **Enabled** to turn off bi-directional support. The button now displays **Disabled**.
Corrected Volume Non-Resetting Accumulator	This field shows a running total of the corrected volume since the last time you clicked the **Push to Reset** button.
Uncorrected Volume Non-Resetting Accumulator	This field shows a running total of the uncorrected volume since the last time you clicked the **Push to Reset** button.
Energy Non-Resetting Accumulator	This field shows a running total of the energy since the last time you clicked the **Push to Reset** button.
Reset Non-Resetting Accumulator Push to Reset	Click the **Push to Reset** button to reset the totals to zero for all this meter run's non-resetting accumulators.

3.3.1 Forward/Reverse Summary

Calling up this Menu Click Station Summary > **Forward/Reverse Totals**

Forward/Reverse Summary

Station Totals					
Forward Corrected Flow Rate	0.000	MSCF/HOUR	Forward Energy Rate	0.000	MMBTU/HOUR
Forward Uncorrected Flow Rate	0.000	MACF/HOUR			
Reverse Corrected Flow Rate	0.000	MSCF/HOUR	Reverse Energy Rate	0.000	MMBTU/HOUR
Reverse Uncorrected Flow Rate	0.000	MACF/HOUR	Back to Station Summary		
Forward Current Hour			**Forward Current Day**		
Forward Corrected Volume	0.000	MSCF	Forward Corrected Volume	0.000	MSCF
Forward Uncorrected Volume	0.000	MACF	Forward Uncorrected Volume	0.000	MACF
Forward Accumulated Energy	0.000	MMBTU	Forward Accumulated Energy	0.000	MMBTU
Reverse Current Hour			**Reverse Current Day**		
Reverse Corrected Volume	0.000	MSCF	Reverse Corrected Volume	0.000	MSCF
Reverse Uncorrected Volume	0.000	MACF	Reverse Uncorrected Volume	0.000	MACF
Reverse Accumulated Energy	0.000	MMBTU	Reverse Accumulated Energy	0.000	MMBTU
Forward Previous Hour			**Forward Previous Day**		
Forward Corrected Volume	0.000	MSCF	Forward Corrected Volume	0.000	MSCF
Forward Uncorrected Volume	0.000	MACF	Forward Uncorrected Volume	0.000	MACF
Forward Accumulated Energy	0.000	MMBTU	Forward Accumulated Energy	0.000	MMBTU
Reverse Previous Hour			**Reverse Previous Day**		
Reverse Corrected Volume	0.000	MSCF	Reverse Corrected Volume	0.000	MSCF
Reverse Uncorrected Volume	0.000	MACF	Reverse Uncorrected Volume	0.000	MACF
Reverse Accumulated Energy	0.000	MMBTU	Reverse Accumulated Energy	0.000	MMBTU
Forward Accumulator			**Reverse Accumulator**		
Forward Corrected Volume	0.000	MSCF	Reverse Corrected Volume	0.000	MSCF
Forward Uncorrected Volume	0.000	MACF	Reverse Uncorrected Volume	0.000	MACF
Forward Accumulated Energy	0.000	MMBTU	Reverse Accumulated Energy	0.000	MMBTU

Figure 3-4. Forward/Reverse Summary

Field	Description
Station Totals	
Forward Corrected Flow Rate	This field displays the current corrected flow rate of gas in the forward direction for this station.
Forward Uncorrected Flow Rate	This field displays the current uncorrected flow rate of gas in the forward direction for this station.
Forward Energy Rate	This field displays the current energy rate of gas in the forward direction for this station.
Reverse Corrected Flow Rate	This field displays the current corrected flow rate of gas in the reverse direction for this station.

Reverse Uncorrected Flow Rate	This field displays the current uncorrected flow rate of gas in the reverse direction for this station.
Reverse Energy Rate	This field displays the current energy rate of gas in the reverse direction for this station.
Back to Station Summary	Click here to return to the *Station Summary* page.
Forward Current Hour	
Forward Corrected Volume	This field displays the corrected volume of gas in the forward direction for this station for the current hour.
Forward Uncorrected Volume	This field displays the uncorrected volume of gas in the forward direction for this station for the current hour.
Forward Accumulated Energy	This field displays the accumulated energy of gas in the forward direction for this station for the current hour.
Reverse Current Hour	
Reverse Corrected Volume	This field displays the corrected volume of gas in the reverse direction for this station for the current hour.
Reverse Uncorrected Volume	This field displays the uncorrected volume of gas in the reverse direction for this station for the current hour.
Reverse Accumulated Energy	This field displays the accumulated energy of gas in the reverse direction for this station for the current hour.
Forward Previous Hour	
Forward Corrected Volume	This field displays the corrected volume of gas in the forward direction for this station for the previous hour.
Forward Uncorrected Volume	This field displays the uncorrected volume of gas in the forward direction for this station for the previous hour.
Forward Accumulated Energy	This field displays the accumulated energy of gas in the forward direction for this station for the previous hour.
Reverse Previous Hour	

Reverse Corrected Volume	This field displays the corrected volume of gas in the reverse direction for this station for the previous hour.
Reverse Uncorrected Volume	This field displays the uncorrected volume of gas in the reverse direction for this station for the previous hour.
Reverse Accumulated Energy	This field displays the accumulated energy of gas in the reverse direction for this station for the previous hour.
Forward Current Day	
Forward Corrected Volume	This field displays the corrected volume of gas in the forward direction for this station for the current day.
Forward Uncorrected Volume	This field displays the uncorrected volume of gas in the forward direction for this station for the current day.
Forward Accumulated Energy	This field displays the accumulated energy of gas in the forward direction for this station for the current day.
Reverse Current Day	
Reverse Corrected Volume	This field displays the corrected volume of gas in the reverse direction for this station for the current day.
Reverse Uncorrected Volume	This field displays the uncorrected volume of gas in the reverse direction for this station for the current day.
Reverse Accumulated Energy	This field displays the accumulated energy of gas in the reverse direction for this station for the current day.
Forward Previous Day	
Forward Corrected Volume	This field displays the corrected volume of gas in the forward direction for this station for the previous day.
Forward Uncorrected Volume	This field displays the uncorrected volume of gas in the forward direction for this station for the previous day.
Forward Accumulated Energy	This field displays the accumulated energy of gas in the forward direction for this station for the previous day.
Reverse Previous Day	
Reverse Corrected Volume	This field displays the corrected volume of gas in the reverse direction for this station for the previous day.

Reverse Uncorrected Volume	This field displays the uncorrected volume of gas in the reverse direction for this station for the previous day.
Reverse Accumulated Energy	This field displays the accumulated energy of gas in the reverse direction for this station for the previous day.
Forward Accumulator	
Forward Corrected Volume	This field displays a running total of the corrected volume in the forward direction since that last time the accumulator was reset.
Forward Uncorrected Volume	This field displays a running total of the uncorrected volume in the forward direction since that last time the accumulator was reset.
Forward Accumulated Energy	This field displays a running total of the energy in the forward direction since that last time the accumulator was reset.
Reverse Accumulator	
Reverse Corrected Volume	This field displays a running total of the corrected volume in the reverse direction since that last time the accumulator was reset.
Reverse Uncorrected Volume	This field displays a running total of the uncorrected volume in the reverse direction since that last time the accumulator was reset.
Reverse Accumulated Energy	This field displays a running total of the energy in the reverse direction since that last time the accumulator was reset.

Chapter 4 – Using the Measurement Group Config Tab

This chapter discusses various flow measurement application configuration pages for your ControlWave EFM, GFC, GFC Plus, Corrector, or XFC.

In This Chapter

4.1 Accessing the Config Tab

1. Within TechView, if you are in any group other than the Measurement group, click the Measurement group icon.
2. Click the **Config** tab.

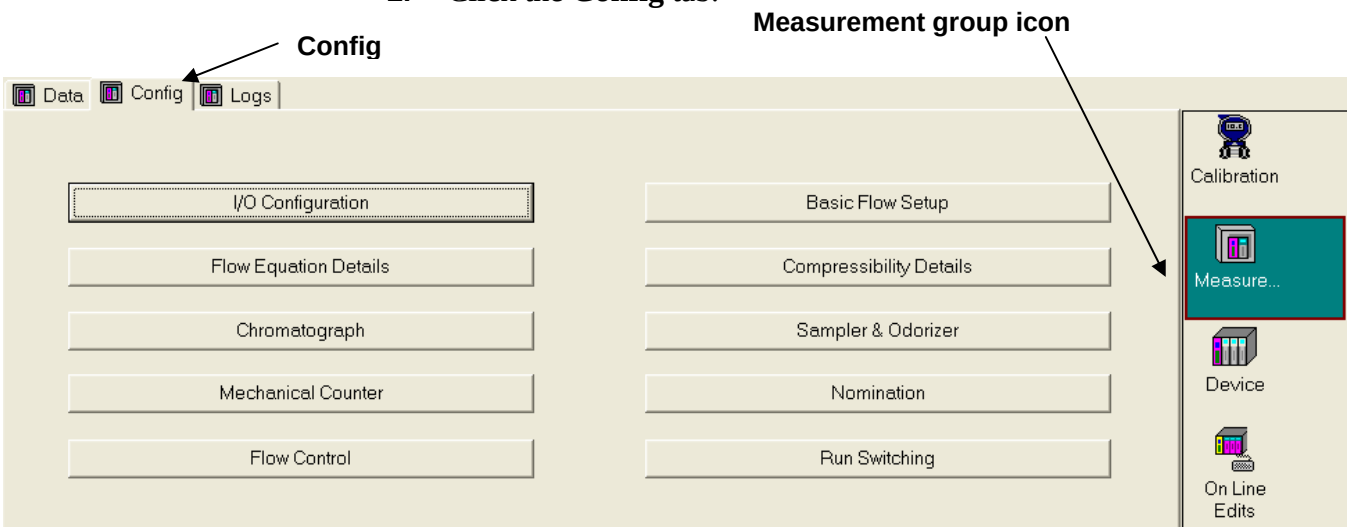


Figure 4-1. Measurement Group Config tab

4.2 Meter Run I/O Configuration

The Meter Run I/O Configuration page lets you specify the flow direction of the meter run, and assign process I/O module points or transmitter values to the pressure and temperature process variables.

Calling up this Menu

Click I/O Configuration

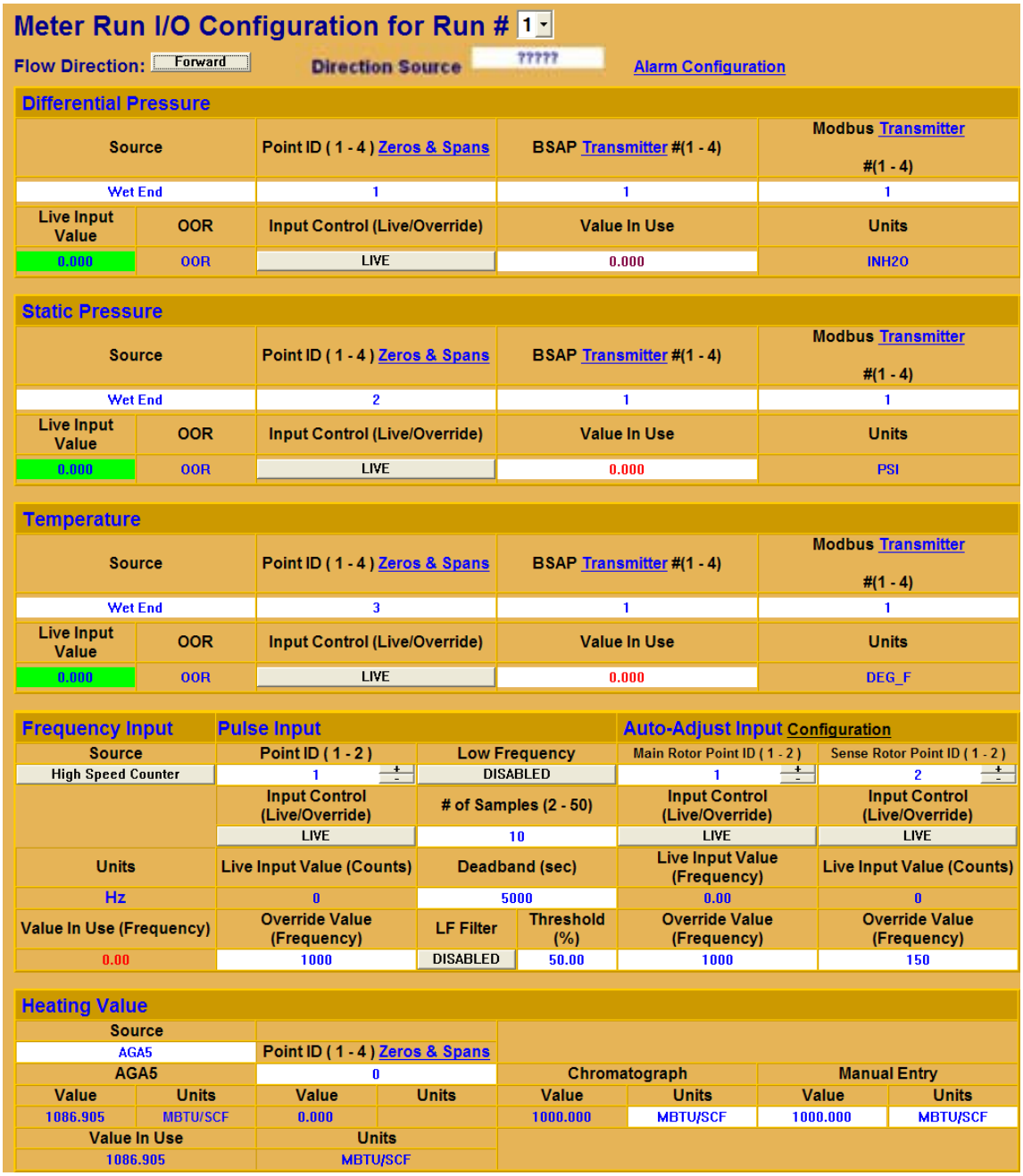


Figure 4-2. Meter Run I/O Configuration page

Field	Description
Meter Run I/O Configuration for Run#	Select the number of the meter run for which you want to configure I/O.
Flow Direction	Use this button to specify, for the application, the direction that gas flows through the pipe. The label on this button shows the current configured direction of gas flow. When you click the button you toggle the direction. Click **Forward** to specify a reverse flow direction. The button now displays **Reverse**. Click **Reverse** to specify a forward flow direction. The button now displays **Forward**.
Direction Source	Use this field to specify, for the application, the source that determines the direction of gas flow through the pipe. **Note: The EFM does not support this field; only the GFC/XFC.** Choices are: **DP/HSC** The application uses differential pressure (DP) or frequency to switch direction. **DI** The application uses a discrete input (DI) to switch direction. **Master** The application switches direction based on commands from the master node's Station Manager application.
Alarm Configuration	Click here to bring up the Alarm Configuration page. See *Section 4.3*.
Differential Pressure	
Source	Select the source for differential pressure data for this meter run. The choices are: **Analog Input** Data comes from a pressure transmitter connected to a 4 to 20mA (or 1 to 5V) analog input (AI) on the process I/O module. You must identify the **Point ID** on the process I/O module to which the transmitter is connected. **Wet End** Data comes from an internal differential pressure (DP) sensor. "Wet" refers to the portion of the sensor in physical contact with the gas. **BSAP** Data comes from an external Bristol transmitter (3808 or 3508) via an RS-485 communication port.

	Modbus	Data comes from an external transmitter via an RS-485 communication port. This function supports the register list of the Rosemount 3095 multivariable transmitter. **Note: This function requires the ControlWave EFM with an Expansion Communication Module (ECOM).**
Point ID	For the EFM: Specify the analog input (AI) point ID for differential pressure on the process I/O module. For other units, this shows the fixed point ID.	
Zeros & Spans	Click here to go to the *Analog Input/Output Configuration* page. See *Section 4.4.*	
BSAP Transmitter #	Specify the number of the BSAP transmitter. Click on the link to open the Transmitter Configuration page, see *Section 4.6.*	
Modbus Transmitter #	Specify the number of the Modbus transmitter. Click on the link to open the Transmitter Configuration page, see *Section 4.6.*	
Live Input Value	Shows the current differential pressure reading coming from the specified **Source**.	
OOR	Shows **OOR** (out-of-range) if the differential pressure live input is out of range. Otherwise this shows **NORMAL**.	
Input Control (Live/Override)	The label on this button shows whether the differential pressure used by the application is a live input reading or an override value you specify. When you click the button you toggle between these two cases. Click **LIVE** to force the application to use the override specified by **Value in Use**. The button now displays **OVERRIDE**. Click **OVERRIDE** to force the application to use the live input reading for differential pressure. The button now displays **LIVE**.	
Value in Use	You can specify an override value here. To force the override, you must set **Input Control** to **OVERRIDE.**	
Units	Shows the engineering units for differential pressure.	
Static Pressure		
Source	Select the source for static pressure data for this meter run. The choices are:	

	Analog Input	Data comes from a pressure transmitter connected to a 4 to 20mA (or 1 to 5V) analog input (AI) on the process I/O module. You must identify the **Point ID** on the process I/O module to which the transmitter is connected.
	Wet End	Data comes from an internal static pressure (SP) sensor.
	BSAP	Data comes from an external Bristol transmitter (3808 or 3508) via an RS-485 communication port.
	Modbus	Data comes from an external transmitter via an RS-485 communication port. This function supports the register list of the Rosemount 3095 multivariable transmitter. **Note: This function requires the ControlWave EFM with an Expansion Communication Module (ECOM).**
Point ID	For EFM: Specify the analog input (AI) point ID for static pressure on the process I/O module. For other units, this shows the fixed point ID.	
Zeros & Spans	Click here to go to the *Analog Input/Output Configuration* page. See *Section 4.4.*	
BSAP Transmitter #	Specify the number of the BSAP transmitter. Click on the link to open the Transmitter Configuration page, see *Section 4.6.*	
Modbus Transmitter #	Specify the number of the Modbus transmitter. Click on the link to open the Transmitter Configuration page, see *Section 4.6.*	
Live Input Value	Shows the current static pressure reading coming from the specified **Source**.	
OOR	Shows **OOR** (out-of-range) if the static pressure live input is out of range. Othewise this shows **NORMAL**.	
Input Control (Live/Override)	The label on this button shows whether the static pressure used by the application is a live input reading or an override value you specify. When you click the button you toggle between these two cases. Click **LIVE** to force the application to use the override specified by **Value in Use**. The button now displays **OVERRIDE**. Click **OVERRIDE** to force the application to use the live input reading for static pressure. The button now displays	

	LIVE.
Value in Use	You can specify an override value here. To force the override, you must set **Input Control** to **OVERRIDE.**
Units	Shows the engineering units for static pressure.
Temperature	
Source	Select the source for temperature data for this meter run. The choices are: **Analog Input** Data comes from a temperature transmitter connected to a 4 to 20mA (or 1 to 5V) analog input (AI) on the process I/O module. You must identify the **Point ID** on the process I/O module to which the transmitter is connected. **Wet End** Data comes from a temperature sensor. **BSAP** Data comes from an external Bristol transmitter (3808 or 3508) via an RS-485 communication port. **Modbus** Data comes from an external transmitter via an RS-485 communication port. This function supports the register list of the Rosemount 3095 multivariable transmitter. **Note: This function requires the ControlWave EFM with an Expansion Communication Module (ECOM).**
Point ID	For EFM: Specify the analog input (AI) point ID for temperature on the process I/O module. For other units, this shows the fixed point ID.
Zeros & Spans	Click here to go to the *Analog Input/Output Configuration* page. See *Section 4.4.*
BSAP Transmitter #	Specify the number of the BSAP transmitter. Click on the link to open the Transmitter Configuration page, see *Section 4.6.*
Modbus Transmitter #	Specify the number of the Modbus transmitter. Click on the link to open the Transmitter Configuration page, see *Section 4.6.*
Live Input Value	Shows the current temperature reading coming from the specified **Source**.

OOR	Shows **OOR** (out-of-range) if the temperature live input is out of range. Otherwise this shows **NORMAL**.
Input Control (Live/Override)	The label on this button shows whether the temperature used by the application is a live input reading or an override value you specify. When you click the button you toggle between these two cases. Click **LIVE** to force the application to use the override specified by **Value in Use**. The button now displays **OVERRIDE**. Click **OVERRIDE** to force the application to use the live input reading for temperature. The button now displays **LIVE**.
Value in Use	You can specify an override value here. To force the override, you must set **Input Control** to **OVERRIDE.**
Units	Shows the engineering units for temperature.
Frequency Input	
Source	The label on this button shows whether the frequency input comes from a high speed counter (pulse input) or an auto-adjust turbine meter. When you click the button you toggle between these two cases. Click **High Speed Counter** to force the application to use the auto-adjust turbine meter as the frequency source. The button now displays **Auto Adjust Module**. Click **Auto Adjust Module** to force the application to use the high speed counter (pulse input) as the frequency source. The button now displays **High Speed Counter**.
Units	Shows the engineering units for frequency.
Value in Use (Frequency)	Shows the frequency value in use, whether the live value or an override value.
Pulse Input	
Point ID	For EFM: Specify the point ID for the pulse input on the process I/O module. For other units, this shows the fixed point ID.
Low Frequency	The label on this button shows whether the frequency input that comes from the high speed counter (pulse input) is high frequency or low frequency. When you click the button you toggle between these two cases. Click **ENABLED** to specify for the application that the

	input is high frequency. The button now displays **DISABLED**. Click **DISABLED** to specify for the application that the input is low frequency. The button now displays **ENABLED**.
Input Control (Live/Override)	The label on this button shows whether the frequency input used by the application is a live input reading or an override value you specify. When you click the button you toggle between these two cases. Click **LIVE** to force the application to use the override specified by **Override Value (Frequency)**. The button now displays **OVERRIDE**. Click **OVERRIDE** to force the application to use the live input reading for frequency. The button now displays **LIVE**.
# of Samples (2-50)	Specify the number of samples (from 2 to 50) used by the pulse input.
Live Input Value (Counts)	Shows the number of counts registered by the pulse input.
Deadband (sec)	Specify the deadband (in seconds). If there are no pulses during this time, the application assumes the pulse count is zero.
Override Value (Frequency)	If you want to override the live input reading for the pulse input, enter a desired value for the frequency here and toggle the **Input Control LIVE/OVERRIDE** button to **OVERRIDE**.
LF Filter	The label on this button shows whether the low frequency (LF) filter is active for the pulse input. When you click the button you toggle between these two cases. Click **ENABLED** to specify for the application that the low frequency (LF) filter in inactive. The button now displays **DISABLED**. Click **DISABLED** to specify for the application that the low frequency (LF) filter in active. The button now displays **ENABLED**.
Threshold (%)	Shows the allowable percentage above the average time for the pulse.
Auto-Adjust Input	The auto-adjust input uses both high speed counter inputs, one for the main rotor, the other for the sense rotor.

Configuration	Click this link to call up the *Auto-Adjust Configuration* page. See *Section 4.5.*
Main Rotor Point ID	For EFM: Specify the point ID for the pulse input connected to the turbine meter's main rotor. For other units, this shows the fixed point ID.
Input Control (Live/Override)	The label on this button shows whether the pulse input used by the application for the main rotor is a live input or an override value you specify. When you click the button you toggle between these two cases. Click **LIVE** to force the application to use the override specified by **Override Value (Frequency)**. The button now displays **OVERRIDE**. Click **OVERRIDE** to force the application to use the live pulse input for frequency. The button now displays **LIVE**.
Live Input Value (Frequency)	Shows the current frequency reading coming from the main rotor.
Override Value (Frequency)	If you want to override the live input reading for this pulse input, enter a desired value for the frequency here and toggle the **Input Control LIVE/OVERRIDE** button to **OVERRIDE**.
Sensor Rotor Point ID	For EFM: Specify the point ID for the pulse input connected to the turbine meter's sense rotor. For other units, this shows the fixed point ID.
Input Control (Live/Override)	The label on this button shows whether the pulse input used by the application for the sense rotor is a live input or an override value you specify. When you click the button you toggle between these two cases. Click **LIVE** to force the application to use the override specified by **Override Value (Frequency)**. The button now displays **OVERRIDE**. Click **OVERRIDE** to force the application to use the live pulse input for frequency. The button now displays **LIVE**.
Live Input Value (Counts)	Shows the current frequency reading coming from the sense rotor.
Override Value (Frequency)	If you want to override the live input reading for this pulse input, enter a desired value for the frequency here and toggle the **Input Control LIVE/OVERRIDE** button to **OVERRIDE**.
Heating Value	

Source	Select the source for heating value data for this meter run. The choices are: **Analog Input** The heating value comes from a 4 to 20mA (or 1 to 5V) analog input (AI) on the process I/O module. You must identify the **Point ID** on the process I/O module which provides the heating value. **Note: This option is only available for the EFM.** **AGA5** The heating value comes from AGA5 calculations performed by the ControlWave flow computer. To use this you must enter component mole percent values on the Chromatograph Setup page. See *Section 4.11.* **Chromatograph** The heating value comes from an external chromatograph using Modbus communications. **Manual Entry** You enter the heating value directly in the Manual Entry **Value** field.
AGA5 Value	When **Source** is **AGA5**, shows the heating value as calculated based on the AGA5 equation with component mole percent data for the chromatograph.
AGA5 Units	Shows the engineering units for the calculated AGA5 heating value.
Value in Use	Shows the heating value currently used by the application, which could be from any of the four sources.
Units	Shows the engineering units for the heating value currently in use.
Point ID	If the **Source** of the heating value is an **Analog Input**, specify the point ID for the analog input on the process I/O module. **Note: This field is only available for the EFM.**
Zeros & Spans	Click here to go to the *Analog Input/Output Configuration* page. See *Section 4.4.* **Note: This field is only available for the EFM.**
Value	Shows the heating value as provided by the analog input. **Note: This field is only available for the EFM.**
Units	Shows the engineering units for the heating value from the analog input. **Note: This field is only available for the EFM.**

Chromatograph	
Value	When **Source** is **Chromatograph**, shows the heating value as provided by the chromatograph.
Units	Specify the engineering units for the heating value from the chromatograph.
Manual Entry	
Value	When **Source** is **Manual Entry**, enter the known heating value in this field.
Units	Specify the engineering units for the heating value here.

4.3 Alarm Configuration

The Alarm Configuration page lets you configure the alarm limits and deadbands for the pressure, temperature, frequency, and flow rate variables used in this meter run.

Calling up this Menu

Click I/O Configuration > **Alarm Configuration**

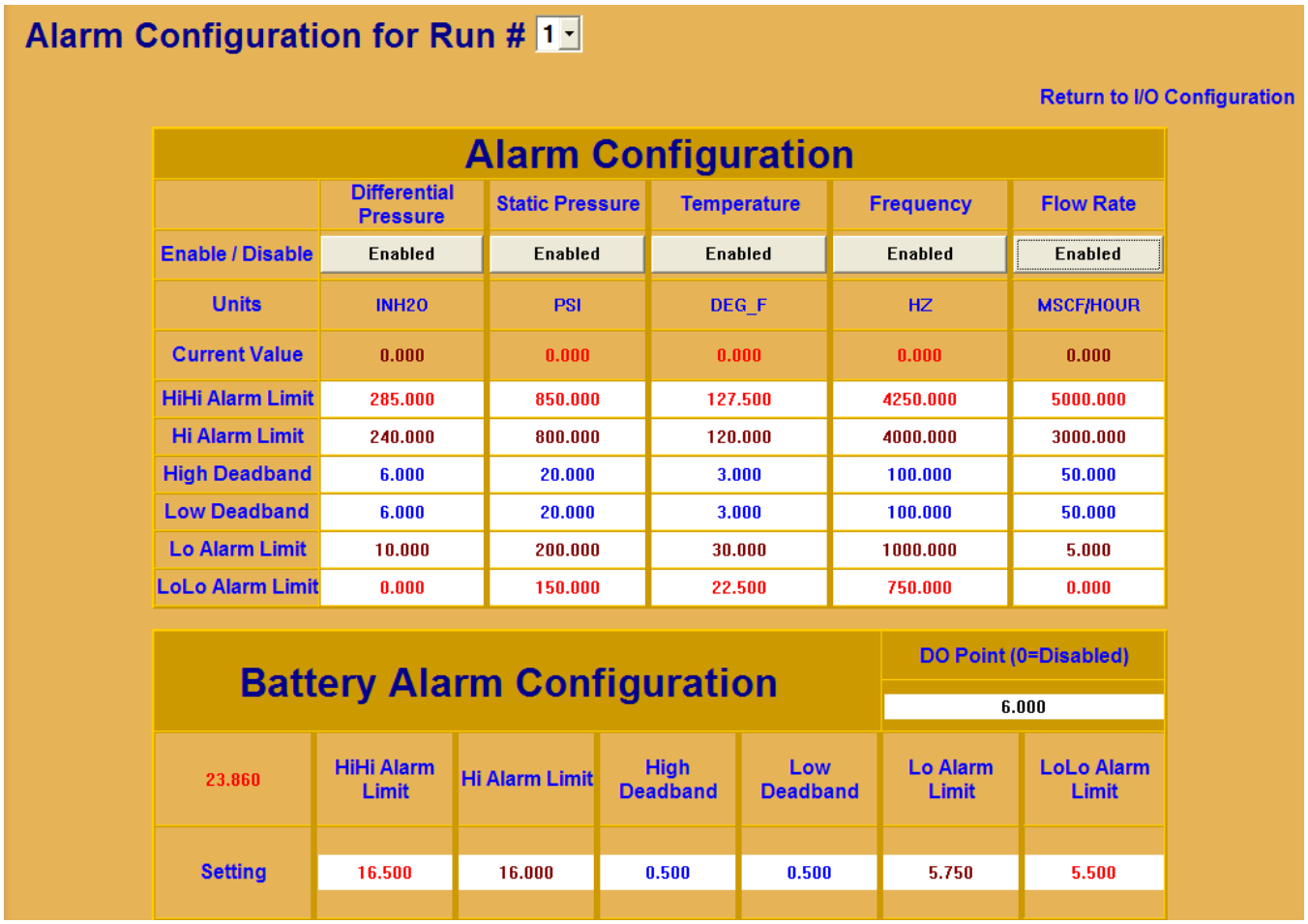


Figure 4-3. Alarm Configuration page

Field	Description
Alarm Configuration for Run#	Select the meter run number for which you want to configure alarms.
Differential Pressure	
Differential Pressure Enable/Disable	The label on this button shows whether alarming is enabled for the differential pressure variable. When you click the button you toggle between these two cases. Click **Enabled** to disable alarming for the differential

	pressure variable. The button now displays **Disabled**. Click **Disabled** to enable alarming for the differential pressure variable. The button now displays **Enabled**.
Differential Pressure Units	Shows the engineering units for the differential pressure variable.
Differential Pressure Current Value	Shows the current value of the differential pressure variable.
Differential Pressure HIHI Alarm Limit	When the differential pressure variable rises above this limit, it triggers a High-High alarm state.
Differential Pressure HI Alarm Limit	When the differential pressure variable rises above this limit, it triggers a High alarm state.
Differential Pressure High Deadband	This deadband is a value that, when **subtracted** from the high and high-high alarm limits, defines a range within which the alarm state remains active, even though the value falls below the limit. The purpose of the deadband is to avoid fluctuations in and out of the alarm state by minor changes in the variable.
Differential Pressure Low Deadband	This deadband is a value that, when **added** to the low and low-low alarm limits, defines a range within which the alarm state remains active, even though the value rises above the limit. The purpose of the deadband is to avoid fluctuations in and out of the alarm state by minor changes in the variable.
Differential Pressure Lo Alarm Limit	When the differential pressure variable falls below this limit, it triggers a Low alarm state.
Differential Pressure LoLo Alarm Limit	When the differential pressure variable falls below this limit, it triggers a Low-Low alarm state.
Static Pressure	
Static Pressure Enable/Disable	The label on this button shows whether alarming is enabled for the static pressure variable. When you click the button you toggle between these two cases. Click **Enabled** to disable alarming for the static pressure variable. The button now displays **Disabled**. Click **Disabled** to enable alarming for the static pressure variable. The button now displays **Enabled**.
Static Pressure Units	Shows the engineering units for the static pressure variable.

Static Pressure Current Value	Shows the current value of the static pressure variable.
Static Pressure HIHI Alarm Limit	When the static pressure variable rises above this limit, it triggers a High-High alarm state.
Static Pressure HI Alarm Limit	When the static pressure variable rises above this limit, it triggers a High alarm state.
Static Pressure High Deadband	This deadband is a value that, when **subtracted** from the high and high-high alarm limits, defines a range within which the alarm state remains active, even though the value falls below the limit. The purpose of the deadband is to avoid fluctuations in and out of the alarm state by minor changes in the variable.
Static Pressure Low Deadband	This deadband is a value that, when **added** to the low and low-low alarm limits, defines a range within which the alarm state remains active, even though the value rises above the limit. The purpose of the deadband is to avoid fluctuations in and out of the alarm state by minor changes in the variable.
Static Pressure Lo Alarm Limit	When the static pressure variable falls below this limit, it triggers a Low alarm state.
Static Pressure LoLo Alarm Limit	When the static pressure variable falls below this limit, it triggers a Low-Low alarm state.
Temperature	
Temperature Enable/Disable	The label on this button shows whether alarming is enabled for the temperature variable. When you click the button you toggle between these two cases. Click **Enabled** to disable alarming for the temperature variable. The button now displays **Disabled**. Click **Disabled** to enable alarming for the temperature variable. The button now displays **Enabled**.
Temperature Units	Shows the engineering units for the temperature variable.
Temperature Current Value	Shows the current value of the temperature variable.
Temperature HIHI Alarm Limit	When the temperature variable rises above this limit, it triggers a High-High alarm state.
Temperature HI Alarm Limit	When the temperature variable rises above this limit, it triggers a High alarm state.

Temperature High Deadband	This deadband is a value that, when **subtracted** from the high and high-high alarm limits, defines a range within which the alarm state remains active, even though the value falls below the limit. The purpose of the deadband is to avoid fluctuations in and out of the alarm state by minor changes in the variable.
Temperature Low Deadband	This deadband is a value that, when **added** to the low and low-low alarm limits, defines a range within which the alarm state remains active, even though the value rises above the limit. The purpose of the deadband is to avoid fluctuations in and out of the alarm state by minor changes in the variable.
Temperature Lo Alarm Limit	When the temperature variable falls below this limit, it triggers a Low alarm state.
Temperature LoLo Alarm Limit	When the temperature variable falls below this limit, it triggers a Low-Low alarm state.
Frequency	
Frequency Enable/Disable	The label on this button shows whether alarming is enabled for the frequency variable. When you click the button you toggle between these two cases. Click **Enabled** to disable alarming for the frequency variable. The button now displays **Disabled**. Click **Disabled** to enable alarming for the frequency variable. The button now displays **Enabled**.
Frequency Units	Shows the engineering units for the frequency variable.
Frequency Current Value	Shows the current value of the frequency variable.
Frequency HIHI Alarm Limit	When the frequency variable rises above this limit, it triggers a High-High alarm state.
Frequency HI Alarm Limit	When the frequency variable rises above this limit, it triggers a High alarm state.
Frequency High Deadband	This deadband is a value that, when **subtracted** from the high and high-high alarm limits, defines a range within which the alarm state remains active, even though the value falls below the limit. The purpose of the deadband is to avoid fluctuations in and out of the alarm state by minor changes in the variable.
Frequency Low Deadband	This deadband is a value that, when **added** to the low and low-low alarm limits, defines a range within which the alarm state remains active, even though the value rises above the limit. The purpose of the deadband is to avoid fluctuations in and out of the alarm state by

	minor changes in the variable.
Frequency Lo Alarm Limit	When the frequency variable falls below this limit, it triggers a Low alarm state.
Frequency LoLo Alarm Limit	When the frequency variable falls below this limit, it triggers a Low-Low alarm state.
Flow Rate	
Flow Rate Enable/Disable	The label on this button shows whether alarming is enabled for the flow rate variable. When you click the button you toggle between these two cases. Click **Enabled** to disable alarming for the flow rate variable. The button now displays **Disabled**. Click **Disabled** to enable alarming for the flow rate variable. The button now displays **Enabled**.
Flow Rate Units	Shows the engineering units for the flow rate variable.
Flow Rate Current Value	Shows the current value of the flow rate variable.
Flow Rate HIHI Alarm Limit	When the flow rate variable rises above this limit, it triggers a High-High alarm state.
Flow Rate HI Alarm Limit	When the flow rate variable rises above this limit, it triggers a High alarm state.
Flow Rate High Deadband	This deadband is a value that, when **subtracted** from the high and high-high alarm limits, defines a range within which the alarm state remains active, even though the value falls below the limit. The purpose of the deadband is to avoid fluctuations in and out of the alarm state by minor changes in the variable.
Flow Rate Low Deadband	This deadband is a value that, when **added** to the low and low-low alarm limits, defines a range within which the alarm state remains active, even though the value rises above the limit. The purpose of the deadband is to avoid fluctuations in and out of the alarm state by minor changes in the variable.
Flow Rate Lo Alarm Limit	When the flow rate variable falls below this limit, it triggers a Low alarm state.
Flow Rate LoLo Alarm Limit	When the flow rate variable falls below this limit, it triggers a Low-Low alarm state.

Battery Alarm Configuration	
DO Point	Select the discrete output (DO) that will serve as a battery voltage alarm.
Battery HIHI Alarm Limit Setting	When the battery voltage rises above this limit, it triggers a High-High alarm state.
Battery HI Alarm Limit Setting	When the battery voltage rises above this limit, it triggers a High alarm state.
Battery High Deadband Setting	This deadband is a value that, when **subtracted** from the high and high-high alarm limits, defines a range within which the alarm state remains active, even though the value falls below the limit. The purpose of the deadband is to avoid fluctuations in and out of the alarm state by minor changes in the variable.
Battery Low Deadband Setting	This deadband is a value that, when **added** to the low and low-low alarm limits, defines a range within which the alarm state remains active, even though the value rises above the limit. The purpose of the deadband is to avoid fluctuations in and out of the alarm state by minor changes in the variable.
Battery Lo Alarm Limit Setting	When the battery voltage falls below this limit, it triggers a Low alarm state.
Battery LoLo Alarm Limit Setting	When the battery voltage falls below this limit, it triggers a Low-Low alarm state.

4.4 Analog Input/Output Configuration

The Analog Input/Output Configuration page allows you to configure zeros and spans for analog I/O variables.

Calling up this Menu (3 ways)

Click I/O Configuration > **Zeros & Spans**

Click Flow Control > **Zeros & Spans**

Click Sampler & Odorizer > **AO Zero & Span**

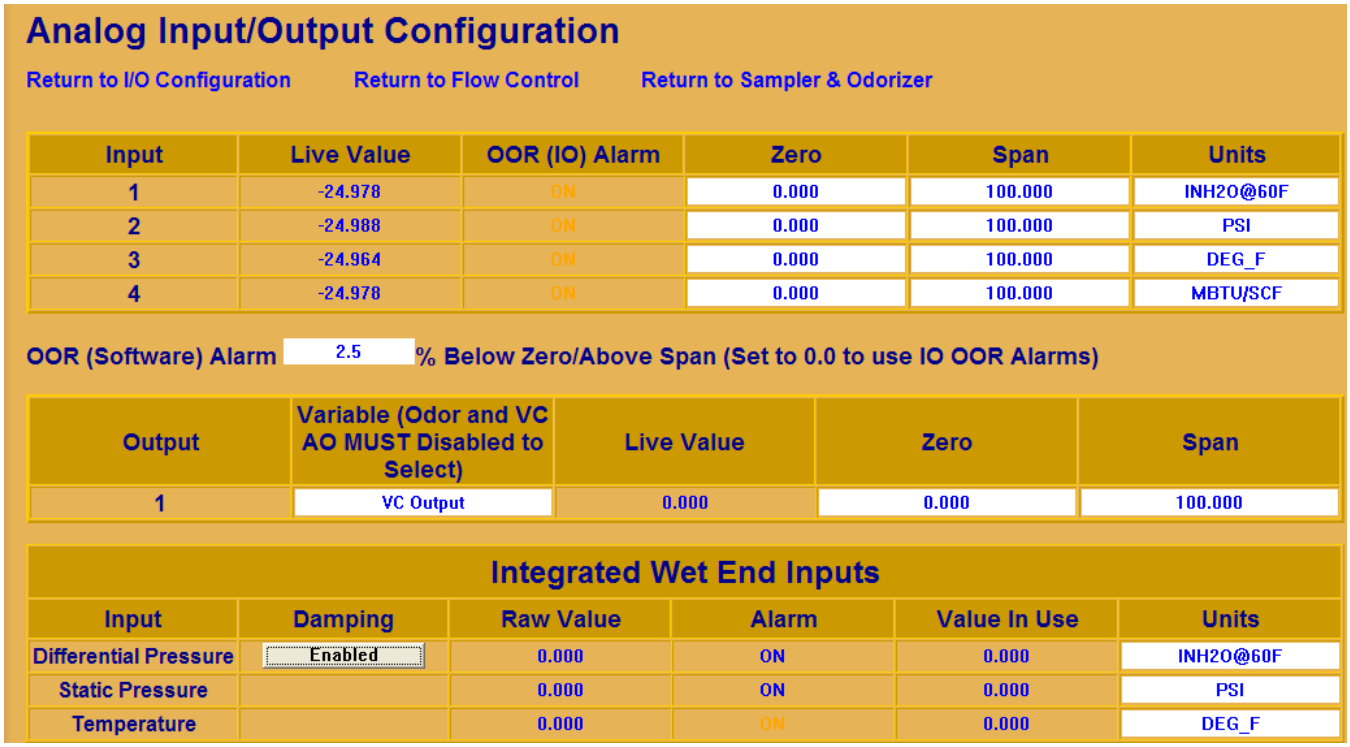
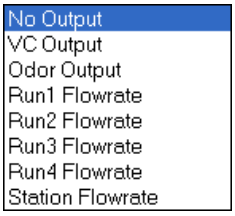


Figure 4-4. Analog Input/Output Configuration

Field	Description
Input *x*	The number of input variables varies depending upon the type of ControlWave device. ControlWave EFM can have up to four inputs, other units can have three.
Live Value	The current value of the analog input.
OOR Alarm	Shows ON when I/O hardware indicates this analog input is out-of-range (OOR). Otherwise shows OFF.
Zero	Enter the value that this analog input process variable should read when the AI field input is 4mA.
Span	Enter the value that, when added to the **Zero** value, represents what the process variable should display when the AI field input is 20mA.

Units	The engineering units for this analog input.
OOR (Software) Alarm % Below Zero/Above Span	If you enter a positive value here, it specifies the percentage below zero or above span which constitutes an out-of-range condition for the analog input. If you enter zero here, it specifies that the hardware detects the out-of-range (OOR) condition, instead of using a value you specify.
Output	
Variable	Choose which variable you want to assign to the analog output (AO). 
Live Value	The current value of the analog output.
Zero	Enter the value that this analog output process variable should read when the AO field output is 4mA.
Span	Enter the value that, when added to the **Zero** value, represents what the process variable should display when the AO field output is 20mA.
Integrated Wet End Inputs	These are the ControlWave's integrated sensors for differential pressure, static pressure, and temperature.
Damping	The label on this button shows the current state of the damping function for the differential pressure input. When you click the button you toggle the state. Click **Disabled** to start damping. The button now displays **Enabled**. Click **Enabled** to turn off damping. The button now displays **Disabled**.
Raw Value	Shows the value from the sensor without any damping applied.
Alarm	Shows **ON** if this variable is in an alarm state.

Value in Use	Shows the value used in gas calculations. This may differ from the raw value either because it reflects damping of the input or an override is in effect.
Units	The engineering units for this analog input.
Digital Inputs	These fields are not available for the ControlWave EFM.
Digital Input x	These fields show the current value of the associated discrete input.
Digital Outputs	These fields are not available for the ControlWave EFM.
Digital Output x	These fields show the current value of the associated discrete output.

4.5 Auto-Adjust Configuration

The Auto-Adjust Configuration page lets you enter configuration data for using the application with an auto-adjust turbine meter.

Calling up this Menu

Click I/O Configuration > **Auto-Adjust Input Configuration**

Auto-Adjust Configuration for Run # 1

Return to I/O Configuration

Inputs		
Main Rotor	Accum Count	0.0000
Sense Rotor	Accum Count	0.0000
Main Rotor Override	Hz	1000.0000
Sense Rotor Override	Hz	150.0000
Status		
Status 1		0.0000
Status 2		0.0000
Status 3		0.0000
Status 4		-16006.0000
Calibration Data		
Blade-Tip Sensor Factor	BTSF	1.0000
Main Rotor Factor	KM	3279.6128
Sensor Rotor Factor	KS	5173.5527
Average Relative Adjustment	ABAR	9.9189
Configuration Data		
Abnormal delta-Abar high limit in percent	ABH	3.0000
Abnormal delta-Abar low limit in percent	ABL	-3.0000
Normal delta-Abar high limit in percent	WBH	1.0000
Normal delta-Abar low limit in percent	WBL	-1.0000
Adjusted and unadjusted flow total scaling factor	INCR	1.0000
Mechanical output factor	Kmo	1.0000
Calculated Factors		
Adjusted Volume rate in CF per second	Vai	0.0000
Average Main rotor rate in CF per second	Pmavg	0.0000
Average Sensor rotor rate in CF per second	Psavg	0.0000
Main rotor adjusted volume	Vm	0.0000
Sensor rotor adjusted volume	Vs	0.0000
Internal 60 second timer	R60	45.0040
Internal 512 second (8.53 minute) timer	R512	66946.1094
Internal count of Main rotor pulses	C25k	0.0000
Main rotor frequency in pulses per second	Pmif	0.0000
Sensor rotor frequency in pulses per second	Psif	0.0000
Delta time between function block executions	DeltaT	1.0040
Calculated Outputs		
Adjusted flow rate in CF per hour	Rate	0.0000
Unadjusted Main rotor rate in CF per second	Vmi	0.0000
Unadjusted Sensor rotor rate in CF per second	Vsi	0.0000
Calculated deviation of Abar from calibration in percent	Delta-Abar	0.0000
Adjusted volume change since the last function block execution	Delta-Va	0.0000
Total adjusted volume	TotA	0.0000
Total unadjusted volume	TotM	0.0000

Figure 4-5. Auto-Adjust Configuration page

Field	Description
Auto-Adjust Configuration for Run#	Select the meter run number for which you want to configure an auto-adjust turbine meter.

Inputs	
Main Rotor Accum. Count	Shows the current accumulated count for the main rotor of the auto-adjust turbine meter. The main rotor is the upstream rotor and has a greater blade angle to the flow of gas.
Sense Rotor Accum. Count	Shows the current accumulated count for the sense rotor of the auto-adjust turbine meter. The sense rotor is the downstream rotor and has a shallower blade angle to the flow of gas.
Main Rotor Override	Specify the frequency the main rotor of the auto-adjust turbine meter should use when override is active.
Sense Rotor Override	Specify the frequency the sensor rotor of the auto-adjust turbine meter should use when override is active.
Status	There are four different status values.
Status 1	This status is for the AUTOADJUST function block within the application.

Value	Explanation
0	Successful execution
-4	Invalid data type in AUTOADJUST function block
-6	Required input not configured for AUTOADJUST function block
-17	Required input data not valid for AUTOADJUST function block
-16001	No memory available
-16002	LIST for AUTOADJUST function block is missing required parameters
-16003	Non-steady flow

Status *2*

Value	Explanation
0	Successful execution
-16004	Delta A is outside normal limits
-16005	Delta A is outside abnormal limits

Status 3

Value	Explanation
0	Successful execution
-16005	Delta A is outside abnormal limits

Status 4

Value	Explanation
0	Successful execution
-16006	No flow or loss of main and sensor pulses

	-16007 Leakage or resonant no net flow (with ABN= -16005)
	-16008 No main rotor pulses or leakage or resonant no net flow
	-16009 No sensor rotor pulse
Calibration Data	
Blade-Tip Sensor Factor	The blade tip sensor factor (BTSF) should be 1.0 for slot sensors.
Main Rotor Factor	The main rotor is the upstream rotor and has a greater blade angle to the flow of gas.
Sensor Rotor Factor	The sense rotor is the downstream rotor and has a shallower blade angle to the flow of gas.
Average Relative Adjustment	The expected deviation (average relative adjustment) between main and sense rotors.
Configuration Data	
Abnormal delta-Abar high limit in percent	This is the high alarm limit for an abnormal deviation between the main and sense rotors.
Abnormal delta-Abar low limit in percent	This is the low alarm limit for an abnormal deviation between the main and sense rotors.
Normal delta-Abar high limit in percent	This is the high alarm limit for a normal deviation between the main and sense rotors.
Normal delta-Abar low limit in percent	This is the low alarm limit for a normal deviation between the main and sense rotors.
Adjusted and un-adjusted flow total scaling factor	Specify a scaling factor which the software applies to the adjusted and un-adjusted flow totals to present the flow in the desired engineering units.
Mechanical output factor	Used to determine unadjusted volume totals with only main rotor pulses. Set to 0 if these are not needed.
Calculated Factors	
Adjusted volume rate in CF per second	Shows the adjusted volume rate in cubic feet (CF) per second.
Adjusted Main rotor rate in CF per second	Shows the adjusted main rotor rate in cubic feet (CF) per second.
Adjusted Sensor rotor rate in CF per second	Shows the adjusted sensor rotor rate in cubic feet (CF) per second.

Main rotor adjusted volume	Shows the main rotor adjusted volume.
Sensor rotor adjusted volume	Shows the sensor rotor adjusted volume.
Internal 60 second timer	This count increments only when main rotor frequency is less than 3 times the blade tip sensor factor (BTSF).
Internal 512 second timer	When the Main rotor frequency is below 48 Hz (i.e. more than 512 seconds to accumulate 25,000 counts) this parameter reaches 512 and rolls over, which forces a check of the sensor rotor frequency, and clears the Internal count of Main rotor pulses.
Internal count of Main rotor pulses	At 25,000 counts this rolls over which forces a check of the Sensor rotor frequency and clears the internal 512 second timer.
Main rotor frequency in pulses per second	Shows the frequency of the main rotor in pulses per second.
Sensor rotor frequency in pulses per second	Shows the frequency of the sensor rotor in pulses per second.
Delta time between function block executions	Shows the time between executions of the AUTOADJUST function block in the ControlWave project.
Calculated Outputs	
Adjusted Flow rate in CF per hour	Shows the adjusted flow rate in cubic feet (CF) per hour.
Unadjusted Main rotor rate in CF per second	Shows the unadjusted main rotor rate in cubic feet (CF) per second.
Unadjusted Sensor rotor rate in CF per second	Shows the unadjusted sensor rotor rate in cubic feet (CF) per second.
Calculated deviation of Abar from calibration in percent	The application calculates how much the meter has changed from factory calibration.
Adjusted volume change since the last function block execution	Shows the change in the adjusted volume since the last execution of the AUTOADJUST function block in the ControlWave project.
Total adjusted volume	Shows the total adjusted volume.
Total unadjusted volume	Shows the total unadjusted volume.

4.6 Transmitter Configuration

The Transmitter Configuration page lets you specify which transmitters provide process variable inputs to the application.

Calling up this Menu

Click I/O Configuration > **Transmitter**

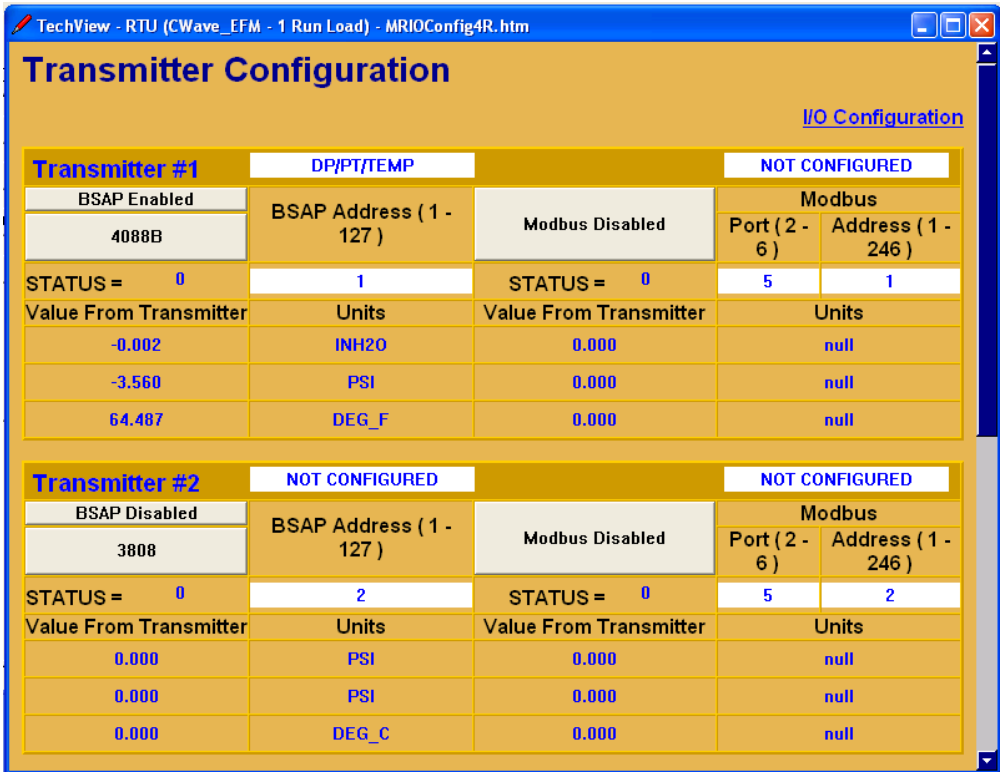


Figure 4-6. Transmitter Configuration page (only transmitters 1 and 2 visible)

Field	Description
Transmitter x	Shows the transmitter type which could be: **DP/PT/TEMP**, **PT/TEMP**, or **TEMP**. Shows **NOT CONFIGURED** if this transmitter has not been configured. You can view data for up to four transmitters on this page.
Status	Shows a status code value from the transmitter. See the ControlWave Designer online help for the CUSTOM function block for information on possible status values.
BSAP Enabled/Disabled	The label on this button shows whether BSAP communication is enabled for this transmitter variable. When you click the button you toggle between these two cases. Click **Enabled** to disable alarming for the temperature variable. The button now displays **Disabled**.

	Click **Disabled** to enable alarming for the temperature variable. The button now displays **Enabled**.
4088B/3808	The label on this button shows that the type of device (3808 or 4088B) for which the application is configured. Click the button to toggle between these choices. Click **4088B** to configure the application to communicate with a Bristol 3808. The button now displays **3808**. Click **3808** to configure the application to communicate with a Rosemount 4088B. The button now displays **4088B**.
BSAP Address	Enter the BSAP local address assigned to this transmitter.
Value From Transmitter	Transmitters can display data from up to three variables. Typically these are differential pressure, static pressure, and temperature.
Units	Shows the engineering units for the associated **Value From Transmitter**.
Modbus Port	For EFM: Enter the number of the port used for Modbus communication. For other units shows the fixed port.
Modbus Address	Enter the Modbus address for this transmitter.

4.7 Basic Flow Setup

The Basic Flow Setup pages let you modify the most important parameters for the flow measurement equation, and view various current values.

Note: This menu varies in appearance depending upon the flow equation you select. If you have not previously selected the flow measurement equation, this button will automatically re-direct you to the flow measurement selection and detail pages. See *Section 4.8*.

Calling up this Menu

Click Basic Flow Setup

4.7.1 Basic Flow Setup – AGA3TERM

There are two different AGA3 equations supported, the AGA3I equation from the 1992 AGA report, and the AGA3TERM equation from the 1985 AGA report.

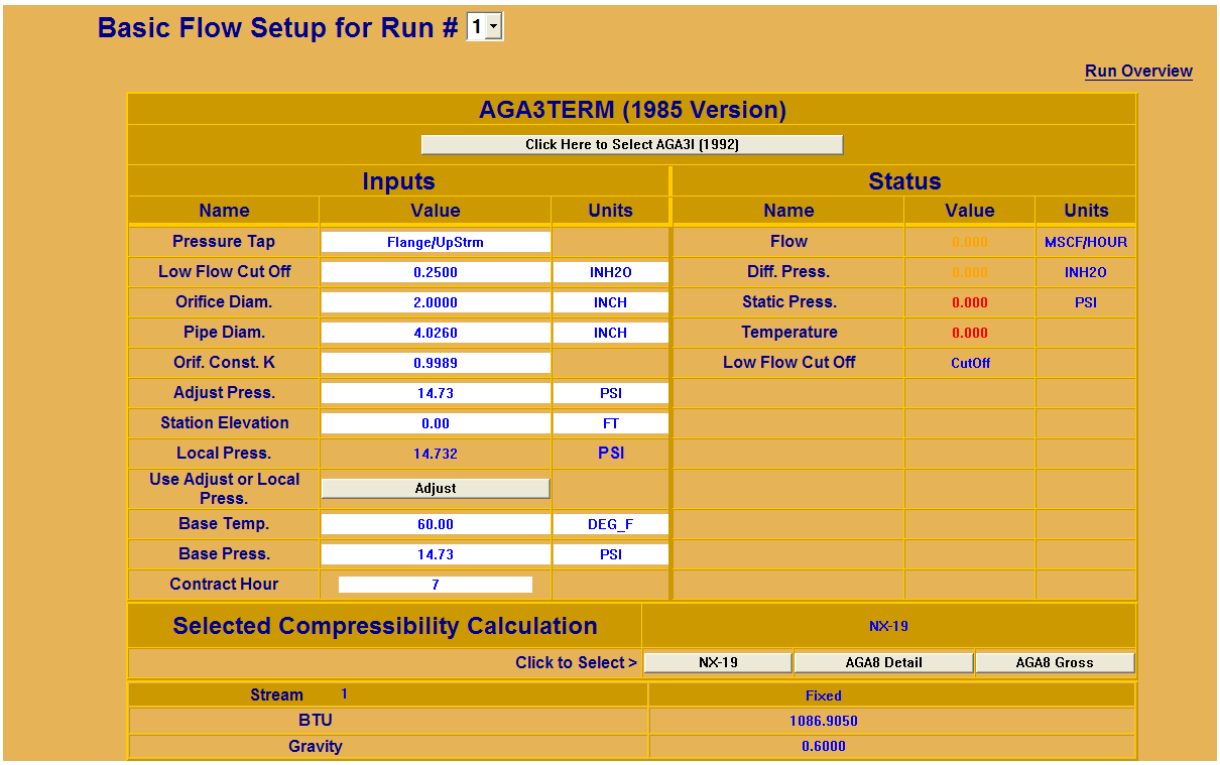


Figure 4-7. Basic Flow Setup – AGA3TERM

Notes:

- If you want to choose the AGA3I calculation, instead of the AGA3TERM calculation, click the **Click Here to Select AGA3I (1992)** button.

- If you chose differential measurement by mistake, and need to choose either linear measurement or coriolis measurement instead, click the **Reset Meter Run's Measurement Type** button on the Meter Run Overview page. See *Section 3.2*.

Field	Description
Basic Flow For Run#	Select the meter run number for which you want to configure AGA3 term measurement.
Inputs	
Pressure Tap	Click this button to change the specified location of the pressure tap. The pressure tap can be either upstream or downstream of the meter.
Low Flow Cutoff	Enter the low flow cutoff here. This the minimum value for differential pressure where the application performs measurements. If the differential pressure drops below this value, the measured flow goes to zero. Select the units for the low flow cutoff.
Orifice Diam.	Enter the orifice bore diameter here and select the proper units.
Pipe Diam.	Enter the inside diameter of the pipe here and select the proper units.
Orifice Const. K	Specify the combined orifice constant K. This is typically the value for orifice thermal expansion unless other corrections are required.
Adjust Press.	Specify the average barometric pressure and select the proper units.
Station Elevation	Specify the station elevation above sea level and choose the appropriate units. The default units are feet.
Local Press.	Show the local atmospheric pressure calculated based on inputs including the station elevation.
Use Adjust or Local Press.	The label on this button shows whether you use the calculated local pressure or the adjusted pressure. When you click the button you toggle between these two cases. Click **Adjust** to specify that the application should use local pressure. The button now displays **Local**. Click **Local** to specify that the application should use adjusted pressure. The button now displays **Adjust**.

Base Temp.	Specify the required (contract) base temperature of the flowing gas and the associated engineering units.
Base Press.	Specify the base or contract pressure of the gas and the associated units.
Contract Hour	Specify the hour (0 to 23) which marks the beginning of the "gas day."
Status	
Flow	Shows the current calculated flow reading.
Diff. Press	Shows the differential pressure across the orifice plate.
Static Press.	Shows the upstream or downstream static pressure.
Temperature	Shows the temperature of the flowing gas.
Low Flow Cut Off	Shows **Cutoff** if the flow is too low and so the low flow cut off is currently active. Shows **Flowing** when cutoff is not active.
Selected Compressibility Calculation	Shows the currently selected type of compressibility calculation.
Click to Select NX19/AGA8 Detail/AGA8 Gross	Click the **NX-19** button to select NX-19 as the compressibility calculation. Click the **AGA8 Detail** button to select AGA8 Detail as the compressibility calculation. Click the **AGA8 Gross** button to select AGA8 Gross as the compressibility calculation.
Stream *x*	Shows **Raw/GC** if there are no errors. Shows **Fixed** if the calculation is using fixed values for components of the gas stream, typically because of a chromatograph failure.
BTU	Shows the current British Thermal Units (BTU) for this gas stream.
Gravity	Shows the gravity value for this gas stream.

4.7.2 Basic Flow Setup – AGA3I

There are two different AGA3 equations supported, the AGA3I equation from the 1992 AGA report, and the AGA3TERM equation from the 1985 AGA report.

Figure 4-8. Basic Flow Setup – AGA3I

Notes:

- If you want to choose the AGA3TERM calculation, instead of the AGA3I calculation, click the **Click Here to Select AGA3TERM (1985)** button.
- If you chose differential measurement by mistake, and need to choose either linear measurement or coriolis measurement instead, you can reset the equation type to undefined, so you can re-select it. To do this, click the **Reset Meter Run's Measurement Type** button on the Meter Run Overview page. See *Section 3.2*.

Field	Description
Basic Flow For Run#	Select the meter run number for which you want to configure AGA3 iterative measurement.
Inputs	
Pressure Tap	Click this button to change the specified location of the pressure tap. The pressure tap can be either upstream or downstream of the meter.
Low Flow Cutoff	Enter the low flow cutoff here. This the minimum value for differential pressure where the application performs measurements. If the differential pressure drops below this value, the measured flow goes to zero. Select the units for the low flow cutoff.
Orifice Diam.	Enter the orifice bore diameter here and select the proper units.
Pipe Diam.	Enter the inside diameter of the pipe here and select the proper units.
Orifice Material	The label on this button shows the type of steel used for the orifice. When you click the button you toggle between these two cases. Click **CARBON** to specify that stainless steel is the orifice material. The button now displays **STNLESS**. Click **STNLESS** to specify that carbon steel is the orifice material. The button now displays **CARBON**.
Pipe Material	The label on this button shows the type of steel used for the pipe. When you click the button you toggle between these two cases. Click **CARBON** to specify that stainless steel is the pipe material. The button now displays **STNLESS**. Click **STNLESS** to specify that carbon steel is the pipe material. The button now displays **CARBON**.
Isentropic Exponent	Specify the fluid Isentropic exponent. This value is used in the calculation of the expansion factor, Y. Typically you should enter 1.3 here, which is the value given in the *1992 American Gas Association (AGA-3) Report.*
Atmospheric Press.	Specify the atmospheric pressure value that the application should use for calculations.

Station Elevation	Specify the station elevation above sea level and choose the appropriate units. The default units are feet.
Local Press.	Show the local atmospheric pressure calculated based on inputs including the station elevation.
Use Adjust or Local Press.	The label on this button shows whether you use the calculated local pressure or the adjusted pressure. When you click the button you toggle between these two cases. Click **Adjust** to specify that the application should use local pressure. The button now displays **Local**. Click **Local** to specify that the application should use adjusted pressure. The button now displays **Adjust**.
Base Temp.	Specify the base temperature of the gas.
Base Press.	Specify the base pressure. This is used to calculate the pressure base factor
Viscosity	Specify the dynamic viscosity of the gas at flowing conditions. Viscosity is used to calculate the Reynolds number.
Contract Hour	Specify the hour (0 to 23) which marks the beginning of the "gas day."
Status	
Flow	Shows the current calculated flow reading.
Diff. Press	Shows the differential pressure across the orifice plate.
Static Press.	Shows the upstream or downstream static pressure.
Temperature	Shows the temperature of the flowing gas.
Low Flow Cut Off	Shows **Cutoff** if the flow is too low and so the low flow cut off is currently active. Shows **Flowing** if flow is sufficient that the low flow cut off is not active.
Selected Compressibility Calculation	Shows the currently selected type of compressibility calculation.

Click to Select NX19/AGA8 Detail/AGA8 Gross	Click the **NX-19** button to select NX-19 as the compressibility calculation. Click the **AGA8 Detail** button to select AGA8 Detail as the compressibility calculation. Click the **AGA8 Gross** button to select AGA8 Gross as the compressibility calculation.
Stream *x*	Shows **Raw/GC** if there are no errors. Shows **Fixed** if the calculation is using fixed values for components of the gas stream, typically because of a chromatograph failure.
BTU	Shows the current British Thermal Units (BTU) for this gas stream.
Gravity	Shows the gravity value for this gas stream.

4.7.3 Basic Flow Setup – AGA7

The AGA7 Basic Flow Setup page lets you configure linear flow measurement for this meter run.

Figure 4-9. Basic Flow Setup – AGA7

Note: If you chose linear measurement by mistake, and need to choose either differential measurement or coriolis measurement instead, you can reset the equation type to undefined, so you can re-select it. To do this, click the **Reset Meter Run's Measurement Type** button on the Meter Run Overview page. See *Section 3.2*.

Field	Description
Basic Flow Setup for Run#	Select the meter run number for which you want to configure AGA7 linear measurement.
Inputs	
Flow Density	Specify the density of the flowing gas as measured by a densitometer.

Base Density	Specify the contract base density of the gas as measured by a densitometer.
K Factor Units	Specify the desired units for the output.
K Factor	Specify a scale factor to adjust the output to your desired units.
Low Flow Cutoff	The low flow cutoff is the minimum frequency that will still be considered valid for flow measurement. If the frequency of the inputs from the high speed counter fall below this number, volume will not be measured.
Adjust Press.	Enter the average barometric pressure here.
Station Elevation	Specify the station elevation above sea level and choose the appropriate units. The default units are feet.
Local Press.	Show the local atmospheric pressure calculated based on inputs including the station elevation.
Use Adjust or Local Press.	The label on this button shows whether you use the calculated local pressure or the adjusted pressure. When you click the button you toggle between these two cases. Click **Adjust** to specify that the application should use local pressure. The button now displays **Local**. Click **Local** to specify that the application should use adjusted pressure. The button now displays **Adjust**.
Base Temp.	Specify the contract base temperature and associated units.
Base Press.	Specify the contract base pressure and associated units.
Meter Factor	Specify an optional meter calibration factor here. The AGA7 calculation uses this factor to correct for known variations in the measuring equipment.
Contract Hour	Specify the hour (0 to 23) which marks the beginning of the “gas day.”
Status	
Flow	Shows the calculated flow rate at base conditions.
Frequency	Shows the live frequency input.

Static Press.	Shows the static gauge pressure of the flowing gas.
Temperature	Shows the temperature of the flowing gas.
Low Flow Cut Off	Shows **Cutoff** if the flow is too low and so the low flow cut off is currently active. Shows **Flowing** if flow is sufficient that the low flow cut off is not active.
Selected Compressibility Calculation	Shows the currently selected type of compressibility calculation.
Click to Select NX19/AGA8 Detail/AGA8 Gross	Click the **NX-19** button to select NX-19 as the compressibility calculation. Click the **AGA8 Detail** button to select AGA8 Detail as the compressibility calculation. Click the **AGA8 Gross** button to select AGA8 Gross as the compressibility calculation.
Stream *x*	Shows **Raw/GC** if there are no errors. Shows **Fixed** if the calculation is using fixed values for components of the gas stream, typically because of a chromatograph failure.
BTU	Shows the current British Thermal Units (BTU) for this gas stream.
Gravity	Shows the gravity value for this gas stream.

4.7.4 Basic Flow Setup – Coriolis

The Basic Flow Setup for Coriolis page lets you configure gas flow measurement using a coriolis meter.

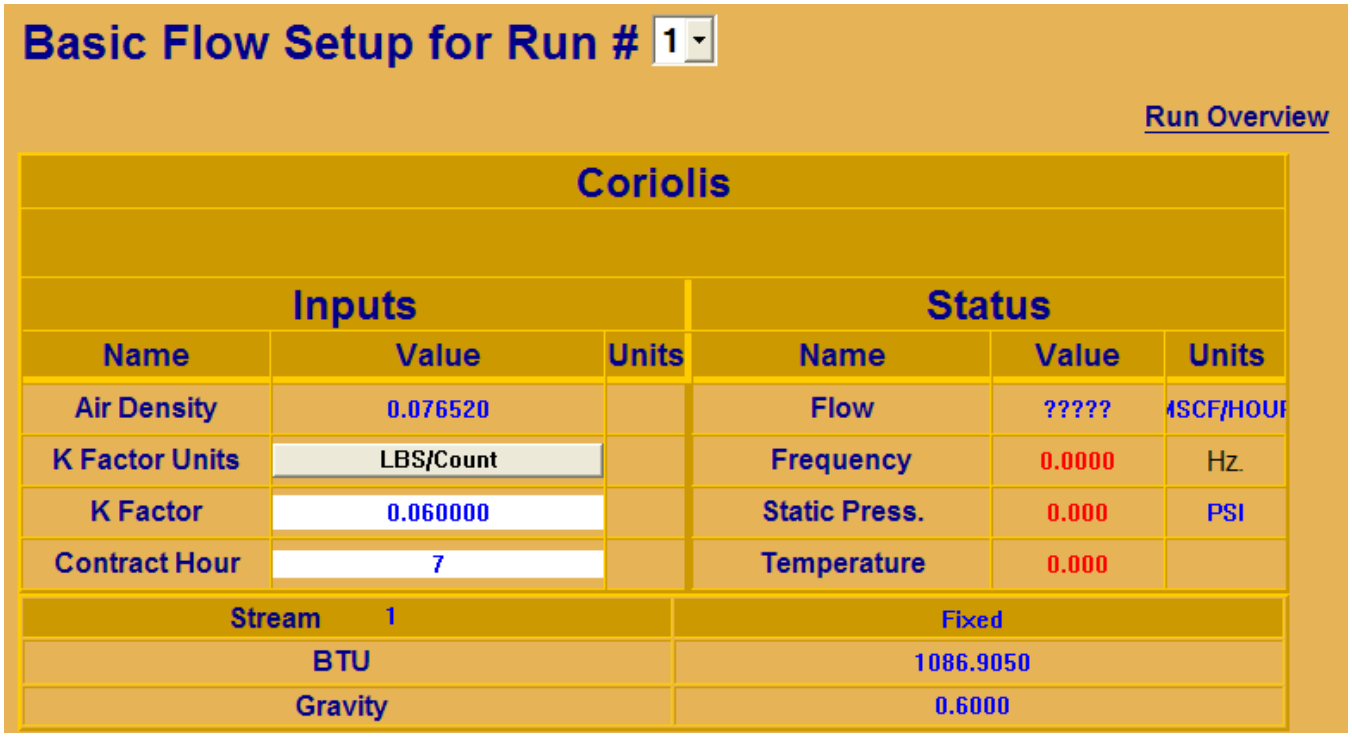


Figure 4-10. Basic Flow Setup – Coriolis

Note: If you chose coriolis measurement by mistake, and need to choose either differential measurement or linear measurement instead, you can reset the equation type to undefined, so you can re-select it. To do this, click the **Reset Meter Run's Measurement Type** button on the Meter Run Overview page. See *Section 3.2*.

Field	Description
Basic Flow Setup for Run#	Select the meter run number for which you want to configure coriolis measurement.
Inputs	
Air Density	Shows the density of air constant.
K Factor Units	Select the engineering units for the coriolis meter.
K Factor	Specify the correction factor (K) for the coriolis meter. This information is available from the coriolis meter data plate.

Contract Hour	Specify the hour (0 to 23) which marks the beginning of the "gas day."
Status	
Flow	Shows the calculated flow rate.
Frequency	Shows the current frequency from the high speed counter input connected to the coriolis meter.
Static Press.	Shows the static pressure of the flowing gas.
Temperature	Shows the temperature of the flowing gas.
Stream *x*	Shows **Raw/GC** if there are no errors. Shows **Fixed** if the calculation is using fixed values for components of the gas stream, typically because of a chromatograph failure.
BTU	Shows the current British Thermal Units (BTU) for this gas stream.
Gravity	Shows the gravity value for this gas stream.

4.8 Flow Equation Selection and Details

For each meter run, you must select the type of flow measurement equation you want to use.

Calling up this Menu

Click Flow Equation Details

Selecting the Type of Measurement

For a particular meter run, you have a choice of one of three possible types of measurement: Click the button that corresponds to the type of meter you use on this meter run.

- **Differential Measurement** - Select this if you have an orifice type meter for this meter run. This uses either the 1992 AGA3 equation (see *Section 4.8.1*) or the 1985 AGA3 equation (see *Section 4.8.2*).
- **Linear Measurement** - Select this if you have a linear type meter (ultrasonic, turbine, auto-adjust, or positive displacement) for this meter run. This uses the AGA7 equation (see *Section 4.8.3*).
- **Coriolis Measurement** - Select this if you have a coriolis meter for this meter run (see *Section 4.8.4*).

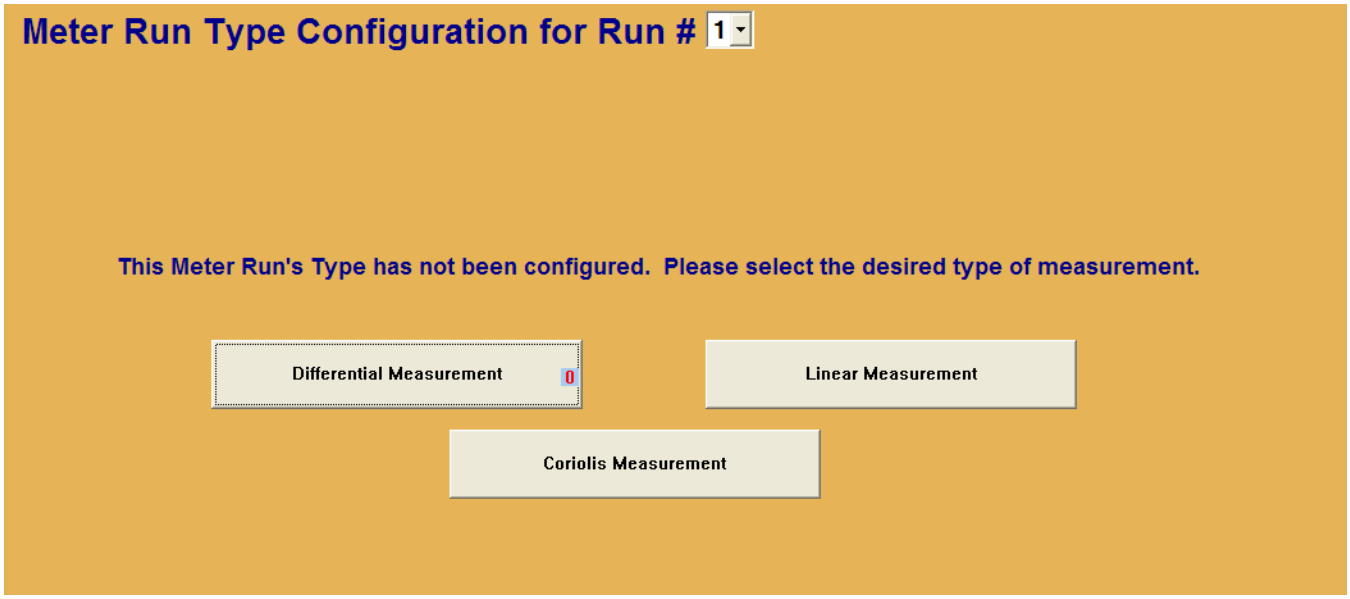


Figure 4-11. Selecting the Type of Measurement

Notes:

- Once you select the equation type, these buttons subsequently open up the equation configuration page for the chosen equation.
- If you inadvertently choose the wrong equation type, you can reset the equation type to undefined, so you can re-select it. To do this, click the **Reset Meter Run's Measurement Type** button on the Meter Run Overview page. See *Section 3.2*.

4.8.1 Differential Measurement – AGA3I (1992 equation)

There are two different AGA3 equations supported, the AGA3I equation from the 1992 AGA report, and the AGA3TERM equation from the 1985 AGA report.

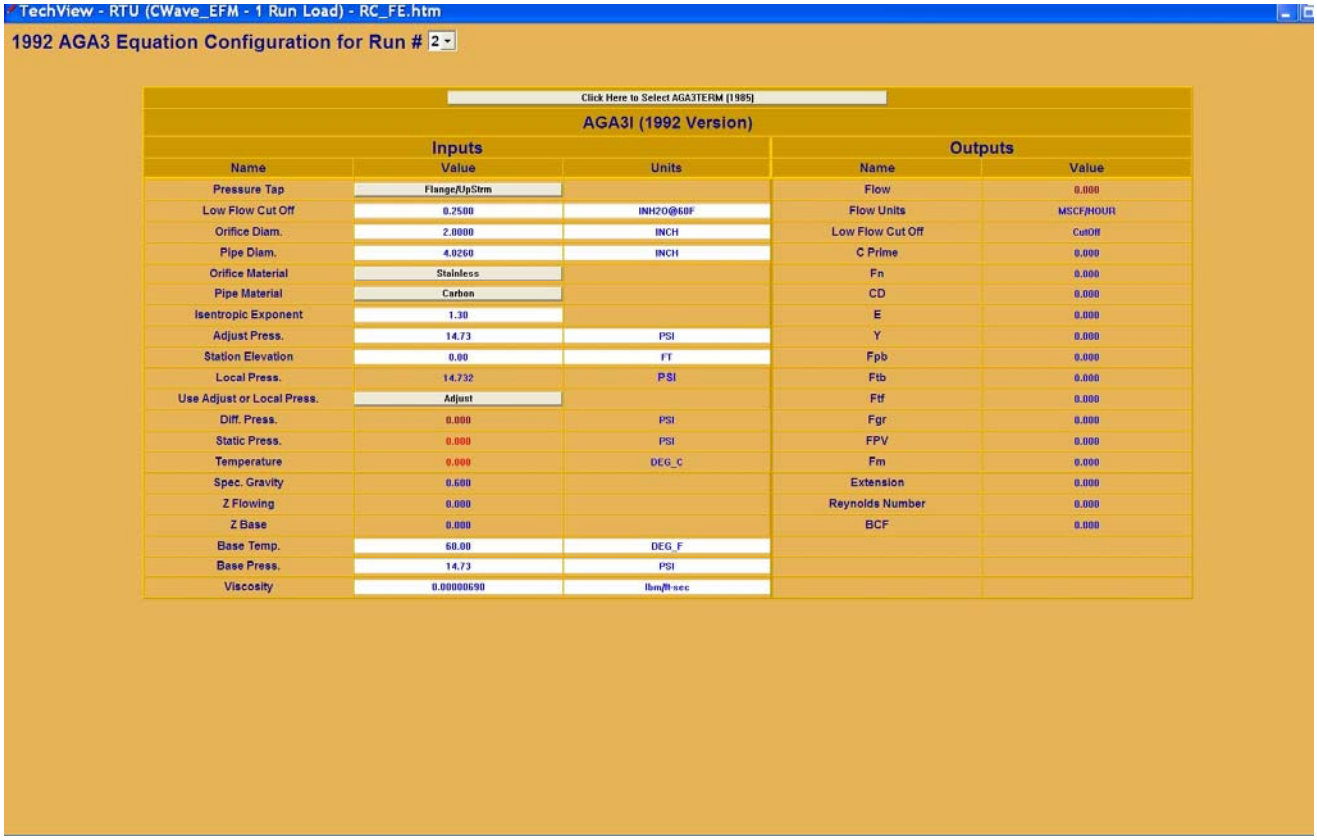


Figure 4-12. Differential Measurement – AGA3I page

Notes:

- If you want to choose the AGA3TERM calculation, instead of the AGA3I calculation, click the **Click Here to Select AGA3TERM (1985)** button.
- If you chose differential measurement by mistake, and need to choose either linear measurement or coriolis measurement instead, you can reset the equation type to undefined, so you can re-select it. To do this, click the **Reset Meter Run's Measurement Type** button on the Meter Run Overview page. See *Section 3.2*.

Field	Description
1992 AGA3 Equation Configuration for Run#	Select the meter run number for which you want to configure AGA3 iterative measurement.

Inputs

Pressure Tap	Click this button to change the specified location of the pressure tap. The pressure tap can be either upstream or downstream of the meter.
Low Flow Cutoff	Enter the low flow cutoff here. This the minimum value for differential pressure where the application performs measurements. If the differential pressure drops below this value, the measured flow goes to zero. Select the units for the low flow cutoff.
Orifice Diam.	Enter the orifice bore diameter here and select the proper units.
Pipe Diam.	Enter the inside diameter of the pipe here and select the proper units.
Orifice Material	The label on this button shows the type of steel used for the orifice. When you click the button you toggle between these two cases. Click **Carbon** to specify that stainless steel is the orifice material. The button now displays **Stainless**. Click **Stainless** to specify that carbon steel is the orifice material. The button now displays **Carbon**.
Pipe Material	The label on this button shows the type of steel used for the pipe. When you click the button you toggle between these two cases. Click **Carbon** to specify that stainless steel is the pipe material. The button now displays **Stainless**. Click **Stainless** to specify that carbon steel is the pipe material. The button now displays **Carbon**.
Isentropic Exponent	Specify the fluid Isentropic exponent. This value is used in the calculation of the expansion factor, Y. Typically you should enter 1.3 here, which is the value given in the *1992 American Gas Association (AGA-3) Report.*
Adjust Press.	Specify the site barometric pressure and select the proper units. This value is added to the value shown for the **Static Press.** to obtain absolute pressure.
Station Elevation	Specify the station elevation above sea level and choose the appropriate units. The default units are feet.
Local Press.	Show the local atmospheric pressure calculated based on inputs including the station elevation.

Use Adjust or Local Press.	The label on this button shows whether you use the calculated local pressure or the adjusted pressure. When you click the button you toggle between these two cases. Click **Adjust** to specify that the application should use local pressure. The button now displays **Local**. Click **Local** to specify that the application should use adjusted pressure. The button now displays **Adjust**.
Diff. Press	Shows the differential pressure across the orifice plate.
Static Press.	Shows the upstream or downstream static pressure.
Temperature	Shows the temperature of the flowing gas.
Spec. Gravity	Shows the specific gravity of the gas at standard conditions.
Z Flowing	Shows the flowing compressibility factor.
Z Base	Shows the base compressibility factor.
Base Temp.	Shows the base temperature of the gas.
Base Press.	Specify the base pressure. This is used to calculate the pressure base factor
Viscosity	Specify the dynamic viscosity of the gas at flowing conditions. Viscosity is used to calculate the Reynolds number.
Outputs	
Flow	Shows the current calculated flow reading.
Flow Units	Shows the engineering units for the calculated flow reading.
Low Flow Cut Off	Shows **Cutoff** if the flow is too low and so the low flow cut off is currently active. Shows **Flowing** if flow is sufficient that the low flow cut off is not active.
C Prime	The **C Prime** factor is: Fn * CD * Y * Fpb * Ftb * Ftf * Fgr * Fpv where: Fn is the numeric conversion factor

	CD is the orifice coefficient of discharge Y is the expansion factor Fpb is the pressure base factor Ftb is the temperature base factor Ftf is the flowing temperature factor Fpv is the supercompressibility factor
Fn	Shows a numeric conversion factor which includes the velocity of approach factor.
CD	Shows the Orifice coefficient of discharge, which is the sum of the orifice calculation factor, Fc and the orifice slope factor Fsl.
E	Shows the velocity of approach factor.
Y	Shows the expansion factor.
Fpb	Shows the pressure base factor.
Ftb	Shows the temperature base factor.
Ftf	Shows the flowing temperature factor.
Fgr	Shows the specific gravity factor.
FPV	Shows the supercompressibility factor, computed as Zb / Zf..
Fm	Shows the internal meter correction factor, Fm , to compensate for external equipment calibration error or local variations in conditions such as gravity, or Downstream tap compressibility.
Extension	Shows the extension factor for the AGA3I calculation.
Reynolds Number	Shows the pipe Reynolds number as computed by iteration as part of the CD (coefficient of discharge) calculation.
BCF	Shows the base correction (Zb/Zs) for Zb other than AGA report Zs value, where Zb is the base compressibility factor and Zs is the standard compressibility for gas in use.

4.8.2 Differential Measurement – AGA3TERM (1985 equation)

There are two different AGA3 equations supported, the AGA3I equation from the 1992 AGA report, and the AGA3TERM equation from the 1985 AGA report.

Figure 4-13. Differential Measurement – AGA3TERM page

Notes:

- If you want to choose the AGA3I calculation, instead of the AGA3TERM calculation, click the **Click Here to Select AGA3I (1992)** button.
- If you chose differential measurement by mistake, and need to choose either linear measurement or coriolis measurement instead, click the **Reset Meter Run's Measurement Type** button on the Meter Run Overview page. See *Section 3.2*.

Field	Description
1985 AGA3 Equation Configuration for Run#	Select the meter run number for which you want to configure AGA3 term measurement.
Inputs	
Pressure Tap	Click this button to change the specified location of the pressure tap. The pressure tap can be either upstream or downstream of the meter.

Low Flow Cutoff	Enter the low flow cutoff here. This the minimum value for differential pressure where the application performs measurements. If the differential pressure drops below this value, the measured flow goes to zero. Select the units for the low flow cutoff.
Orifice Diam.	Enter the orifice bore diameter here and select the proper units.
Pipe Diam.	Enter the inside diameter of the pipe here and select the proper units.
Fm / Fl	Enter the combined orifice constant here.
Adjust Press.	Specify the average barometric pressure and select the proper units.
Station Elevation	Specify the station elevation above sea level and choose the appropriate units. The default units are feet.
Local Press.	Show the local atmospheric pressure calculated based on inputs including the station elevation.
Use Adjust or Local Press.	The label on this button shows whether you use the calculated local pressure or the adjusted pressure. When you click the button you toggle between these two cases. Click **Adjust** to specify that the application should use local pressure. The button now displays **Local**. Click **Local** to specify that the application should use adjusted pressure. The button now displays **Adjust**.
Diff. Press	Shows the differential pressure across the orifice plate.
Static Press.	Shows the upstream or downstream static pressure.
Temperature	Shows the temperature of the flowing gas.
Spec. Gravity	Shows the specific gravity of the flowing gas.
FPV	Shows the supercompressibility factor of the gas.
Base Temp.	Specify the required (contract) base temperature of the flowing gas and the associated engineering units.

Base Press.	Specify the base or contract pressure of the gas and the associated units.
Outputs	
Flow	Shows the current calculated flow reading.
Flow Units	Shows the engineering units for the calculated flow reading.
Low Flow Cut Off	Shows **Cutoff** if the flow is too low and so the low flow cut off is currently active. Shows **Flowing** if flow is sufficient that the low flow cut off is not active.
C Prime	The **C Prime** factor is: Fn * CD * Y * Fpb * Ftb * Ftf * Fgr * Fpv where: Fn is the numeric conversion factor CD is the orifice coefficient of discharge Y is the expansion factor Fpb is the pressure base factor Ftb is the temperature base factor Ftf is the flowing temperature factor Fpv is the supercompressibility factor
Fb	Show the base orifice factor.
Fr	Shows the Reynolds number factor.
Y	Shows the expansion factor.
Fpb	Shows the pressure base factor.
Ftb	Shows the temperature base factor.
Ftf	Shows the flowing temperature factor.
Fg	Shows the specific gravity factor.
Extension	Shows the extension factor for the AGA3TERM calculation.
Orif. Const. K	Shows the combined orifice constant K. This is typically the value for orifice thermal expansion unless other corrections are required.

4.8.3 Linear Measurement – AGA7

The AGA7 Equation Configuration page lets you configure linear flow measurement for this meter run.

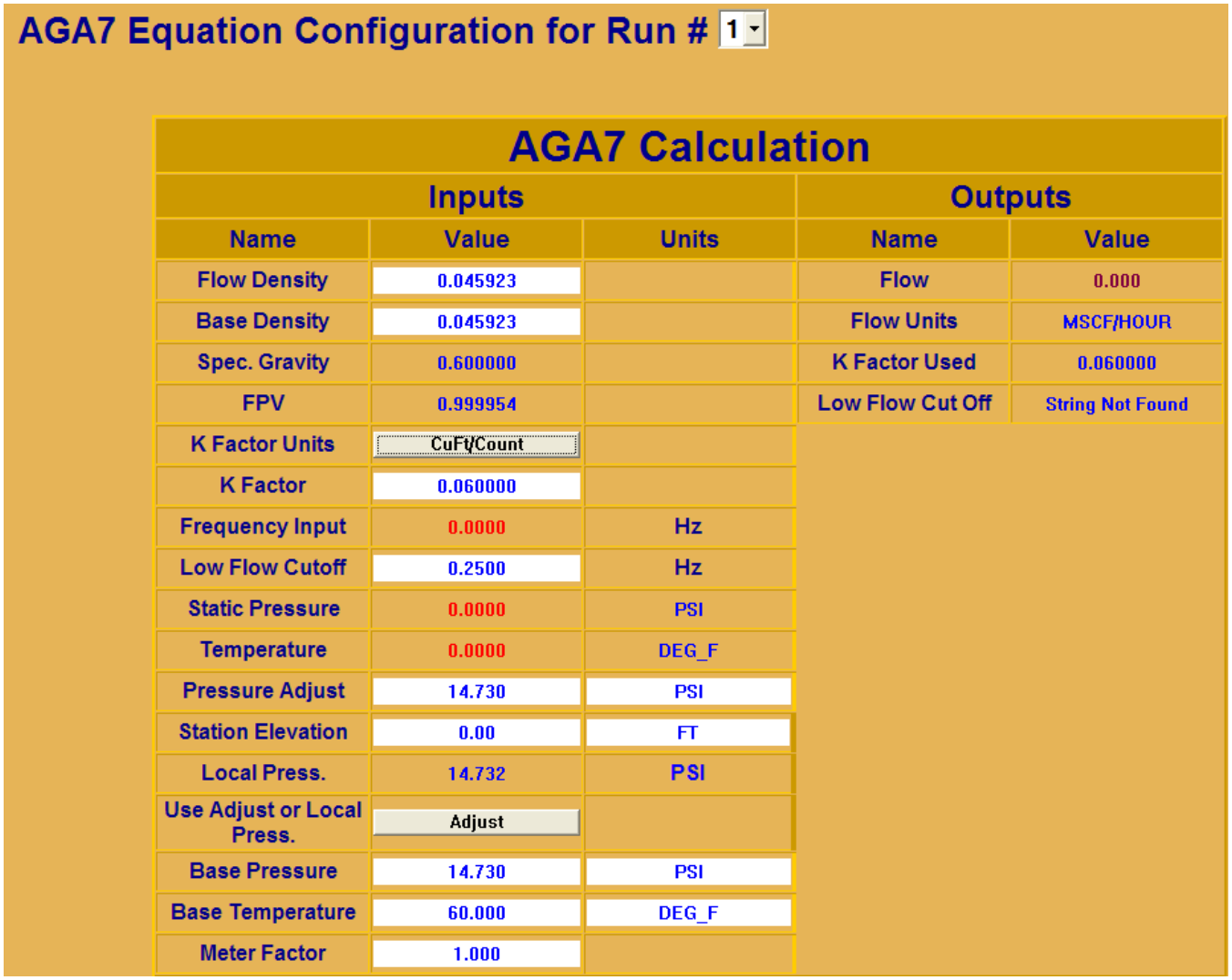


Figure 4-14. AGA7 Calculation page

Note: If you chose linear measurement by mistake, and need to choose either differential measurement or coriolis measurement instead, you can reset the equation type to undefined, so you can re-select it. To do this, click the **Reset Meter Run's Measurement Type** button on the Meter Run Overview page. See *Section 3.2*.

Field	Description
AGA7 Equation Configuration for Run#	Select the meter run number for which you want to configure AGA7 linear measurement.
Inputs	
Flow Density	Specify the density of the flowing gas as measured by a densitometer.
Base Density	Specify the contract base density of the gas as measured by a densitometer.
Spec. Gravity	Specify the specific gravity of the gas as measured by a gravitometer.
FPV	Shows the supercompressibility factor.
K Factor Units	Specify the desired units for the output.
K Factor	Specify a scale factor to adjust the output to your desired units.
Frequency Input	Shows the live frequency input.
Low Flow Cutoff	The low flow cutoff is the minimum frequency that will still be considered valid for flow measurement. If the frequency of the inputs from the high speed counter fall below this number, volume will not be measured.
Static Pressure	Shows the static gauge pressure of the flowing gas.
Temperature	Shows the temperature of the flowing gas.
Pressure Adjust	Enter the average barometric pressure here.
Station Elevation	Specify the station elevation above sea level and choose the appropriate units. The default units are feet.
Local Press.	Show the local atmospheric pressure calculated based on inputs including the station elevation.
Use Adjust or Local Press.	The label on this button shows whether you use the calculated local pressure or the adjusted pressure. When you click the button you toggle between these two cases.

	Click **Adjust** to specify that the application should use local pressure. The button now displays **Local**. Click **Local** to specify that the application should use adjusted pressure. The button now displays **Adjust**.
Base Pressure	Specify the contract base pressure and associated units.
Base Temperature	Specify the contract base temperature and associated units.
Meter Factor	Specify an optional meter calibration factor here. The AGA7 calculation uses this factor to correct for known variations in the measuring equipment.
Outputs	
Flow	Shows the calculated flow rate at base conditions.
Flow Units	Shows the engineering units for the calculated flow rate reading.
K Factor Used	Shows the value of the K factor used in the calculation.
Low Flow Cut Off	Shows **Cutoff** if the flow is too low and so the low flow cut off is currently active. Shows **Flowing** if flow is sufficient that the low flow cut off is not active.

4.8.4 Coriolis Measurement

The Coriolis Equation Configuration page lets you configure gas flow measurement using a coriolis meter.

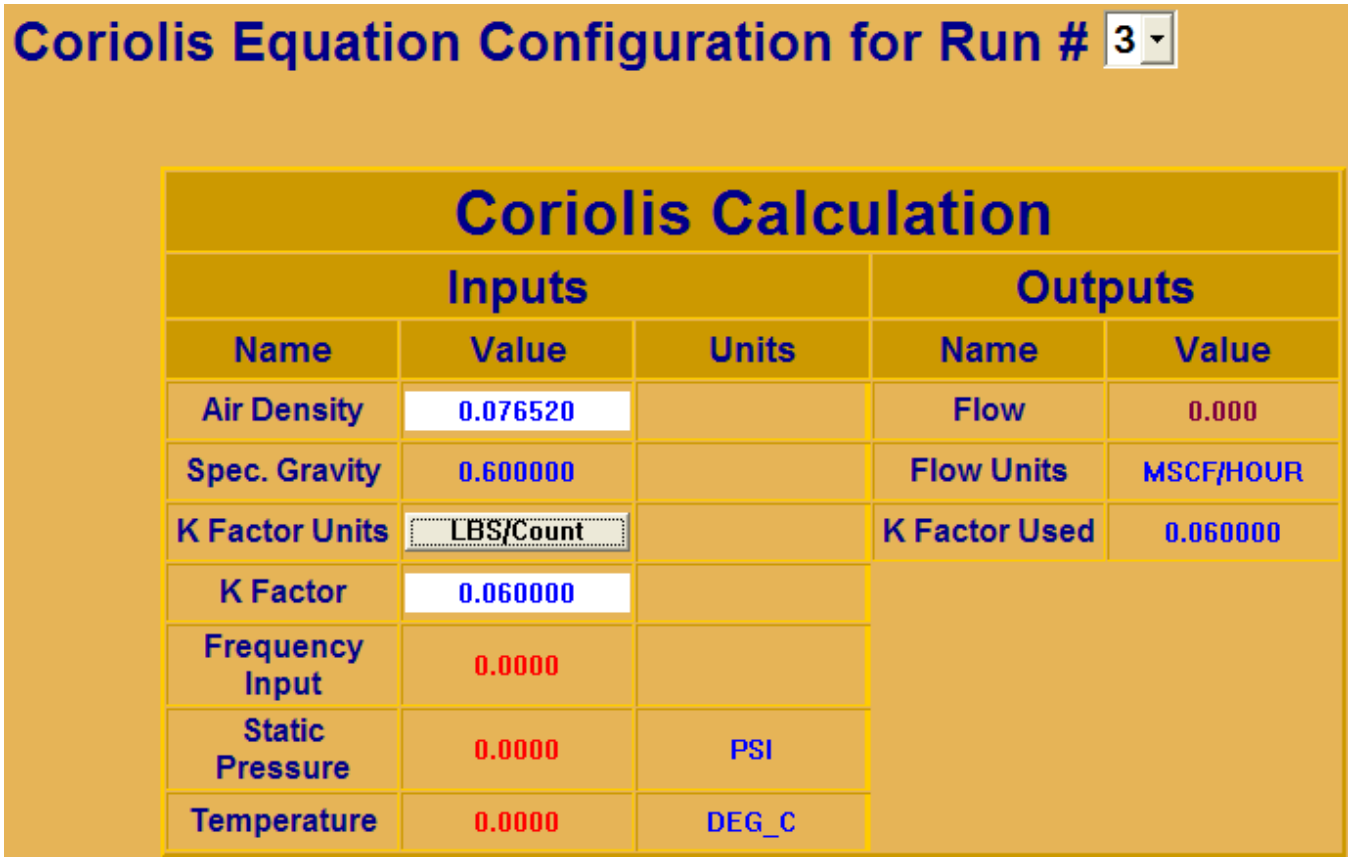


Figure 4-15. Coriolis Calculation page

Note: If you chose coriolis measurement by mistake, and need to choose either differential measurement or linear measurement instead, you can reset the equation type to undefined, so you can re-select it. To do this, click the **Reset Meter Run's Measurement Type** button on the Meter Run Overview page. See *Section 3.2*.

Field	Description
Coriolis Equation Configuration for Run#	Select the meter run number for which you want to configure coriolis measurement.
Inputs	
Air Density	Specify the density of air constant.
Spec. Gravity	Shows the specific gravity of the gas.

K Factor Units	Select the engineering units for the coriolis meter.
K Factor	Specify the correction factor (K) for the coriolis meter. This information is available from the coriolis meter data plate.
Frequency Input	Shows the current frequency from the high speed counter input connected to the coriolis meter.
Static Pressure	Shows the static pressure of the flowing gas.
Temperature	Shows the temperature of the flowing gas.
Outputs	
Flow	Shows the calculated flow rate.
Flow Units	Shows the engineering units for the calculated flow rate reading.
K Factor Used	Shows the value of the K factor used in the calculation.

4.9 Compressibility Setup

The Supercompressibility Configuration page lets you enter parameters to enable supercompressibility calculations.

Calling up this Menu

Click Compressibility Details

Supercompressibility Configuration for Run # 1

Selected Compressibility Calculation			NX-19		
		Click to Select >	NX-19	AGA8 Detail	AGA8 Gross
Inputs				**Outputs**	
Name	Value	Name	Value	Outputs	Value
Gross Mode	Mode 2	CH_4	89.000	FPV	1.000
Static Pressure	0.000	N_2	0.000	Z Base	0.000
Base Pressure	14.73	CO_2	0.000	Z Flowing	0.000
Temperature	0.000	C_2	8.000		
Base Temp.	60.00	C_3	3.000		
BTU	1086.905	IC_4	0.000		
Spec. Gravity	0.600	NC_4	0.000		
		IC_5	0.000		
		NC_5	0.000		
		NC_6	0.000		
		NC_7	0.000		
		NC_8	0.000		
		H_2O	0.00		
		H_2S	0.00		
		H_2	0.00		
		CO	0.00		
		O_2	0.00		
		NC_9	0.00		
		NC_{10}	0.00		
		He_2	0.00		
		Ar	0.00		

Figure 4-16. Supercompressibility Configuration page

Field	Description
Supercompressibility Configuration for Run#	Select the meter run number for which you want to configure supercompressibility calculations.
Selected Compressibility Calculation	Shows the currently selected type of compressibility calculation.
Click to Select NX19/AGA8 Detail/AGA8 Gross	Click the **NX-19** button to select NX-19 as the compressibility calculation. Click the **AGA8 Detail** button to select AGA8 Detail as the compressibility calculation. Click the **AGA8 Gross** button to select AGA8 Gross

	as the compressibility calculation.
Inputs	
Gross Mode	The label on this button shows whether you use gross Mode 1 or gross Mode 2. When you click the button you toggle between these two cases. Mode 1 uses the heating value (in BTU), the relative density (specific gravity) and the mole fraction percent of CO_2. Mode 2 uses the relative density (specific gravity) and the mole fraction percent of N_2 and CO_2. Click **Mode 1** to specify that the application should use Mode 2. The button now displays **Mode 2**. Click **Mode 2** to specify that the application should use Mode 1. The button now displays **Mode 1**.
Static Pressure	Shows the static pressure of the flowing gas.
Base Pressure	Specify the contract base pressure.
Temperature	Shows the temperature of the flowing gas.
Base Temp.	Specify the contract base temperature.
BTU	Shows the heat in British Thermal Units (BTU)
Spec. Gravity.	Shows the specific gravity of the gas. There are no units for specific gravity.
CH_4	Shows the mole fraction percentage of methane in the gas.
N_2	Shows the mole fraction percentage of nitrogen in the gas.
CO_2	Shows the mole fraction percentage of carbon dioxide in the gas.
C_2	Shows the mole fraction percentage of ethane in the gas.

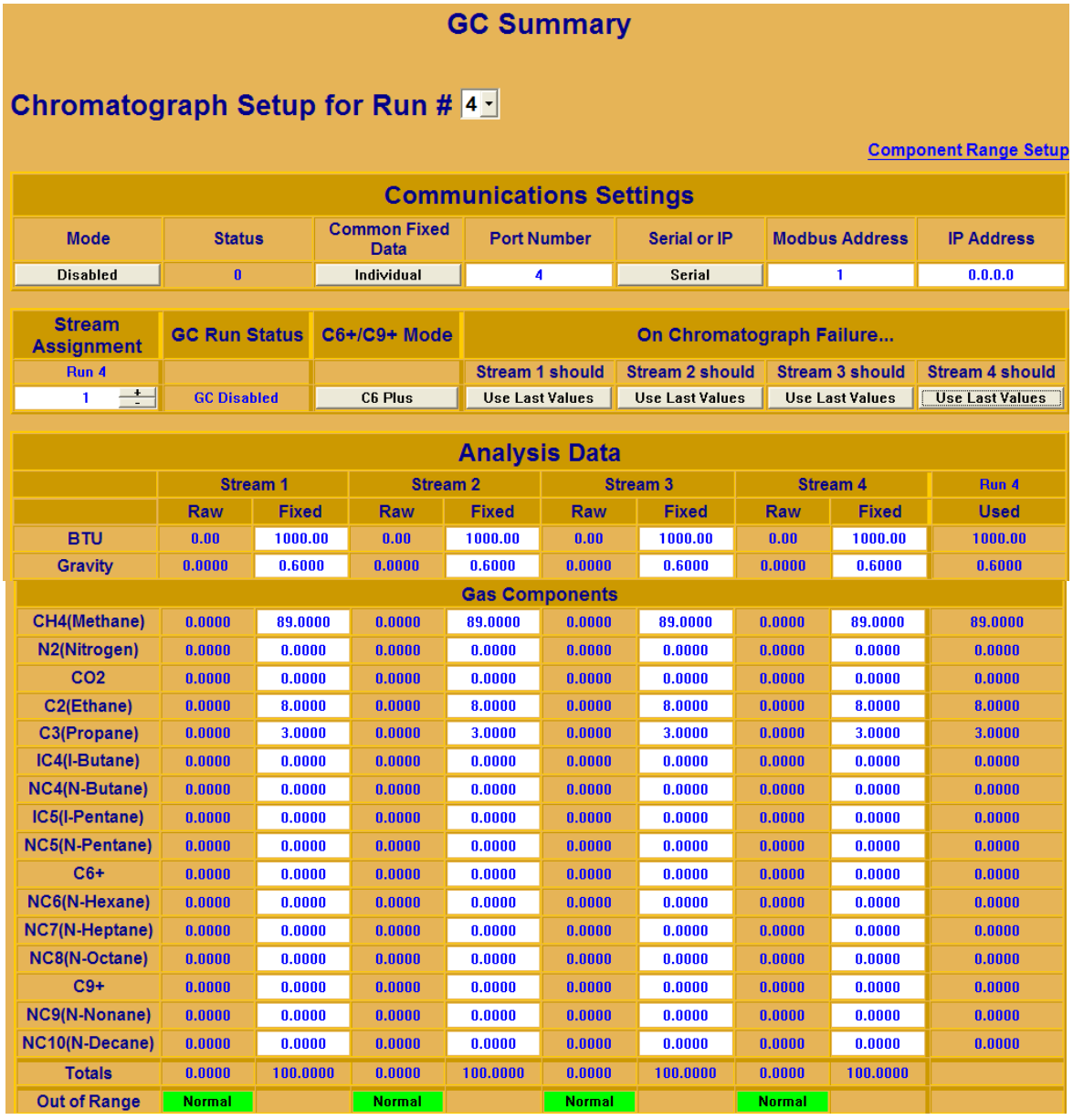
C_3	Shows the mole fraction percentage of propane in the gas.
IC_4	Shows the mole fraction percentage of I-butane in the gas.
NC_4	Shows the mole fraction percentage of N-butane in the gas.
IC_5	Shows the mole fraction percentage of I-pentane in the gas.
NC_5	Shows the mole fraction percentage of N-pentane in the gas.
NC_6	Shows the mole fraction percentage of N-hexane in the gas.
NC_7	Shows the mole fraction percentage of N-heptane in the gas.
NC_8	Shows the mole fraction percentage of N-octane in the gas.
H_2O	Specify the mole fraction percentage of water in the gas.
H_2S	Specify the mole fraction percentage of hydrogen sulfide in the gas.
H_2	Specify the mole fraction percentage of hydrogen in the gas.
CO	Specify the mole fraction percentage of carbon monoxide in the gas.
O_2	Specify the mole fraction percentage of oxygen in the gas.
NC_9	Specify the mole fraction percentage of n-nonane in the gas.
NC_{10}	Specify the mole fraction percentage of n-decane in the gas.
He_2	Specify the mole fraction percentage of helium in the gas.
Ar	Specify the mole fraction percentage of argon in the gas.

Outputs

FPV	Shows the calculated supercompressibility factor of the gas.
Z Base	Shows the base compressibility factor.
Z Flowing	Shows the flowing compressibility factor.

4.10 GC Summary

Calling up this Menu Click Chromatograph



GC Summary

Chromatograph Setup for Run # 4

Component Range Setup

Communications Settings

Mode	Status	Common Fixed Data	Port Number	Serial or IP	Modbus Address	IP Address
Disabled	0	Individual	4	Serial	1	0.0.0.0

Stream Assignment	GC Run Status	C6+/C9+ Mode	On Chromatograph Failure...			
Run 4			Stream 1 should	Stream 2 should	Stream 3 should	Stream 4 should
1	GC Disabled	C6 Plus	Use Last Values	Use Last Values	Use Last Values	Use Last Values

Analysis Data

	Stream 1		Stream 2		Stream 3		Stream 4		Run 4
	Raw	Fixed	Raw	Fixed	Raw	Fixed	Raw	Fixed	Used
BTU	0.00	1000.00	0.00	1000.00	0.00	1000.00	0.00	1000.00	1000.00
Gravity	0.0000	0.6000	0.0000	0.6000	0.0000	0.6000	0.0000	0.6000	0.6000
Gas Components									
CH4(Methane)	0.0000	89.0000	0.0000	89.0000	0.0000	89.0000	0.0000	89.0000	89.0000
N2(Nitrogen)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CO2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
C2(Ethane)	0.0000	8.0000	0.0000	8.0000	0.0000	8.0000	0.0000	8.0000	8.0000
C3(Propane)	0.0000	3.0000	0.0000	3.0000	0.0000	3.0000	0.0000	3.0000	3.0000
IC4(I-Butane)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NC4(N-Butane)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
IC5(I-Pentane)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NC5(N-Pentane)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
C6+	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NC6(N-Hexane)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NC7(N-Heptane)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NC8(N-Octane)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
C9+	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NC9(N-Nonane)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NC10(N-Decane)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Totals	0.0000	100.0000	0.0000	100.0000	0.0000	100.0000	0.0000	100.0000	
Out of Range	Normal		Normal		Normal		Normal		

Figure 4-17. GC Summary page

Field	Description
Chromatograph Setup for Run#	Select the meter run for which you want to configure a chromatograph.
Communications Settings	
Mode Disabled/Enabled	Use this button to specify, for the application, whether a chromatograph is present (enabled) and providing gas component data or not present (disabled) in which

	case the application uses fixed values for gas component data. The label on this button shows the current configured state of the chromatograph. When you click the button you toggle the direction. Click **Disabled** to specify that the chromatograph is present and providing gas component data. The button now displays **Enabled**. Click **Enabled** to specify that the chromatograph is not present and that the application should use fixed gas component data values. The button now displays **Disabled**.
Status	Non-zero values indicate an error. See the ControlWave Designer online help CUSTOM function block **odiStatus** parameter value for the Modbus Master communication protocol you use with the chromatograph.
Common Fixed Data	Use this button to specify, for the application, whether the fixed component values you enter for stream 1 should apply to all four streams (Common) or whether each stream should use its own fixed component value (Individual). The label on this button shows the current choice. When you click the button you toggle the choice. Click **Individual** to specify that the application should use the gas component data specified for stream 1 for all four streams. The button now displays **Common**. Click **Common** to specify that the application should use individual gas component values specified for each stream instead of using the stream 1 value for all four streams. The button now displays **Individual**.
Port Number	When a chromatograph is present, this is the port number on the ControlWave flow computer to which the chromatograph connects.
Serial or IP	Use this button to specify, for the application, whether the ControlWave flow computer communicates with the chromatograph using a serial Modbus protocol or an IP communication protocol. The label on this button shows the current configured choice of protocol. When you click the button you toggle the protocol. Click **IP** to specify that the flow computer uses a serial Modbus protocol to communicate with the chromatograph. The button now displays **Serial.**.

	Click **Serial** to specify that the flow computer uses IP protocol to communicate with the chromatograph. The button now displays **IP**.
Modbus Address	If the ControlWave communicates with the chromatograph using a serial Modbus communication protocol, enter the chromatograph's Modbus Address (1-246),
IP Address	If you communicate with the chromatograph using IP, specify its IP address here.
Stream Assignment	Select the chromatograph gas stream you want to assign to the current meter run. The current meter run is the one you selected at the top of the menu with the **Chromatograph Setup for Run#** field.
GC Run Status	Possible status messages include: OK operating okay DISABLED in disabled mode OUT OF RANGE ERROR value out of range based on the limits set GC FAILURE the chromatograph failed BAD RUN# Improper GC configuration for this meter run
C6+/C9+ Mode	Use this button to specify, for the application, whether your chromatograph supports C6+ or C9+. The label on this button shows the current configured choice. When you click the button you toggle the choice. Click **C6+** to specify that the chromatograph supports C9+. The button now displays **C9+.**. Click **C9+** to specify that the chromatograph supports C6+. The button now displays **C6+.**
On Chromatograph Failure Stream *x* should	Use this button to specify, for each stream, what gas component values the application should use if the chromatograph fails. The application can either use the last known good value from the chromatograph, or a fixed value you enter on this page. The label on this button shows the current configured choice of what gas components to use for this stream if the chromatograph fails. When you click the button you toggle the choice. Click **Use Fixed Values** to specify that the flow computer should use the last known component values received from the chromatograph for this stream if the chromatograph fails. The button now

	displays **Use Last Values**. Click **Use Last Values** to specify that the flow computer should use the fixed component values entered on this page for this stream if the chromatograph fails. The button now displays **Use Fixed Values**.
Analysis Data	
Stream *x* BTU Raw	Shows the most recent BTU value received from the chromatograph for gas stream *x*.
Stream *x* BTU Fixed	Enter a fixed BTU value the application can use if the chromatograph fails for gas stream *x*. The application only uses this value if the chromatograph fails and you specified that it should **Use Fixed Values** for this stream.
Stream *x* Gravity Raw	Shows the most recent gravity value received from the chromatograph for gas stream *x*.
Stream *x* Gravity Fixed	Enter a fixed gravity value the application can use if the chromatograph fails for gas stream *x*. The application only uses this value if the chromatograph fails and you specified that it should **Use Fixed Values** for this stream.
Gas Components	
Stream *x* CH_4 (Methane) Raw	Shows the most recent methane value received from the chromatograph for gas stream *x*.
Stream *x* CH_4 (Methane) Fixed	Enter a fixed methane value the application can use if the chromatograph fails for gas stream *x*. The application only uses this value if the chromatograph fails and you specified that it should **Use Fixed Values** for this stream.
Stream *x* N_2 (Nitrogen) Raw	Shows the most recent nitrogen value received from the chromatograph for gas stream *x*.
Stream *x* N_2 (Nitrogen) Fixed	Enter a fixed nitrogen value the application can use if the chromatograph fails for gas stream *x*. The application only uses this value if the chromatograph fails and you specified that it should **Use Fixed Values** for this stream.
Stream *x* CO_2 Raw	Shows the most recent carbon dioxide value received from the chromatograph for gas stream *x*.
Stream *x* CO_2 Fixed	Enter a fixed carbon dioxide value the application can use if the chromatograph fails for gas stream *x*. The application only uses this value if the chromatograph fails and you specified that it should **Use Fixed Values** for this stream.

Stream *x* C_{2+}(Ethane) Raw	Shows the most recent ethane value received from the chromatograph for gas stream *x*.
Stream *x* C_{2+}(Ethane) Fixed	Enter a fixed ethane value the application can use if the chromatograph fails for gas stream *x*. The application only uses this value if the chromatograph fails and you specified that it should **Use Fixed Values** for this stream.
Stream *x* C_{2+}(Propane) Raw	Shows the most recent propane value received from the chromatograph for gas stream *x*.
Stream *x* C_{3+}(Propane) Fixed	Enter a fixed propane value the application can use if the chromatograph fails for gas stream *x*. The application only uses this value if the chromatograph fails and you specified that it should **Use Fixed Values** for this stream.
Stream *x* IC_{4+}(I-Butane) Raw	Shows the most recent I-butane value received from the chromatograph for gas stream *x*.
Stream *x* IC_{4+}(I-Butane) Fixed	Enter a fixed I-butane value the application can use if the chromatograph fails for gas stream *x*. The application only uses this value if the chromatograph fails and you specified that it should **Use Fixed Values** for this stream.
Stream *x* NC_{4+}(N-Butane) Raw	Shows the most recent N-butane value received from the chromatograph for gas stream *x*.
Stream *x* NC_{4+}(N-Butane) Fixed	Enter a fixed N-butane value the application can use if the chromatograph fails for gas stream *x*. The application only uses this value if the chromatograph fails and you specified that it should **Use Fixed Values** for this stream.
Stream *x* IC_{5+}(I-Pentane) Raw	Shows the most recent I-pentane value received from the chromatograph for gas stream *x*.
Stream *x* IC_{5+}(I-Pentane) Fixed	Enter a fixed I-pentane value the application can use if the chromatograph fails for gas stream *x*. The application only uses this value if the chromatograph fails and you specified that it should **Use Fixed Values** for this stream.
Stream *x* NC_{5+}(N-Pentane) Raw	Shows the most recent N-pentane value received from the chromatograph for gas stream *x*.
Stream *x* NC_{5+}(N-Pentane) Fixed	Enter a fixed N-pentane value the application can use if the chromatograph fails for gas stream *x*. The application only uses this value if the chromatograph fails and you specified that it should **Use Fixed Values** for this stream.

Stream *x* C_{6+} * Raw	Shows the most recent C_{6+} value received from the chromatograph for gas stream *x*.
Stream *x* C_{6+} *Fixed	Enter a fixed C_{6+} value the application can use if the chromatograph fails for gas stream *x*. The application only uses this value if the chromatograph fails and you specified that it should **Use Fixed Values** for this stream.
Stream *x* NC_6 *(N-Hexane) Raw	Shows the most recent N-hexane value received from the chromatograph for gas stream *x*.
Stream *x* NC_6 *(N-Hexane) Fixed	Enter a fixed N-hexane value the application can use if the chromatograph fails for gas stream *x*. The application only uses this value if the chromatograph fails and you specified that it should **Use Fixed Values** for this stream.
Stream *x* NC_7 *(N-Heptane) Raw	Shows the most recent N-heptane value received from the chromatograph for gas stream *x*.
Stream *x* NC_7 *(N-Heptane) Fixed	Enter a fixed N-heptane value the application can use if the chromatograph fails for gas stream *x*. The application only uses this value if the chromatograph fails and you specified that it should **Use Fixed Values** for this stream.
Stream *x* NC_8 *(N-Octane) Raw	Shows the most recent N-octane value received from the chromatograph for gas stream *x*.
Stream *x* NC_8 *(N-Octane) Fixed	Enter a fixed N-octane value the application can use if the chromatograph fails for gas stream *x*. The application only uses this value if the chromatograph fails and you specified that it should **Use Fixed Values** for this stream.
Stream *x* C_{9+} * Raw	Shows the most recent C_{9+} value received from the chromatograph for gas stream *x*.
Stream *x* C_{9+} *Fixed	Enter a fixed C_{9+} value the application can use if the chromatograph fails for gas stream *x*. The application only uses this value if the chromatograph fails and you specified that it should **Use Fixed Values** for this stream.
Stream *x* NC_9 *(N-Nonane) Raw	Shows the most recent N-nonane value received from the chromatograph for gas stream *x*.
Stream *x* NC_9 *(N-Nonane) Fixed	Enter a fixed N-nonane value the application can use if the chromatograph fails for gas stream *x*. The application only uses this value if the chromatograph fails and you specified that it should **Use Fixed Values** for this stream.

Stream *x* NC_{10+}(N-Decane) Raw	Shows the most recent N-decane value received from the chromatograph for gas stream *x*.
Stream *x* NC_{10+}(N-Decane) Fixed	Enter a fixed N-decane value the application can use if the chromatograph fails for gas stream *x*. The application only uses this value if the chromatograph fails and you specified that it should **Use Fixed Values** for this stream.
Stream *x* Raw Totals	Shows the sum of the gas component values in the raw column as a percentage.
Stream *x* Fixed Totals	Shows the sum of the gas component values in the fixed column as a percentage.
Stream *x* Out of Range	Shows **OOR** if the raw gas stream total is out of range of the Component Total Sum Limits defined on the Chromatograph Component Range Setup page (see *Section 4.11*), or **Normal** if the raw gas stream total is within these limits.
Used	This column shows the gas component values currently in use in calculations for the current meter run. This could be either the fixed value or the raw value. The current meter run is the one you selected at the top of the menu with the **Chromatograph Setup for Run#** field.

4.11 Chromatograph Component Range Setup

On the Chromatograph Component Range Setup page, you specify the minimum and maximum percentages for particular gas components in each gas stream.

If a component percentage goes outside these limits, operation is governed by the chromatograph failure settings on the GC Summary page.

Calling up this Menu

Click Chromatograph > **Component Range Setup**

Chromatograph Component Range Setup

Return to Chromatograph Setup

Component Out of Range Limits

Individual	Stream 1		Stream 2		Stream 3		Stream 4	
Limit	Max	Min	Max	Min	Max	Min	Max	Min
C2(Ethane)	100.00	0.00	100.00	0.00	100.00	0.00	100.00	0.00
C3(Propane)	100.00	0.00	100.00	0.00	100.00	0.00	100.00	0.00
CH4(Methane)	100.00	0.00	100.00	0.00	100.00	0.00	100.00	0.00
CO2(Carbon Dioxide)	100.00	0.00	100.00	0.00	100.00	0.00	100.00	0.00
IC4(I-Butane)	100.00	0.00	100.00	0.00	100.00	0.00	100.00	0.00
IC5(I-Pentane)	100.00	0.00	100.00	0.00	100.00	0.00	100.00	0.00
N2(Nitrogen)	100.00	0.00	100.00	0.00	100.00	0.00	100.00	0.00
NC4(N-Butane)	100.00	0.00	100.00	0.00	100.00	0.00	100.00	0.00
NC5(N-Pentane)	100.00	0.00	100.00	0.00	100.00	0.00	100.00	0.00
NC6(N-Hexane)	100.00	0.00	100.00	0.00	100.00	0.00	100.00	0.00
C6+	100.00	0.00	100.00	0.00	100.00	0.00	100.00	0.00
NC7(N-Heptane)	100.00	0.00	100.00	0.00	100.00	0.00	100.00	0.00
NC8(N-Octane)	100.00	0.00	100.00	0.00	100.00	0.00	100.00	0.00
C9+	100.00	0.00	100.00	0.00	100.00	0.00	100.00	0.00
NC9(N-Nonane)	100.00	0.00	100.00	0.00	100.00	0.00	100.00	0.00
NC10(N-Decane)	100.00	0.00	100.00	0.00	100.00	0.00	100.00	0.00
Gravity	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00
BTU	3000.00	0.00	3000.00	0.00	3000.00	0.00	3000.00	0.00

Component Total Sum Limit

	Max	Min
Pecentage Limits (Common to all Streams)	100.00	0.00

C6+/C9+ Factors

Component	Stream 1	Stream 2	Stream 3	Stream 4
	Factor (%)	Factor (%)	Factor (%)	Factor (%)
NC6(N-Hexane)	100.00000000	100.00000000	100.00000000	100.00000000
NC7(N-Heptane)	0.00000000	0.00000000	0.00000000	0.00000000
NC8(N-Octane)	0.00000000	0.00000000	0.00000000	0.00000000
NC9(N-Nonane)	100.00000000	100.00000000	100.00000000	100.00000000
NC10(N-Decane)	0.00000000	0.00000000	0.00000000	0.00000000

Figure 4-18. Component Range Setup page

Field	Description
Component Out of Range Limits	
Chromatograph Out of Range Limits Individual/Common button	Use this button to specify, for the application, whether the component out of range limits you enter for stream 1 should apply to all four streams (Common) or whether each stream should use its own individual out of range limits (Individual). The label on this button shows the current choice. When you click the button you toggle the choice. Click **Individual** to specify that the application should use the out of range limits specified for stream 1 for all four streams. The button now displays **Common**. Click **Common** to specify that the application should use out of range limits specified for each stream instead of using the stream 1 limits for all four streams. The button now displays **Individual**.
Stream *x* C_2 *(Ethane) Max Limit	Specify the maximum percentage of ethane allowed in gas stream *x*.
Stream *x* C_2 *(Ethane) Min Limit	Specify the minimum percentage of ethane allowed in gas stream *x*.
Stream *x* C_3 *(Propane) Max Limit	Specify the maximum percentage of propane allowed in gas stream *x*.
Stream *x* C_3 *(Propane) Min Limit	Specify the minimum percentage of propane allowed in gas stream *x*.
Stream *x* CH_4 *(Methane) Max Limit	Specify the maximum percentage of methane allowed in gas stream *x*.
Stream *x* CH_4 *(Methane) Min Limit	Specify the minimum percentage of methane allowed in gas stream *x*.
Stream *x* CO_2 *(Carbon Dioxide) Max Limit	Specify the maximum percentage of carbon dioxide allowed in gas stream *x*.
Stream *x* CO_2 *(Carbon Dioxide) Min Limit	Specify the minimum percentage of carbon dioxide allowed in gas stream *x*.
Stream *x* IC_4 *(I-Butane) Max Limit	Specify the maximum percentage of I-butane allowed in gas stream *x*.

Stream *x* IC_{4*}(I-Butane) Min Limit	Specify the minimum percentage of I-butane allowed in gas stream *x*.
Stream *x* IC_{5*}(I-Pentane) Max Limit	Specify the maximum percentage of I-pentane allowed in gas stream *x*.
Stream *x* IC_{5*}(I-Pentane) Min Limit	Specify the minimum percentage of I-pentane allowed in gas stream *x*.
Stream *x* N_{2*}(Nitrogen) Max Limit	Specify the maximum percentage of nitrogen allowed in gas stream *x*.
Stream *x* N_{2*}(Nitrogen) Min Limit	Specify the minimum percentage of nitrogen allowed in gas stream *x*.
Stream *x* NC_{4*}(N-Butane) Max Limit	Specify the maximum percentage of N-butane allowed in gas stream *x*.
Stream *x* NC_{4*}(N-Butane) Min Limit	Specify the minimum percentage of N-butane allowed in gas stream *x*.
Stream *x* NC_{5*}(N-Pentane) Max Limit	Specify the maximum percentage of N-pentane allowed in gas stream *x*.
Stream *x* NC_{5*}(N-Pentane) Min Limit	Specify the minimum percentage of N-pentane allowed in gas stream *x*.
Stream *x* NC_{6*}(N-Hexane) Max Limit	Specify the maximum percentage of N-hexane allowed in gas stream *x*.
Stream *x* NC_{6*}(N-Hexane) Min Limit	Specify the minimum percentage of N-hexane allowed in gas stream *x*.
Stream *x* C_{6+*}(Max Limit	Specify the maximum percentage of C_{6+} allowed in gas stream *x*.
Stream *x* C_{6+*}(Min Limit	Specify the minimum percentage of C_{6+} allowed in gas stream *x*.
Stream *x* NC_{7*}(N-Heptane) Max Limit	Specify the maximum percentage of N-heptane allowed in gas stream *x*.
Stream *x* NC_{7*}(N-Heptane) Min Limit	Specify the minimum percentage of N-heptane allowed in gas stream *x*.
Stream *x* NC_{8*}(N-Octane) Max Limit	Specify the maximum percentage of N-octane allowed in gas stream *x*.
Stream *x* NC_{8*}(N-Octane) Min Limit	Specify the minimum percentage of N-octane allowed in gas stream *x*.

Stream *x* C_{9+} Max Limit	Specify the maximum percentage of C_{9+} allowed in gas stream *x*.
Stream *x* C_{9+} Min Limit	Specify the minimum percentage of C_{9+} allowed in gas stream *x*.
Stream *x* NC_{9} (N-Nonane) Max Limit	Specify the maximum percentage of N-nonane allowed in gas stream *x*.
Stream *x* NC_{9} (N-Nonane) Min Limit	Specify the minimum percentage of N-nonane allowed in gas stream *x*.
Stream *x* NC_{10} (N-Decane) Max Limit	Specify the maximum percentage of N-decane allowed in gas stream *x*.
Stream *x* NC_{10} (N-Decane) Min Limit	Specify the minimum percentage of N-decane allowed in gas stream *x*.
Stream *x* Gravity Max Limit	Specify the maximum gravity allowed in gas stream *x*.
Stream *x* Gravity Min Limit	Specify the minimum gravity allowed in gas stream *x*.
Stream *x* BTU Max Limit	Specify the maximum BTUs allowed in gas stream *x*.
Stream *x* BTU Min Limit	Specify the minimum BTUs allowed in gas stream *x*.
Component Total Sum Limit	
Max Percentage Limits (Common to all Streams)	Specify a maximum value for the total percentage of gas components allowed in a single gas stream. This same value is used for each one of the four gas streams.
Min Percentage Limits (Common to all Streams)	Specify a minimum value for the total percentage of gas components allowed in a single gas stream. This same value is used for each one of the four gas streams.
C6+/C9+ Factors	The gas chromatograph reports a single value for either C6+ or C9+. The percentage applied to each component (C6, C7, C8, C9 and C10) will be how the number reported by the gas chromatograph is distributed across the components.
Stream *x* NC_{6} (N-Hexane) Factor %	Specify the percentage applied to the C6 component.

Stream *x* NC_{7*}(N-Heptane) Factor %	Specify the percentage applied to the C7 component.
Stream *x* NC_{8*}(N-Octane) Factor %	Specify the percentage applied to the C8 component.
Stream *x* NC_{9*}(N-Nonane) Factor %	Specify the percentage applied to the C9 component.
Stream *x* NC_{10*}(N-Decane) Factor %	Specify the percentage applied to the C10 component.

4.12 Sampler and Odorizer Output Configuration

Samplers are external devices which measure the quality of the gas stream.

Because natural gas is odorless and colorless, devices called odorizers inject an additive to the gas stream that allows people to detect the presence of natural gas in the event of a gas leak.

The Sampler & Odorizer Output configuration menu provides application control over these devices.

Calling up this Menu

Click Sampler & Odorizer

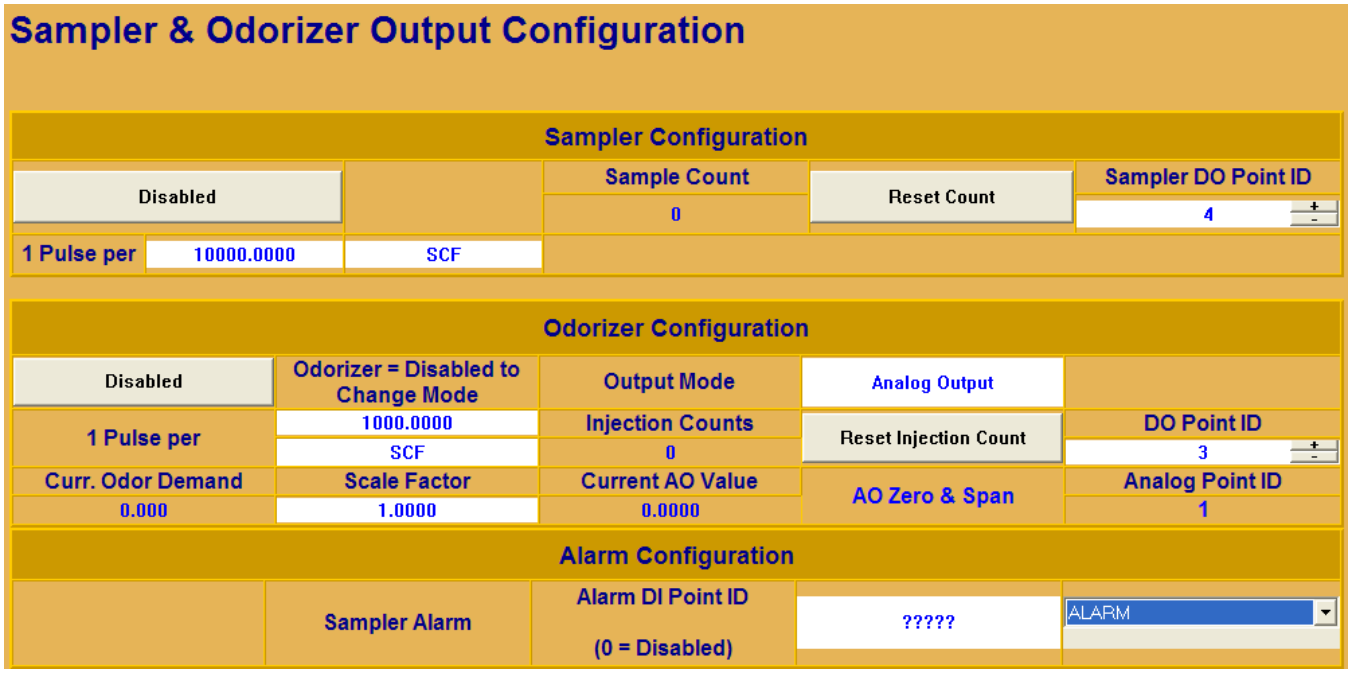


Figure 4-19. Sampler & Odorizer Output Configuration

Field	Description
Sampler Configuration	Gas samplers are external devices that sample the gas stream to determine gas quality.
Enabled/Disabled	The label on this button shows the current state of the sampler. When you click the button you toggle the state. Click **Disabled** to start sampling. The button now displays **Enabled**. Click **Enabled** to turn off sampling. The button now displays **Disabled**.

Sample Count	This field displays a running count of the number of samples taken.
Reset Count	Click this button to reset the sample count to zero.
Sampler DO Point ID	Select which one of the discrete outputs (DO) you want to use to turn the sampler on/off.
1 Pulse Per	This is the pulse frequency setpoint for the sampler. The sampler operates at the frequency of pulses per cubic feet that you specify.
Odorizer Configuration	These fields allow control of an external odorizer.
Enabled/Disabled	The label on this button shows the current state of the odorizer. When you click the button you toggle the state. Click **Disabled** to start the odorizer. The button now displays **Enabled**. Click **Enabled** to turn off the odorizer. The button now displays **Disabled**.
Output Mode	Select either: **Analog Output** to use an AO to control the odorizer. In this mode, you must enter the proper **Scale Factor**. **Pulse Output** to use a DO to control the odorizer. In this mode you must enter the frequency of pulses per volume through the meter in cubic feet using the **1 Pulse Per** field.
1 Pulse Per	This is the pulse frequency setpoint for the odorizer. The odorizer operates at the frequency of pulses per cubic feet that you specify.
Injection Counts	This field shows the number of times the odorizer injects additive into the gas.
Reset Injection Count	Click this button to reset the **Injection Counts** value to zero.
DO Point ID	Select which one of the discrete outputs (DO) you want to control the odorizer. (Pulse Output Mode only.)
Curr. Odor Demand	This field shows how much odorant the odorizer must inject to obtain proper odorization.

Scale Factor (AO Only)	The scale factor is a ratio of the amount of odorant the odorizer injects per cubic foot of gas. You must know the maximum output of your odorizer to calculate the ratio. Enter the ratio in this field.
Current AO Value	If you use Analog Output for the **Output Mode**, this is the current value of the analog output (AO).
AO Zero & Span	Click here to configure the analog output (AO) on the *Analog Input/Output Configuration* page.
Analog Point ID	Shows which analog output (AO) point ID controls the odorizer. (Analog Output Mode only.)
Alarm Configuration	
Sampler Alarm: Alarm DI Point ID	If your external sampler includes an alarm to indicate a problem with gas quality, you can assign one of the ControlWave flow computer's discrete inputs (DI) to it here. If the DI is FALSE, this shows **Normal**. If the DI is TRUE, this shows **Alarm**. **Note:** This option is not supported on ControlWave EFM.

4.13 Mechanical Counter Configuration

You can associate one of the two counter inputs with an external mechanical counter.

Calling up this Menu

Click Mechanical Counter

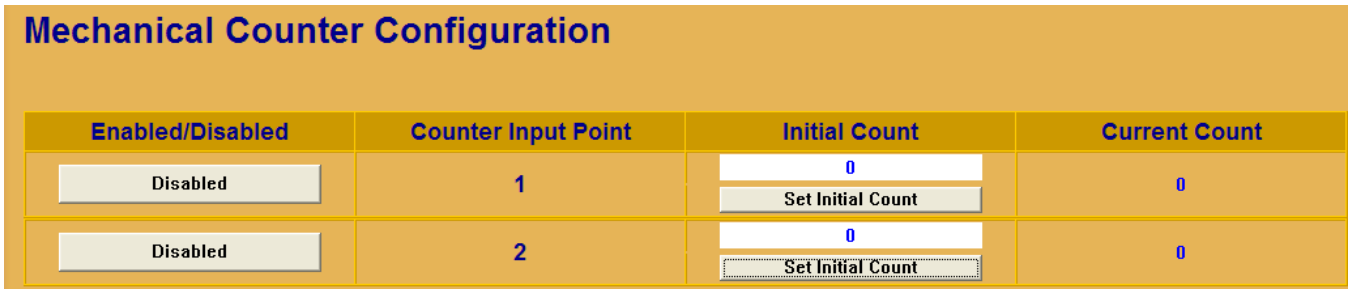


Figure 4-20. – Mechanical Counter Configuration page

Field	Description
Counter Input Point *x*	
Enabled/Disabled	The label on this button shows the current state of the counter. When you click the button you toggle the state. Select one of the two counter inputs to work with the external mechanical counter. Click **Disabled** to start the counter for this input point. The button now displays **Enabled**. Click **Enabled** to turn off the counter for this input point. The button now displays **Disabled**.
Initial Count	You can enter an initial count to synchronize the external mechanical counter with the software counter. After you enter the value, click the **Set Initial Count** button.
Set Initial Count	Click this to set the **Current Count** to the value of **Initial Count**.
Current Count	This field shows the current value for the counter input.

4.14 Nominations

Nominations allow you to configure the ControlWave flow computer to allocate precise amounts of gas flow during specific time periods, called **nomination periods**. You can set a nomination to be any duration of time up to one month. The volume of gas delivered during a nomination period is called the **target**. You can specify the target in terms of volume (MCF) or energy (MMBTU).

You define the nomination period by pre-programming a start date/hour and end date/hour. Alternatively, you can specify a daily nomination period to deliver gas during the same period of time each day.

The nomination function runs once per calculation cycle after the ControlWave flow computer completes its volume and energy accumulations. The application compares the current date/time to the next programmed nomination period; if they match, it zeroes the accumulators for the current period, copies the pre-programmed target and date/time fields into the current period section and starts the new nomination period.

Nomination supports two different control modes:

Valve Control If you choose **Valve Control** for the control mode, the application overrides PID flow control to independently control the valve. This permits full flow of gas through the meter and allows the controller to reach the targeted quantity of gas (in volume or energy) in the shortest possible time. When the target is reached, the application automatically closes the valve. Valve control ignores the pre-programmed end time.

Flow Control If you choose **Flow Control** for the control mode, the application uses proportional-integral-derivative (PID) control of the gas flow to reach the targeted quantity of gas (in volume or energy) at the pre-programmed end date/hour. The PID setpoint is re-calculated every 15 minutes and whenever you change any PID parameters. When the application reaches the targeted quantity, it sets the setpoint to 0.0 and ramps down accordingly.

Note: To use this mode, you must first configure PID parameters such as gain and integral on the *Flow Control and Valve* Control page but do **not** enable flow control on that page because that disables the nomination function.

Calling up this Menu

Click 

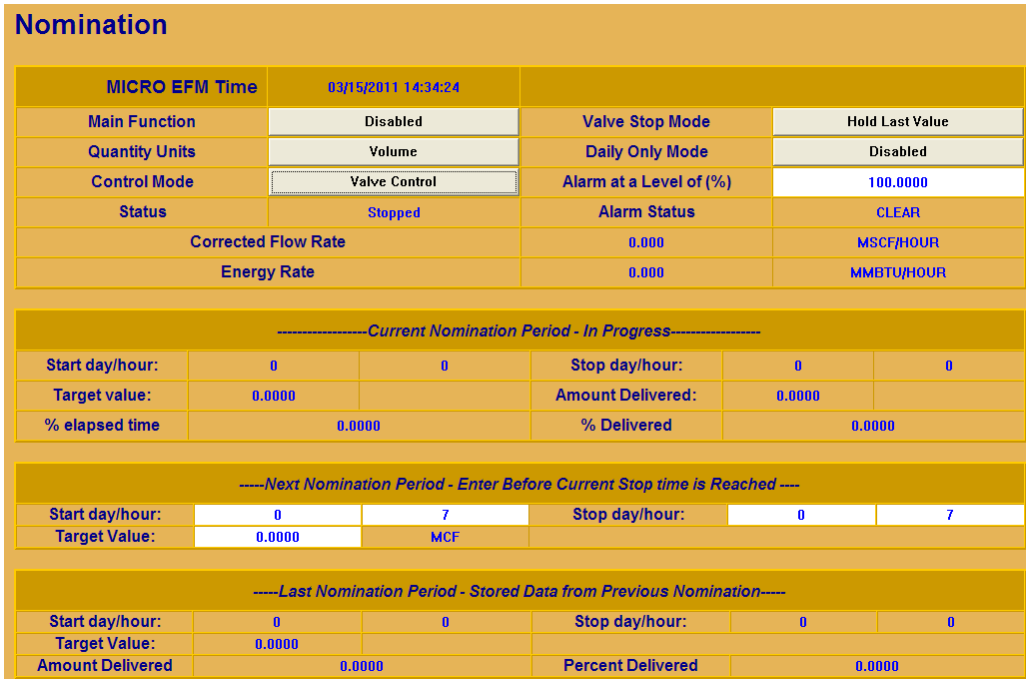


Figure 4-21. Nomination Function

Field	Description
Time	This field shows the current date/time in the ControlWave. If the date/time is inaccurate, it indicates an SRAM battery failure.
Main Function Enabled/Disabled	The label on this button shows the current state of the nomination function. When you click the button you toggle the state. Click **Disabled** to activate the nomination function. The button now displays **Enabled**. Click **Enabled** to turn off the nomination function. The button now displays **Disabled**.
Quantity Units	The label on this button shows the type of units currently configured for the nomination function. When you click the button you toggle the state. Click **Volume** to select MMBTU as the energy units. The button now displays **Energy**. Click **Energy** to select MCF as the volume units. The button now displays **Volume**.
Control Mode	The label on this button shows the currently selected control mode for the nomination function. When you click the button you toggle the state. Valve Control is the default control mode.

	Click **Valve Control** to select Flow Control as the control mode. The button now displays **Flow Control**. Click **Flow Control** to select Valve Control as the control mode. The button now displays **Valve Control**.
Status	This field displays the state of the nomination period.
Valve Stop Mode	The label on this button shows the currently selected valve stop mode. The valve stop mode determines what the valve does when the targeted quantity of gas is reached. When you click the button you toggle the selection. Click **Hold Last Value** to select Shut In as the valve stop mode. The button now displays **Shut In**. In Shut In mode, the application closes the valve immediately upon reaching the target quantity of gas for this nomination period. Click **Shut In** to select Hold Last Value as the valve stop mode. The button now displays **Hold Last Value**. In Hold Last Value mode, the valve stays at its last position when it reaches the target quantity of gas for this nomination period.
Daily Only Mode Disabled/Enabled	Daily-only mode means that the nomination period occurs at the same time each day; the application ignores the stop and start day entries because the nomination uses the same hours during each 24-hour period. The label on this button shows the current status of Daily Only Mode. When you click the button you toggle the selection. Click **Enabled** to turn **off** Daily Only Mode. The button now displays **Disabled**. Click **Disabled** to turn **on** Daily Only Mode. The button now displays **Enabled**.
Alarm at a Level of (%)	You can specify a percentage (0 to 100) of the target gas volume (MCF) or energy (MMBTU) at which the application should generate an alarm to report reaching that amount. For example, if you enter 100, the application generates an alarm when the 100% of the targeted volume (or energy) of gas has been delivered; if you enter 75%, the alarm occurs when 75% of the target is reached, and so on. To see the status of the alarm check the **Alarm Status** field.
Alarm Status	This field shows **CLEAR** when the percentage specified in **Alarm at a Level of (%)** has not been reached.

	When the level has been reached, this field shows **ACTIVE**.
Corrected Flow Rate	This field displays the current corrected flow rate of gas for this station.
Energy Rate	This field displays the current energy rate of gas for this station.
Current Nomination Period – In Progress	
Start day/hour	Shows the start day of the month (1 to 31) for the current nomination period in the left field, and the start hour of the day (0 to 23) for the current nomination period in the right field.
Stop day/hour	Shows the stop day of the month (1 to 31) for the current nomination period in the left field, and the stop hour of the day (0 to 23) for the current nomination period in the right field. If you selected **Valve Control** for the **Control Mode**, the nomination period will stop as soon as the target value is reached, which could be sooner than the **Stop day/hour**. If **Daily Only Mode** is enabled, the **Stop day** shows as 0 because the application ignores it.
Target value	Shows the total amount of gas to be delivered in the current nomination period. If you chose **Volume** as the **Quantity Units** this is in MCF; if you chose **Energy** as the **Quantity Units**, this is in MMBTU.
% elapsed time	This field shows the percentage of time elapsed since the start of the nomination period. For example, if a nomination period is 10 hours, and four hours have elapsed since the start, this would show 40%.
Amount Delivered	This field shows the amount of gas delivered since the start of the nomination period in either volume (MCF) or energy (MMBTU).
% Delivered	This field shows the percentage of the target amount of gas delivered since the start of the nomination period.
Next Nomination Period	You must enter all entries for the next nomination period prior to the completion of the current nomination period.
Start day/hour	Enter the start day of the month (1 to 31) for the next nomination period in the left field. Enter the start hour of the day (0 to 23) for the next nomination period in the right field. **Note:** If **Daily Only Mode** is **Enabled**, the application ignores the start day field.

Stop day/hour	Enter the stop day of the month (1 to 31) for the next nomination period in the left field. Enter the stop hour of the day (0 to 23) for the next nomination period in the right field. **Note:** If **Daily Only Mode** is **Enabled**, the application ignores the stop day field.
Target value	Enter the total amount of gas to be delivered in the next nomination period. If you chose **Volume** as the **Quantity Units** this is in MCF; if you chose **Energy** as the **Quantity Units**, this is in MMBTU.
Last Nomination Period	Start and end times shown here reflect the actual time the nomination period ended, which may not necessarily match the programmed time due to the time required to close/open valves or complete other actions.
Start day/hour	Shows the start day of the month (1 to 31) in the left field and the start hour of the day (0 to 23) in the right field for the last nomination period. The day shown is valid even if daily-only mode is enabled.
Stop day/hour	Shows the stop day of the month (1 to 31) in the left field and the stop hour of the day (0 to 23) in the right field for the last nomination period. The day shown is valid even if daily-only mode is enabled.
Target value	Shows the amount of gas targeted for delivery in the last nomination period.
Amount Delivered	This field shows the amount of gas delivered during the last nomination period in either volume (MCF) or energy (MMBTU).
Percent Delivered	This field shows the percentage of the target amount of gas delivered during the last nomination period.

4.15 Flow Control and Valve Control

There are two mutually exclusive methods for controlling the gas flow – flow control and valve control:

Calling up this Menu Click Flow Control

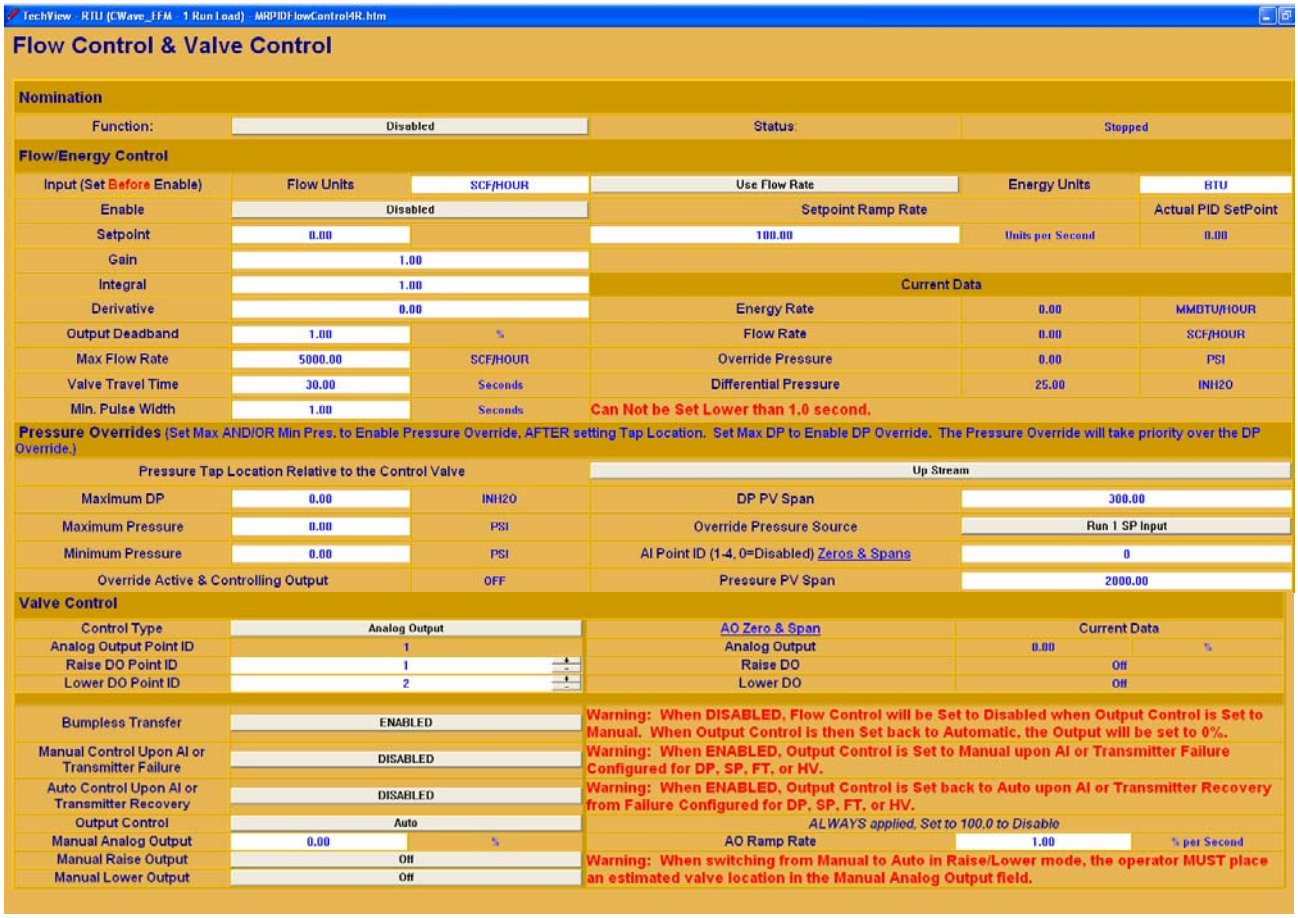


Figure 4-22. Flow and Valve Control Page

Flow control uses a proportional integral derivative (PID) algorithm to drive the flow to a particular setpoint you enter by continually comparing the flow and adjusting the output accordingly.

Valve control uses either an analog output (AO) or a pair of discrete outputs (DO) to open/close the valve based on the PID output to reach the desired flow rate.

Field	Description
Nomination	
Function	The label on this button shows the current state of the nomination function. When you click the button you toggle the state. Click **Disabled** to activate the nomination function. The button now displays **Enabled**.

	Click **Enabled** to turn off the nomination function. The button now displays **Disabled**.
Status	This field shows the current status of the nomination function.
Flow/Energy Control	
WARNING	**Do not enable PID flow control without first checking the external process control loop. The initial values displayed on the PID menu may drive critical processes beyond the extremes of safe limits. This could result in fire, explosion, property damage or injury to persons. When configuring parameters, ensure the associated process is observed and protected.**
Enable	The label on this button shows the current state of the flow control/energy control function. When you click the button you toggle the state. **Note: If you are using nominations, do not enable flow control, because it disables the nomination function. You do, however, configure Gain, Integral, and Derivative for nominations in this section.** Click **Disabled** to activate the flow control/energy control function. The button now displays **Enabled**. Click **Enabled** to turn off the flow control/energy control function. The button now displays **Disabled**.
Flow Units	Select the flow units used for flow control.
Use Flow Rate / Use Energy Rate	When you click this button you toggle between using the flow rate for control or the energy rate for control. Click **Use Flow Rate** to use the flow rate. The button now displays Use Energy Rate Click **Use Energy Rate** to use the energy rate. The button now displays Use Flow Rate .
Energy Units	Select the energy units used for energy control.
Setpoint	In this field you enter the operating setpoint to which the application controls the flow. The default is 1000 MSCF per hour.

Setpoint Ramp Rate	When you enter a new operating **Setpoint**, the **Setpoint Ramp Rate** gradually changes the actual setpoint over a period of units per second to value you entered. This prevents an abrupt change to the setpoint.
Actual PID Setpoint	This field shows the current setpoint in use. This may be different from the **Setpoint** because the **Actual PID Setpoint** is still ramping up to the **Setpoint** value.
Gain	This controls the amount of output change that results from a change of the measured variable. Typically, you use the default value of 1.0 as a starting point; final gain is usually less.
Integral	This determines the time the PID takes to correct an error in the measured variable. You specify the number of times the PID adjusts the output in a given time period in seconds. You can use an entry of 60 seconds as a starting point; this provides one repeat per minute.
Derivative	Derivative compensates for a rapidly changing measured variable. You specify the derivative in seconds, and most applications use a setting of zero (0).
Output Deadband	The deadband lets you specify a range in which the variable does not affect the output. This entry is in percent of the setpoint variable. For example, a 5% **Output Deadband** means that the controller output must exceed the present setpoint by 5% before the output changes.
Max Flow Rate	In this field you specify the maximum flow rate allowed. If the operator enters a **Setpoint** value which exceeds the **Max Flow Rate**, the application uses the **Max Flow Rate**.
Valve Travel Time	In this field you specify the total time it takes for the control valve to go from being fully opened to fully closed (or fully closed to fully opened.) The default is 30 seconds.
Min. Pulse Width	Specify the minimum width of the pulse (in seconds) transmitted to the valve for PID control. This value cannot be less than one second.
Current Data	
Energy Rate	This field shows the current gas energy rate in the selected units.
Flow Rate	This field shows the current gas flow rate in the selected units.

Override Pressure	This field shows the current override pressure for the gas.
Differential Pressure	This field shows the current differential pressure reading for the gas.
Pressure Overrides	When the PID controller is active in flow control mode, it adjusts a pressure valve to maintain the established flow rate setpoint. Override pressure is used in situations where full line pressure should not be applied to the downstream equipment or in circumstances where a minimum pressure must be maintained.
Pressure Tap Location Relative to the Control Valve	The pressure tap location is either upstream or downstream of the control valve. The action of the override controller depends on the pressure tap location. When the location is **Down Stream** of the control valve, if demand causes pressure to exceed the **Maximum Pressure** limit, the override takes control to close the valve and maintain the maximum pressure. If demand causes pressure to fall below the **Minimum Pressure** limit, the override takes control to open the valve to maintain the minimum pressure. When the location is **Up Stream** of the control valve, actions are reversed. If demand causes pressure to exceed the **Maximum Pressure** limit, the override takes control to open the valve and maintain the maximum pressure. If demand causes pressure to fall below the **Minimum Pressure** limit, the override takes control to close the valve to maintain the minimum pressure. The label on this button shows the current pressure tap location relative to the control valve. When you click the button you toggle the state. Click **Up Stream** to specify a **Down Stream** tap location. The button now displays **Down Stream**. Click **Down Stream** to specify an **Up Stream** tap location. The button now displays **Up Stream**.
⚠ Caution	**Carefully test all override controller actions to verify correct valve movement for all expected conditions.**
Maximum DP	Specify the maximum differential pressure (DP) in this field. The PID controller manipulates the valve to keep below this DP, however, the **Maximum Pressure / Minimum Pressure** settings take precedence over **Maximum DP** setting.

Maximum Pressure	Enter the maximum pressure here. If conditions occur that cause the pressure to exceed the **Maximum Pressure** limit, the override takes control and manipulates the valve to maintain this value. If the **Tap Location Relative to the Control Valve** is **Down Stream**, the override closes the valve. If the **Tap Location Relative to the Control Valve** is **Up Stream**, the override opens the valve.
Minimum Pressure	Enter the minimum pressure here. If conditions occur that cause the pressure to fall below the **Minimum Pressure** limit, the override takes control and manipulates the valve to maintain this value. If the **Tap Location Relative to the Control Valve** is **Down Stream**, the override opens the valve. If the **Tap Location Relative to the Control Valve** is **Up Stream**, the override closes the valve.
Override Active & Controlling Output	Shows **ON** if an override is currently in effect and controlling the valve. Shows **OFF** if the override is not in effect.
DP PV Span	Enter the span for the differential pressure (DP) process variable (PV) here. The span is the number that, when added to the DP zero, represents the DP reading when the associated AI is at 20mA,
Override Pressure Source	The label on this button shows the current override pressure source. When you click the button you toggle the source. Click **Run 1 SP Input** to change the override pressure source to **Analog Input**. The button now displays **Analog Input**. Click **Analog Input** to change the override pressure source to **Run 1 SP Input**. The button now displays **Run 1 SP Input**.
AI Point ID	Specify the analog input (AI) point used for the pressure variable. **Note:** Point 4 only exists on the ControlWave EFM; it does not apply to the ControlWave GFC or XFC.
Pressure PV Span	Enter the span for the pressure process variable here. The span is the number that, when added to the pressure zero, represents the pressure reading when the associated AI is at 20mA.

Zeros & Spans	Click here to bring up the *Analog Input/Output Configuration* page. See *Section 4.4*.
Valve Control	
Control Type	The label on this button shows how the application controls the valve. You can use either an analog output or a pair of raise / lower discrete outputs to control the valve. When you click the button you toggle the control method. Click **Analog Output** to change the valve control method source to **Raise / Lower** The button now displays **Raise / Lower**. Click **Raise / Lower** to change the valve control method to **Analog Output**. The button now displays **Analog Output**.
AO Zero & Span	Click here to bring up the *Analog Input/Output Configuration* page. See *Section 4.4*.
Analog Output Point ID	This field displays the point ID for the analog output (AO) used to control the valve.
Raise DO Point ID	Specify the point ID for the discrete output (DO) used for the raise command to the valve.
Lower DO Point ID	Specify the point ID for the discrete output (DO) used for the lower command to the valve.
Analog Output Current Data	This field shows the current percent open value for the analog output used to control the valve.
Raise DO Current Data	This field shows the current state for the discrete output used as the raise DO for the valve. This state is either **Off** or **Raising**. When switching back and forth between auto and manual, this DO is set **Off**.
Lower DO Current Data	This field shows the current state for the discrete output used as the lower DO for the valve. This state is either **Off** or **Lowering**. When switching back and forth between auto and manual, this DO is set **Off**.
Bumpless Transfer Enable/Disable	This button enables/disables the bumpless transfer function. Bumpless transfers prevent a large jump in valve position by tracking the valve position so that a switch from manual to auto valve control is not abrupt. When you click the button you toggle between enabling/disabling the bumpless transfer function. Click **Enabled** to disable the bumpless transfer

	function. The button now displays **Disabled**. Click **Disabled** to enable the bumpless transfer function. The button now displays **Enabled**.
Manual Control Upon AI or Transmitter Failure Enable/Disable	When enabled, if the analog input fails or the transmitter fails, the application switches to manual control for the valves.
Auto Control Upon AI or Transmitter Recovery Enable/Disable	When enabled, if the failed analog input or failed transmitter recovers, the application switches to automatic control for the valves.
Output Control	When you click the button you toggle between auto and manual control of the valve outputs. When you set to **Manual**, the application freezes the current value of the analog output, until you change enter a different value. When you switch back to **Auto**, valve control starts from the last **Manual Analog Output** value you entered to allow a bumpless transfer. Click **Auto** to switch to manual control. The button now displays **Manual**. Click **Manual** to switch to auto control. The button now displays **Auto**
⚠ WARNING	**If Control Type is Raise/Lower, you must enter an estimated valve position in the Manual Analog Output field before you switch the output control to Auto.**
Manual Analog Output	If **Output Control** is set to **Manual**, you can enter a desired percent open position to which the AO will drive the valve.
Manual Raise Output	If **Output Control** is set to **Manual**, you can click here to send a raise command to the valve to incrementally open it further from its current position. If the valve is lowering and you press **Manual Raise Output** the **Manual Lower Output** goes to **Off**.
Manual Lower Output	If **Output Control** is set to **Manual**, you can click here to send a lower command to the valve to incrementally close it further from its current position. If the valve is raising and you press **Manual Lower Output** the **Manual Raise Output** goes to **Off**.
AO Ramp Rate	When you enter a new value for the **Manual Analog Output**, this is the allowed percentage change of the AO, in seconds, to reach the new value. To disable the ramping function, set this to 100%.

4.16 Run Switching

Run switching (also known as meter run staging or tube switching) refers to changing the number of meter runs currently active to meet the gas flow demand for the station. Each meter run has an associated rank (a number from 1 to 4) called the target rank. The meter run with the lowest target rank is brought on-line first; if there is demand for additional gas, the meter run with the next lowest target rank is brought on line next, and so on.

Calling up this Menu

Click Run Switching

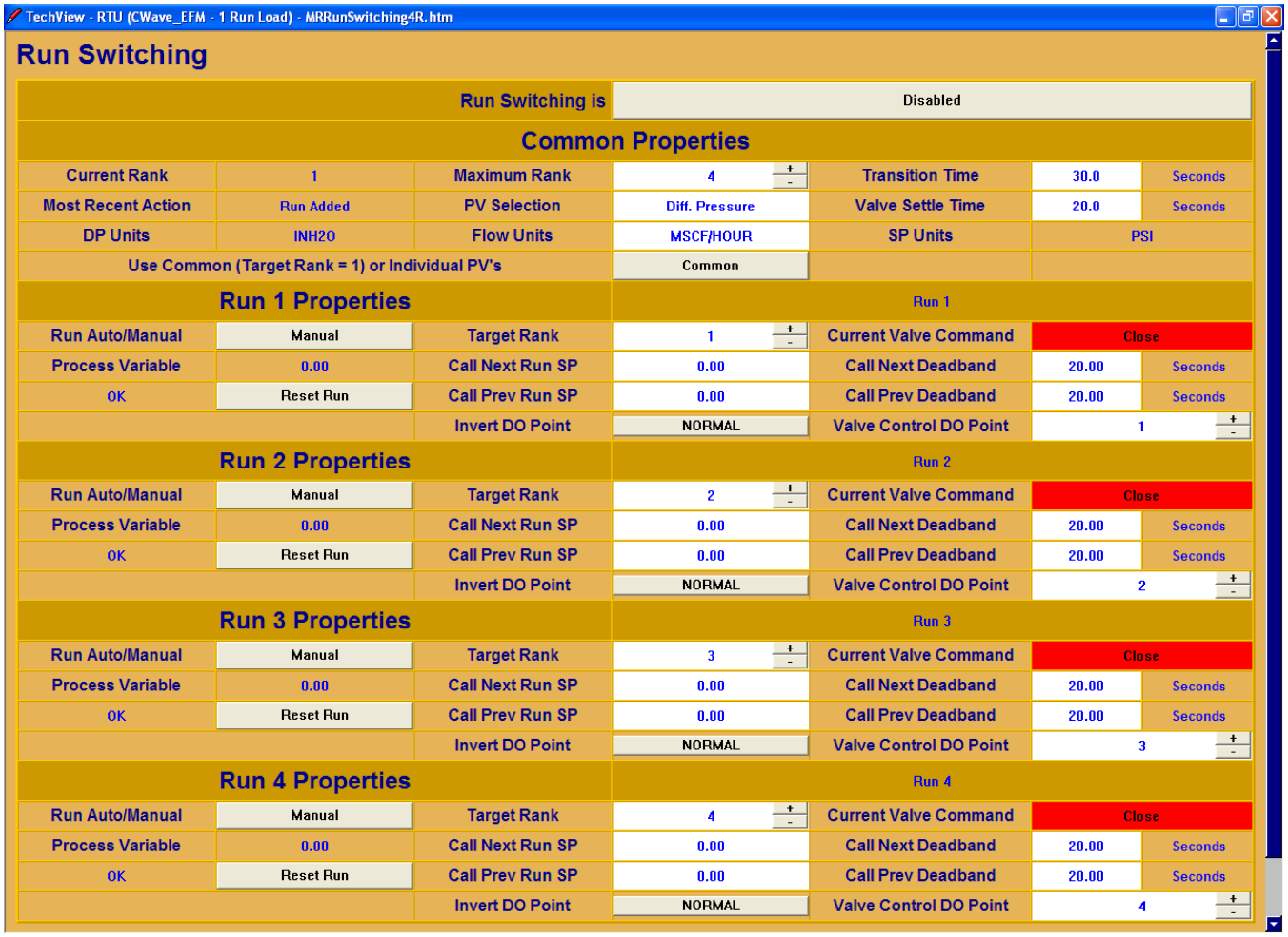


Figure 4-23. Run Switching

Notes:

- ControlWave EFM supports up to four meter runs. ControlWave GFC and ControlWave XFC default to a maximum of two meter runs.
- Although not required, we recommend that to avoid confusion, you assign a target rank that matches the run number. In other words meter

run 1 would have a target rank of 1, meter run 2 would have a target rank of 2, and so on.

- The action of bringing a meter run on-line is called **opening** the run. Turning off a meter run is called **closing** the run.

Field	Description
Run Switching is Enabled/Disabled	When you click this button you toggle between enabling/disabling the run switching function. Click **Enabled** to disable the run switching function. The button now displays **Disabled**. Click **Disabled** to enable the run switching function. The button now displays **Enabled**.
Common Properties	
Current Rank	This field shows how many meter runs are required to be open.
Maximum Rank	Enter the number of the maximum target rank run you want to allow to open.
Transition Time	Specify the amount of time you want to allow for a meter run to open or close.
Most Recent Action	This field displays the most recent change with respect to the number of runs opened or closed.
PV Selection	Select the process variable (PV) for which the value is used by the run switching function to compare to the setpoint and determine demand. Choices are **Flow Rate**, **Diff. Press** (differential pressure), **Stat. Press** (static pressure)**,** and **Frequency**.
Valve Settle Time	Specify the amount of time, after a meter run is opened/closed (run switching action) and **Transition Time** has expired, that you want to allow the process variable to settle, before allowing another run switching action.
DP Units	Shows the engineering units of differential pressure. Used when **PV Selection** is **Diff. Press**.
Flow Units	Shows the engineering units of flow. Used when **PV Selection** is **Flow Rate**.
SP Units	Shows the engineering units of static pressure. Used when **PV Selection** is **Stat. Press**.
Use Common (Target Rank=1) or Individual PVs	When you click this button you toggle between **Common** and **Individual** mode for run switching. In **Common** mode, runs switch based on the PV from the

	run with target rank 1. In **Individual Mode**, runs switch based on the PV from each individual meter run. Click **Enabled** to disable the run switching function. The button now displays **Disabled**. Click **Disabled** to enable the run switching function. The button now displays **Enabled**.
Run *x* Properties	Each meter run has the following properties:
Run Auto/Manual	When you click this button you toggle between **Auto** and **Manual** mode for this meter run. In **Manual** mode, you can open/close the meter run by selecting the **Current Valve Command**. In **Auto** mode, the run switching function automatically opens/closes meter runs based on the demand and rank settings. Click **Enabled** to disable the run switching function. The button now displays **Disabled**. Click **Disabled** to enable the run switching function. The button now displays **Enabled**.
Process Variable	This field displays the value of the process variable which the application compares to the setpoint to determine whether a run should open or close.
Reset Run	If the meter run fails, as indicated by the field to the left of this button, you can click this button to reset the run.
Target Rank	Specify the target rank here. This is the order in which a meter run is opened / closed. Target rank 1 is opened first and closed last, target rank 4 is closed first and opened last.
Call Next Run SP	If the process variable increases to the setpoint you enter here, the run switching function opens the next meter run, as determined by the target rank.
Call Prev Run SP	If the process variable falls below the setpoint you enter here, the run switching function closes the most recently started meter run, as determined by the target rank.
Invert DO Point	This button shows whether the DO is direct acting (Normal) or whether the DO is inverted (reverse acting). When you click this button you toggle between these choices. Click **Inverted** to indicate a direct acting DO. The button now displays **Normal**. Click **Normal** to indicate a reverse acting DO. The button now displays **Inverted**

Current Valve Command	In **Auto** mode, this shows the current command for the valve for this meter run. In **Manual** mode, you can use the selection box to set the current command for the valve for this meter run.
Call Next Deadband	Enter a deadband (in seconds) during which the process variable must remain above the **Call Next Run SP** value, before the next run is opened.
Call Prev Deadband	Enter a deadband (in seconds) during which the process variable must remain below the **Call Prev Run SP** value, before the most recently started run is closed.
Valve Control DO Point (1-n)	Select the discrete output (DO) used for valve control for this meter run. For the ControlWave EFM, the DOs range from 1 to 4. For the ControlWave GFC/XFC the DOs range from 1 to 2.

Chapter 5 – Using the Measurement Group Logs Tab

Logs display historical data from either audit records or archive files.

In This Chapter

5.1 Accessing the Logs Tab

1. Within TechView, if you are in any group other than the Measurement group, click the Measurement group icon.
2. Click the **Logs** tab.

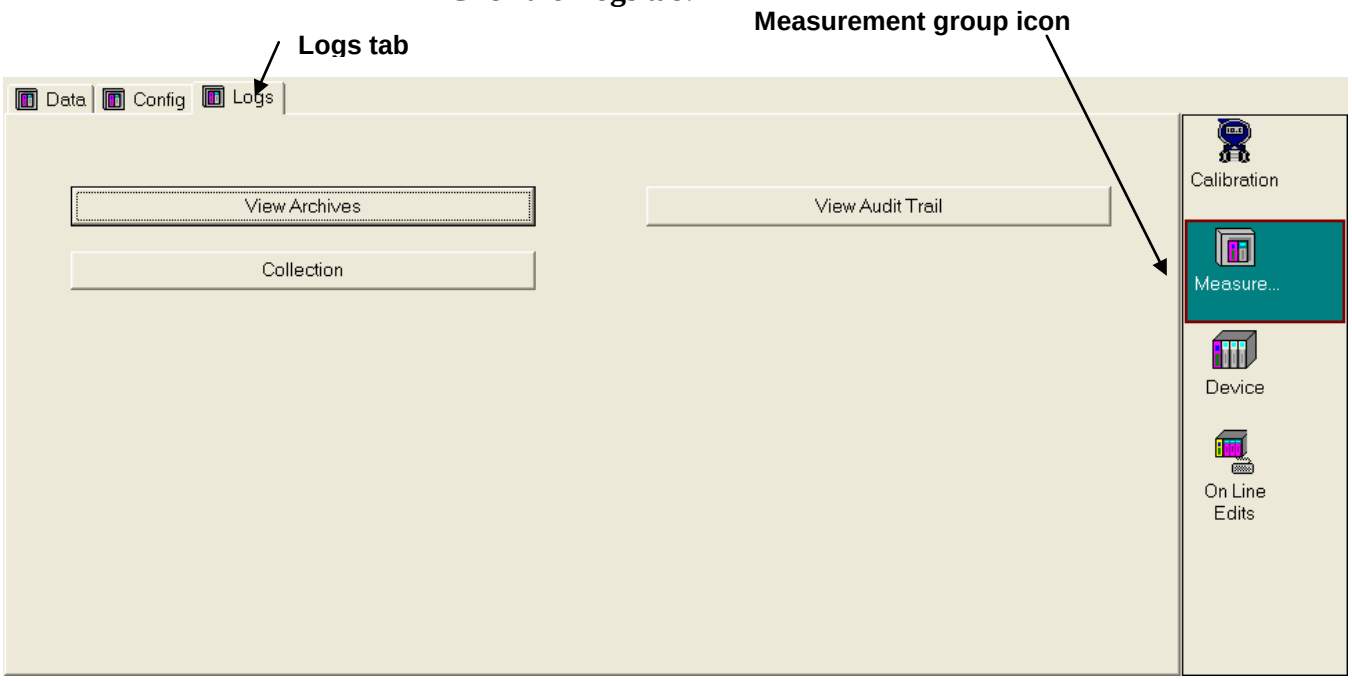


Figure 5-1. Measurement Group Logs tab

5.2 Viewing Archives – Meter Run Archive Files / Alarms

The Meter Run Archive Files page shows snapshots of variables at a particular time.

Calling up this Menu

Click View Archives

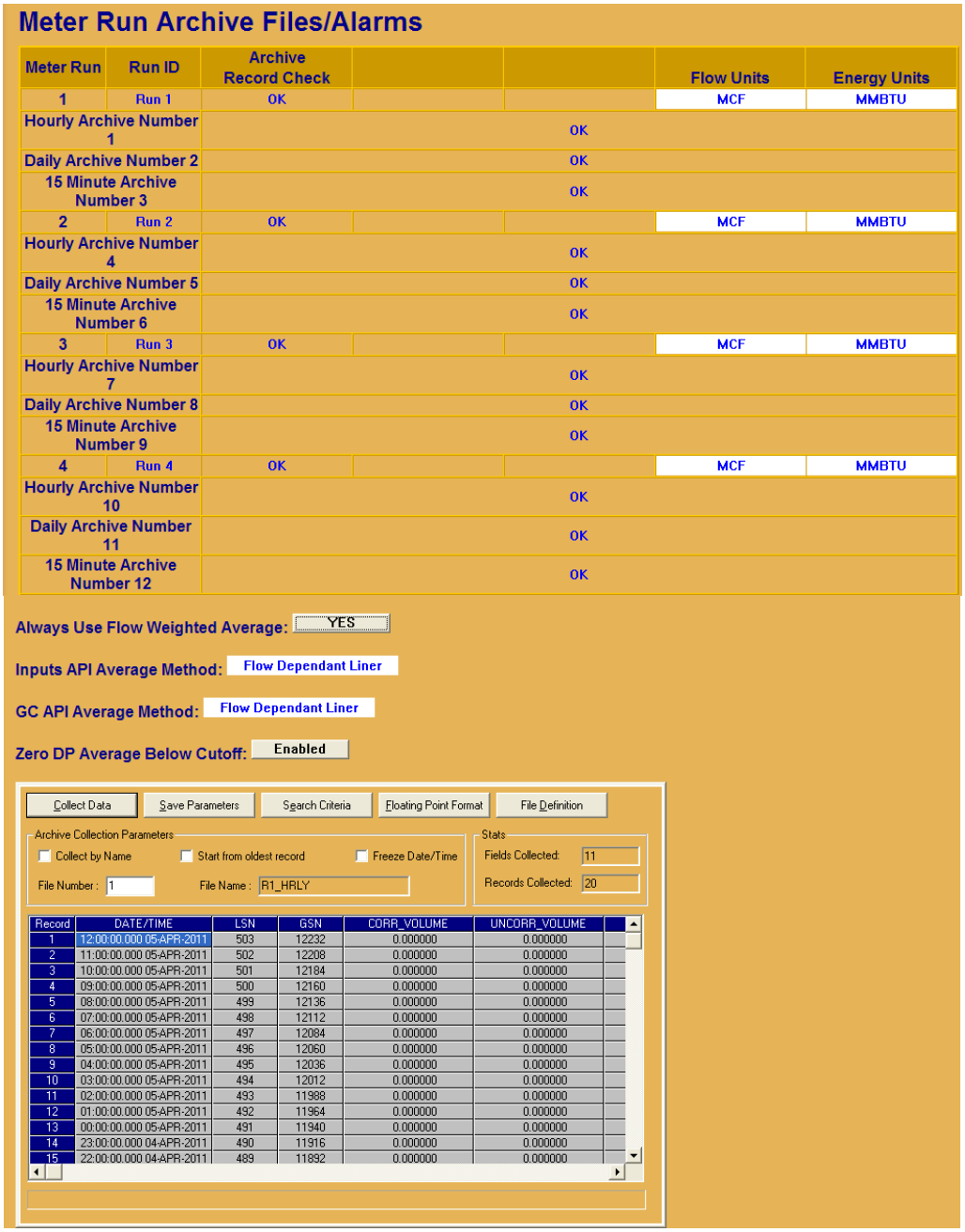


Figure 5-2. Meter Run Archive Files

Field	Description
Meter Run	Shows the number of the meter run currently on screen.
Run ID	Shows the name of the meter run currently on screen.
Archive Record Check	Shows the status of the archive collection. See the ControlWave Designer online help for the ARCHIVE function block for a description of these status messages.

Flow Units	Select the proper engineering units for the flow variable.
Energy Units	Select the proper engineering units for the energy variable.
Hourly Archive Number	Shows the hourly archive file number.
Daily Archive Number	Show the daily archive file number.
15 Minute Archive Number	Shows the 15 minute archive file number.
Always Use Flow Weighted Average	Use this button to specify, for the application, whether it should calculate averages based on straight time, or only when there is a non-zero flow. The label on this button shows the current choice for averaging. When you click the button you toggle the choice. Click **YES** to specify a non-flow rated averaging. The button now displays **NO**. Click **NO** to specify flow-rated averaging. The button now displays **YES**.
Inputs API Average Method	Select one of the following API averaging methods: Flow Dependent Linear Flow Dependent Formulaic Flow Weighted Linear Flow Weighted Formulaic
GC API Average Method	Select one of the following API averaging methods: Flow Dependent Linear Flow Dependent Formulaic Flow Weighted Linear Flow Weighted Formulaic
Zero DP Average Below Cutoff	Use this button to specify, for the application, whether a DP value below the cutoff should result in a zero for averaging calculations. The label on this button shows the current choice. When you click the button you toggle the choice. Click **Enabled** to prevent using a zero for the averaging calculation when the DP is below the cutoff. The button now displays **Disabled**. Click **Disabled** to use a zero for the averaging calculation

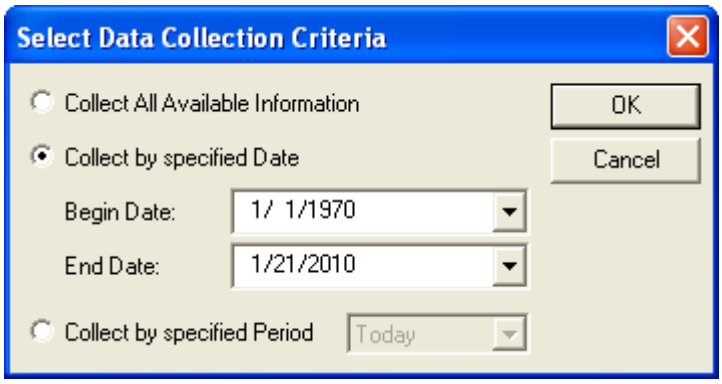
	when the DP is below the cutoff. The button now displays **Enabled**.
Collect Data	Click on this button to collect archive data based on your entries in the **"Archive Collection Parameters"** section.
Save Parameters	Click this button to open the Save Parameters dialog box. You can save the archive data you have viewed into a file on your PC hard disk.

To save the archive data, check the **Save Archive Data** check box, then enter a filename in the **Filename** field, or choose the **[...]** button to locate a path and filename of a file.

Note: This only saves a snapshot of the data you have actually viewed on the screen; it does **not** save the entire archive file. As you scroll to bring new data on the screen, it will be added to the specified file. If you want to save an entire Archive File, go to the Archive Collection page.

Click **OK** when finished.

Search Criteria	Click this button to open the Select Data Collection Criteria dialog box.

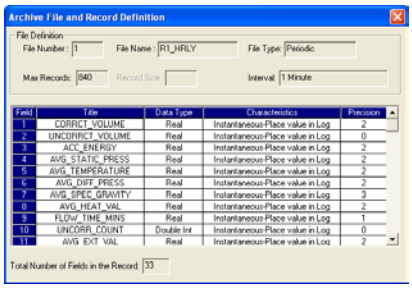


This dialog box allows you to filter the archive data shown on screen.

Collect All Available Information specifies that the system should collect all archive data from this archive file.

Collect by specified Date specifies that the system should only collect archive data with timestamps between the **Begin Date** and **End Date** entries you specify.

Collect by specified Period specifies that the system should only collect archive data during the period you

	specify. Choices are **Today**, **This Week**, or **This Month**. Click **OK** when you finish selecting the search criteria.
Floating Point Format	Click this button to open the Float Format dialog box. See *Section 5.2.1.*
File Definition	This button displays certain configuration parameters for this archive file, such as the number of records. **Note:** You cannot change these parameters here. 
Archive Collection Parameters	
Collect by Name	If the type of controller you are communicating with supports access to Archive files using the Archive file's name, you can check this box, and then enter the desired archive file's name in the **File Name** field. Otherwise, you must access the file through its file number.
Start from oldest record	If you would like the oldest archive file entries to appear first, select this option.
Freeze Date/Time	As you scroll through the archive file window, the first column (which may contain date/time stamps) may disappear from the window as higher numbered columns are brought into the window. To prevent this, select this option.
File Number	This is the unique ID number for the archive file you want to view. To enter the file number, you must de-select the **Collect by Name** check box.
File Name	This is the archive file name of the archive file you want to view. To enter the archive file name, you must check the **Collect by Name** box.
Stats	
Fields Collected	This displays the number of fields (columns) in the archive file which have been collected.

Records Collected	This displays the number of records (rows) in the archive file which have been collected.

5.2.1 Using the Float Format dialog box

In this dialog box, you can specify the precision with which the system shows analog (floating point) values.

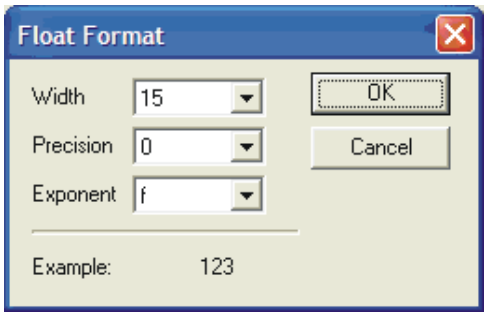


Figure 5-3. Float Format dialog box

Field	Description
Width	Use this list box to specify the total number of characters in the field (including the decimal point) when the system displays a floating point number. This can range from 1 to 15. The default is 12.
Precision	Use this list box to choose the number of places to the right of the decimal point which the system should display. This can range from 0 to 15. The default is 6.
Exponent	Use this list box to choose the floating point format **f**, exponential notation **e**, or choose **g** to have the Archive Collection control choose the best fit format.
OK	Click here to save your changes.
Cancel	Click here to exit the dialog box without saving changes.

5.2.2 Working with the Archive Grid

The Archive grid is where you view the actual archive file data. Each row represents a snapshot in time for all variables; each column represents data for a single variable such as Volume or Energy.

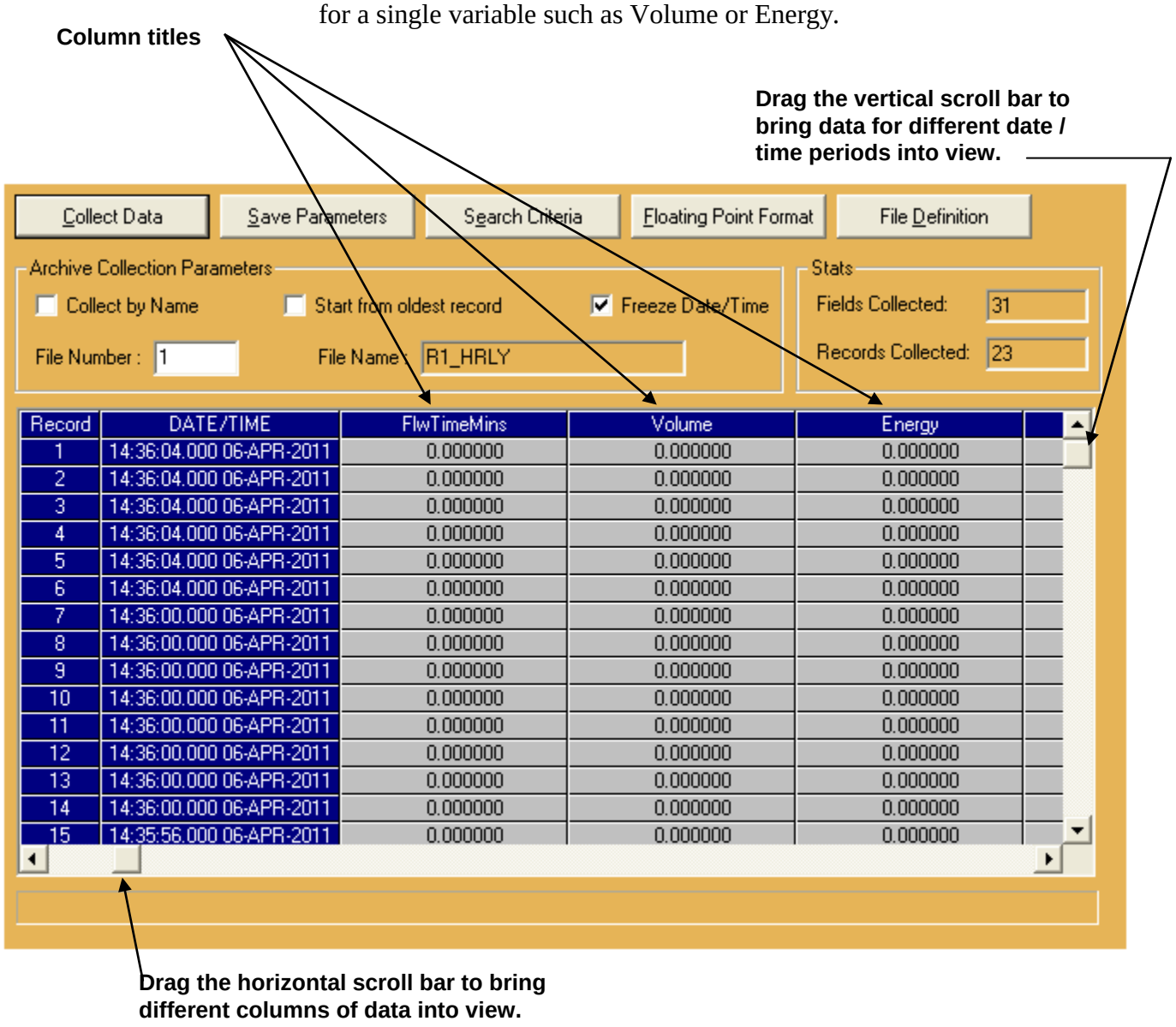


Figure 5-4. Archive File Grid Control

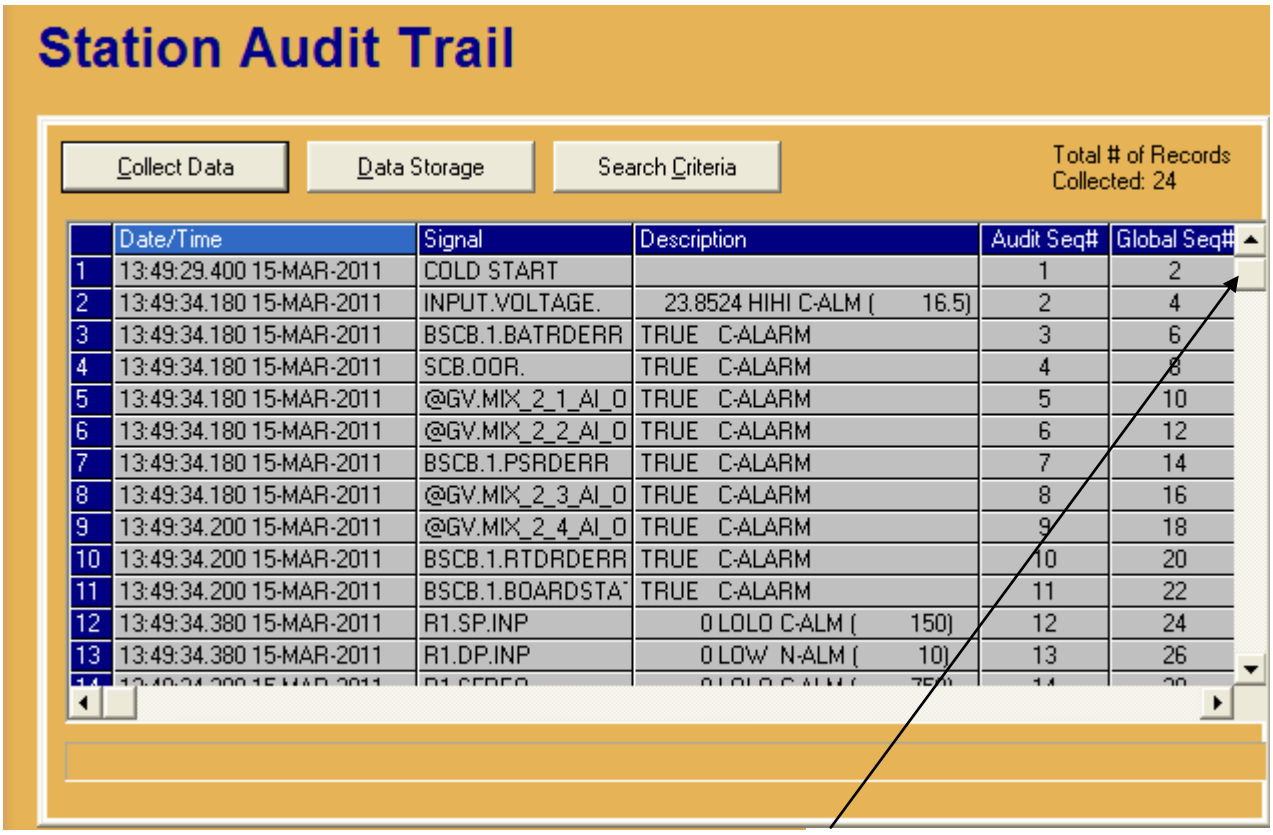
- To keep the date/time stamp visible, check the **Freeze Date/Time** box.
- Use the vertical scroll bar to bring data from different date/time periods into the visible window.
- Use the horizontal scroll bar to bring different columns of data into the visible window.

5.3 View Audit Trail

The Station Audit Trail log displays records of alarms and significant system events.

Calling up this Menu

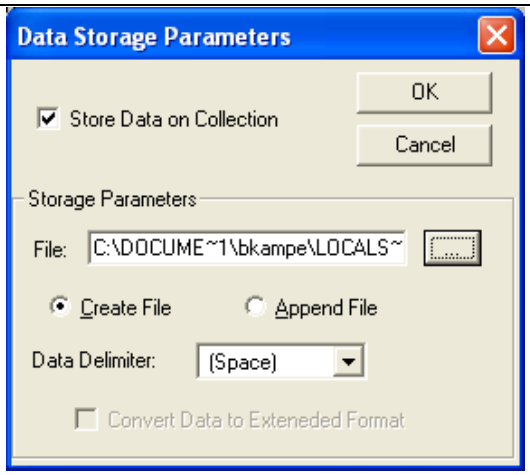
Click View Audit Trail



	Date/Time	Signal	Description	Audit Seq#	Global Seq#
1	13:49:29.400 15-MAR-2011	COLD START		1	2
2	13:49:34.180 15-MAR-2011	INPUT.VOLTAGE.	23.8524 HIHI C-ALM (16.5)	2	4
3	13:49:34.180 15-MAR-2011	BSCB.1.BATRDERR	TRUE C-ALARM	3	6
4	13:49:34.180 15-MAR-2011	SCB.OOR.	TRUE C-ALARM	4	8
5	13:49:34.180 15-MAR-2011	@GV.MIX_2_1_AI_0	TRUE C-ALARM	5	10
6	13:49:34.180 15-MAR-2011	@GV.MIX_2_2_AI_0	TRUE C-ALARM	6	12
7	13:49:34.180 15-MAR-2011	BSCB.1.PSRDERR	TRUE C-ALARM	7	14
8	13:49:34.180 15-MAR-2011	@GV.MIX_2_3_AI_0	TRUE C-ALARM	8	16
9	13:49:34.200 15-MAR-2011	@GV.MIX_2_4_AI_0	TRUE C-ALARM	9	18
10	13:49:34.200 15-MAR-2011	BSCB.1.RTDRDERR	TRUE C-ALARM	10	20
11	13:49:34.200 15-MAR-2011	BSCB.1.BOARDSTA	TRUE C-ALARM	11	22
12	13:49:34.380 15-MAR-2011	R1.SP.INP	0 LOLO C-ALM (150)	12	24
13	13:49:34.380 15-MAR-2011	R1.DP.INP	0 LOW N-ALM (10)	13	26

Figure 5-5. Station Audit Trail Log

Field	Description
Collect Data	Click on this button to collect audit data based on your entries in the Data Storage Parameters and Search Criteria dialog boxes.
Data Storage	Click on this button to open the Data Storage Parameters dialog box. You can save the audit data you have viewed into a file on your PC hard disk.



To save a snapshot of the audit data, first, select the **Store Data on Collection** option.

Storage Parameters:

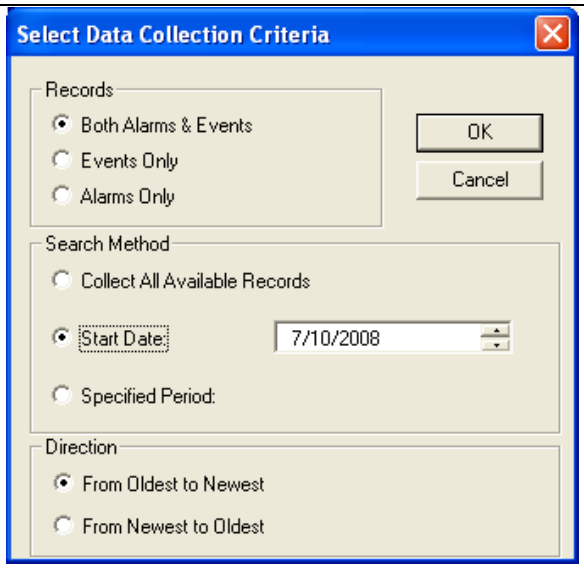
Next, enter a filename in the **File** field, or choose the **[…]** button to specify a path and filename of the snapshot file. If you are creating an all-new file, choose **Create File**; if you are appending to an existing file, choose **Append File**.

Choose a format for the way the system separates the audit data entries in the snapshot file using the **Data Delimiter** field. Choices include a space, comma, or semi-colon.

Select the **Convert Data to Extended Format** option to store a longer version of the audit data.

Note: This only saves a snapshot of the data you have actually viewed on the screen; it does **not** save the entire contents of the audit buffers. As you scroll to bring new data on the screen, the system adds it to the specified file. If you want to save **all** Audit data, go the Archive Collection page.

Click **OK** when finished.

Search Criteria	 This dialog box allows you to filter the audit data which will be displayed. Records: **Both Alarms & Events** specifies that both alarm and event data will be displayed **Events Only** specifies that only event data will be displayed. **Alarms Only** specifies that only alarms will be displayed. Search Method: **Collect All Available Records** specifies that all audit data from this alarm and event buffer should be collected. **Start Date** specifies that only audit data with timestamps newer than the date you specify should be collected. **Specified Period** specifies that only audit data collected during the period you specify should be collected. Choices are **Today**, **This Week**, or **This Month**. Click **OK** when you finish selecting the search criteria.
Total # of Records Collected	This displays the total number of audit records collected by the Audit Collection control for the current window.

5.4 Archive File Collection

The Archive File Collection page lets you save log files on your PC hard disk for long-term storage.

The window in the center of the page displays details of the available data in the ControlWave you can use to create log files.

Calling up this Menu

Click Collection

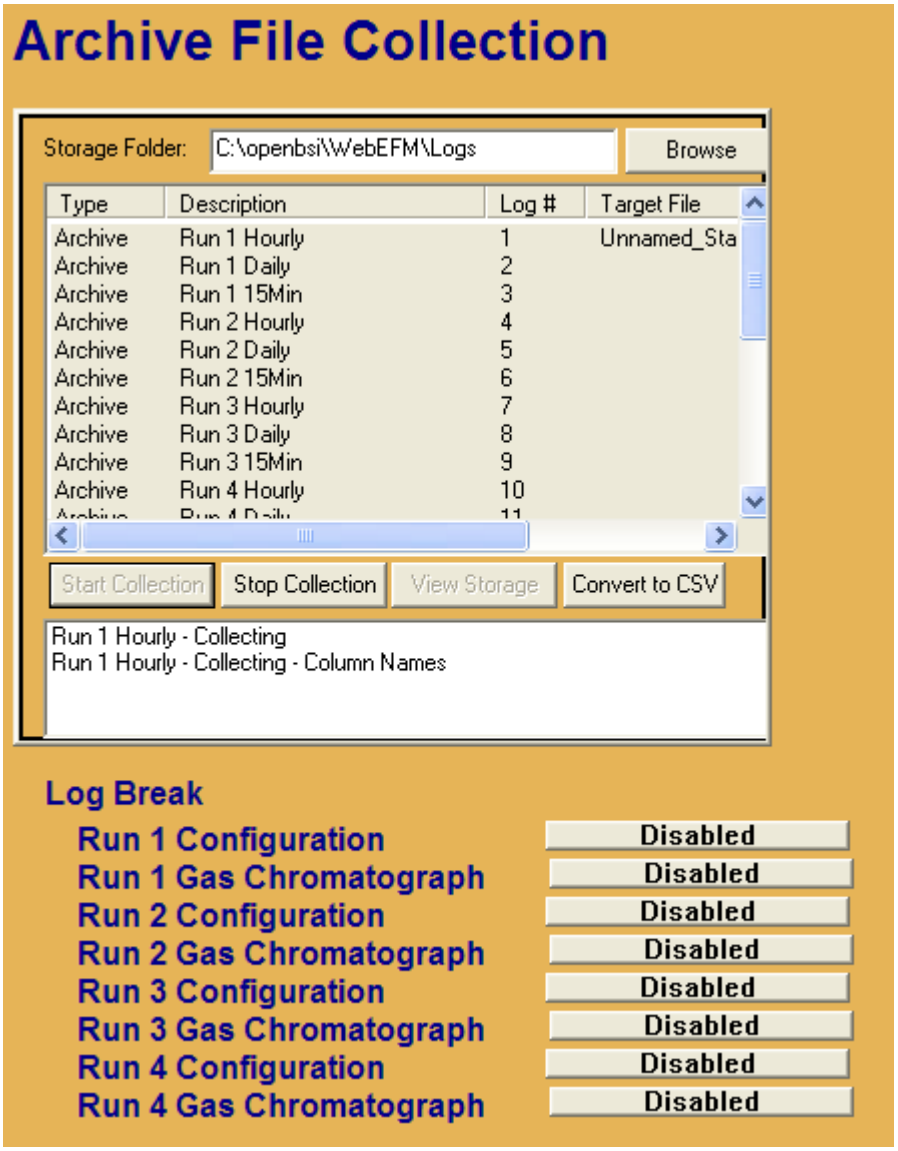


Figure 5-6. Archive File Collection page

Selecting Logs for Storage on the PC

The window in the center of the page displays details of the available data in the ControlWave from which you can generate log files on the PC.

You also use this window to specify which logs you want to collect,

view, or convert to CSV. To select a log, click on it. You can select multiple logs for collection by holding down the **Ctrl** key as you select. Once you have selected the logs, you can start the collection by clicking on **Start Collection**. The view and convert options can only be used on one log at a time.

The status window below the collection buttons shows the progress of conversions.

Field	Description
Storage Folder	This is the directory on the PC where the system stores the log files. This directory must exist. Use the **Browse** button to locate it.
Type	Shows the type of log (archive, audit, or list).
Description	Shows a brief description of the contents of the log.
Log#	Shows the archive file number or list number. This field is blank for the audit log.
Target File	Shows the file base name of the log file.
Start Collection	Click this to start collections of all selected logs. This button is disabled if collections are already in progress.
Stop Collection	Click this to terminate all underway collections. **Note**: This can result in storage of incomplete data in log files.
View Storage	Click this to display the contents of the currently selected log file in a separate window on the screen.
Convert to CSV	Click this to generate a comma separated variable (CSV) file, from the contents of the currently selected log file(s). To select more than one log file, hold down the **Ctrl** key.This file will be created in the folder specified in the **"Storage Folder"** field. The filename will be the original file base name, followed by an underscore, followed by the original file extension, then (.CSV) for the extension. For example, the CSV file generated from the log file DAILY.DLY would be named DAILY_DLY.CSV.
Log Break Run *x* Configuration Enabled/Disabled	You may want configuration changes to end a current log, and start a new one. This is called a "log break." For example, if an orifice plate changes, you might

	want to end the current log. Use this button to specify, for the application, whether you want to allow a log break for any configuration change. The label on this button shows the current choice.. When you click the button you toggle the choice. Click **Disabled** to specify that you want a log break when configuration variables change. The button now displays **Enabled**. Click **Enabled** to specify that you want to prevent log breaks. The button now displays **Disabled**.
Log Break Run *x* Gas Chromatograph Enabled/Disabled	You may want configuration changes on the chromatograph pages to end a current log, and start a new one. This is called a "log break." For example, if a gas component value changes, you might want to end the current log. **Note:** Run 3 and Run 4 only appear for the ControlWave EFM. Use this button to specify, for the application, whether you want to allow a log break for any configuration change on the gas chromatograph pages. The label on this button shows the current choice.. When you click the button you toggle the choice. Click **Disabled** to specify that you want a log break when chromatograph configuration variables change. The button now displays **Enabled**. Click **Enabled** to specify that you want to prevent log breaks. The button now displays **Disabled**.

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Chapter 6 – Using the Device Group Config Tab

In This Chapter

6.1 Accessing the Config Tab

1. Within TechView, if you are in any group other than the Device group, click the Device group icon.
2. Click the **Config** tab.

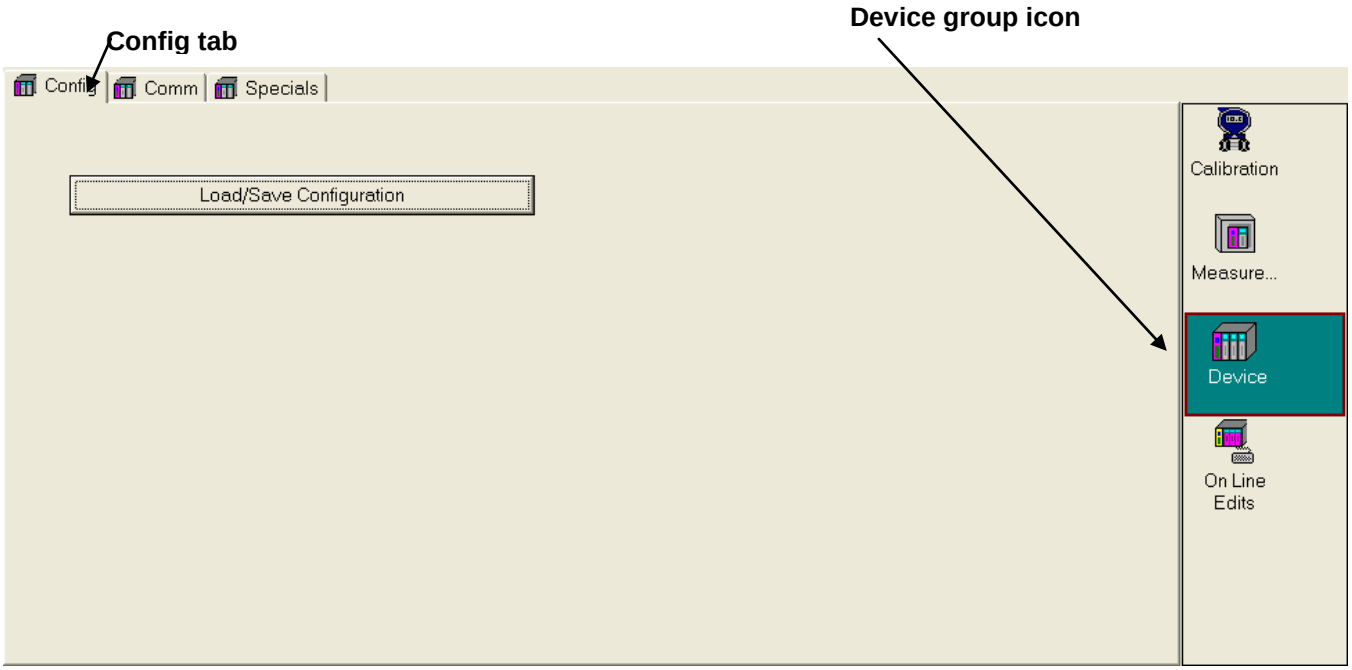

Figure 6-1. Device Group Config tab

6.2 Meter Run Save/Load Configuration

The Meter Run Save/Load Configuration page lets you save a set of initial values for a collection of variables in a file at the PC called a **recipe**. You can load the values into the recipe file directly from the control strategy running in the ControlWave, or you can type them in manually. Once you save the recipe file, you can open it at a later time, and load the values to the corresponding variables in the ControlWave. This can be useful, for example, if you have determined the optimum values for various tuning parameters and setpoints and you want to save them for later use.

Calling up this Menu

Click Load/Save Configuration

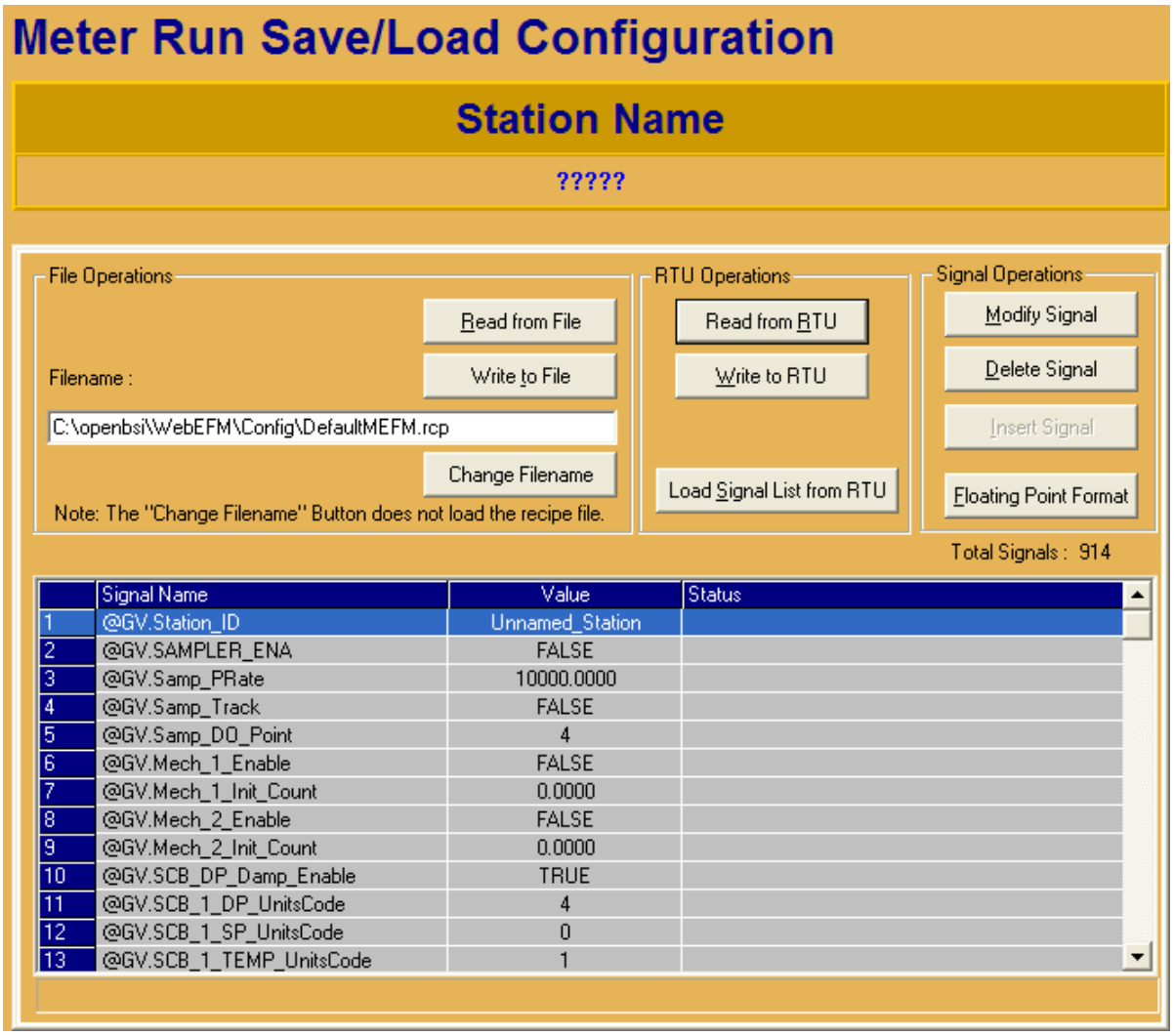

Figure 6-2. Meter Run Load/Save Configuration

Field	Description
Station Name	Shows the name of the station.

File Operations	
Read from File	Click this button to open the recipe named in the **Filename** field in the window.
Write to File	Click this button to write the recipe named in the **Filename** field to the PC hard disk. Answer **Yes** when prompted.
Filename	Specify the path and filename of the recipe file here.
Change Filename	Click here to select an existing recipe file from the default recipes area.
RTU Operations	
Read from RTU	Click here to load the current values in the ControlWave into their respective entries in the recipe
Write to RTU	Once you load the recipe file, you can click this button to send the recipe values to the ControlWave; answer **Yes** to the confirmation prompt.
Load Signal List from RTU	If the variables you want to include in your recipe already reside in a list, click this button and specify the list number at the prompt, and click **OK**. This loads those variable names from the list into the recipe.
Signal Operations	
Modify Signal	Click here to remove a variable from the recipe. For more information, see *Creating a Recipe* below.
Delete Signal	Click here to remove a variable from the recipe. For more information, see *Creating a Recipe* below.
Insert Signal	Click here to remove a variable from the recipe. For more information, see *Creating a Recipe* below.
Floating Point Format	Click here to bring up the Float Format dialog box. See *Section 5.2.1.*
Total Signals	Shows the total number of variables in the recipe, including those not visible in the window.

6.2.1 Creating a Recipe

To create a recipe you must first specify the variables you want included in the recipe. One way to do this is to either right-click on the grid in the center of the Recipe page and choose **Insert Signal** from the pop-up menu, *or* click the **Insert Signal** button.

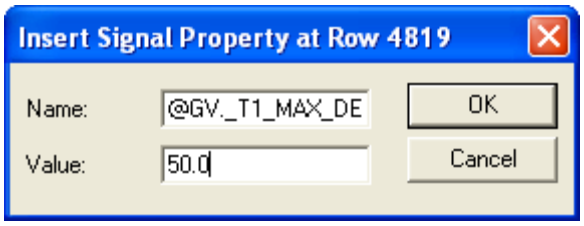

Figure 6-3. Insert Signal Property

In either case, a dialog box opens in which you can enter the variable's name. You can also enter a value for the variable. Click on **OK** when you finish. Repeat for each additional variable.

If you don't enter values for the variable when you insert the variable, you can load the current values in the running control strategy for all variables in the recipe by clicking **Read From RTU**.

Another way to specify variables for the recipe is to load the variables from a pre-existing list in the running ControlWave project. To do this, click on the **Load Signal List from RTU** button, then specify the number of the list and click **OK**.

Figure 6-4. Signal List to Load

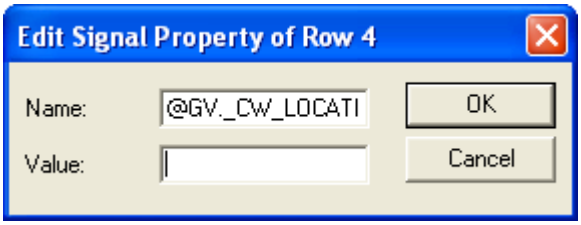

Figure 6-5. Edit Signal Property

If, as you create the recipe, you decide you want to change a variable or value for a particular entry, either right click on the entry and choose **Edit Signal** from the pop-up menu, or click **Modify Signal**. Make changes, as desired, and click **OK**.

If you want to delete a variable in the recipe, either right-click on the line for that variable and choose **Delete Signal** from the pop-up menu, or click **Delete Signal**. The system prompts you to confirm the variable deletion.

6.2.2 Saving the Recipe

Type the path and filename for your recipe file in the **Filename** field or click **Change Filename** to select a recipe from the default recipe area. Standard recipe files are stored with a file extension of (.RCP).

Once you have specified the path and filename, click the **Write to File** button; answer **Yes** to the confirmation prompt, and the control writes the recipe to the specified file.

6.2.3 Recalling a Saved Recipe, and Sending Its Values to the ControlWave

To recall a recipe which you saved previously, use the **Browse** button to locate it, or type its path and filename in directly in the **Filename** field. Finally, click the **Read From File** button to bring the recipe into the page.

Once you load the recipe file, you can send the recipe values to the ControlWave. To do this, click the **Write to RTU** button; answer **Yes** to the confirmation prompt, and the system writes the recipe to the ControlWave.

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Chapter 7 – Using the Device Group Comm Tab

In This Chapter

7.1 Accessing the Config Tab

1. Within TechView, if you are in any group other than the Device group, click the Device group icon.
2. Click the **Comm** tab.

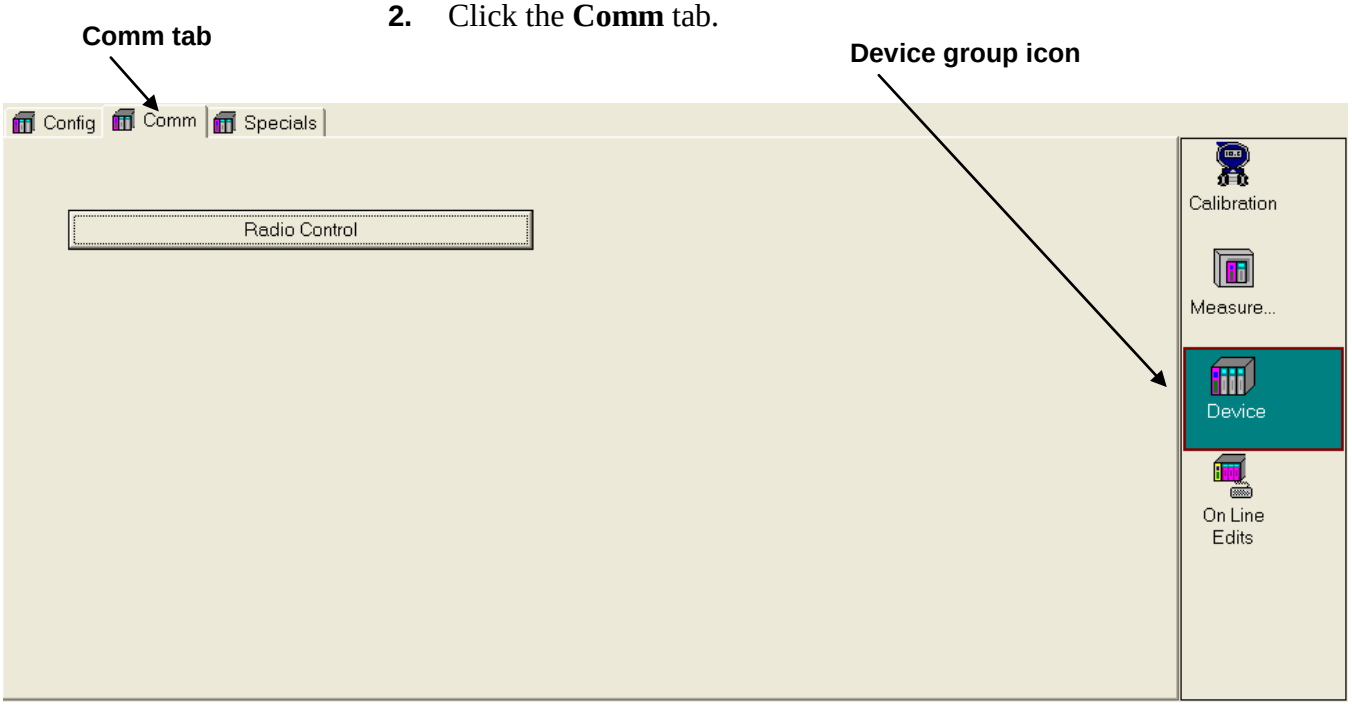

Figure 7-1. Device Group Config tab

7.2 Radio Control

The Radio Control Configuration page lets you configure data collection using radios using one of four possible modes: Radio Sensing Mode, Hourly Mode, Daily Mode, or Day Light Mode.

Calling up this Menu

Click Radio Control

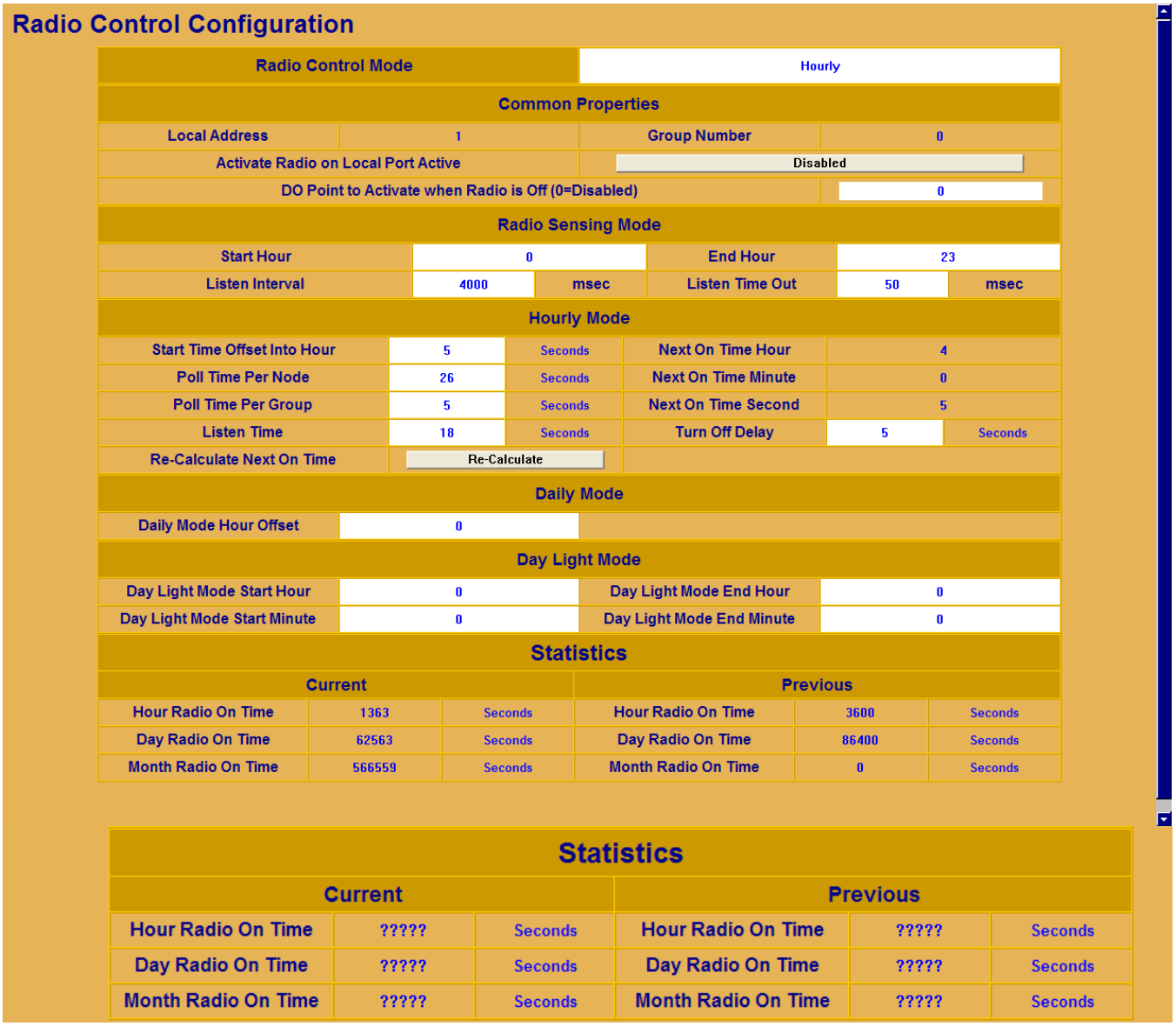

Figure 7-2. Radio Control Configuration Page

Field	Description
Radio Control Configuration Enabled/Disabled	When you click this button you toggle between enabling/disabling radio control. Click **Enabled** to disable radio control. The button now displays **Disabled**. Click **Disabled** to enable radio control. The button now displays **Enabled**.
Common Properties	

Local Address	This field shows the BSAP local address of this ControlWave flow computer as specified in the flash configuration.
Group Number	This field shows the EBSAP group number of this ControlWave flow computer as specified in the flash configuration.
Activate Radio on Local Port Active Enabled/Disabled	If you enable this function, activity on ControlWave port 1 activates the radio port (port 2). If you disable this function, the radio port only activates when scheduled to do so. When you click this button you toggle between enabling/disabling this function. Click **Enabled** to disable the function. The button now displays **Disabled**. Click **Disabled** to enable the function. The button now displays **Enabled**.
DO Point to Activate when Radio is Off	Specify the discrete output (DO) point that should turn ON when the radio is OFF.
Radio Sensing Mode	Radio sensing mode provides a way to use the least amount of energy as possible to power the radio at the ControlWave flow computer's radio. The idea is to only turn the radio on only for brief listening periods throughout the day to listen for message traffic. For other periods the radio is inactive and so not consuming so much energy. Radio sensing mode activates the radio for very short periods of time (specified by the **Listen Time Out**) at a specified interval (as specified by the **Listen Interval**) to listen and "sense" a valid BSAP message on the radio's carrier frequency. If the radio doesn't detect a message, it shuts off until the next scheduled listen interval elapses. If the radio detects a valid BSAP message it remains on until it responds, after which it remains on for another listen interval. If it detects no more messages, the radio returns to radio sensing mode. Using radio sensing mode and assuming a 1 watt radio with a 200ms **Listen Timeout** and a **Listen Interval** of 5,000ms uses an equivalent of 0.04 watts. You need to configure the **Listen Timeout** and **Listen Interval** to values which suit your energy requirements and still allow for good radio communications.
Start Hour	Specify the hour of the day (0 to 23) during which radio sensing mode begins.

End Hour	Specify the hour of the day (0 to 23) during which radio sensing mode ends.
Listen Interval	Specify the number of milliseconds between times when the radio should listen for messages. For example, if you enter 5,000 here, every five seconds, the radio listens for the number of milliseconds specified by the **Listen Time Out**.
Listen Time Out	Specify the number of milliseconds the radio stays on when activated at its scheduled time. If no communications occur, it shuts off at the conclusion of this time.
Hourly Mode	In hourly mode, the application collects data from a ControlWave flow computer at a calculated time during the hour, then it goes on to the next ControlWave flow computer, and so on, until it collects from all flow computers in the network. The process starts over again during the next hour.
Start Time Offset Into Hour	This specifies an offset into the hour (in seconds) that the application uses to calculate the start time of data collection from this flow computer.
Poll Time Per Node	This specifies the duration of time (in seconds) allocated to communicate with a single node. The term “node” refers to a single ControlWave flow computer (EFM/GFC/XFC). This is used to calculate the next “On” time for the radio.
Poll Time Per Group	This specifies the duration of time (in seconds) allocated to communicate with an EBSAP group. This is used to calculate the next “On” time for the radio.
Listen Time	This specifies the number of seconds the radio listens for data from a particular ControlWave flow computer before it shuts off due to lack of communications.
Re-Calculate Next On Time button	If you make any modifications to the entries for hourly mode, click this button to re-calculate the on time for this ControlWave flow computer.
Next On Time Hour	This field displays the next hour (0 to 23) at which the radio turns on for this ControlWave flow computer.
Next On Time Minute	This field displays the next minute (0 to 59) at which the radio turns on for this ControlWave flow computer.
Next On Time Second	This field displays the next second (0 to 59) at which the radio turns on for this ControlWave flow computer.
Turn Off Delay	Enter the number of seconds the radio should remain active after a successful communication session between a ControlWave flow computer and the PC

	finishes.
Daily Mode	In daily mode, the application collects data from a ControlWave flow computer once a day.
Daily Mode Hour Offset	This specifies an offset into the hour (in seconds) that the application uses to calculate the start time of data collection from this flow computer.
Day Light Mode	Day Light Mode allows you to configure the radio to only operate during daylight hours. If you have a solar panel/battery for your ControlWave flow computer, this helps conserve power.
Day Light Mode Start Hour	Specify the start hour of the day (0 to 23) for day light mode.
Day Light Mode Start Minute	Specify the start minute (0 to 59) into the start hour for day light mode.
Day Light Mode End Hour	Specify the end hour of the day (0 to 23) for day light mode.
Day Light Mode End Minute	Specify the end minute (0 to 59) into the end hour for day light mode.
Statistics	These fields display statistics on the amount of time the radio is on. You may find this information useful when calculating power usage of the radio.
Current Hour Radio On Time	This field displays the number of seconds the radio was active during the current hour.
Current Day Radio On Time	This field displays the number of seconds the radio was active during the current day.
Current Month Radio On Time	This field displays the number of seconds the radio was active during the current month.
Previous Hour Radio On Time	This field displays the number of seconds the radio was active during the previous hour.
Previous Day Radio On Time	This field displays the number of seconds the radio was active during the previous day.
Previous Month Radio On Time	This field displays the number of seconds the radio was active during the previous month.

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Chapter 8 – Using the Device Group Specials Tab

In This Chapter

8.1 Accessing the Specials Tab

1. Within TechView, if you are in any group other than the Device group, click the Device group icon.
2. Click the **Specials** tab.

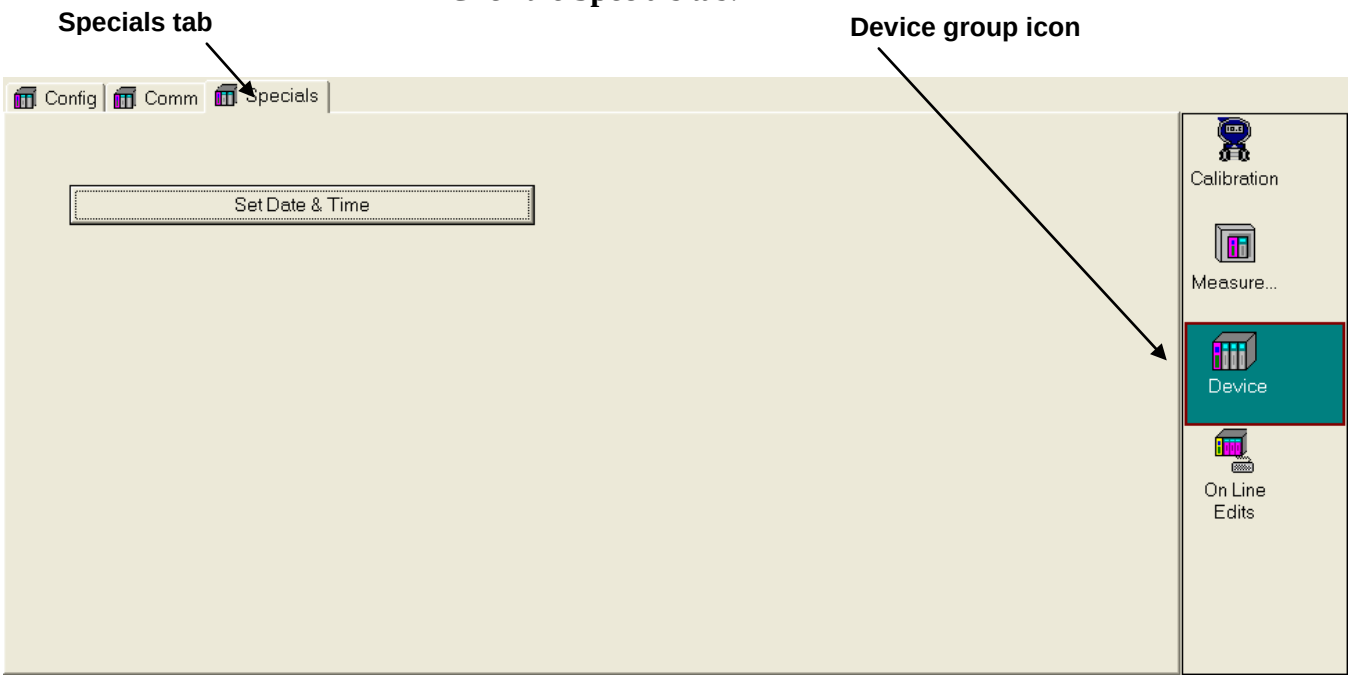

Figure 8-1. Device Group Config tab

8.2 RTU Date and Time

Calling up this Menu Click Set Date & Time

Figure 8-2. RTU Date and Time

Field	Description
Date/Time	This field shows the current date/time in the ControlWave flow computer in the format *mm/dd/yyyy hh:mm:ss* where: *mm/dd/yyyy* is: *mm* is the two-digit month (01-12) *dd* is the two-digit day (01-31) *yyyy* is the four-digit year and *hh:mm:ss* *hh:* is the two-digit hour (0-23) *mm* is the two-digit minute (0-59) *ss* is the two-digit second (0-59)
Force Time Sync	Click here to reset the time in the ControlWave flow computer to the current time on your PC workstation.

Appendix M – Modbus Coil and Register Maps

These tables show the correspondence between Modbus coils and registers and the variables in the Station Manager application.

Table M-1 Modbus Coil Map – BOOL Variables

Coil#	Variable	Description
1001	@GV.R1_DP_MO	Run 1 DP Manual Override
1002	@GV.R1_FTEMP_MO	Run 1 FTEMP Manual Override
1003	@GV.R1_SP_MO	Run 1 SP Manual Override
1004	@GV.R2_DP_MO	Run 2 DP Manual Override
1005	@GV.R2_FTEMP_MO	Run 2 FTEMP Manual Override
1006	@GV.R2_SP_MO	Run 2 SP Manual Override
1007	@GV.R3_DP_MO	Run 3 DP Manual Override
1008	@GV.R3_FTEMP_MO	Run 3 FTEMP Manual Override
1009	@GV.R3_SP_MO	Run 3 SP Manual Override
1010	@GV.R4_DP_MO	Run 4 DP Manual Override
1011	@GV.R4_FTEMP_MO	Run 4 FTEMP Manual Override
1012	@GV.R4_SP_MO	Run 4 SP Manual Override

Table M-2 Modbus Register Map – SINT Variables

Reg#	Variable	Description
3001	@GV.ST1_FLOW_RATE	Station Flow Rate
3002	@GV.R1_FLOW_RATE	Run 1 Flow Rate
3003	@GV.R1_DP_INP	Run 1 DP
3004	@GV.R1_FTEMP_INP	Run 1 FTEMP
3005	@GV.R1_SP_INP	Run 1 SP
3006	@GV.R2_FLOW_RATE	Run 2 Flow Rate
3007	@GV.R2_DP_INP	Run 2 DP
3008	@GV.R2_FTEMP_INP	Run 2 FTEMP
3009	@GV.R2_SP_INP	Run 2 SP
3010	@GV.R3_FLOW_RATE	Run 3 Flow Rate
3011	@GV.R3_DP_INP	Run 3 DP
3012	@GV.R3_FTEMP_INP	Run 3 FTEMP
3013	@GV.R3_SP_INP	Run 3 SP
3014	@GV.R4_FLOW_RATE	Run 4 Flow Rate
3015	@GV.R4_DP_INP	Run 4 DP

Reg#	Variable	Description
3016	@GV.R4_FTEMP_INP	Run 4 FTEMP
3017	@GV.R4_SP_INP	Run 4 SP

Table M-3 Modbus Register Map – LINT Variables

Reg#	Variable	Description
5001	@GV.ST1_FLOW_RATE	Station Flow Rate
5002	@GV.R1_FLOW_RATE	Run 1 Flow Rate
5003	@GV.R1_DP_INP	Run 1 DP
5004	@GV.R1_FTEMP_INP	Run 1 FTEMP
5005	@GV.R1_SP_INP	Run 1 SP
5006	@GV.R2_FLOW_RATE	Run 2 Flow Rate
5007	@GV.R2_DP_INP	Run 2 DP
5008	@GV.R2_FTEMP_INP	Run 2 FTEMP
5009	@GV.R2_SP_INP	Run 2 SP
5010	@GV.R3_FLOW_RATE	Run 3 Flow Rate
5011	@GV.R3_DP_INP	Run 3 DP
5012	@GV.R3_FTEMP_INP	Run 3 FTEMP
5013	@GV.R3_SP_INP	Run 3 SP
5014	@GV.R4_FLOW_RATE	Run 4 Flow Rate
5015	@GV.R4_DP_INP	Run 4 DP
5016	@GV.R4_FTEMP_INP	Run 4 FTEMP
5017	@GV.R4_SP_INP	Run 4 SP

Table M-4 Modbus Register Map – REAL Variables

Reg#	Variable	Description
7001	@GV.ST1_FLOW_RATE	Station Flow Rate
7002	@GV.R1_FLOW_RATE	Run 1 Flow Rate
7003	@GV.R1_DP_INP	Run 1 DP
7004	@GV.R1_FTEMP_IN	Run 1 FTEMP
7005	@GV.R1_SP_INP	Run 1 SP
7006	@GV.R2_FLOW_RATE	Run 2 Flow Rate
7007	@GV.R2_DP_INP	Run 2 DP
7008	@GV.R2_FTEMP_INP	Run 2 FTEMP
7009	@GV.R2_SP_INP	Run 2 SP
7010	@GV.R3_FLOW_RATE	Run 3 Flow Rate
7011	@GV.R3_DP_INP	Run 3 DP

Reg#	Variable	Description
7012	@GV.R3_FTEMP_INP	Run 3 FTEMP
7013	@GV.R3_SP_INP	Run 3 SP
7014	@GV.R4_FLOW_RATE	Run 4 Flow Rate
7015	@GV.R4_DP_INP	Run 4 DP
7016	@GV.R4_FTEMP_INP	Run 4 FTEMP
7017	@GV.R4_SP_INP	Run 4 SP

These tables show the correspondence between Modbus registers and the archive file columns.

Table M-5 ControlWave EFM Archive File Column Ordering –

Reg#	Description
701	R1 Hourly
702	R1 Daily
703	R1 15 Min
704	R2 Hourly
705	R2 Daily
706	R2 15 Min
707	R3 Hourly
708	R3 Daily
709	R3 15 Min
710	R4 Hourly
711	R4 Daily
712	R4 15 Min
713	GC 1
714	GC 2
715	GC 3
716	GC 4
717	R1 HiLo
718	R2 HiLo
719	R3 HiLo
720	R4 HiLo

Table M-6 ControlWave GFC / XFC Archive File Column Ordering –

Reg#	Description
701	R1 Hourly
702	R1 Daily
703	R1 15 Min

Reg#	Description
704	R2 Hourly
705	R2 Daily
706	R2 15 Min
707	GC 1
708	GC 2
709	R1 HiLo
710	R2 HiLo

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