MicroMG4 GAS
OPERATORS MANUAL

Flow Computer

Gas Version

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Date: 8/13/2013

WARRANTY

Dynamic Flow Computers warrants to the owner of the Smart Flow Computer that the product delivered will be free from defects in material and workmanship for one (1) year following the date of purchase.

This warranty does not cover the product if it is damaged in the process of being installed or damaged by abuse, accident, misuse, neglect, alteration, repair, disaster, or improper testing.

If the product is found otherwise defective, Dynamic Flow Computers will replace or repair the product at no charge, provided that you deliver the product along with a return material authorization (RMA) number from Dynamic Flow Computers.

Dynamic Flow Computers will not assume any shipping charge or be responsible for product damage due to improper shipping.

THE ABOVE WARRANTY IS IN LIEU OF ANY OTHER WARRANTY EXPRESS IMPLIED OR STATUTORY. BUT NOT LIMITED TO ANY WARRANTY OF MERCHANTABILITY, FITNESS FOR PARTICULAR PURPOSE, OR ANY WARRANTY ARISING OUT OF ANY PROPOSAL, SPECIFICATION, OR SAMPLE.

LIMITATION OF LIABILITY:

DYNAMIC FLOW COMPUTERS SHALL HAVE NO LIABILITY FOR ANY INDIRECT OR SPECULATIVE DAMAGES (INCLUDING, WITHOUT LIMITING THE FOREGOING, CONSEQUENTIAL, INCIDENTAL AND SPECIAL DAMAGES) ARISING FROM THE USE OF, OR INABILITY TO USE THIS PRODUCT. WHETHER ARISING OUT OF CONTRACT, OR UNDER ANY WARRANTY, IRRESPECTIVE OF WHETHER DFM HAS ADVANCED NOTICE OF THE POSSIBILITY OF ANY SUCH DAMAGE INCLUDING, BUT NOT LIMITED TO LOSS OF USE, BUSINESS INTERRUPTION, AND LOSS OF PROFITS. NOTWITHSTANDING THE FOREGOING, DFM'S TOTAL LIABILITY FOR ALL CLAIMS UNDER THIS AGREEMENT SHALL NOT EXCEED THE PRICE PAID FOR THE PRODUCT. THESE LIMITATIONS ON POTENTIAL LIABILITY WERE AN ESSENTIAL ELEMENT IN SETTING THE PRODUCT PRICE. DFM NEITHER ASSUMES NOR AUTHORIZES ANYONE TO ASSUME FOR IT ANY OTHER LIABILITIES

CHAPTER 1: QUICK START

Introduction:

The micro MV Gas Multi-Stream Flow Computer was designed after careful listening to our customers in all sectors of the oil and gas industry. It was built to address the different needs for refineries, chemical plants, gas processing plants, offshore platforms, pipeline and transmission, remote gas wells, and storage caverns. The focus has been to bring the different needs and requirements of these specialized industries into one hardware platform and therefore reducing the spare parts requirements, the training process, calibration, and overall cost of ownership. We believe the Micro MV Gas Flow Computer has delivered and met the design intentions.

The Micro MV Gas Flow Computer combines the following features:

- **User Friendly**
- **Flexible**
- **Easy to understand and configure**
- **Rugged**
- **Economical to install and maintain**
- **Accurate**

We hope that your experience with the Micro MV Gas Flow Computer will be a simple pleasant experience, not intimidating in any way.

The Micro MV Gas Flow computer handles up to four-meter runs capabilities. It includes the following mass flow equations: New API14.3, ISO 5167, and turbine (AGA7). Additionally, it can perform density calculations per these standard procedures: AGA8, other tables are added constantly, call our main office for current software

One Rosemount multi-variable digital transducers can be connected to each Micro MV flow computer for temperature, pressure (up to 3626 PSIG), and DP (up to 830 inches H_2O). Other Rosemount multi variable transmitters can be connected to the Micro MV Gas Flow Computer via RS485 serial interface. Up to four meter runs can be stored and calculated in a single Micro MV Gas flow computer. The 2nd RS485 is used as modbus port for data acquisition and other serial functions.

The Micro MV Gas flow Computer has a host of inputs and outputs beyond the built in Rosemount Multi Variable transmitter.

Three turbine inputs (Sine or Square wave), 70 mV peak to peak or sine wave 6 volts, or lighter on square wave

Four additional analog inputs, or two analog inputs and one three wire RTD inputs

One analog output expandable to four, or five additional analog inputs, one RS232, two RS485 with Modbus protocol, and one additional serial printer output.

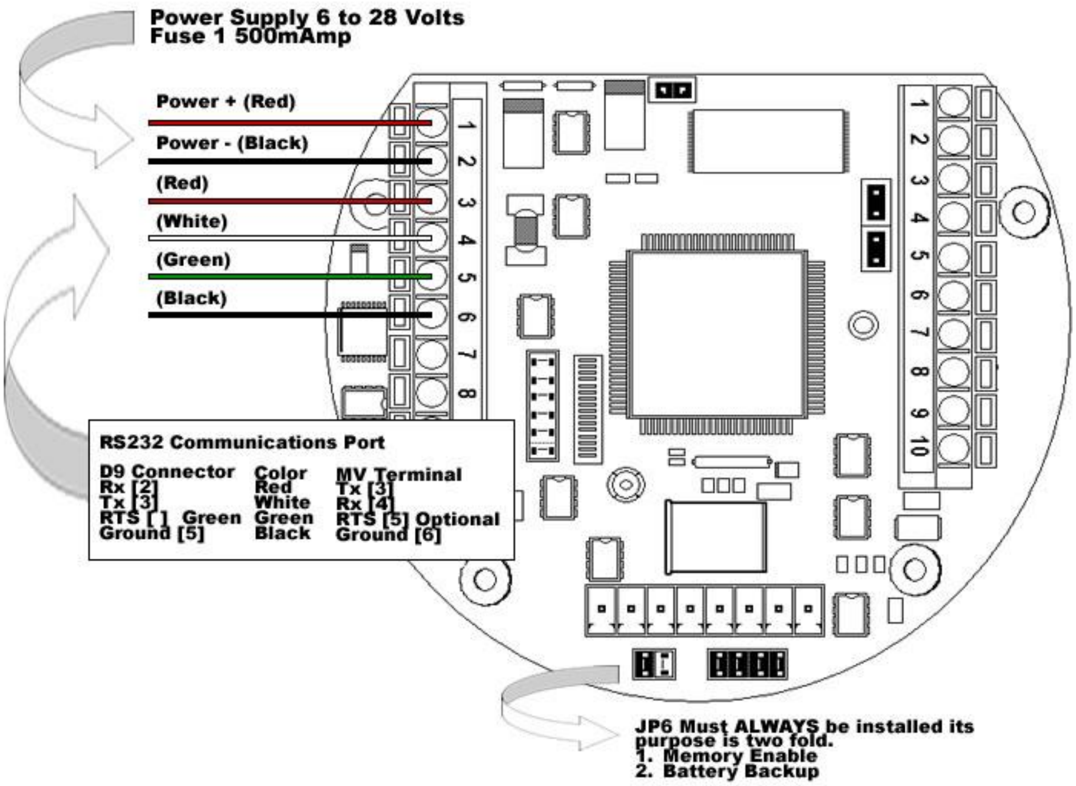
Three status inputs or digital outputs are user configurable. The fourth digital I/O is optional.

Additionally, each Micro MV Gas Flow Computer can store up to 32 days of hourly and daily data. Optional expandable memory (Virtual Hard Drive) up to 132 Megs, combined with our customized data storage allows almost any type data logging task to become possible.

Note: Flow equations used are continuously upgraded and new equations are added.
Call factory for current software library.

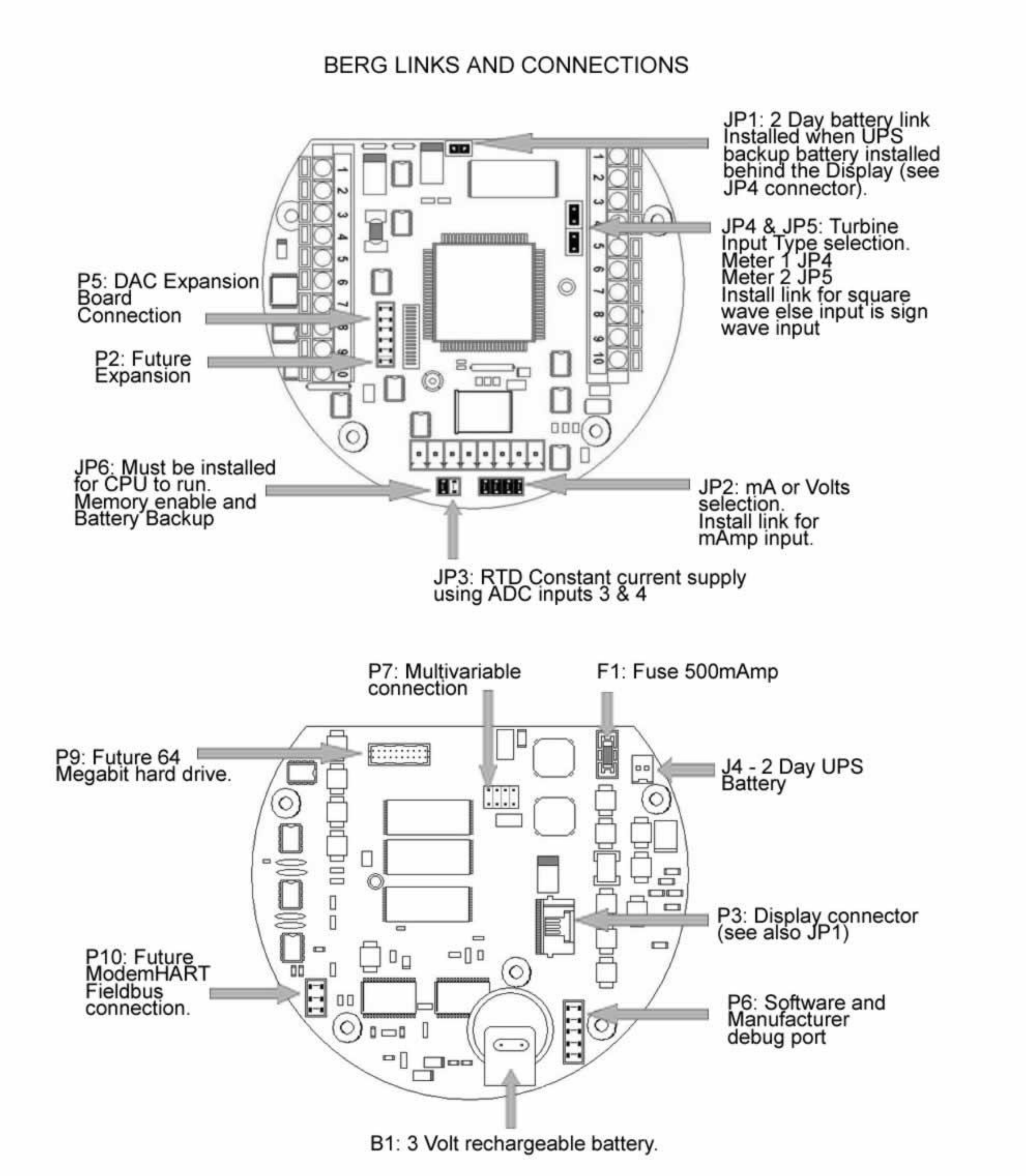
Quick Start Up

MicroMV Quick Start



MV Step by Step Startup

1. Connect Power Supply cables
2. Connect RS232 Communications
3. Ensure Jumper JP6 Installed
4. Energize Voltage [24 Volts Recommended]
5. Verify the display is ON
6. Run DynacomTM Software
7. Configure the Micro MV unit
8. Consult the Faultfinding if a problem is incurred


BERG LINKS AND CONNECTIONS
JP1: 2 Day battery link Installed when UPS backup battery installed behind the Display (see JP4 connector).
JP4 & JP5: Turbine Input Type selection. Meter 1 JP4 Meter 2 JP5 Install link for square wave else input is sign wave input
P5: DAC Expansion Board Connection
P2: Future Expansion
JP6: Must be installed for CPU to run. Memory enable and Battery Backup
JP2: mA or Volts selection. Install link for mAmp input.
JP3: RTD Constant current supply using ADC inputs 3 & 4
P7: Multivariable connection
F1: Fuse 500mAmp
P9: Future 64 Megabit hard drive.
J4 - 2 Day UPS Battery
P3: Display connector (see also JP1)
P10: Future ModemHART Fieldbus connection.
P6: Software and Manufacturer debug port
B1: 3 Volt rechargeable battery.

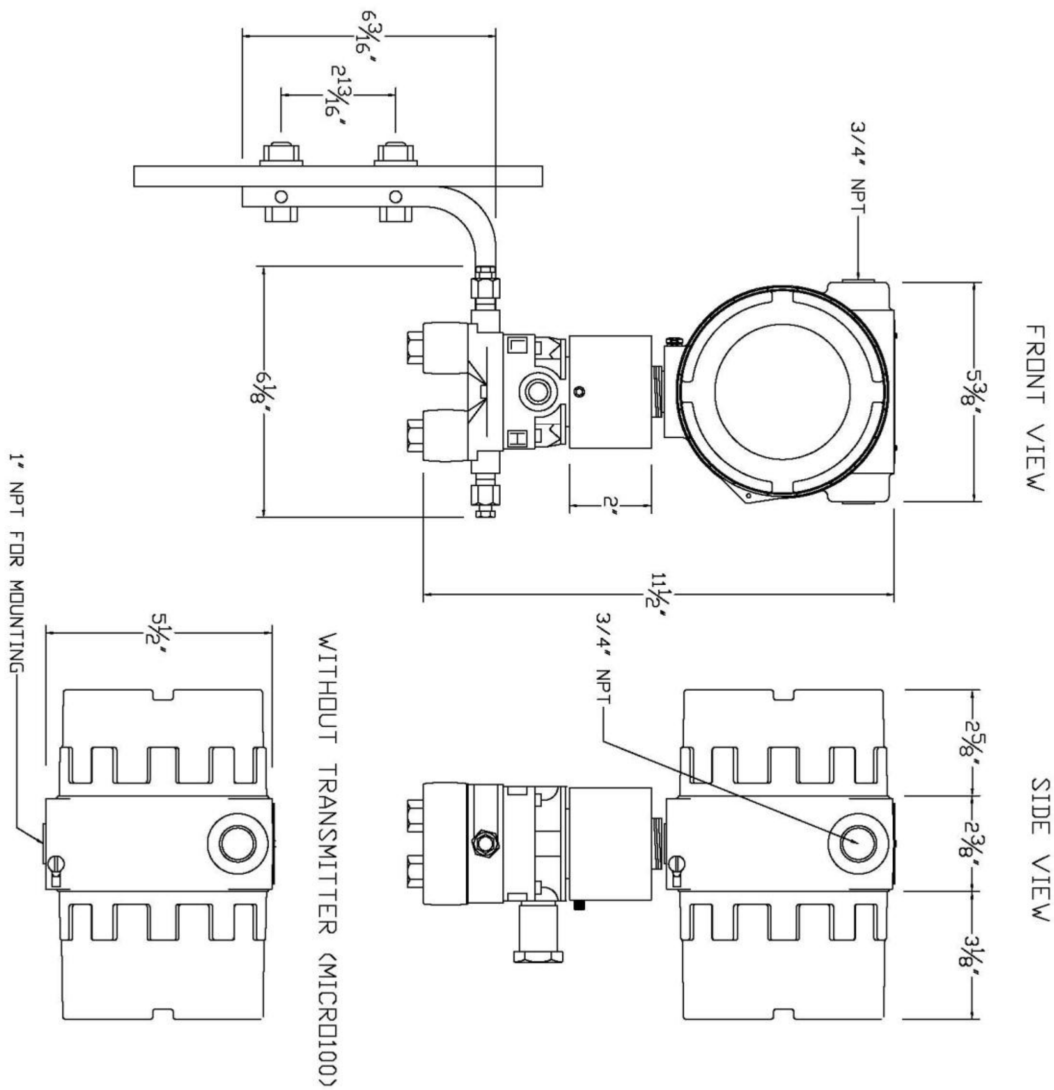
Technical Data

POWER	
VOLTAGE RANGE	7-28 VDC
POWER CONSUMPTION	0.5 WATT
OPERATING CONDITIONS	
TEMPERATURE	- 40 TO 185 °F
HUMIDITY	100%
HOUSING	NEMA 4X CLASS 1 DIV. 1
FEATURES	
DISPLAY	PLASMA 4 LINES 20 CHARACTERS BACKLIT DISPLAY WITH 4 INFRARED REFLECTIVE SENSORS
PROCESSOR	32-BIT MOTOROLA 68332 @ 16.7 MHZ
FLASH ROM	4 MBITS @ 70 NANO SECONDS
RAM	2 MBITS
FREQUENCY INPUT	3 CHANNELS CHANNELS 1 & 2 ARE SINE/SQUARE WAVE CAPABLE CHANNEL 3 IS SQUARE WAVE ONLY SQUARE WAVE RANGE 0 - 6000 HZ SINE WAVE RANGE 0 – 1200 HZ SIGNAL > 40 mV FOR SINE WAVE SIGNAL > 3 VOLTS FOR SQUARE WAVE
ANALOG INPUT	4 INPUTS STANDARD EXPANDABLE UP TO 9 ANALOG INPUTS OR 7 WITH ADDITIONAL 3 WIRE RTD.
MULTIVARIABLE	BUILT-IN ROSEMOUNT MULTIVARIABLE TRANSMITTER WITH DIRECT SPI DIGITAL CONNECTION. MAXIMUM UPDATE SPEED ONCE EVERY 109 MILLISECONDS.
ANALOG OUTPUT	ONE (1) OPTICALLY ISOLATED 16 BITS EXPANDABLE TO FOUR (4)
DIGITAL I/O	4 DIGITAL INPUTS OR OUTPUTS. DIGITAL OUTPUTS HAVE 0.25 AMPS RATING.
SERIAL	2 RS485 @ 19200 BAUDS VARIABLE 1 RS232 @ 9600 BAUDS VARIABLE 1 PRINTER OUTPUT
COMMUNICATION PROTOCOL	MODBUS

Parts List

Spare Parts - Micro MV	
Part #	**Description**
MVC	Micro MV CPU Main Board Only
MVM	Micro MV CPU Memory Board Only
MVD	Micro MV Display Board
MVI	Micro MV Analog In Board
MVO	Micro MV Analog Out Board
MVP	Micro MV Prover Board
MVR	Micro MV Rosemount Board
S6920	Explosion Proof Housing Unit for Micro MV Flow Computer
Adapter A	Adapter for 0205 Rosemount Transmitter (Accommodates Micro MV Flow Computer)
Bracket-MVD	Bracket for Micro MV Display
Bracket-MVC A	Bracket for Micro MV CPU (Without Analog)
Bracket-MVC B	Bracket for Micro MV CPU (With Analog)
MVD Cable	Micro MV Display Ribbon Cable
O-Ring A	O-Ring Gasket for Micro MV Housing
Fuse A	250 mA Fuse
Fuse B	500 mA Fuse
Fuse C	2 Amp Fuse
Battery A	Replacement Battery for Micro MV Flow Computer (Board Mounted)

Micro MV Flow Computer: Dimensions



Window Software Minimum Requirements:

Please make sure your computer has the minimum requirements to install Dynamic's Dynacom software.

System Minimum Requirements

In order to install this software product the following requirements must be met:

- Windows Operating System (Win95, Win98, Win98SE, win2000, WinNT, WinXP, Vista)
- For a Windows NT machine: Service Pack 3 or later. (Service Pack 5 Update is Included in the Installation Disk)
- Internet Explorer 5 or later. (Internet Update is Included in the Installation Disk)
- For Windows NT, 2000, XP or Vista: Administrator level access to create an ODBC system DNS.
- Minimum disk space available: 16 MB.
- 1 Serial Communication Port

If your computer meets these requirements, you can run the setup file downloaded from our website

What is a configuration file?

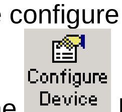
The configuration file is an archive that contains the data used by the flow computer to determine calculation settings (Pipe ID, Flow Equation, Meter ID, etc.) and input/output assignments.

Downloading a configuration file to the flow computer.

- Open the configuration file using the **Configuration File | Open…** option on the main menu or pressing the open button  in the toolbar. Once the file is open the file name will appear on the upper left corner of the window, so you can verify that the desired file was open.

- Connect to the Flow Computer either by using the **Tools | Connect to Device** option on the main menu, the 

button on the vertical toolbar, or by pressing the **[F5]** key on the keyboard. Once you are connected the application it will show an ONLINE status on the upper right corner of the main window. Failure to communicate can occur because of a communication wiring problem, wrong PC port selection, communication parameter mismatch between PC and MicroMV (Modbus type, parity, baud rate, etc.) or lack of power to the MicroMV Flow Computer. To use **"Tools | Com Settings | Auto Detect Settings"** option, the user must insure that **only one MicroMV** computer is connected to the PC. More than one MicroMV Flow Computer in the loop will cause data collisions and unintelligible responses.

- Go to the configure device option either by using the **Tools | Meter Configuration** option, the 

button on the vertical toolbar, or by pressing the **[F10]** key on the keyboard.

- Because you are connected to a device, a window will appear asking you if you want to read the configuration from the connected meter, Press **NO** since what we want is to write the PC file to the flow computer.

- A configuration window will now appear showing you the information in the configuration file, you can check these values to make sure this is the file you want to send to the flow computer. Once you have checked that the configuration is correct, press the **[Download]** button. A blue bar indicating the progress of the download will appear at the bottom of the application window, after that the information in the configuration file will be in the flow computer.

Note: In case the flow computer is a liquid application, remember to End Batch after the configuration in downloaded for the changes to take effect.

What is an Image File?

An image file is an EPROM code for a certain purpose (liquid, gas, prover, etc.) **The image file is only done when an application upgrade is needed**.

When an image file is downloaded to the flow computer, all the information in the computer is lost (configuration and historical data), so make sure to retrieve all the important information before changing the image file.

How to download an Image File

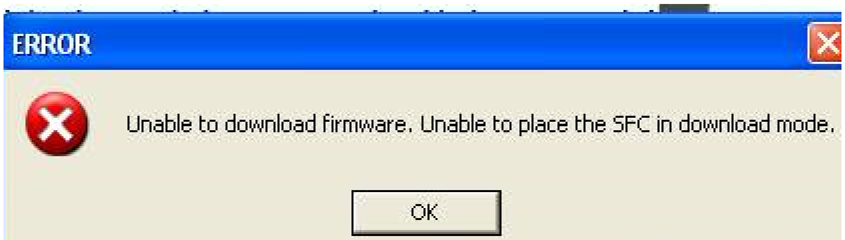
- Download an image file through **RS232 port** only.
- To Download an Image File to the Flow Computer select the **Tools | Download Program** option form the main menu or press the  button in the toolbar.
- A small dialog will appear asking for the file name of the image file (Image file have the extension .img). Type it in or use the **Browse** button to locate it.
- Once the file name is in place press **Download**.
- If a retry message of small dialog appears, try to use **"Tools | Com Settings | Auto Detect Settings"** option, the user must insure that **only one MicroMV** computer is connected to the PC. More than one MicroMV Flow Computer in the loop will cause data collisions and unintelligible responses. Failure to communicate can occur because of a communication wiring problem, wrong PC port selection, communication parameter mismatch between PC and MicroMV (Modbus type, parity, baud rate, etc.) or lack of power to the MicroMV Flow Computer. After the device is detected, then you can follow steps described above.

Warning messages will remind you that this action will erase **ALL** the information in the flow computer.

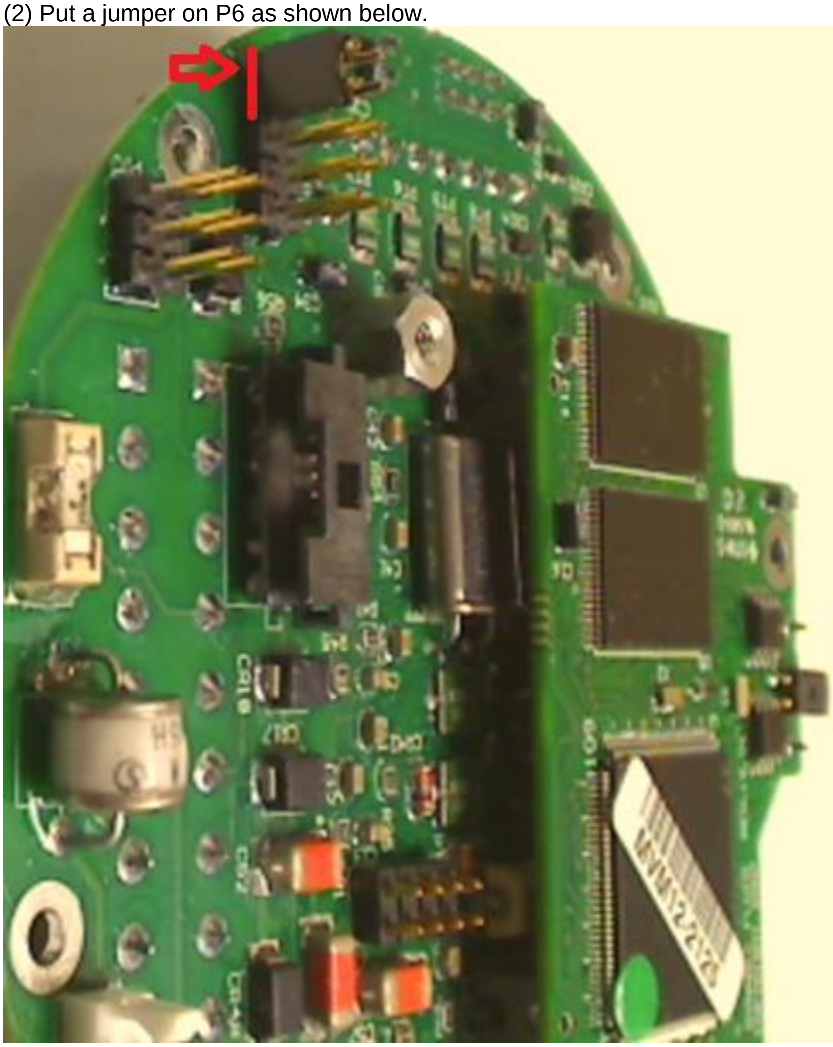
The download task will take about 7 minutes to be completed. Once the image file is in place, the flow computer is ready to be configured (enter calculation parameters and I/O assignments).

How to force a board into download mode

First try to recycle the power and reload the image if the error message is displayed while downloading a new image file. Download an image file only through **RS-232 port**. . Contact technical support for old boards loaded with downloader v1.
Forcing download mode could be required if a wrong type of application image was loaded or other issues. Call our main office for more information



Steps to force the board into download mode.
(1) Remove Power
(2) Put a jumper on P6 as shown below.



(3) Power up the board
(4) Board is in download mode
(5) Download image
(6) Remove power and jumper on P6 after a new image is loaded
(7) Board is ready.

Website - DFM Configuration Software

Step 1. Go to our website WWW.DYNAMICFLOWCOMPUTERS.COM

Step 2. Click on the **Software** link located on the left hand side of the web page. You will be presented with two options: **Windows®** software and **DOS** software.

First look for your application under Windows, if you don't see your application listed here it means it only has DOS software.

Step 3. Select either Windows® or DOS software based on Step 2.

Step 4. On the new screen presented to you click on the application that you are trying to download. Once you hit the link it will ask you if you want to run or save the file in you computer. Select **SAVE.** (See illustration 1)

Step 5. The file will start to transfer to your computer. The download time depends on your Internet connection speed and the type of application that being downloaded.

Step 6. When the download if finish. Press the **OPEN** button to start the setup process. (See Illustration)

Step 7. Follow the steps in the application setup.

Website – Image File (Firmware)

Check the version number of image file**. The image file is only done when an application upgrade is needed**.

Step 1. Go to our website WWW.DYNAMICFLOWCOMPUTERS.COM

Step 2. Click on the **Software** link located on the left hand side of the web page, then you select **Firmware** option. All our image files are available for download. Only EEPROM based models like the SFC will need actual EEPROMS to be shipped out to you.

Step 3. On the new screen presented to you click on the application that you are trying to download. Once you hit the link it will ask you the location and file name to be saved.

Step 4. The file will start to transfer to your computer. The download time depends on your Internet connection speed and the type of application that being downloaded.

Step 5. After the download is finished, follow the steps in the image downloading setup.

Getting acquainted with the flow computer wiring:

Back terminal wiring:

The back terminal wiring indicates the overall positions of the terminal plugs and their functions. Though the back panel's jumpers are also shown, refer to the next drawing, "Back Panel Jumpers", for information on their settings and functions.
The MicroMV receives its power via the .top two pins on Terminal P1, on the left of the board. Also on Terminal P1 from top to bottom are inputs to the four serial connections
To the right (P4), from top to bottom, are two turbine inputs, density frequency input, and switch/status inputs and output.
Terminal P3, at the lower bottom, handles analog inputs and outputs. These are, in order from right to left, analog output one, analog input 1 & 2, RTD excitation, analog 3 & 4 or RTD, analog input return. Analog 3&4 can be used as RTD input 1,but the jumper for the RTD excitation has to be installed, and the flow computer has to be configured for RTD input.

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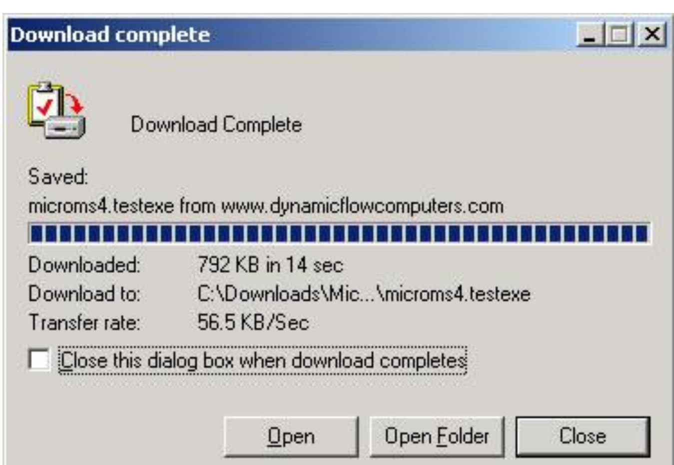

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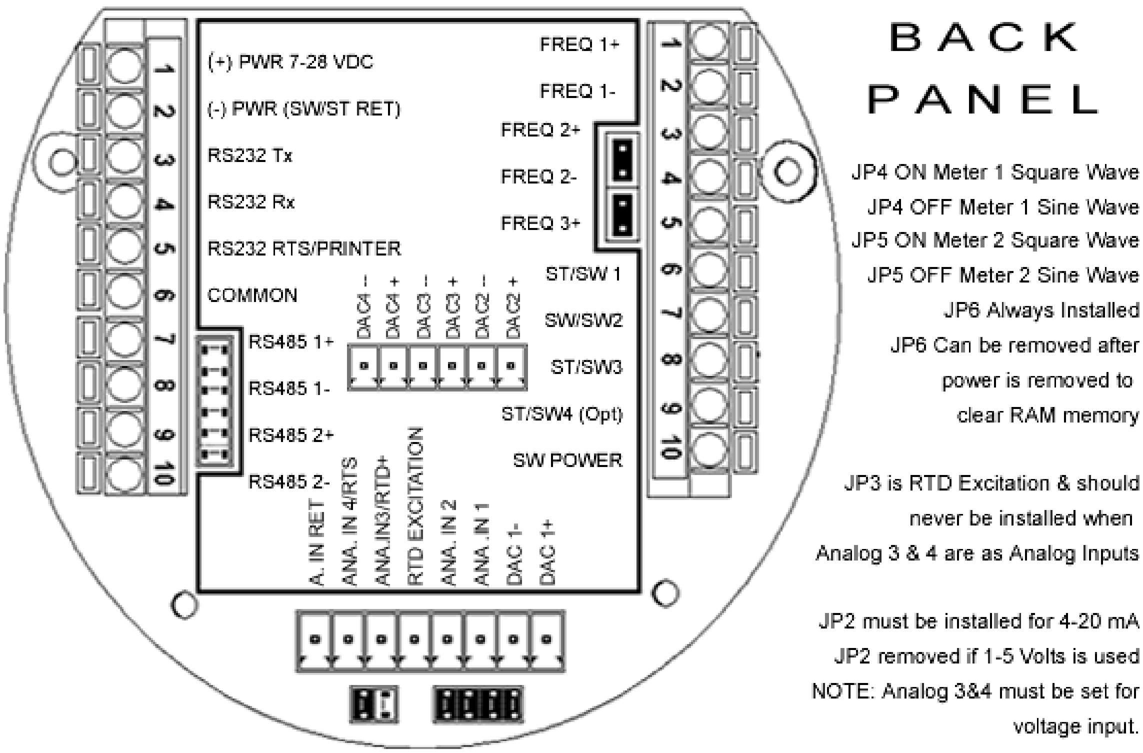
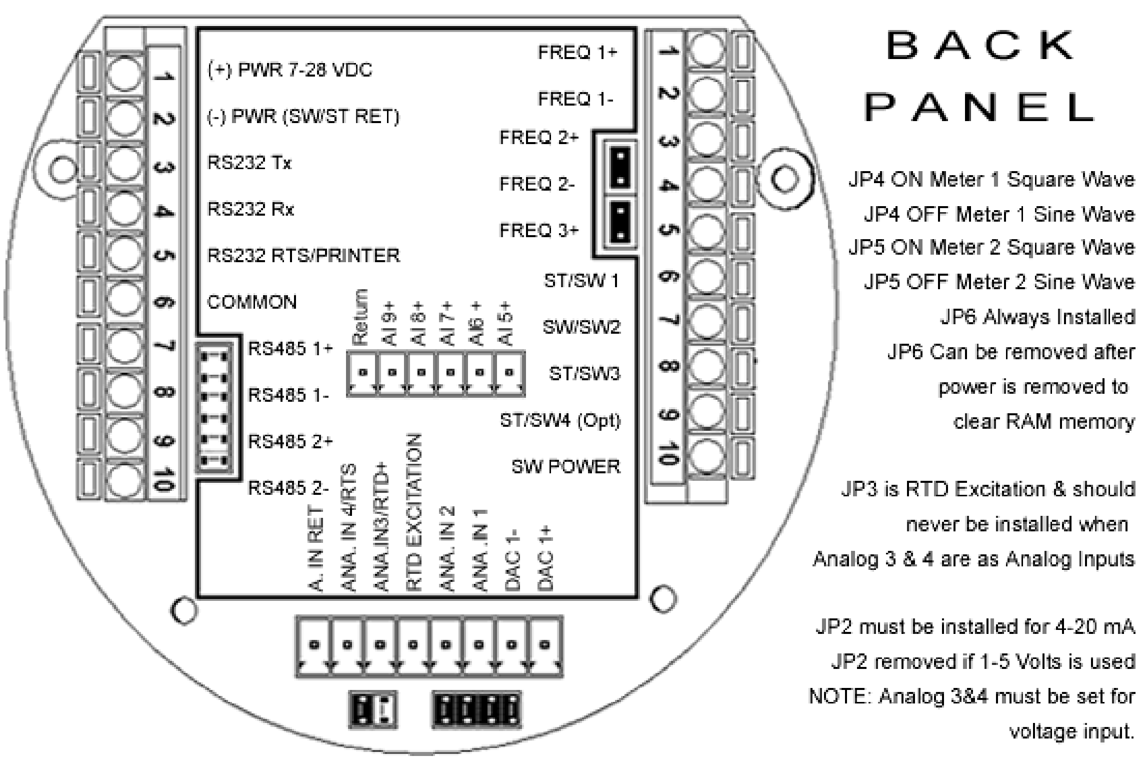
Back Panel Jumper

In this illustration, a jumper is “ON” when the jumper block is used to connect the jumper’s to prongs. “OFF” means the jumper block is completely removed or attached to only one of the two prongs.

4 analog outputs



9 analog inputs



INPUT/OUTPUT: Assigning and Ranging Inputs

Input/Output Assignment

We will now configure your MicroMG4 Flow Computer's inputs and outputs. The flow computer allows the user to configure the inputs and outputs. (I.e. Analog #1 is pressure for Meter #1). The flow computer does not use unassigned inputs.

How to assign a transmitter to an I/O point:

1 Click "Configure Device", configuration menu is prompted

2 On configuration menu, click "Input Assignment"

3 Enter assignments for DP, temperature, pressure, density and spare inputs.

4 **`Assignment (1-`*n*`)`**. Assignments 1-4 are analog inputs attached to terminal of the back panel. These inputs accept 4-20mA or 1-5 volts input and are suitable for temperature, pressure, density, or spare inputs. An assignment 5 is strictly RTD (temperature) input only for the meter, densitometer or spare. Assignment 7 indicates a density frequency input; it is assigned automatically once you choose live density frequency input in the setup menu at density type Assignment 10 (module 1) is for Rosemount multi-variable module only. DP, pressure, and temperature for the meter can be assigned. When a frequency type primary element is hooked to the flow computer, the Multi Variable pressure and temperature can be used and the DP becomes a spare input that could be assigned for strainer differential.

Ranging the Transmitter Inputs:

1. **Enter the range values for analog inputs**: after assigning the analog inputs, click square box next to the assignment to scale the 4-20mA. Enter the value at **`@4mA`** and **`@20mA`**. Enter both values similar to the way the transmitter is ranged. 1-5 volts are equivalent to 4-20mA. Enter the 1 Volt value at the 4mA, and 5 Volt value at 20mA. When the Multi Variable is used the 4-20 ma scale has no effect on anything and does not need to be configured for that input. The reason is simply that the flow computer gets the data via digital communication from the transmitter in engineering units, and therefore a scale is not needed. Normal pressure range is 0-3626, temperature –40 to 1200, DP –250 to 250, or -830 to 830 inches of water.

2. **Enter the high and low limits**: high limits and low limits are simply the alarm points in which you would like the flow computer to flag as an alarm condition. Enter these values with respect to the upper and lower range conditions. Try to avoid creating alarm log when conditions are normal. For example: If the line condition for the pressure is between 0 to 500 PSIG. Then you should program less than zero for low-pressure alarm, and 500 or more for high-pressure alarm. High limits are also used in the SCALE for the Modbus variables. The high limit is equivalent to 32767 or 4095. The low limit is not used for calculating the scale. The scale starts at zero to wherever the high limit value.

3. **Set up the fail code: `Maintenance`** and **`Failure Code`** values tell the flow computer to use a default value in the event the transmitter fails. The default value is stored in **`Maintenance`**. There are three outcomes: the transmitter value is always used, no matter what (**`Failure Code`** = 0); the **`Maintenance`** value is always used, no matter what (**`Failure Code`** = 1); and the **`Maintenance`** value is used only when the transmitter's value indicates that the transmitter has temporarily failed (**`Failure Code`** = 2).

RTD inputs will skip 4-20 mA assignment because RTD is a raw signal of 50Ω (ohms) to 156Ω. Readings beyond that range require a 4-20 mA signal to the flow computer or using the built in Rosemount Multi Variable transmitter. The Rosemount Multivariable has a range of –40-1200 degrees Fahrenheit.

Density coefficients for raw frequency inputs are programmed in this menu. The menu will only show parameters relevant to the live density selected (i.e., Solartron or UGC, etc.).

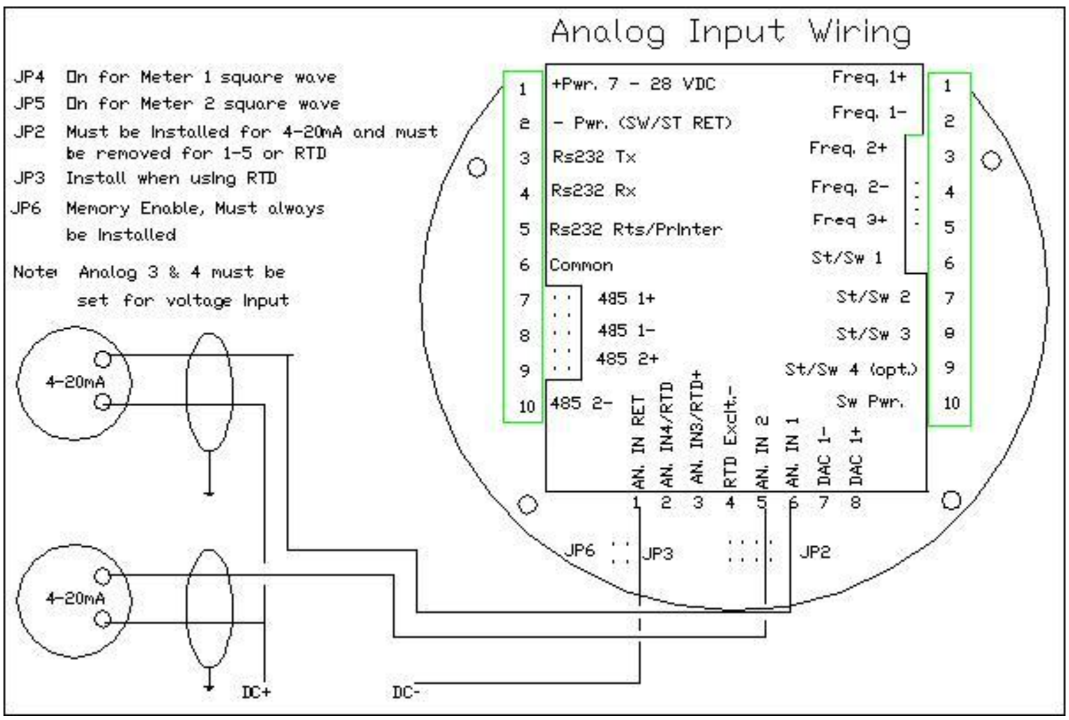
WIRING:

Wiring to the flow computer is very straightforward and simple. But still it is very important to get familiar with the wiring diagram.

Wiring the analog inputs:

Typical wiring for analog inputs 1 and 2 are shown in the drawing. Analog inputs 3 and 4 are to the left of analog 1 and 2 separated by the RTD excitation. Note that the analog input has only one common return that is the -Ve signal of power supply powering the transmitters.

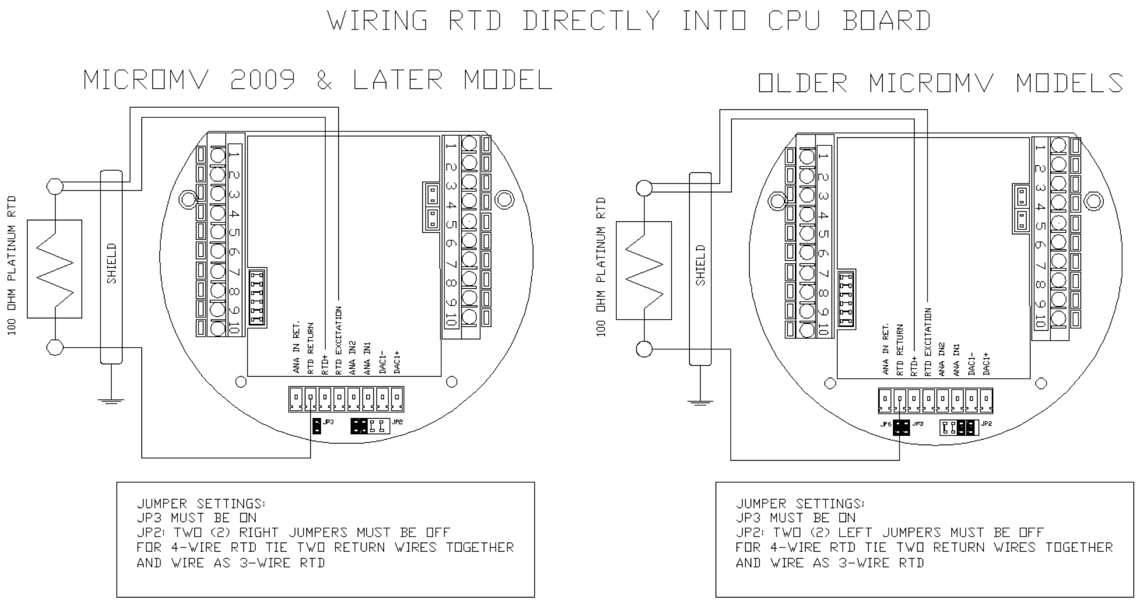
When wiring 1-5 volts, make sure to calibrate the flow computer for the 1-5 volt signal because the flow computer calibration defaults for the 4-20 ma, which is different from the 1-5 volts. JP2 must be removed for 1-5 volt inputs. The jumpers for analog 1-4 are in order from right to left. It is possible to remove the first two jumpers for analog 1 & 2 in for 1-5 volts signal and have analog in 3 & 4 as 4-20 mA signal. Signal line impedance provided by our flow computer is 250Ω.

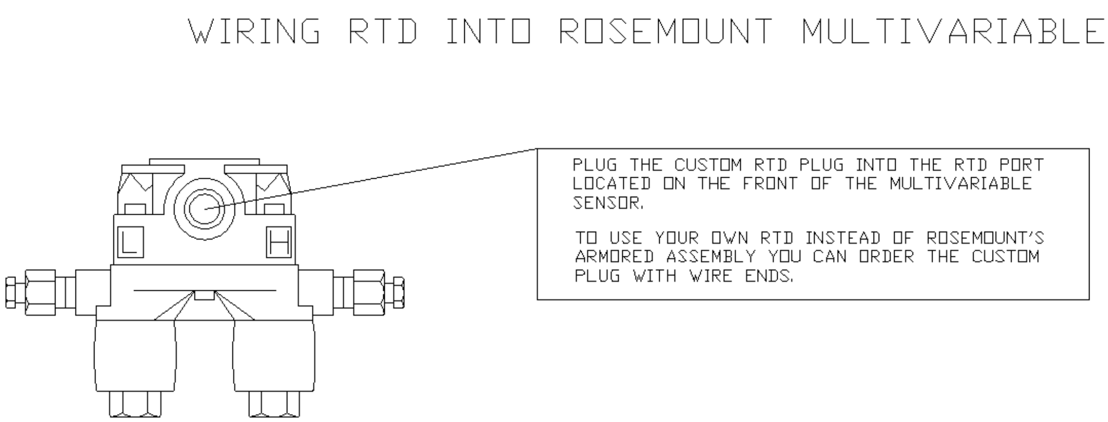


NOTE: *The 4-20mA or 1-5 volt DOES NOT source power to the transmitters. You can use the DC power feeding the flow computer to power the 4-20mA loops IF that power supply is FILTERED.*

RTD

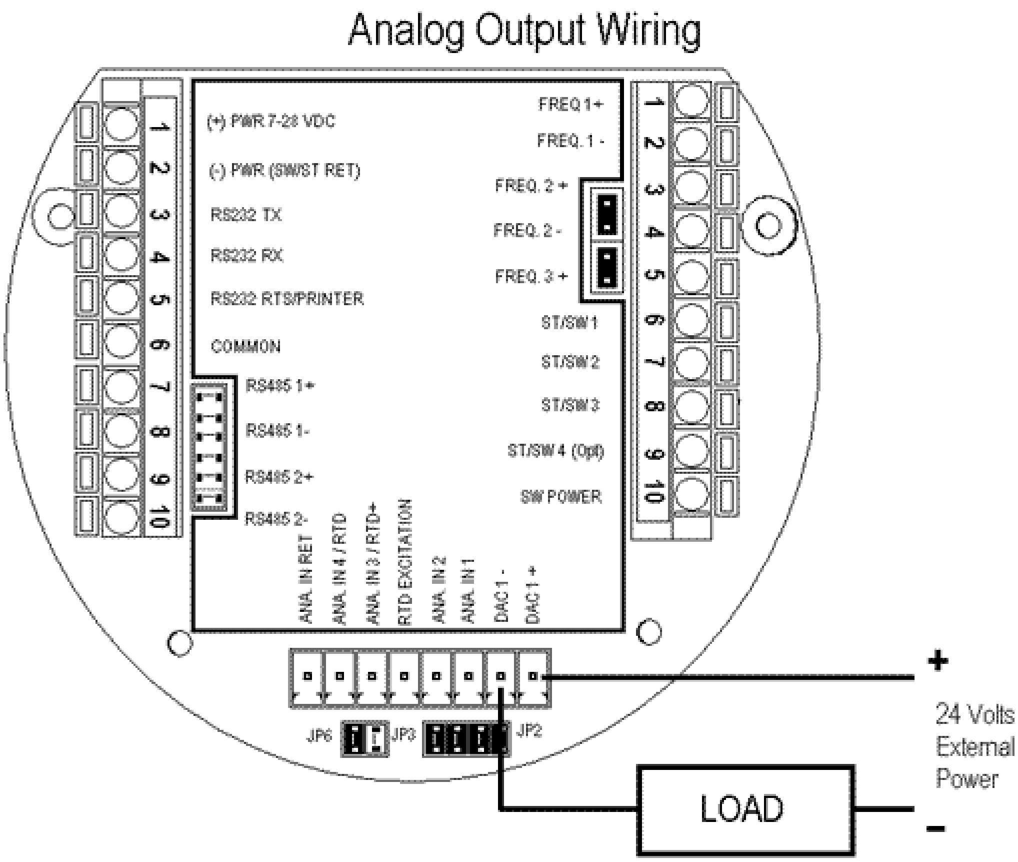
100Ω platinum **must** be used; a temperature range of -43°F to +300°F can be measured. RTD is to the left of analog in 1&2. The RTD excitation jumper has to be installed for the RTD to function. In the figure below, notice that the RTD requires a three wire connections. Internal excitation current source generated is in the micro AMP range.





Wiring analog output:

Wiring diagram shows typical Analog output wiring. Notice that analog outputs will regulate 4-20 mA current loops but DOES NOT source the power for it. External power is required.

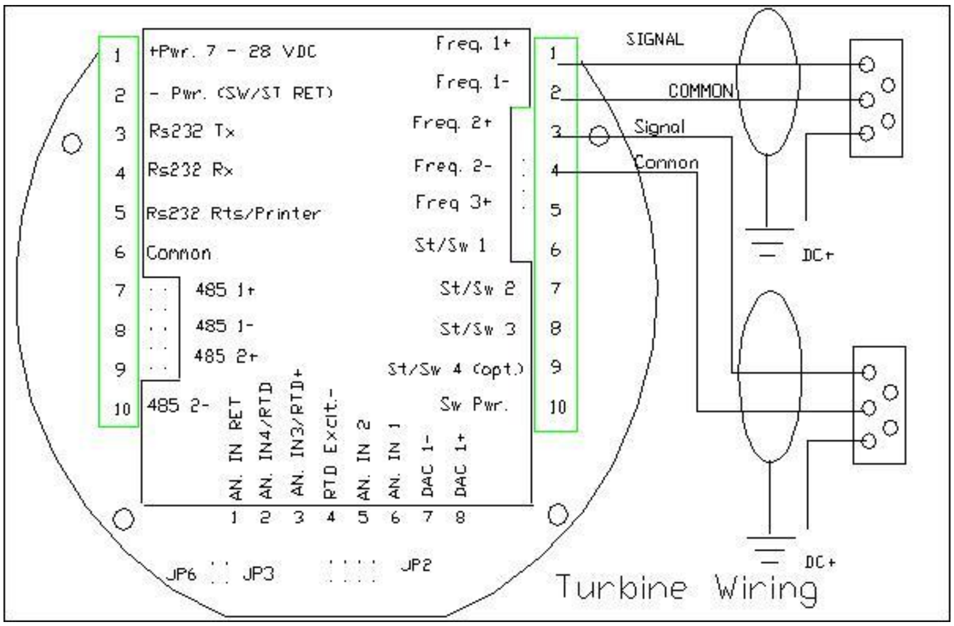


ASSIGNING/RANGING THE 4-20MA ANALOG OUTPUTS:

Go to the **`I/O`** assignment main menu and click **`Analog Output Assignment`**. A selection menu is prompted. Select the analog output number, and then enter what the 4 mA output will indicate and the 20 mA. Make sure that the 20 mA assignment value exceeds the upper range limit of what you assigned the Analog output for, otherwise the analog output will not update beyond 20 mA.

Turbine input wiring

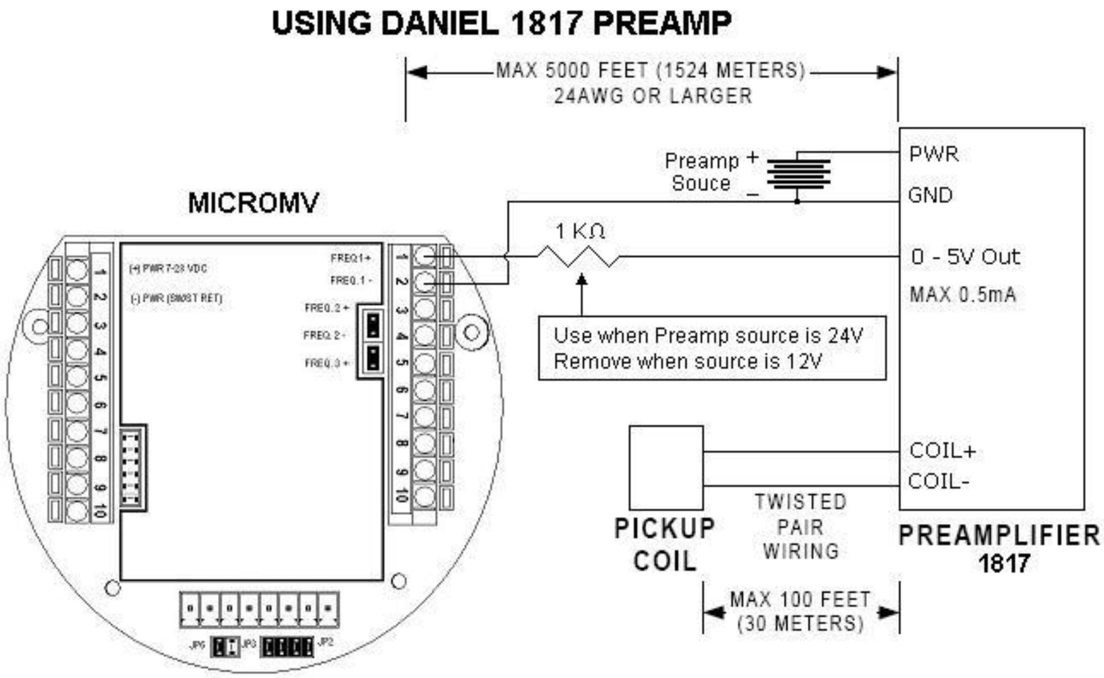
Go to view main menu, click turbine under **`Wiring Drawings`**. Two drawings above each other will show typical wiring for turbine meter 1 and turbine meter 2. When dual pick ups from the same turbine are connected, use the inputs for turbine 1 for pickup 1 and turbine 2 for the second pickup coil. When connecting sine wave directly from the pickup coil make sure the distance from the pickup coil to the flow computer is very short–less than 50 feet with shielded cable. In the event there is presence of noise, the distance must be shortened. When connecting sine wave signal, the JP4 jumper for meter 1 must not be installed and JP5 jumper for meter 2 must not be installed. (*JP4 and JP5 must be off when using sine wave*). On the other hand, when using square wave, the square wave signal can be sinusoidal but has to be above 5 volts peak to peak with less than 0.4 volts offset in order for the flow computer to read it. The JP4 jumper for meter 1 must be installed and JP5 jumper for meter 2 must be installed.



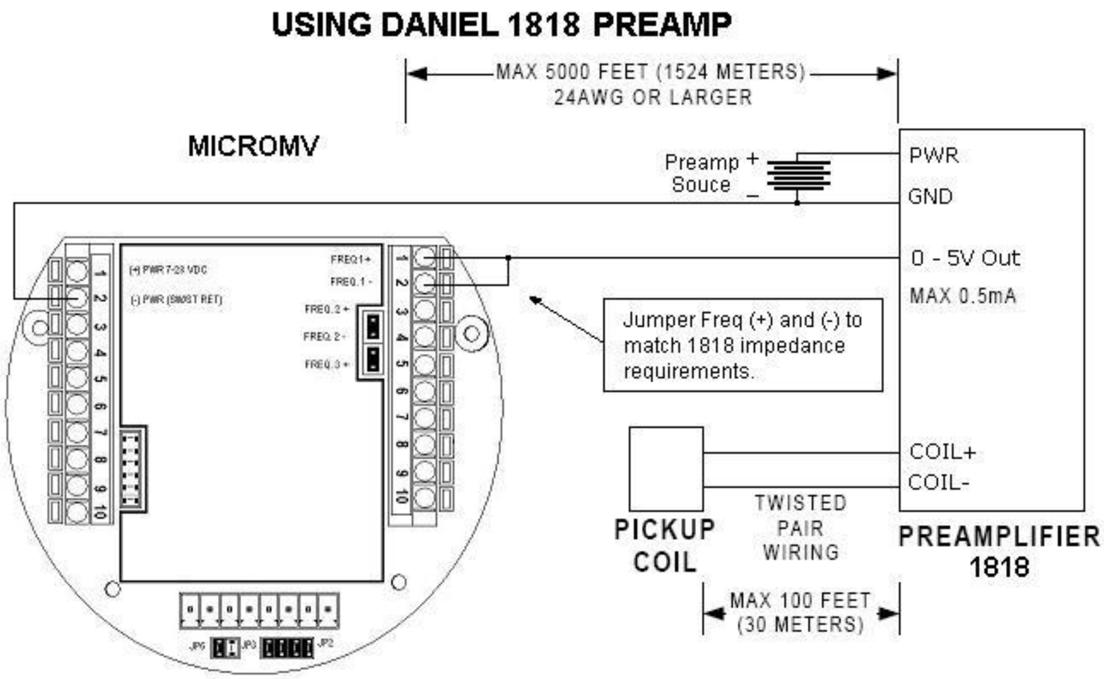
***Note**:*	*When connecting square wave input, the JP4 and JP5 connect the turbine return to the flow computer power return. Therefore, signal polarity is very important. Reverse polarity could result in some **damage or power loss**. When sine wave is used the signal polarity is usually of no significance.*

The turbine input is on the top of terminal P3 The third pin down from the top is Turbine/PD input 2 plus and below it is Turbine 2 minus. The third frequency input (fifth pin down) has the positive input and the negative is the power input ground. If a different power supply is used to power the densitometer then the power return for that input needs to be connected to the Micro MV power ground.

Turbine input wiring – Using Daniel 1817 Preamp



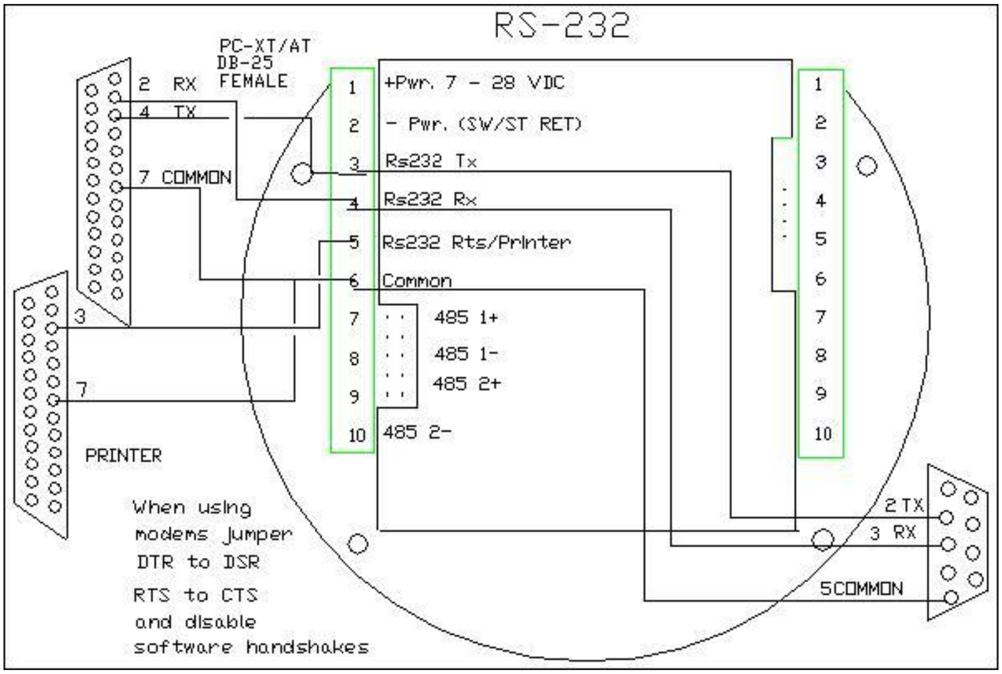
Turbine input wiring – Using Daniel 1818 Preamp



RS-232 connection:

The RS-232 is located on the left terminal block. The third, fourth, fifth, and sixth pins of the RS232 below the power input. The RS-232 RTS pin can be used for printing reports or shares common pin with the regular RS232 port.

Note: Twisted shielded cable is required.

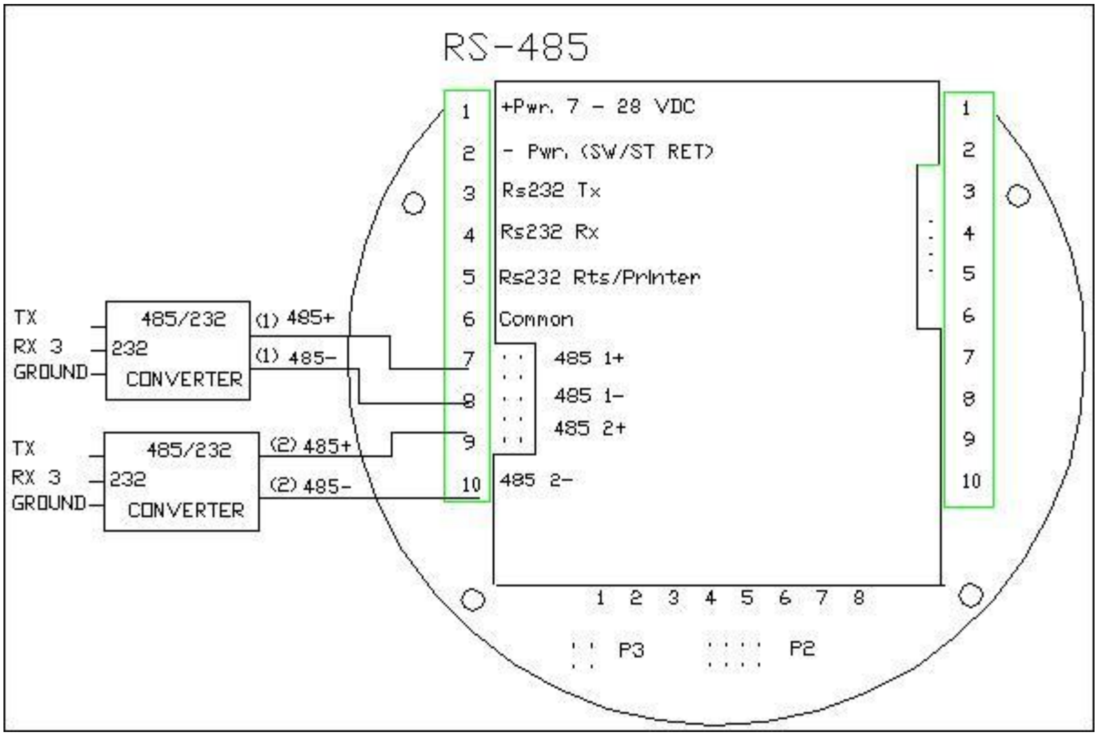


WARNING: *When the RS-232 terminal is used with a modem, external protection on the phone line is required. Jumper DTR to DSR, RTS to CTS, and disable software handshake on the modem RS232 connection*

RS-485:

RS-485 wiring is shown in the wiring diagram under **RS-485**. Two Rs485 channels are available for Modbus communication or as a master to other slave devices. I.e. gas G.C., external Modbus slave devices and token passing ring. The maximum distance when 18-gauge wire is used is 4000 feet.

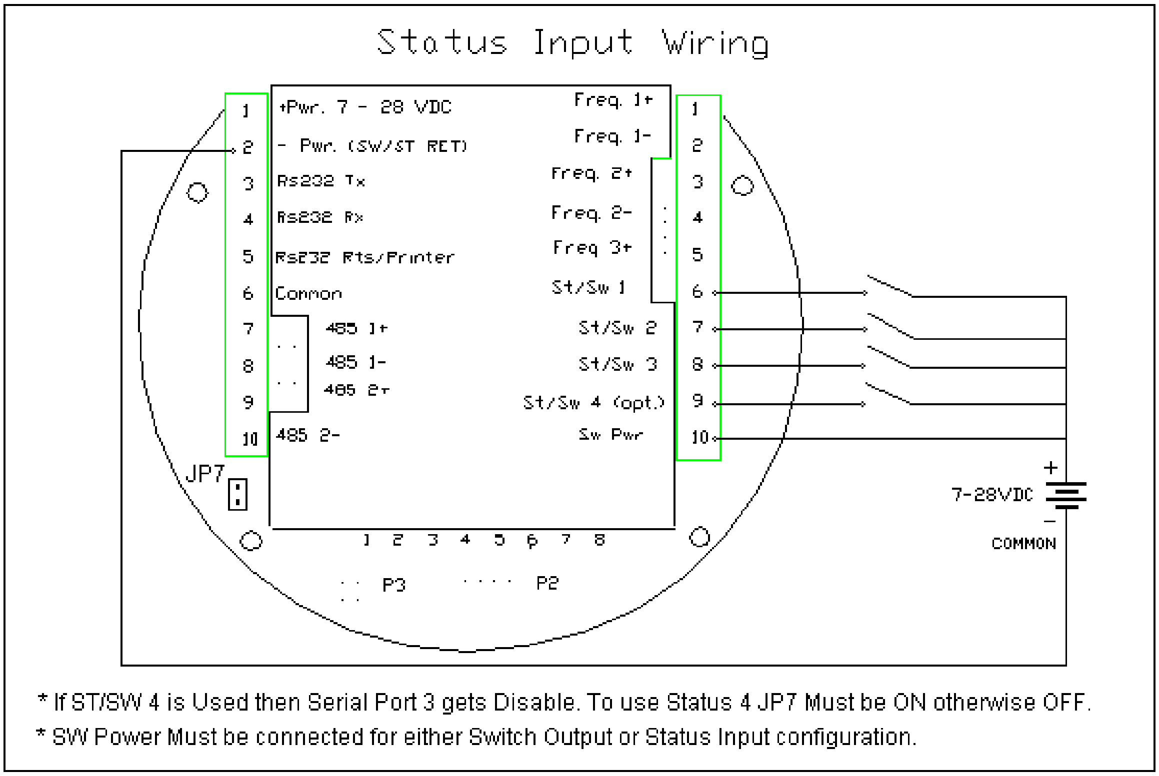
Note: Twisted shielded cable is required.



WARNING: When the RS-485 terminal is used, external transient protection and optical isolation is required, especially for long distance wiring.

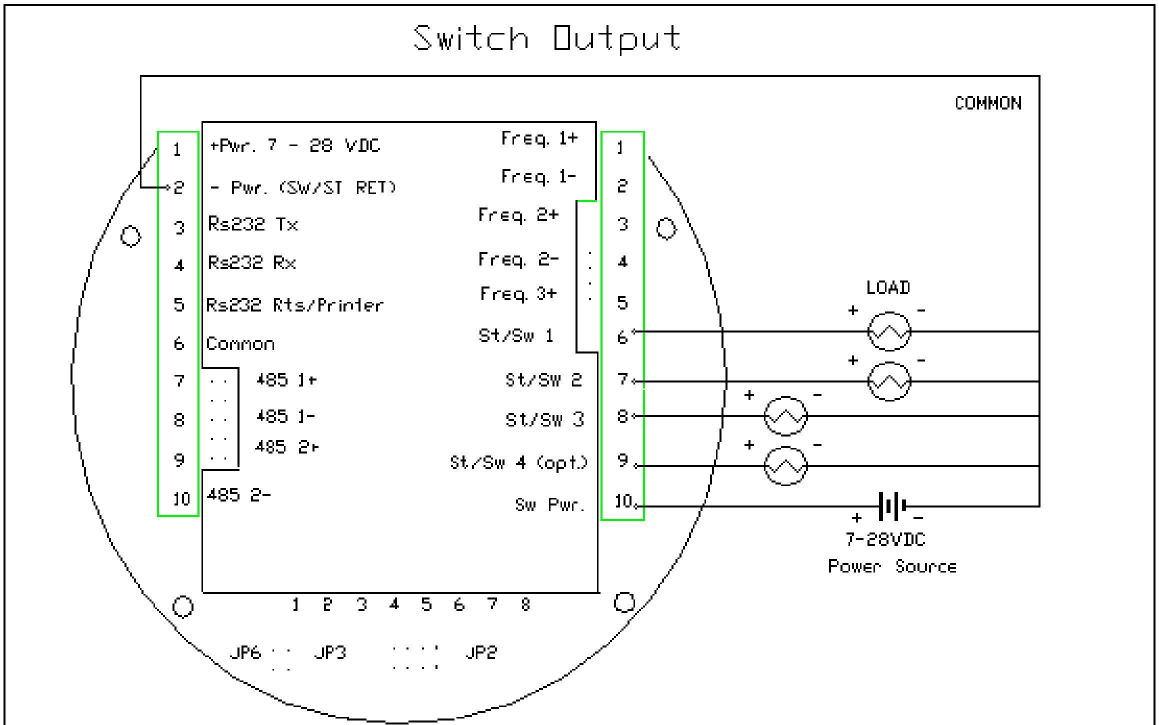
Wiring of status inputs:

There are 4 digital inputs or outputs that are user configurable. The configuration software will configure the input to be a status input or a switch output. The fourth digital I/O is optional and can only be used if the 2nd RS485 is not used. The standard status input has 4 volts of noise hysteresis, with on trigger point of 5 volts and an off point of 1 Volt.



Wiring of switch/pulse outputs:

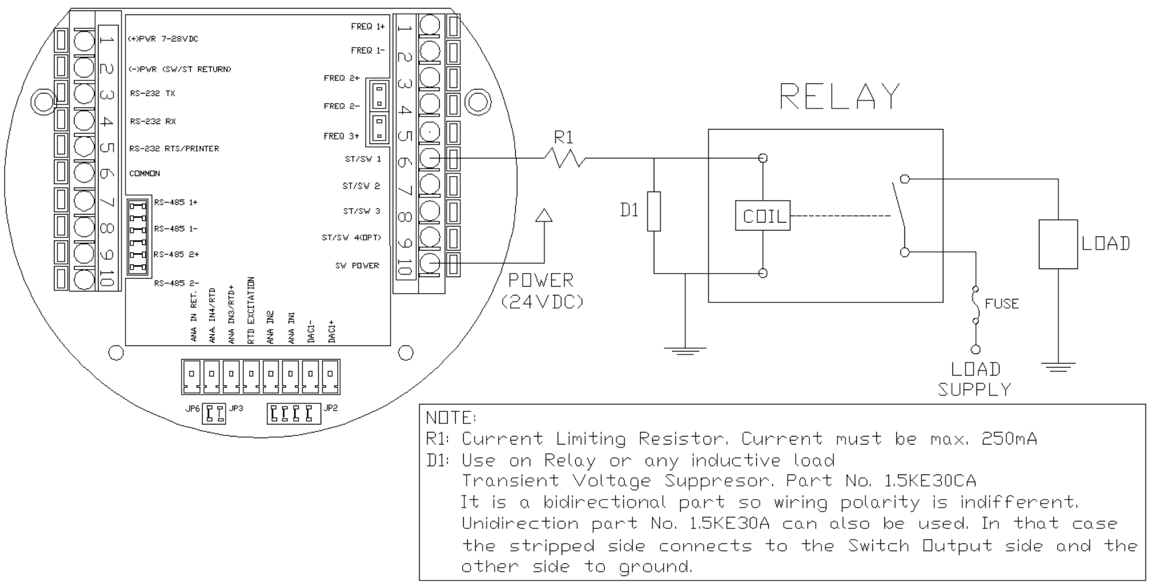
Switch one and two can be on /off or pulse type output up to 125 pulse per second. Notice that the switch outputs are transistor type outputs (open collector type with maximum DC rating of 350 mA continuous at 24 VDC) connections		
1	Status Input /switch output 1	Switch - Maximum rating: 350mA @24 volts Switch Output Range: 5-28 VDC Status Input Rating: 6-28 VDC
2	Status Input/switch output 2	
3	Status Input /switch output 3	
4	Status input/ switch output 4	



* When using ST/Sw4, Serial Port 3 gets disabled. They cannot be used at the same time.

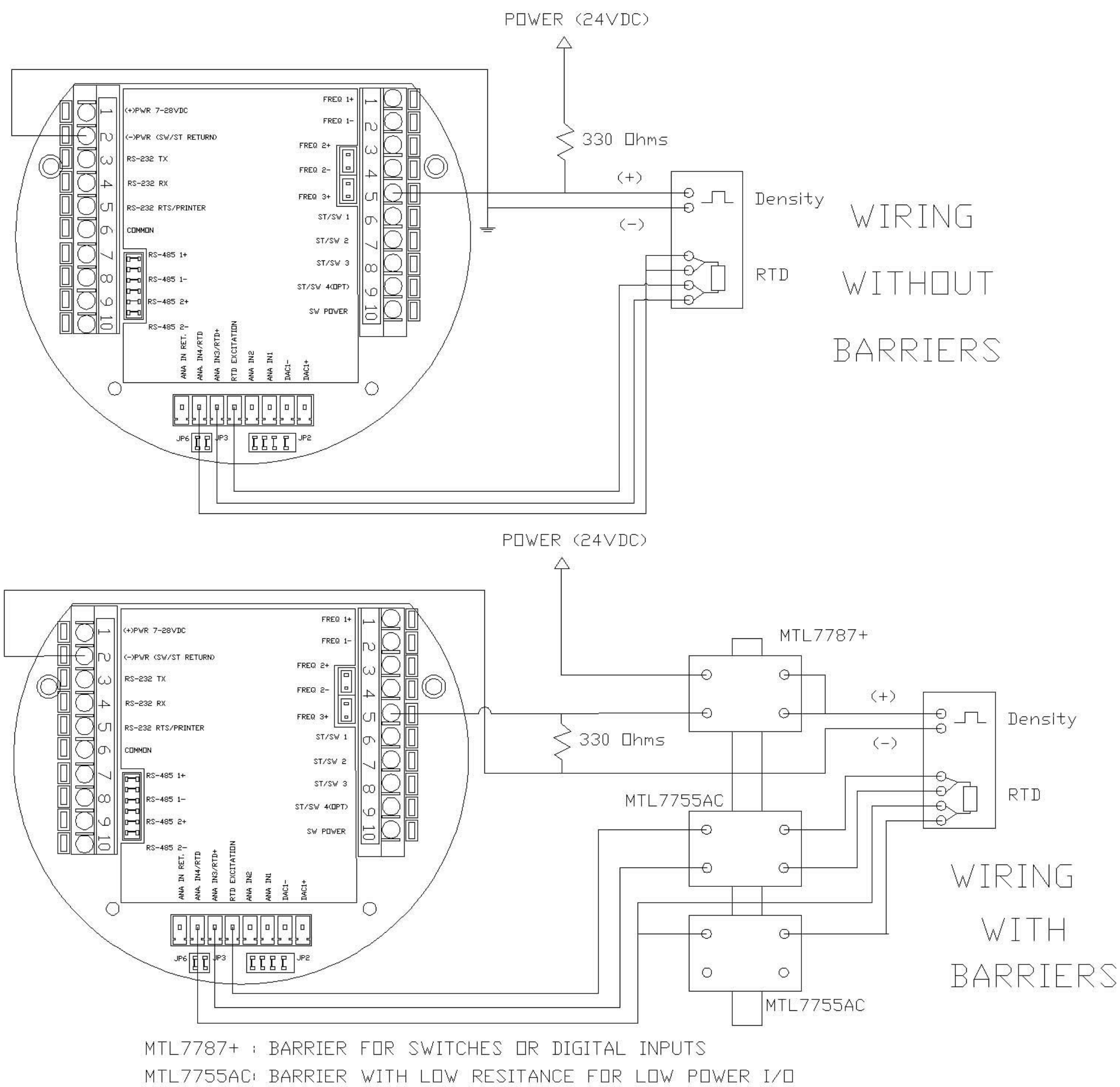
Switch Output to Relay Wiring Diagram

When wiring the Switch Outputs to an inductive load such as a relay, it is better to add transient protection to the flow computer's electronics due to the surge in voltage that inductive loads may create. This protection can be added as shown in the drawing below.



Density input wiring:

When using a live densitometer input with frequency signal, the signal can be brought into the MicroMV in its raw form. The MicroMV accepts a sine wave or square with or without DC offset.



Note:	*When wiring the density input polarity is of significance and reverse polarity could result in some damage or power loss. When Density input is 4-20mA it should be connected as a regular 4-20mA signal to the analog input and not the density frequency input.*

CALIBRATION

Analog Input 4-20mA or 1-5 volt signal

Calibrations are performed under **`Calibration`**. Select inputs to be calibrated, and then select full, single, offset calibration method.

OFFSET CALIBRATION:

For simple offset type calibration simply induce the signal into the analog input and make sure the MicroMV is reading it. After you verify that the MicroMV recognized the analog input, enter the correct mA reading, and then click OK. The offset type calibration is mainly used when a small offset adjustment needs to be changed in the full-scale reading. The offset will apply to the zero and span. Offset is the recommended method for calibrating the temperature input.

FULL CALIBRATION METHOD:

To perform full calibration be prepared to induce zero and span type signal.

1. Induce the low-end signal i.e. 4mA in the analog input.
2. Click inputs to be calibrated under calibration menu, click full calibration, enter the first point - the analog input value i.e. 4mA, and then click OK button.
3. Now be ready to enter the full-scale value. Simply induce the analog signal and then enter the second value i.e. 20mA, and then click OK button
4. ***Induce live values to verify the calibration***.

TO USE DEFAULT CALIBRATION

1. Select Analog Input
2. Select Reset calibration method
3. ***Now verify the live reading against the flow computer reading***

RTD calibration:

RTD Calibration is a 2-step process. The first step is a one time procedure to verify transducer linearity and is done at the time the meter is being setup. The second step is the routine calibration sequence.

Step 1 – Linearity Verification

1. Use a Decade box with 0-150 °F settings.
2. Connect RTD cable to this resistive element for verification of linearity. Verify low and high points. It must be within ½ degree.
3. Connect the actual RTD element and compare with a certified thermometer.
4. If not within ½ degree do a Full Calibration (See Full Calibration below). If problem persists verify other elements such as RTD Probe, connections, shield, conductivity of connectors, etc.

The purpose of the above procedure is to verify zero and span and make sure that the two points fall within the expected tolerance.

Step 2 – Routine Calibration

Once Linearity has been verified through Step 1, the routine calibration procedure is reduced to simply connecting the actual RTD and doing an offset point calibration (see offset calibration below).

Calibration after that will be simple verification for the stability of the transmitter. If it drifts abnormally then you need to verify the other parts involved.

RESET TO DEFAULT CALIBRATION

To go back to the default calibration simply press <F8> and scroll to the RTD input, and press <ALT> <R> key followed by <F3> function key.

OFFSET CALIBRATION:

For offset calibration simply go to **I/O | Calibration** and press <ENTER>. Once the flow computer shows communication status OK press <F8> function key and scroll to **RTD.** Induce a live value and wait for 10 seconds for the reading to stabilize. Then enter the live value followed by <F3> function key to download the direct reading. The value entered must be in ohms only.

FULL SCALE CALIBRATION:

1. Prepare low range resistive input (i.e., 80Ω) and High range resistive input (i.e., 120Ω). Go to the calibration menu and press <F8> function key. Scroll to the RTD input you are calibrating and press <ALT> <R> (key <ALT> and the letter R at the same time). Induce the low end (80Ω) resistive signal and then wait 10 seconds and enter 80 followed by pressing the <F3> function key.
2. Induce Higher range signal (120Ω) and wait 10 seconds, then enter the number 120 ohm and press the <F3> key.
3. ***Now verify the live reading against the flow computer reading***.

Calibration of Analog Output:

To calibrate the analog output against the end device follow the following steps:

1. Go to the calibration menu, select analog output, and then select method. Full calibration will cause the flow computer to output the minimum possible signal 4 mA. Enter the live output value reading in the end device i.e. 4 mA and click OK button. Now the flow computer will output full scale 20 mA. Enter the live output i.e. 20 then click OK button.
2. ***Now verify the output against the calibration device***.

Multi-Variable Transmitters (Model 205) – DP and Pressure

Calibrations are performed under `Calibration`. . Select inputs to be calibrated, and then select full, single, offset calibration method.

OFFSET CALIBRATION

1. Induce live value for temperature, pressure, or DP.
2. Select Multivariable DP, temperature, or pressure.
3. Select offset calibration method, enter offset, and click OK button.
4. ***Now read induce live values to verify the calibration.***

FULL SCALE CALIBRATION

1. Induce live value for temperature, pressure, or DP.
2. Select Multivariable DP, temperature, or pressure
3. Select full calibration method
4. . Induce the low range signal, enter the first point, and then click OK button.
5. Induce the high range signal, enter the second point, and then click OK button.
6. ***Now verify the live reading against the flow computer reading***.

TO USE DEFAULT CALIBRATION

1. Select Multivariable DP or pressure
2. Select Reset calibration method
3. ***Now verify the live reading against the flow computer reading***

While doing calibration before downloading any of the calibrated values, it is a good practice to verify that the Micro MV close reading to the induced value.
The DP reading must be re-calibrated for the zero offset after applying line pressure.

Multi-Variable Transmitters (Model 205)- RTD

Calibrations are performed under **I/O | Calibration**. Use the arrow keys to scroll to **Calibration-Multi-Variable** and press <ENTER>. After you press <ENTER> the screen should show **COMMUNICATION STATUS : OK**.

RTD Calibration is a 2-step process. The first step is a one time procedure to verify transducer linearity and is done at the time the meter is being setup. The second step is the routine calibration sequence.

Step 1 – Linearity Verification

1. Use a Decade box with 0-150 °F settings.
2. Connect RTD cable to this resistive element for verification of linearity. Verify low and high points. It must be within ½ degree.
3. Connect the actual RTD element and compare with a certified thermometer.
4. If not within ½ degree do a Full Calibration (See Full Calibration below). If problem persists verify other elements such as RTD Probe, connections, shield, conductivity of connectors, etc.

The purpose of the above procedure is to verify zero and span and make sure that the two points fall within the expected tolerance.

Step 2 – Routine Calibration

Once Linearity has been verified through Step 1, the routine calibration procedure is reduced to simply connecting the actual RTD and doing an offset point calibration (see offset calibration below).

Calibration after that will be simple verification for the stability of the transmitter. If it drifts abnormally then you need to verify the other parts involved.

RESET TO DEFAULT CALIBRATION

To go back to the default calibration simply press <F8> and scroll to the RTD input, and press <ALT> <R> key followed by <F3> function key.

OFFSET CALIBRATION:

For offset calibration simply go to **I/O | Calibration** and press <ENTER>. Once the flow computer shows communication status OK press <F8> function key and scroll to **RTD.** Induce a live value and wait for 10 seconds for the reading to stabilize. Then enter the live value followed by <F3> function key to download the direct reading. The value entered must be in degrees only.

FULL SCALE CALIBRATION:

1. Prepare low range resistive input (i.e., 80Ω) and High range resistive input (i.e., 120Ω). Go to the calibration menu and press <F8> function key. Scroll to the RTD input you are calibrating and press <ALT> <R> (key <ALT> and the letter R at the same time). Induce the low end (80Ω) resistive signal and then wait 10 seconds and enter the equivalent temperature in degrees followed by pressing the <F3> function key.
2. Induce Higher range signal (120Ω) and wait 10 seconds, then enter the temperature degrees equivalent to 120 followed by pressing the <F3> function key.
3. ***Now verify the live reading against the flow computer reading***.

Verifying Digital Inputs and Outputs

Use the diagnostic menu. A live input and output is displayed. On the top of the screen pulse inputs and density frequency input are shown. Compare the live value against the displayed value on the screen. Failure to read turbine input could be a result of a bad preamplifier or the jumper selection for sine and square wave input are not in the correct position. Refer to wiring diagram **View | Wiring Drawing| Turbine** for proper turbine input wiring. Density input can be sine or square wave with or without DC offset. Minimum accepted signal has to be greater than 1.2 volt peak to peak. Status input is shown below the frequency input to the left of the screen. When the status input is on, the live diagnostic data will show **ON**. Minimum voltage to activate the status is 6 volts with negative threshold of 2 volts. The switch outputs are open collector and require external voltage

CHAPTER 2: Data Entry and Configuration Menus

Introduction to the Micro M.V. Computer Software

The MicroMG4 software is constructed around a menu-driven organization

Your MicroMv Gas software is constructed around a menu-driven organization. Begin your MicroMv Gas software and, across the top of your screen, you see a bar like this:

≡ File Port Diag Meter I/O Report Wiring Print TEST

This is called the *menu bar*. It consists primarily of series of topics–**Port**, **Diag**, and so forth. When you move the cursor to a topic you will see a list–we will call it a *menu list*– of topics related to the main topic on the menu bar.

At the bottom of the screen is the *prompt bar*. It informs you of appropriate actions that you can perform while your cursor is at its present location. In this example:

↑ ↓ ← → to Choose Enter to Select F1=Help

you are informed that your valid choices are the four arrow (′, ≤,⁄, and ∞)keys, the ←ENTER key, and the □ key.

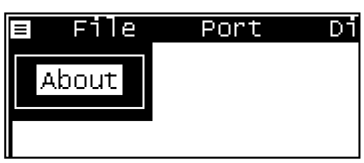
Another important area of the screen is the *filename area*. This is the rightmost section of the menu bar; it informs you what configuration file you are presently viewing and editing. In the example above, you are editing the file TEST. When you first begin the MicroMv gas software, however, it will display ???????? because no file has yet been chosen. Until you choose a file to edit or view, by opening either an existing file or a new one, you will not be able to move from the **File** menu item.

The center portion of the screen is simply called the *viewing area*. Here you view either various menu lists or the *prompt window* associated with an item in a menu list after it is selected (that is, after you press ←ENTER). When you are in a prompt window the message PROMPT appears in the filename area.

Under certain conditions you will have a screen where the viewing area takes up the whole screen and the menu and/or prompt bars disappear. Examples of these are the wiring diagrams, the calibration windows, and the **Diag** windows.

About

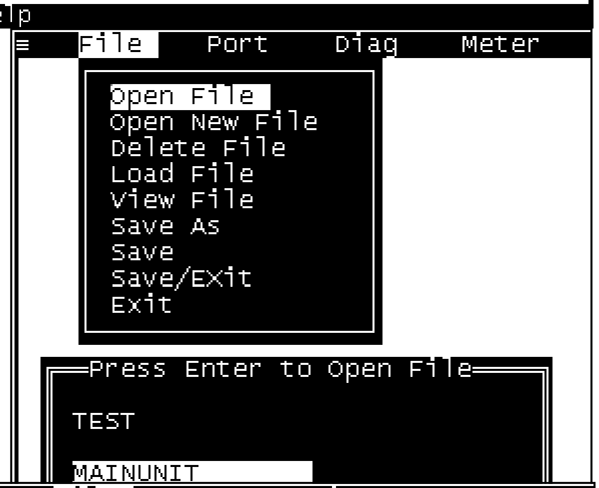
Displays the version number of EPROM and PC configuration menu. Press <Esc> to Exit.



File

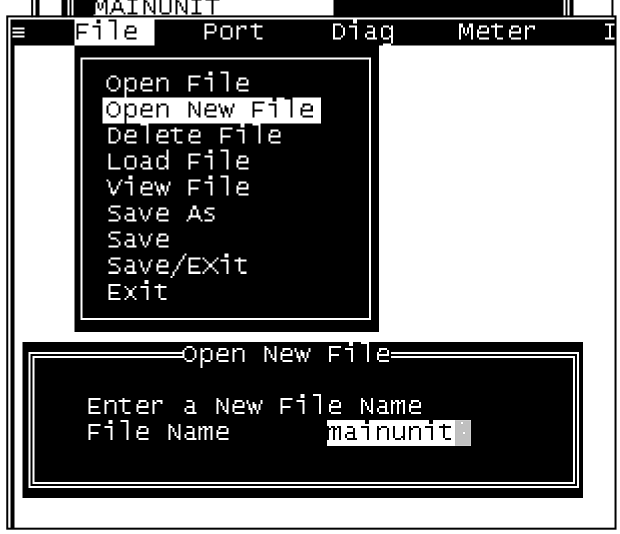
Open a File

Use this function to open an existing configuration file. After a file is opened it becomes the currently active file; its contents can be viewed and its parameters can be edited.
When this function is chosen a list of existing configuration files is displayed. Use the cursor arrow keys to move the cursor to your selection, then press the ←ENTER key.



Open a New File

Create a new file to store all the programmed information for one Micro MV Gas Flow Computer. You are prompted for the new file's name of eight characters or less. If you enter the name of a pre-existing file, the software informs you of this and prompts you for your file's name again. After a file is opened it becomes the currently active file; its contents can be viewed and its parameters can be edited.



Delete a File

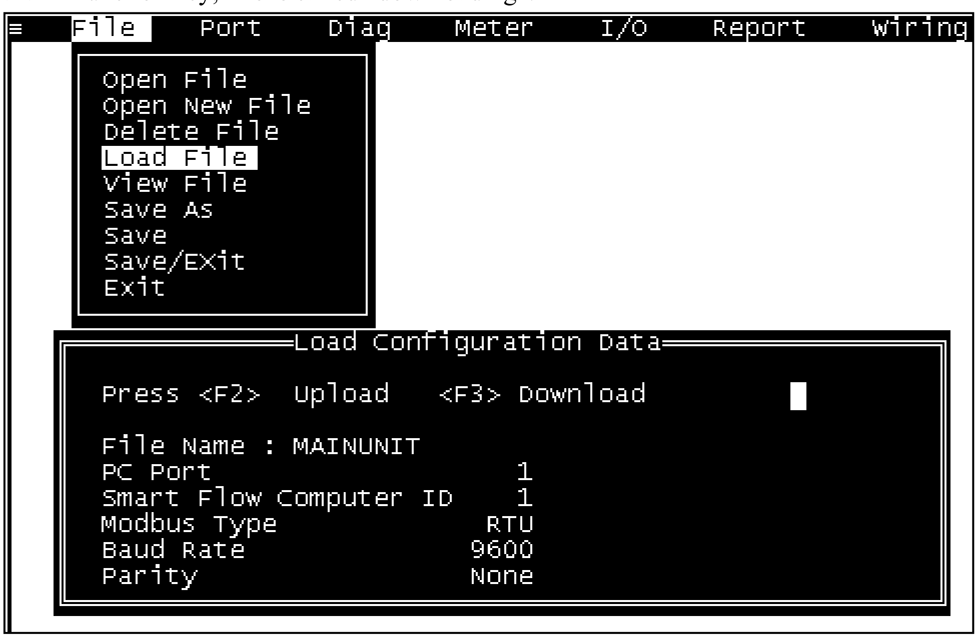
Delete a file when that file is no longer needed. When this function is chosen a list of existing configuration files is displayed. Use the arrow keys to move the cursor to your selection, then press $f\Delta$ to delete the file.

Load File

Use this function to exchange parameter values between the PC and the Micro MV Gas Flow Computer. After this action, all parameter from the P.C. are in the Micro MV Gas Flow Computer.

To read all current parameters from the Micro MV Gas Flow Computer to the currently active file in the PC, press the □ function key; this is called “uploading”.

To write all current parameters from the currently active file in the PC to the Micro MV Gas Flow Computer, press the □ function key; this is called “downloading”.



View File

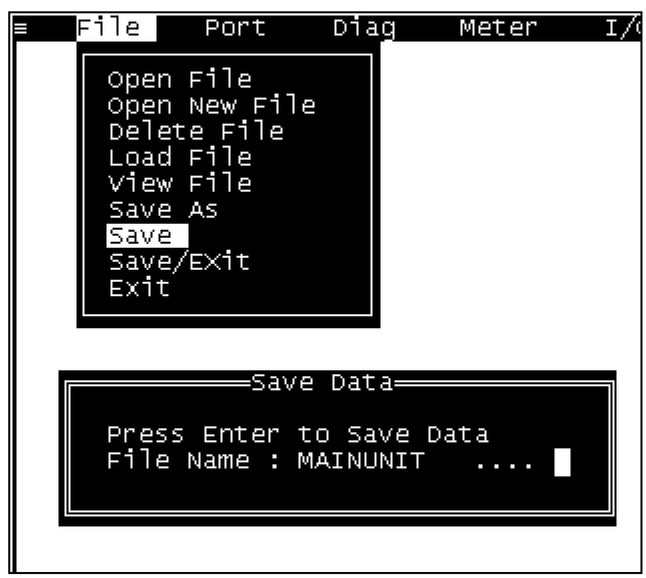
Unlike every other file function, View File does not act upon configuration files. Instead, View File allows the user to view files that were previously captured in a report. For capturing data in a report, look for these items under the **Report** menu header:

Prev. Hourly Data
Prev. Daily Data
Prev. Monthly Data
Alarm Data
Audit Trail Report
TicKet Report
Auto Data Retrieval
Current Data

When viewing a file use PageUp and PageDown to browse through it.

Save As

Use Save As to save the parameters in the currently active file (that is, the parameter values currently being edited) to a new file. You are prompted for the new file's name of eight characters or less. If you enter the name of a pre-existing file, the software informs you of this and prompts you for your file's name again. The original file will remain in memory.



Save

When permanent modifications are performed on a file, user must save the new changes before exiting the program, or proceeding to open a different file.

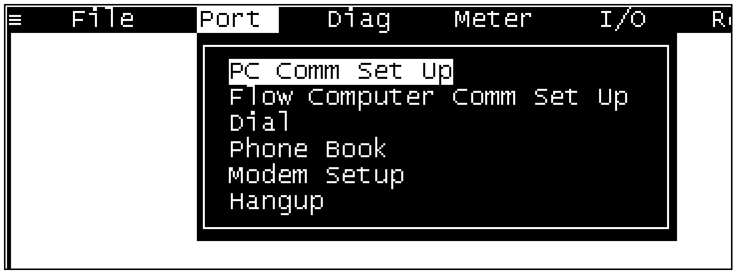
Save and Exit

Exit the program and save the parameters that were changed.

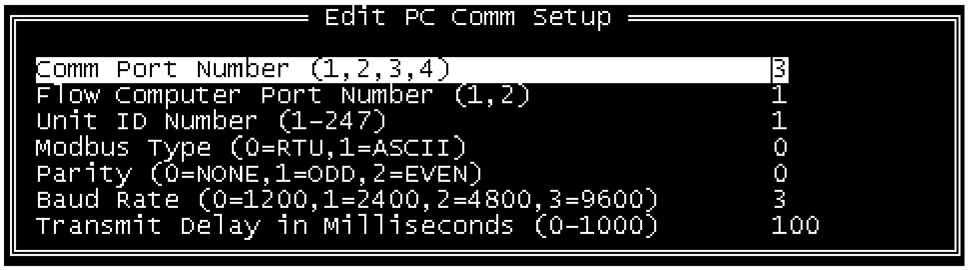
Exit

Exit without saving new modified parameters.

PORT



PC Communication Set Up



Communication Port Number (1,2,3,4)

Enter the PC port used to communicate with the MicroMv Gas Flow Computer.

Flow Computer Port Number

There are three available ports in the Flow Computer. Port 1/Port 3 is the RS-485 port that can only be a Modbus port. Port 2 is the RS-232 port that can be user configurable as printer/Modbus. The PC set up must match the Micro MV Gas Computer port set up.

Unit ID Number

The Unit ID Number is used strictly for communication purposes; it can take any value from 1 to 247.

> *Note: Do not duplicate the Unit ID number in a single communication loop! This situation will lead to response collisions and inhibit communications to units with duplicate ID numbers.*

Only one master can exist in each loop.

Modbus Type

> *Note: this parameter must be set the same for both the PC and the MicroMV Gas Flow Computer for communication to occur.*

The Modbus Communication Specification is either Binary RTU or ASCII.

Parity

> *Note: this parameter must be set the same for both the PC and the Micro MV Gas Flow Computer for communication to occur.*

0 = RTU - NONE
1 = ASCII - EVEN or ODD

Set the parity to match the **Modbus Type**.

Baud Rate

> *Note: this parameter must be set the same for both the PC and the Micro MV Gas Flow Computer for communication to occur.*

Baud rate is defined as number of bits per second. The available selections are 1200, 2400, 4800, or 9600.

Transmit Delay

This Delay in milliseconds is used to allow handshaking between the PC and the Micro MV Gas Flow Computer. The PC will hold the RTS line high for the specified Transmit Delay time. After that time expires the data stream will begin transmitting. Transmit Delay is applicable regardless of the type of communication with the Micro MV Gas Flow Computer (RS-232 or RS-485).
This function can be very useful, especially when using a half-duplex RS-485 port; otherwise the RS-485 port will never turn off. A delay of 50 milliseconds is normally sufficient.

Flow Computer Communication Set Up

Unit ID Number

The Unit ID Number is used strictly for communication purposes; it can take any value from 1 to 247.

> *Note: Do not duplicate the Unit ID number in a single communication loop! This situation will lead to response collisions and inhibit communications to units with duplicate ID numbers.*

Only one master can exist in each loop.

Port #1/#3 Modbus Type

> *Note: this parameter must be set the same for both the PC and the Micro MV Gas Flow Computer for communication to occur.*

The Modbus Communication Specification is either Binary RTU or ASCII.

Port #1/#3 Parity

> *Note: this parameter must be set the same for both the PC and the Micro MV Gas Flow Computer for communication to occur.*

0 = RTU - NONE
1 = ASCII - EVEN or ODD

Set the parity to match the **Modbus Type**.

Port #1/#3 Baud Rate

> *Note: this parameter must be set the same for both the PC and the Micro MV Gas Flow Computer for communication to occur.*

Baudrate is defined as number of bits per second. The available selections are 1200, 2400, 4800, or 9600.

Port #1/#3 RTS Delay

This function allows modem delay time before transmission. The Micro MV Gas Flow Computer will turn the RTS line high before transmission for the entered time delay period.

Port #2 Baud Rate

Baud rate is defined as number of bits per second. The available selections are 1200, 2400, 4800, or 9600.

Port #2 Type

RTS line has dual function selection; either RTS for driving request to send or transmit to serial printer.

Port #2 Modbus Type

Note: this parameter must be set the same for both the PC and the Micro MV Gas Flow Computer for communication to occur.

The Modbus Communication Specification is either Binary RTU or ASCII.

Port #2 Parity

0 = RTU - NONE

1 = ASCII - EVEN or ODD

Set the parity to match the **Modbus Type**.

Printer Port - Number of Nulls

This function is used because no handshaking with the printer is available and data can become garbled as the printer's buffer is filled. The Micro MV Gas Flow Computer will send nulls at the end of each line to allow time for the carriage to return. Printers with large buffers do not require additional nulls. If data is still being garbled, try reducing the baud rate to 1200.

Slave Units

The Micro MV can poll up to three slaves

Slave Unit

The Slave Unit ID Number is used strictly for communication purposes; it can take any value from 1 to 247. Enter slave ID only if MPU 1200 series is used and skip the following entries- variable type and destination address.

VT – Variable Type

Variable type describes the position of high, low words of slave device. When 32 bits (two words) register is polled, it is essential to define where the highest significant word.

Code	**Description**	*1. Sequence in words*
0	2 registers of 16 bits integers	High, Low
1	1 register of 32 bits floating	Low, High
2	2 registers of 16 bits floating	Low, High
3	1 register of 32 bits integer	High, Low
4	2 registers of 16 bits integers	Low, High
5	1 register of 32 bits floating	High, Low
6	2 registers of 16 bits floating	High, Low
7	1 register of 32 bits integer	Low, High

DEST - Destination Address

Destination defines where the polled variables are used in the flow computer. Variable statements and other pre-defined locations are accepted. Pre-defined locations are temperature, pressure, and density. Variables can be accessed through the display and reports.

0	Floating #1 (7061)	**10**	Integer #1(5071)	**20**	M#1 TF	**30**	M#3 TF
1	Floating #2 (7062)	**11**	Integer #2(5073)	**21**	M#1 PF	**31**	M#3 PF
2	Floating #3 (7063)	**12**	Integer #3(5075)	**22**	M#1 DF	**32**	M#3 DF
3	Floating #4 (7064)	**13**	Integer #4(5077)	**23**	M#1 DB	**33**	M#3 DB
4	Floating #5 (7065)	**14**	Integer #5(5079)	**24**	M#1 DP	**34**	M#3 DP
5	Floating #6 (7066)	**15**	Integer #6(5081)	**25**	M#2 TF	**35**	M#4 TF
6	Floating #7 (7067)	**16**	Integer #7(5083)	**26**	M#2 PF	**36**	M#4 PF
7	Floating #8 (7068)	**17**	Integer #8(5085)	**27**	M#2 DF	**37**	M#4 DF
8	Floating #9 (7069)	**18**	Integer #9(5087)	**28**	M#2 DB	**38**	M#4 DB
9	Floating 10 (7070)	**19**	Integer 10(5089)	**29**	M#2 DP	**39**	M#4 DP

ADDR - Source Address

Source Defines the actual registers being polled from the slave device. Source address is considered to be continuous without zero address in between.

Example : Meter #1 density uses micro motion density.

Slave ID = Micro Motion ID ***VT*** = 2, ***DEST***=22, ***ADDR***=248

Gas Chromatograph Communcation Set up

Note: AGA8 Detailed Method must be seleceted, and G.C. modbus registers have to configured.

G.C.Unit ID

Gas Chromatograph Modbus Communication ID number to be polled by the Master Flow Computer. Flow Computers in listen mode must have the G.C. Modbus ID configurated, so they can recognize the G.C. response.

G.C.Stream ID

Modbus holding register where the current stream number resides. When the master flow computer reads this address, all flow computers will recognize the current stream composition.

G.C.Unit ID

Gas Chromatograph Modbus Communication ID number to be polled by the Master Flow Computer. Flow Computers in listen mode must have the G.C. Modbus ID configurated, so they can recognize the G.C. response.

VT – Variable Type

Variable type describes the position of high, low words of slave device. When 32 bits (two words) register is polled, it is essential to define where the highest significant word.

Code	**Description**	**Sequence in words**
0	1 register of 32 bits floating	High, Low
1	1 register of 32 bits floating	Low, High

DEST - Destination Address

Destination defines where the polled variables are used in the flow computer. Variable statements and other pre-defined locations are accepted. Pre-defined locations are temperature, pressure, and density. Variables can be accessed through the display and reports.

0	Methane
1	Nitrogen
2	Carbon Dioxide
3	Ethane
4	Propane
5	Water
6	Hydrogen Sulfide
7	Hydrogen

8	Carbon Monoxide
9	Oxygen
10	i-Butane
11	n-Butane
12	i-Pentane
13	n-Pentane
14	n-Hexane
15	n-Heptane

16	n-Octane
17	n-Nonane
18	n-Decane
19	Helium
20	Argon
21	S.G.
22	Heating Value BTU

ADDR - Source Address

Source Defines the actual registers being polled from the slave device. Source address is considered to be continuous without zero address in between.

Example : Heating Value BTU

DEST=22, ***ADDR***=7081

Dial

Use the cursor arrow keys to move the cursor to the desired phone number and press ←ENTER. Dial's display indicates the owner of each phone number according to the Phone Book.
Dial cannot add new phone numbers; it can only dial numbers that have previously been entered in the Phone Book.
Example: T,9,1800-530-5539 instructs the dialer to use tone dialing, pause, dial 9 for an outside line, pause, then dial the number. See Phone Book for more information.

Phone Book

Phone Book lists all the phone numbers with the phone's owner. New numbers can be added to the list.

<Arrow Keys> Select Number to Modify or Delete.

A Add new entry to phonebook.

f + Δ Delete selected entry.

M or ←ENTER Modify selected entry.

<Esc> Exit and save changes.

Phone Book Edit

Type name, press ♥, and type phone number. Press ←ENTER to save, <Esc> to leave entry unchanged. In the phone number the following codes may be used:

<0-9> Dial digit

<P> Change to pulse dialing

<T> Change to tone dialing

<Comma> Pause

Example: T,9,1800-530-5539 instructs the dialer to use tone dialing, pause, dial 9 for an outside line, pause, then dial the number.

Modem Setup

<Modem Dial Prefix> Enter the string sent to the modem before the phone number. Normally either "ATDT" (dial tone) or "ATDP" (dial pulse)

<Modem Dial Suffix> Enter the string sent to the modem after the phone number. Normally just "^M" (CR)

<Modem Hangup String> Enter the string sent to the modem to hang-up the phone.

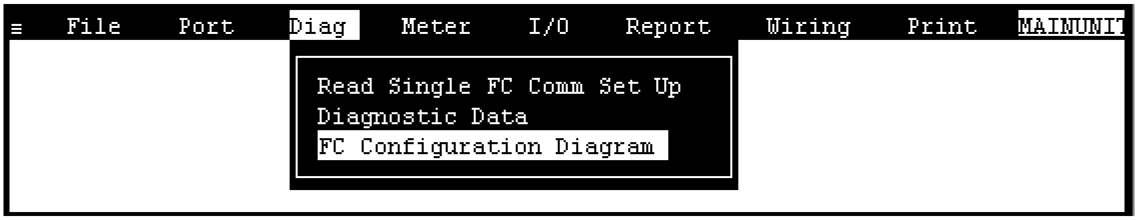
See your modem manual for other characters.

Hang-up Phone

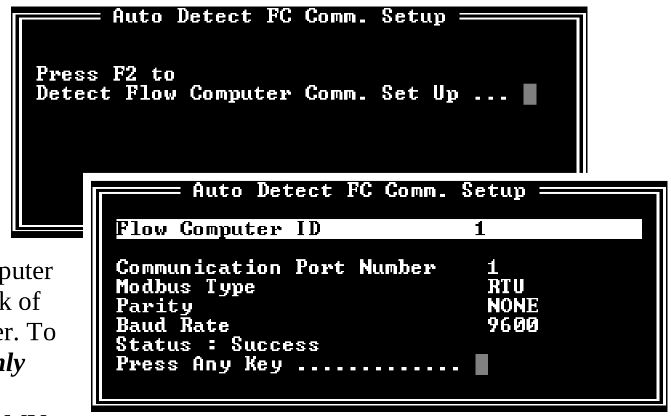
Press ←ENTER to send the Modem Hang-up string (Defined in Modem Setup) to the modem.

Note : Hand shake and error checking should be turned off. Commands to turn off the hand shake vary between modems. Check your modem manual. Typical command - AT&K0, AT&Y0.

DIAG



Read Single Flow Computer Communication Setup

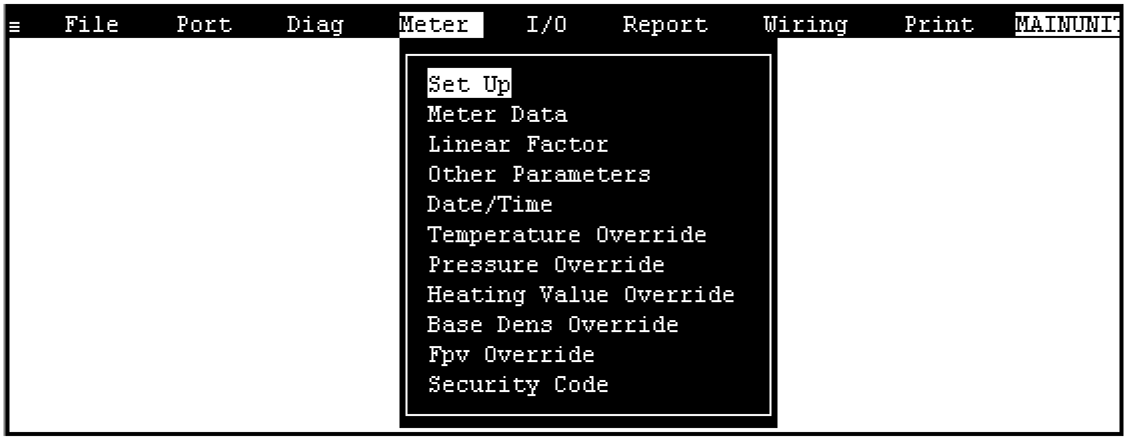


Press □ and the configuration program will attempt to communicate with a single Micro MV Gas Flow Computer at different baud rates and formats. Failure to communicate can occur because of a communication wiring problem, wrong PC port selection, communication parameter mismatch between PC and Micro MV Gas Flow Computer (Modbus type, parity, baud rate, etc.) or lack of power to the Micro MV Gas Flow Computer. To use this feature, the user must insure that ***only one Micro MV Gas Flow Computer*** is connected to the PC. More than one Micro MV Gas Flow Computer in the loop will cause data collisions and unintelligible responses.

Diagnostic Data

Diagnostic Data shows real-time, live data. Use it to monitor switch outputs, status inputs, analog inputs and outputs, frequency, failure codes and so forth. To control the switch outputs manually use the □ function key, press the SPACE BAR to change activity, and use ←ENTER key to move to next switch.

METER



Meter Set Up

All items in this section are listed in the submenu **Meter**|**Set Up**|….

SELECT UNIT

Selection	Description	Temperature	Pressure
0	US Unit	DEG.F	PSIG
1	Metric Unit	DEG.C	BAR,KG/CM

PRESSURE UNIT

Selection	Description	Pressure
0	Metric Unit	BAR
1	Metric Unit	KG/CM

FLOW UNIT

Selection	Description
0	MCF
1	KM3

NUMBER OF METERS

Enter '1', '2', '3', or '4' meters run configuration per individual flow computer.

STATION TOTAL

Station total can add all meters, or subtract meters from each other, or ignore this feature by selecting none. Station Total does not affect, destroy or otherwise alter the data from either meters. When Station Total is other than none, an additional data parameter, Station Total, is generated by the Micro MV Gas Flow Computer and appears on the live display monitor.

COMMON PARAMETERS

Meter|Set Up|Common [Temperature/Pressure/Density]

This feature allows the Micro MV Gas Flow Computer to use the transmitters on meter one to substitute and compensate for meter two, three, or four.

Meter Data

All items in this section are listed in the submenu **Meter**|**Meter Data** |….

METER ID

Up to 8 characters. This function will serve as Meter Tag.

FLOW EQUATION TYPE (0-3)

0 = API 14.3 (NEW AGA3, 1992 Orifice Equations)
1 = ISO5167 (1991)
2 = AGA7 (Frequency Type Input)
3 = V-CONE Flow Meter
4 = MPU-1200
5 = MPU-1200 Series B

DENSITY OF DRY AIR

Typical value would be 28.9625 for us unit

The real gas relative density is used in the calculations of the compressibility factor, flowing and reference densities (required only when AGA8 is not used).

FLOWRATE LOW/HIGH LIMIT

The high/low flow rate alarm is activated, when the flow rate exceeds or is below the set limit. The alarm will be documented with time, date, and totalizer.

DENSITY CALCULATION TYPE (1-3)

Calc. #	Calculation Type	Comments and Limitations
1 =	AGA8 Gross Method 1	Relative Density: 0.554–0.87 US Unit- Heating.Value: 477–1150 BTU/SCF Metric Unit- Heating Value: 18.7 – 45.1 MJ/M3
2 =	AGA8 Gross Method 2	Relative Density: 0.554–0.87 US Unit Heating.Value: 477–1150 BTU/SCF Metric Unit Heating Value: 18.7 – 45.1 MJ/M3
3 =	AGA8 Detail Method	Relative Density: 0.07–1.52 Heating.Value 0–1800 BTU/SCF (US Unit)

AGA 8 detail method can be used for gases other than natural gas, such as methane, carbon dioxide, ethane, and hydrogen sulfide.

USE STACK DP

The Micro MV Gas Flow Computer allows the user to select dual DP transmitters on each meter for better accuracy and low range flow. Use in conjunction with the DP Switch High % parameter setting.

DP SWITCH HIGH %

The Micro MV Gas Flow Computer will begin using the high DP when the low DP reaches the percent limit assigned in this entry. Example: DP low was ranged from 0-25 inches and switch % was set at 95%. When low DP reaches 23.75 in (= 0.95 * 25) the Micro MV Gas Flow Computer will begin using the high DP provided the high DP did not fail. When the high DP cell drops below 23.75, the Flow Computer will start using the Low DP for measurement.

DENSITY TYPE

If live density is connected to the flow computer, user must enter the density type. Raw density frequency or 4-20mA input can be selected. This density will be used to calculate mass flow and net flow.

<table>
<tr><th>Density Type</th><th>Densitometer</th><th colspan="2"></th></tr>
<tr><td>Type 0</td><td>None</td><td colspan="2"></td></tr>
<tr><td rowspan="3">Type 1</td><td rowspan="3">4–20 mA</td><td colspan="2">Density 4–20 mA Type*</td></tr>
<tr><td>Type 0</td><td>Density Signal 4-20mA in LB/FT3 (us unit) or in KG/M3 (metric unit)</td></tr>
<tr><td>Type 1</td><td>SG Signal 4-20mA</td></tr>
<tr><td>Type 2</td><td>UGC</td><td colspan="2"></td></tr>
<tr><td>Type 3</td><td>Sarasota</td><td colspan="2"></td></tr>
<tr><td>Type 4</td><td>Solartron</td><td colspan="2"></td></tr>
</table>

DENSITY 4-20MA TYPE

Note that this type of input requires the user to choose a subtype, as indicated in the table above.

INPUT POSITION ASSIGNMENT

1 : Analog Input#1
2 : Analog Input#2
3 : Analog Input#3
4 : Analog Input#4
5 : RTD Input
10. Multi-Variable Module

API 14.3 Data (new AGA3)

To set API 14.3 flow parameters, set **Meter|Meter Data|Flow Equation Type = 0** and press ←ENTER. You will then access a submenu in which you can set the parameters below.

Pipe I.D.

Orifice ID

Pipe ID in inches (us unit), or in millimeter (metric unit) is the measured inside pipe diameter at reference conditions. Orifice ID in inches is the measured diameter of the orifice at reference conditions.

DP Cutoff

The Micro MV Gas Flow Computer suspends flow rate calculations whenever the DP, in inches of water column (us unit) or in mbar (metric unit), is less than this value. This function is vital for suppressing extraneous data when the DP transmitter drifts around the zero mark under no-flow conditions.

Y Factor (0=None,1=Upstream,2=Downstream)

Y factor is the expansion factor through the orifice. The user must enter the position of the pressure and temperature sensors. Select y=1 if the sensors are installed upstream of the orifice plate. Select y=2 if the sensors are down stream of the orifice plate. When multi-variable is used, the pressure sensor is always upstream and set Y to 1.

Isentropic Exponent (Specific Heat)

Ratio of specific heat is a constant associated with each product. Even though it varies slightly with temperature and pressure, in all cases it is assumed as a constant.

Viscosity in Centipoise

Even though viscosity will shift with temperature and pressure changes, the effect on the calculations is negligent. Therefore using a single value is appropriate in most cases. Enter viscosity in centipoise at typical flowing conditions. Natural gas has a typical viscosity of 0.01.

Reference Temperature of Orifice

Reference Temperature of Pipe

These parameters give temperature at which the bore internal diameter was measured on the orifice and pipe respectively. Commonly 68 °F (us unit) or 20 °C (metric unit) is used.

Orifice Thermal Expansion Coeff. E-6

Pipe Thermal Expansion Coeff. E-6

These parameters give the linear expansion coefficients of the orifice and pipe materials respectively.

	Us Unit	Metric Unit
Type 304 and 316 Stainless	9.25 E 6	16.7 E-6
Monel	7.95 E 6	14.3 E-6
Carbon Steel	6.20 E 6	11.2 E-6

ISO5167

To set ISO5167 flow parameters, set **`Meter|Meter Data|Flow Equation Type = 1`** and press ←ENTER. You will then access a submenu in which you can set the parameters below.

Pipe I.D.

Orifice ID

Pipe ID in inches (us unit), or in millimeter (metric unit) is the measured inside pipe diameter to 5 decimals at reference conditions. Orifice ID in inches is the measured diameter of the orifice at reference conditions.

DP Cutoff

The Micro MV Gas Flow Computer suspends flow calculations whenever the DP, in inches of water column (us unit) or in mbar (metric unit), is less than this value. This function is vital for suppressing extraneous data when the DP transmitter drifts around the zero mark under no-flow conditions.

Select Position of Temperature and Pressure Sensors

Selection	Description
1	Temperature and Pressure Upstream
2	Temperature and Pressure Downstream
3	Temperature Upstream and Pressure Downstream
4	Temperature Downstream and Pressure Upstream

Note: *When the multi-variable is used, the pressure sensor is always upstream.*

Isentropic Exponent (Specific Heat)

Ratio of specific heat is a constant associated with each product. Even though it varies slightly with temperature and pressure, in most cases it is assumed as a constant.

Viscosity in Centipoise

Even though viscosity will shift with temperature and pressure changes, the effect on the calculations is negligent. Therefore using a single value is appropriate in most cases. Enter viscosity in centipoise.

Reference Temperature of Orifice

Reference Temperature of Pipe

These parameters give temperature at which the bore internal diameter was measured on the orifice and pipe respectively. Commonly 68 °F (us unit) or 20 °C (metric unit) is used.

Orifice Thermal Expansion Coeff. E-6

Pipe Thermal Expansion Coeff. E-6

These parameters give the linear expansion coefficients of the orifice and pipe materials respectively.

	Us Unit	Metric Unit
Type 304 and 316 Stainless	9.25 E 6	16.7 E-6
Monel	7.95 E 6	14.3 E-6
Carbon Steel	6.20 E 6	11.2 E-6

Distance of Upstream Tapping

Distance of upstream tapping from the upstream face of the plate

Distance of Downstream Tapping

Distance of upstream tapping from the face of the orifice plate

Density Use Upstream Temperature

Using up-stream temperature to calculate the density of gas at the inlet of the orifice.

AGA 7 Data (Frequency)

To set AGA 7 flow parameters, set **Meter|Meter Data|Flow Equation Type = 2** and press ←ENTER. You will then access a submenu in which you can set the parameters below.

K Factor

K Factor is the number of pulses per unit volume, i.e. 1000 pulses/CF (us unit), M3 (metric unit). The meter's tag would normally indicate the K Factor.

Meter Factor

Meter Factor is a correction to the K Factor for this individual meter, applied multiplicatively to the K factor.

Flow Cutoff Frequency

The Micro MV Gas Flow Computer will quit totalizing when the turbine frequency (or other frequency input) is below this set limit. This feature is to reduce extraneous noise appearing as volume data when the meter is down for period of time.
This value is entered as pulses per second.

Flowrate Threshold/Linear Factor

Enter the different correction factors for the meter at different flow rates. The Micro MV Gas Flow Computer will perform linear interpolation each second. Notice that even though using this feature enhances the measurement accuracy and range, performing audit trail on a linearized meter factor is very difficult.

V-Cone Data

To set V-Cone flow parameters, set **Meter|Meter Data|Flow Equation Type = 3** and press ←ENTER. You will then access a submenu in which you can set the parameters below.

Pipe I.D.

Orifice ID

Pipe ID in inches (us unit), or in millimeter (metric unit) is the measured inside pipe diameter at reference conditions. Orifice ID in inches is the measured diameter of the orifice at reference conditions.

DP Cutoff

The Micro MV Gas Flow Computer suspends flow rate calculations whenever the DP, in inches of water column (us unit) or in mbar (metric unit), is less than this value. This function is vital for suppressing extraneous data when the DP transmitter drifts around the zero mark under no-flow conditions.

Y Factor (1=Compressible Fluids)

Selection	Description
0	Non-Compressible Fluids
1	Compressible Fluids – Precision Tube
2	Compressible Fluids – Wafer and Cone

Isentropic Exponent (Specific Heat)

Ratio of specific heat is a constant associated with each product. Even though it varies slightly with temperature and pressure, in all cases it is assumed as a constant.

Flow Coefficient

Enter flow coefficient of the meter.

Pipe and Cone Thermal Expasion Coefficient E-6

Pipe and cone material coefficient of thermal expansion.
Note: *the value is typically between 5.0e-6 and 10.0e-6.*

Other Parameters

All parameters in this section are in the submenu **Meter**|**Other Parameters**|… unless otherwise noted.

Day Start Hour (0-23)

Day start hour is used for daily totalizer reset operation. The flow computer will reset the daily value to zero and start a new day totalizer.

Company Name

Up to 20 characters. The company name appears in the reports.

Meter Location

Up to 20 characters. This entry appears only in the report and serves no other function.

Flow Rate Selection

The flow rate will be based on daily basis, hourly, or minute.

Flow Rate Averaged Second

The flow rate is averaged for 1-10 seconds to minimize fluctuating flow rate conditions. This number averages the current flow rate by adding it to the previous seconds' flow rate, and then displays an averaged smoothed number. Only a low resolution pulse meter requires this function.

Disable Alarms

Use Disable Alarms to ignore alarms. When the alarm function is disabled alarms are not logged. Alarms are also not logged if the DP is below the cut-off limit.

Print Intervals in Minutes (0-1440)

When the second port (RS-232) of the Micro MV Gas Flow Computer is configured as printer port, a snapshot report is generated every print interval (i.e., every five minutes, every hour, or every ten hours).

Base Temperature

The basis reference temperature for all corrections. Used, for example, when seller contracts to sell to buyer at an agreed base temperature. Typically 60.0 °F in US units, 15 °C in Metric units.

Base Pressure

The basis reference pressure for all corrections. Used, for example, when seller contracts to sell to buyer at an agreed base pressure. Typical values are 14.73 PSIA for US units, 1.01325 bar in Metric units.

Atmospheric Pressure

This pressure is the local pressure or contracted atmospheric pressure to be used. Typical value is 14.696 PSIA for US units.

Run Switching

Run switching is used to switch from tube one to tube two, when flow rate reaches certain limits. The Micro MV Gas Flow Computer has one active output that can be dedicated to this function. The time delay allows for some delay in switching.

> *Note: if Run Switching is being used, then the meter should be configured for a single stream (see Set Up under Meter).*

RUN SWITCH HIGH SET POINT

When this flow rate value is exceeded and after the delay timer expires, the switch output will activate. This output normally opens the meter run number two. The Micro MV Gas Flow Computer provides open collector type output that requires external power at the sw power input.

RUN SWITCH LOW SET POINT

When the flow rate drops below this value and stays below it until the delay timer expires, the output switch will be turned off to shut meter two.

Pulse Output** and **Pulse Output Width

Pulse Output is used to activate a sampler or external totalizer. The number selected will be pulses per unit volume or per unit mass. If 0.1 pulse is selected, the one pulse will be given every 10 unit volumes has passed through the meter.

Pulse Output Width is the duration, in milliseconds, of one complete pulse cycle (where each cycle is the pulse plus a wait period, in a 50/50 ratio). For example: if POW = 500 msec, the Micro MV Gas Flow Computer at most can produce one pulse each second regardless of the pulse per unit volume selected (500 msec pulse + 500 msec wait). If POW = 10 msec the Micro MV Gas Flow Computer can produce up to 50 pulses per second.

The Micro MV Gas Flow Computer’s maximum pulse output is 125 pulses/sec. The Pulse Output in combination with the Pulse Output Width should be set appropriately.

Date and Time

Meter|Date/Time

The PC software will show the current date and time from the PC. Press □ to download that date and time to the flow computer. Press □ to upload the date and time from the flow computer.

Parameter Overrides

Temperature Override **Meter | Temperature Override**

Pressure Override **Meter|Pressure Override**

Heating Value Override **Meter | Heating Value Override**

Base Density Override **Meter|Base Dens Override**

FPV Override **Meter|Fpv Override**

An override value is entered when no live parameter value is available, or when a different value from live value should be used. In the diagnostic screen, the fail code will appear as 9. Zero in the data entry indicates use live value.

Heating Value Override is used in the AGA8 calculation GROSS METHOD 1. In addition the heating value totalizer requires the heating value; without a BTU override value entered, the “Energy Flow Rate” will always equal zero. Enter this number in BTU/SCF(standard cubic feet – US Units) or in MJ/M3 for metric units.

Base Density Override is used to override the calculated base density and affects the net calculations only. For products other than natural gas, you must enter base density override for net calculations.

FPV override: used to enter a value to override the super-compressibility factor.

Security Code

Meter|Security Code

Several levels of security codes have been selected to fit different levels of responsibility. Up to six numeric codes can be used for each entry. If the security code is not used, then there will not be any security code prompt in the menu.

INPUT/OUTPUT

Transducer I/O Range

Parameters in this section are in the submenu **I/O|Transducer I/O Range** | ... unless otherwise noted. Throughout this section the label **[Parameter]** includes all these parameters unless otherwise noted: Analog input, RTD, Analog Output.

ANALOG INPUT

In order for the Flow Computer to use the live input, the input must be properly assigned and properly wired. Unassigned inputs are not used by the flow computer.

Transducer Tag ID

Up to 8 alphanumeric ID number. The transmitters are referred to according to the TAG ID. All alarms are labeled according to TAG ID.

4mA

Enter the 4mA value for the transmitter.

20mA

Enter the 20mA value for the transmitter.

Low/High Limit

Enter the low and high limits. When live value exceeds high limit or less than low limit, a alarm log will be generated.

Maintenance Value

The value to be used when the transmitter fails, or while calibrating. For calibration, set fail code to 1 while calibrating.

Fail Code

Fail Code 0: always use the live value even if the transmitter failed.
Fail Code 1: always use the maintenance value
Fail Code 2: use maintenance value if transmitter failed. i.e. 4-20mA is above 21.75 or below 3.25)

Note: Multi-variable default value is used when transmitter connection fails.

RTD INPUT

Lo/Hi Limit

Enter the low and high limits. When live value exceeds high limit or less than low limit, a alarm log will be generated.

Maintenance Value

The value to be used when the transmitter fails, or while calibrating. For calibration, set fail code to 1 while calibrating.

Fail Code

Fail Code 0: always use the live value even if the transmitter failed.
Fail Code 1: always use the maintenance value
Fail Code 2: use maintenance value if transmitter failed

ANALOG OUTPUT ASSIGNMENT

4-20mA selection must be proportional and within the range of the selected parameter.

Analog Output Tag ID

Up to 8 alphanumeric ID number. The transmitters are referred to according to the TAG ID. All alarms are labeled according to TAG ID.

Assignments: 3 Digits

	Meter 1	Meter 2	Meter 3	Meter 4	Station
Gross Flow Rate	111	211	311	411	511
Net Flow Rate	112	212	312	412	512
Mass Flow Rate	113	213	313	413	513
Energy Flow Rate	114	214	314	414	514
DP	121	221	321	421	
Temperature	122	222	322	422	
Pressure	123	223	323	423	
Density	124	224	324	424	
Dens.Temp.	125	225	325	425	
Density.b	126	226	326	426	
DP Low	127	227	327	427	
DP High	128	228	328	428	
SG	129	229	329	429	

Assignments- others

	Assignment
Analog Input #1	1
Analog Input #2	2
Analog Input #3	3
Analog Input #4	4
RTD Input	5
Remote Control	6
Meter #1 PID	7
Meter #2 PID	8
Meter #3 PID	9
Meter #4 PID	10

Analog Output 4mA/20mA

4-20mA selection must be proportional and within the range of the selected parameter. The 4-20mA output signal is 12 bits.

DENSITOMETER DATA

Densitometer Tag ID

Up to 8 alphanumeric ID number. The transmitters are referred to according to the TAG ID. All alarms are labeled according to TAG ID.

Densitometer Temperature IO Position

Selection	Description
1	Analog Input #1
2	Analog Input #2
3	Analog Input #3
4	Analog Input #4
5	RTD Input

Densitometer Pressure IO Position

Selection	Description
1	Analog Input #1
2	Analog Input #2
3	Analog Input #3
4	Analog Input #4

Density Period Low/High Limits

Density Period is the time period in microsecond. The densitometer fails if the density period exceeds the density period low or high limits. If the densitometer fails and density fail code is set to 2, the maintenance value will be used. (Density Period = 1000000/Density Frequency)

Density Correction Factor

Enter the correction factor for the densitometer

Density Low/High Limits

Enter the low and high limits. When live value exceeds high limit or less than low limit, an alarm log will be generated.

Density Low/High Limits

The value to be used when the transmitter fails, or while calibrating. Set fail code to 1 while calibrating.

Density Fail Code

Fail Code 0: always use the live value even if the densitometer failed.
Fail Code 1: always use the maintenance value
Fail Code 2: use maintenance value if densitometer failed. (i.e. densitometer period is above density high period or is below densitometer period.)

Sarata, UGC, or Solartron Constants

Enter the densitometer constants.

Input Override

ANALOG INPUT #1 OVERRIDE

ANALOG INPUT #2 OVERRIDE

ANALOG INPUT #3 OVERRIDE

ANALOG INPUT #4 OVERRIDE

RTD INPUT OVERRIDE

MULTI.VAR DP INPUT OVERRIDE

MULTI.VAR TEMPERATURE INPUT OVERRIDE

MULTI.VAR PRESSURE INPUT OVERRIDE

Enter a value to override current transducer data. Enter ‘0’ to clear override status.
Override value is used when calibrating the transmitter or no live transmitter is available.

Calibration Mode

I/O|Calibrate Mode

CALIBRATE MODE

To calibrate Flow Computer, totalizer will continue at same rate where live parameters will show actual value, i.e. flow Rate, DP, pressure etc. Enter ‘1’ to enable this feature.

SET TIME (1-9 HOUR)

This entry is the duration for the calibrate mode. After time expires, the Micro MV Gas Flow Computer will resume its normal operation.

Calibration

See details in chapter 1.

PID Tuning

FLOW CONTROLLER GAIN

(Allowable Entries 0.0 – 9.99)
The gain is effectively 1/Proportional Band.
The basis of theory for proportional band is the relationship of the percentage of the output of the controller to the percentage of the change of the process. In this case, if the control output changes 5% the flow rate should change 5%, the proportional band would be 1.0 and the gain would be 1.0.
If the percentage of the output is 5% and the flow rate would change by 10%, the proportional band would be 2 and the Gain would be 0.5
However since you do not know until you are flowing the effect of the output on the flow rate, you have to start somewhere. A good starting point is to use a proportional band of 0.5 if the valve is properly sized.

FLOW CONTROLLER RESET

(Allowable Range 0.0 – 9.99)
Reset is the number of minutes per repeat is the time interval controller adjusts the output to the final control element. If the reset is set at 2 , the flow computer will adjust the signal to the flow control valve every 2 minutes. If the Reset is set at 0.3, the output signal will be adjusted approximately every 20 seconds, until the process and set point are the same.
The rule of thumb is the reset per minute should be set slightly slower that the amount of time it takes for the control valve and the flow rate to react to the flow computer output signal changing.
This can only be determined when there is actual flow under normal conditions. It is best to start the reset at 0.3 or reset the signal every 3 minutes, if the control valve is properly sized.

PRESSURE CONTROLLER GAIN

(Allowable Entries 0.0 – 9.99)
The gain is effectively 1/Proportional Band.
The basis of theory for proportional band is the relationship of the percentage of the output of the controller to the percentage of the change of the process. In this case, if the control output changes 5% the pressure should change 5%, the proportional band would be 1.0 and the gain would be 1.0.
If the percentage change of the output is 5% and the pressure would change by 10%, the proportional band would be 2 and the Gain would be 0.5.
However since you do not know until you are flowing the effect of the output on the pressure, you have to start somewhere. A good starting point is to use a proportional band of 0.5 if the control element is properly sized.

PRESSURE CONTROLLER RESET

(Allowable Range 0.0 – 9.99)
Reset is the number of times per minute the controller adjust the output to the control valve. If the reset is set at 2 , the flow computer will adjust the signal to the final control element every 2 minutes. If the Reset is set at 0.3, the output signal will be adjusted approximately every 20 seconds, until the process and the set point are the same.
The rule of thumb is the reset per minute should be set slightly slower that the amount of time it takes for the control valve and the pressure to react to the flow computer changing the output..
This can only be determined when there is actually flow under normal conditions. It is best to start the reset at 0.3 or reset the signal every 3 minutes, if the control element is properly sized.

PID Configuration

(PID) Proportional Integral Derivative control– We call this function PID, however the flow computer performs Proportional Integral control. And does not apply the Derivative. The Derivative is not normally used in flow and pressure control operations and complicates the tuning operation

USE FLOW LOOP

(Valid entries are 0 or 1)
Enter 1 if the computer performs flow control.
Enter 0 if the flow computer does not perform flow control.

FLOW LOOP MAXIMUM FLOW RATE

Enter the maximum flow rate for this meter. This rate will be basis for maximum flow rate to control at.

FLOW SET POINT

Enter the set point. The set point is the flow rate that the flow computer will try to control at.

FLOW ACTING – FORWARD OR REVERSE

Enter 1 if the control is direct acting, Enter 0 if the control is reverse acting.
Direct acting is when the output of the controller causes the flow rate to follow in the same direction. The output goes up and the flow rate increases. A fail Close valve located in line with the meter will typically be direct acting. If the Controller output signal increases, the control valve will open more causing the flow rate to increase.
Reverse acting is when the output of the controller causes the opposite action in the flow rate. A fail open valve in line with the meter will typically be reverse acting. If the Controller output increases the control valve will close some causing the flow rate to decrease.
Care must be taken to study where the valves are located in relation to the meter and whether the valves are fail open or fail close to understand if the controller should be direct or reverse acting. Some control valves can be fail in position (especially Electrically actuated control valves). This valve should be studied to understand if the actuators themselves are direct or reverse acting.

USE PRESSURE LOOP

(Valid entries are 0 or 1)
Enter 1 if the computer performs pressure control.
Enter 0 if the flow computer does not perform pressure control.

PRESSURE MAXIMUM

Enter the Maximum pressure for this meter. This pressure will be basis for Maximum pressure to control at.

PRESSURE SET POINT

Enter the set point. The set point is the pressure that the flow computer will try to control at.

PRESSURE ACTING – FORWARD OR REVERSE

Enter 0 if the control is direct acting, Enter 1 if the control is reverse acting.
Direct acting is when the output of the controller causes the pressure to follow in the same direction. The output goes up and the pressure increases. A fail open valve located in the line down stream of the meter will typically be direct acting to maintain the pressure at the meter. An Increase in the output from the controller will cause the control valve to close thus causing the pressure to increase.
Reverse acting is when the output of the controller causes the opposite action in the flow rate. A fail close valve in the line down stream of the meter will typically be reverse acting to maintain the pressure at the meter. An increase in the output signal will cause the valve to open which will cause the pressure to be released thus causing the pressure to decrease.
Care must be taken to study where the valves are located in relation to the meter and whether the valves are fail open or fail close to understand if the controller should be direct or reverse acting. Some control valves can be fail in position (especially Electrically actuated control valves). These valves should be studied to understand if the actuators themselves are direct or reverse acting.

PID- Operating

It displays PID output percentage. Press F8 to change setups. After entering the new data, press F3 to download new data and start PID loop.

Status Input /Switch Output Assignment

I/O|Status Input/Switch Output Assignment

	Assignment	Comments
2	Calibration Mode	
4	Alarm Acknowledge	Reset the previous occurred alarms output bit

Switch Output Assignment

User can assign an output to each of the Micro MV Gas Flow Computer's output switches from this list. The Micro MV Gas Flow Computer switch outputs are open collector type, requiring external D.C power applied to the SW power.

Outputs in the top list, "Pulse Outputs", require a definition of pulse output per unit volume and "Pulse Output Width". Those data entry are in the other parameter's menu. These outputs are available through switches 1 or 2 only.

Outputs in the bottom list, "Contact Type Outputs", are ON/OFF type outputs. They can be assigned to any of the four switch outputs.

Switches 1 and 2 can be pulse or contact type output; switches 3, 4 are contact-type output only.

Assignments - Pulse Outputs

	Meter 1	Meter 2	Meter 3	Meter 4	Station
Gross	101	105	109	113	117
Net	102	106	110	114	118
Mass	103	107	111	115	119
Energy	104	108	112	116	120

Assignments - Contact Type Outputs

	Meter 1	Meter 2	Meter 3	Meter 4
Meter Down	123	127	131	135
AGA8 Out of Range	124	128	132	136
Flow Rate High	125	129	133	137
Flow Rate Low	126	130	134	138

Day Ended	121
Month Ended	122
Analog Input #1 High	139
Analog Input #1 Low	140
Analog Input #2 High	141
Analog Input #2 Low	142
Analog Input #3 High	143
Analog Input #3 Low	144
Analog Input #4 High	145
Analog Input #4 Low	146
RTD Input High	147
RTD Input Low	148
Densitometer Failed	149

Density High	150
Density Low	151
Multi-Variable DP High	152
Multi-Variable DP Low	153
Multi-Variable PF High	154
Multi-Variable PF Low	155
Multi-Variable TF High	156
Multi-Variable TF Low	157
Active Alarms	158
Occurred Alarms	159
Watchdog	160
Remote Control	161
Run Switch	162

Micro MV Gas Flow Computer Display Assignment

Display assignment selections are up to 16 assignments. The Micro MV Gas Flow Computer will scroll through them at the assigned delay time.

ASSIGNMENT

	Meter 1	Meter 2	Meter 3	Meter 4	Station
Flow Rate	101	201	301	401	501
Daily Total	102	202	302	402	502
Cumulative Total	103	203	303	403	503
Previous Daily Total	104	203	304	404	504

	Meter 1	Meter 2	Meter 3	Meter 4
DP/DP Low/DP High	105	205	305	405
Temperature/Pressure	106	206	306	406
Density/Density @b	107	207	307	407
Densitometer Frequency	108	208	308	408
Densitometer Temperature	109	209	309	409
Flow and Density Calc. Type	110	210	310	410
Previous Day FWA TF,PF,SG	111	211	311	411
Alarms	112	212	312	412

Selection	Description
13	Date/Time

Modbus Shift

Reassigns Modbus address registers on the Micro MV Gas Flow Computer to predefined Modbus registers for easy polling and convenience. Use Modbus Shift to collect values in scattered Modbus registers into a consecutive order. The Micro MV Gas Flow Computer will repeat the assigned variables into the selected locations.

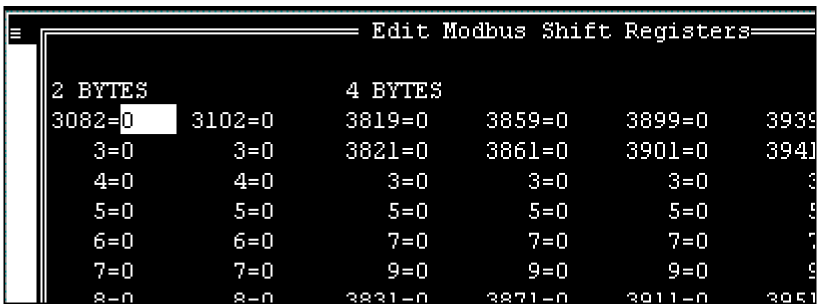
Note: some Modbus registers are 2 byte/16 bit, and some are 4 byte/32 bit. Register size incompatibility could cause rejection to certain address assignments. Refer to the Modbus Address Table Registers in Chapter 5.

Example: you want to read the current status of switches #1 and #2 (addresses 2751 and 2752) and the Daily Gross Total for Meter #1 (address 3131). Make assignments such as:

3082=2751 (2 bytes)

3083=2752 (2 bytes)

3819=3131 (4 bytes)



Modbus Shift – Floating Point

Use Modbus Shift to collect values in scattered Modbus floating point registers into a consecutive order. The Micro MV Gas Flow Computer will repeat the assigned variables(Refer to the Modbus Address Table Registers in Chapter 5) into the selected locations(7501-7600)

Boolean Statements

From the MicroMV Gas Configuration Software, Point cursor to **'I/O',** scroll down to **'Boolean Statements',** then press **'Enter'** and the following menu will be displayed:

Boolean Points – 4 digits (0001-0800, 7831-7899) **F2:UPLOAD,F3:DOWNLOAD**

#70	#80	#90
#71	#81	#91
#72	#82	#92
#73	#83	#93
#74	#84	#94
#75	#85	#95
#76	#86	#96
#77	#87	#97
#78	#88	#98
#79	#89	#99

Enter the Boolean statements (**no space allowed**, up to 30 statements). Each statement contains up to two Boolean variables (optionally preceded by '/') and one of the Boolean function (&, +, *). ***4 digits are required*** for referencing programmable variables or Boolean points. (Example: 0001)

Example:

The statement is true if either temperature or pressure override is in use.

0070=0112+0113

Program Variable Statements

From the MicorMG4 Configuration Software, Point cursor to **'I/O',** scroll down to **`Program Variable Statements'** then press **'Enter'** and the following menu will be displayed:

Program Variable Statements – 78xx (4 digits), F2: UPLOAD, F3: DOWNLOAD

#31	#54	#77
#32	#55	#78
#33	#56	#79
#34	#57	#80
#35	#58	#81
#36	#59	#82
#37	#60	#83
#38	#61	#84
#39	#62	#85
#40	#63	#86
#41	#64	#87
#42	#65	#88
#43	#66	#89
#44	#67	#90
#45	#68	#91
#46	#69	#92
#47	#70	#93
#48	#71	#94
#49	#72	#95
#50	#73	#96
#51	#74	#97
#52	#75	#98
#53	#76	#99

Enter the user programmable statements (**no space allowed**, up to 69 statements). Each statement contains up to three variables and separated by one of the mathematical functions. ***4 digits are required*** for referencing programmable variables or Boolean points. (Example: 0001+7801)

Example:

7832 is equal to total of variable#1(modbus addr.7801) and variable#2 (modbus addr.7802)
32=7801+7802

BOOLEAN STATEMENTS AND FUNCTIONS

Each programmable Boolean statement consists of two Boolean variables optionally preceded a Boolean 'NOT' function (/) and separated by one of the Boolean functions (**&, +, ***). Each statement is evaluated every 100 milliseconds. Boolean variables have only two states 0 (False, OFF) or 1 (True, ON). Any variable (integer or floating point) can be used in the Boolean statements. The value of Integer or floating point can be either positive (TRUE) or negative (FALSE).

Boolean Functions	Symbol
NOT	/
AND	&
OR	+
EXCLUSIVE OR	*

Boolean points are numbered as follows:

0001 through 0050 Digital I/O Points 1 through 50

0001 – Status Input/Digital Output #1
0002 – Status Input/Digital Output #2
0003 – Status Input/Digital Output #3
0004 – Status Input/Digital Output #4
0005 – 0050 **-** Spare

0070 through 0099 Programmable Boolean Points

See Boolean Statements.

Boolean Points

0100 through 0199 Meter #1 Boolean Points
0200 through 0299 Meter #2 Boolean Points
0300 through 0399 Meter #3 Boolean Points
0400 through 0499 Meter #4 Boolean Points

1st digit – always 0, 2nd digit – meter number.

0n01 Spare
0n02 Spare
0n03 Spare
0n04 Spare
0n05 Meter Active
0n06 Spare
0n07 Any Alarms
0n08-0n10 Spare
0n11 DP Override in use
0n12 Temperature Override in use
0n13 Pressure Override in use
0n14 Density Override in use
0n15 Densitometer Temperature Override in use
0n16-0n19 Spare

501 through **0699** Spare

0701 through **0799** Station Boolean Points

0701 Spare
0702 Spare
0703 Spare
0704 Spare
0705-0710 Spare
0711 Run Switch

0801 through 0899 Command Boolean Points

0801 Spare
0802 Alarm Acknowledge

Variable Statements and Mathematical Functions

Each statement can contain up to 3 variables or constants.

Function	Symbol	
ADD	**+**	Add the two variables or constant
SUBTRACT	**-**	Subtract the variable or constant
MULTIPLY	*****	Multiply the two variables or constant
DIVIDE	**/**	Divide the two variables or constants
CONSTANT	**#**	The number following is interpreted as a constant
POWER	**&**	1st variable to the power of 2nd variable
ABSOLUTE	**$**	unsigned value of variable
EQUAL	**=**	Move result to another variable Variable within the range of 7801-7899 (floating points) Variable within the range of 5031-5069 (long integer)
IF STATEMENT	**)**	Compares the variable to another

Example: 7801)T7835 (if variable is greater to or is equal to 1 then go to 7835)
7801)7802=#0 (if variable is greater to or is equal to 1 then set variable 7802 to 0)

GOTO STATEMENT	**T**	Go to a different statement (**forward only**)

Example: 7801%#60**T**7836 (if variable is equal to 60 then go to statement 7836)

COMPARE	**%**	Compare a value (**EQUAL TO**)
GREATER/EQUAL	**>**	Compare a value (**GREATER OR EQUAL TO)**

Example: 7801>7802**T**7836
(if variable 1 is greater to or equal to variable 2 then go to 7836)

Natural Log	**L**	Natural Log of variable

Order of precedence – absolute, power, multiply, divide, add and subtract.
Same precedence – left to right

Variables stored on the hourly report –

7791-7800 –

The variables 7801-7805 will be stored at 7791-7795
First 5 Variables (7801-7805) will be **reset** at the end of hour.

Scratch Pad Variables – Floating Point - 7801-7830 (Read or Write)
- Long Integer – 5031 – 5069 (Read or Write)

7791-7800 – Last Hour Program Variables (Read Only)
7831-7899 – Programmable Variable Statements

REPORTS

Current Data - Snapshot Totalizer Updates

This report consists of three sections. The upper section is primarily the non-changing parameters, the bottom section is the dynamic. Press any key (except ESC key) move from one section of the report to the other.
To print or capture a snapshot report in the laptop while in the current data screen, press <F4> to freeze, then press <F5> to print, or enter the file name and press <F6> to capture the snapshot data.

Previous Hourly Data

Up to 768 previous hourly data are stored in the Micro MV Gas Flow Computer. Enter the meter number, the Micro MV Gas Flow Computer will go backward from that selected report. Press <F4> to display, then press <F5> to print, or enter the file name and press <F6> to capture the "Previous Hourly Report".

Previous Daily Data

Up to 32 previous daily reports can be retrieved. Current day data cannot be retrieved. Press <F4> to display, press <F5> to print, or enter the file name and press <F6> to capture the "Previous Daily Report."

Previous Monthly Data

Up to 2 previous month data are stored in the Micro MV Gas Flow Computer. Select the number of previous month data to be displayed, printed, or captured. Current month data cannot be retrieved. Press <F4> to display, press <F5> to print, or enter the file name and press <F6> to capture the "Previous Monthly Report."

Previous Alarm Data

Up to 80 previous alarm data can be retrieved. Starting from the most recent to the oldest. Press <F4> to display, press <F5> to print, or enter the file name and press <F6> to capture the "Previous Alarm Report".

Audit Trail Report

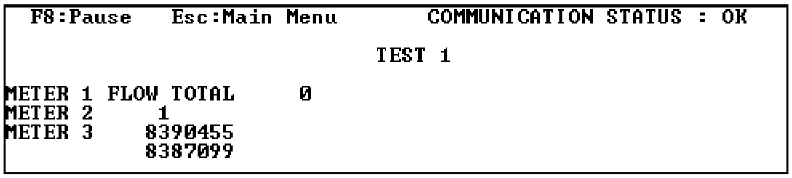
The audit trail report shows configuration parameters that has changed which could influence the calculated numbers. The Micro MV Gas Flow Computer provides up to 80 event logs. One purpose for audit trail is to back track calculation errors that result from mistakes by the operator of the flow computer operator. Press <F4> to display, press <F5> to print, or enter the file name and press <F6> to capture the "Audit Trail Report".

Build User Report

One screen can be built or edited with this menu. Any text can be used. Modbus register must follow the "^" sign in order for the program to retrieve the address location.

View User Report

To monitor the **Build User Report**. User reports can be printed through the PC parallel port–see **Print | Files**.



Formatted Ticket Report

The Micro MV Gas Flow Computer allow the user to make customized ticket report. This ticket report is just for display and printing purposes. To make this report, user must use "Last Daily Data Area" in the Modbus registers (3431-3703).

Example:

```
            DYNAMIC FLUID BATCH REPORT
METER 1 GROSS TOTAL   ^3453
METER 1 MASS TOTAL      ^3459
```

***Results** - The report will look as follows:*

```
            DYNAMIC FLUID BATCH REPORT
METER 1 GROSS TOTAL     3000
METER 1 MASS TOTAL      1258
```

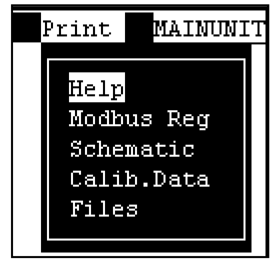
Ticket Report

Select 0=Standard Report, 1=Format Ticket Report
Standard is the default report format that is programmed in the Micro MV Gas Flow Computer. Format is according to the formatted daily report.
Capture File Name - capture that file under certain name.

Auto Data Retrieval

This function is made to replace printers and use PC to poll the configured units on time basis (Hourly or Daily). All parameters polled will be stored in the configured file name. Each unit ID will have individual file name. The PC or laptop must be on at the time it has to get the data, and the user must activate that function by pressing <F3> and leaving the PC on. The data format can be either standard or user defined format. This function is to eliminate the need for paper and make the process more environmentally friendly.

PRINT



Print "Help" File

Turn on parallel printer, point the cursor to **`Print | Help`**, press ←ENTER, and then press <F5> to print "Help" file. Note that this prints all on-line helps; this print function does not print context-specific help information.

Print Modbus Registers

Turn on parallel printer, point the cursor to **`Print | Modbus Reg`**, press ←<ENTER>, and then press <F5> to print Modbus registers. Note that this print request generates basically Chapter 5 of this manual, *Modbus Data*. It does not print the contents of the Modbus registers.

Print Calibration Data

Calibration data are programmed parameters in the data file. To print, turn on parallel printer, point the cursor to **`Print | Calib. Data`**, press <ENTER>, and then press <F5>. This printing function's name is slightly misleading: though the calibration data is printed, in actuality the configuration file currently resident in memory is printed in its entirety.

Print Files

The user can print the files that were captured by a **`Report`** command. Turn on the parallel printer, move the cursor to the desired file, and then press ←ENTER.

CHAPTER 3: Data Entry

Through Front Panel Display

The Data entry is a menu driven type construction.

Four Keys – **ESC/Mode, Enter/Select, ↓ ,→**
These keys can be operated with a reflective object. The reflective object must be placed in front of the key to get a response.

Function

ESC/Mode Key
This key serves dual functions. In order to access the data entry, the mode key has to be activated. The mode key is on/off type key. This key will get the security code prompt, and then using select, enter key with the arrow keys to access the program. Place the reflective object on and then off for each step. Once the data menu function access is completed, exit by using the escape key.

Select/Enter Key

It is used to stop screen from scrolling, to select data entry, and accept the data configurations. It is on/off type key. Place the reflective object in front of key, and then move away before the next step.

↓ Key, → Key

Scrolling keys, the **→ Key** function is to scroll **→** way for selecting the number to be changed, and then changing the number by using **↓ Key**

MAIN MENU

It consists primarily of series of topics. Your valid choices are the two Arrow Keys (↓, →) and select/enter key. Use the Down (↓) or Right (→) Arrow keys to make your selection and then use the select/enter key. Use Esc/Mode key to go back to previous mode.

Security Code

Enter Security Code 00000

Enter the right security code to be able to change data.

Calibrate /1=M.Var

Enter 0 to calibrate analog input 1-4, RTD, analog output 1-4, or enter '1' to calibrate multi-variable

Calibrate/1=M.Var
Override Meter No.
Date Time
Configuration

You must first select this menu and the number will begin to blink. Use arrow key to change between 0 and 1, then use select key.

Enable Calib. Mode
Analog Input (1-9)
RTD Input
Analog Output (1-4)

Enable Calibrate Mode

Enter '1' to enable calibrate mode. Calibration mode will set the flow computer to continue totalizing at same rate while all values are still showing live readings.

Calibrate Analog Input, RTD

0=**Offset** is a single point calibration that will offset zero and span.
1=**Full** – zero and span must be calibrated.
2=**Reset** to factory calibration.

```
0=Offset,1=Full
2=Reset
```

Offset (Single Point)

Induce the signal into the analog input, wait for 10 seconds for the reading to stabilize, then enter the offset.

```
Enter Correct Value        8.000

Current Value
          7.9000
```

FULL (ZERO AND SPAN CALIBRATION)

1. Calibrate Low Point (4mA or 75 Ω,), induce the known live value for the low set point, and wait for 10 seconds for the reading to stabilize. Now enter in that value.

```
First Point                0.000

Current Value
          0.900
```

2. Calibrate High Point (20mA or 120 Ω), induces the known live value for the high set point, and then wait for 10 seconds for the reading to stabilize. Now enter in that value.

```
Second Point               20.000

Current Value
          19.900
```

Reset (Use Default)

Enter '2' to use manufacture default.

Calibrate Analog Output

0=Offset is a single point calibration that will offset zero and span.
1=Full – zero and span must be calibrated.
2=Reset to factory calibration.

```
0=Offset,1=Full
2=Reset
```

Offset (Single Point)

Enter the live output value reading in the end device.

```
Enter mA              4.000

Reading mA
           4.000
```

Full (Zero and Span Calibration)

1.The screen will show the minimum possible signal 4mA. Enter the live output value reading in the end device i.e. 4mA.

```
Enter 4mA             4.000

Reading mA
           4.000
```

2. Now the flow computer will output full scale 20mA. Enter the live output i.e. 20mA

```
Enter 20mA            20.000

Reading mA
           20.000
```

Reset (Use Default)

Enter '2' to use manufacture default.

Calibrate Multivariable

Select DP, Pressure, or Temperature to be calibrated.

```
Calibrate Muli.Var.
DP
Pressure
Temperature
```

Enter the calibrate method (0=Offset, 1=Full, 2=Reset).

```
0=Offset,1=Full
2=Reset
```

OFFSET (SINGLE POINT)

Induce the live value, and then enter the offset.

```
Enter Offset            10.0000

Current Value
            10.9000
```

Full (Zero and Span Calibration)

1.Calibrate Low Point - induce the low range signal, and enter in that value.

```
First Point              0.0000

Current Value
            0.9000
```

2. Calibrate High Point - induces the high range signal, and enters in that value.

```
Second Point           250.0000

Current Value
            250.0000
```

Reset (Use Default)

Enter '2' to use manufacture default.

Override Meter No.

Enter the meter number 1 or 2 to change meter override value

TF/PF/MF
HV/FPV
Dens.b/DCF
Orifice/Pipe/DP

TF/PF/MF

TF - Temperature

This value is entered when no live temperature is available, or when a different value from the live value should be used.

PF – Pressure

This value is entered when no live temperature is available, or when a different value from the live value should be used.

MF – Meter Factor

Enter the value to change current meter factor (AGA7 Method)

HV/FPV

Heating Value Override is used in the AGA8 calculation GROSS METHOD 1. In addition the heating value totalizer requires the heating value; without a BTU override value entered, the Energy Flow rate will always equal zero. Enter this number in BTU/SCF for US unit, or in MJ/M3 for Metric unit.

FPV override: used to enter a value to override the NX19 super-compressibility factor.

Dens.b/DCF

Base Density Override is used to override the calculated base density and affects the net calculations only. For products other than natural gas, you must enter base density override for net calculations.

DCF- Density Correction Factor

Orifice/Pipe/DP

Orifice ID in inches is the measured inside pipe diameter to 5 decimals at reference conditions

Pipe ID in inches is the measured diameter of the orifice at reference conditions.

Date/Time

Change Date
Change Time

Change Date

Month	09
Day	08
Year	00
Change Date 1=Yes	

Enter Month (1-12), Day (1-31), Year (0-99) and then enter '1' to change date.

Change Time

Hour	09
Minute	08
Second	00
Change Time 1=Yes	

Enter Hour (0-23), Minute (0-59), Second (0-59) and then enter '1' to change time.

Configuration

Configuration

Configure Meter No 1
Configure I/O
Pulse Output
Others

Configue Meter

Flow Equation 0-5 1
0=New AGA3,1=ISO5167
2=AGA7,3=V-Cone

Flow Equation Type (0-3)

0 = API 14.3 (NEW AGA3, 1992 Orifice Equations)
1 = ISO5167
2 = AGA7 (Frequency Type Input)
3 = V-Cone Flow Meter
4 = MPU 1200
5 = MPU 1200 Series.B

New AGA3/ISO5167/V-Cone

Orifice ID	10.00000
Pipe ID,	5.00000
DP Cut Off	1.0000
Viscosity	.024500

Pipe I.D.

Orifice ID

Pipe ID is the measured inside pipe diameter to 5 decimals at reference conditions. Orifice ID is the measured diameter of the orifice at reference conditions.

DP Cutoff

The Micro MV Gas Flow Computer suspends all calculations whenever the DP, in inches of water column, is less than this value. This function is vital for suppressing extraneous data when the DP transmitter drifts around the zero mark under no-flow conditions.

Viscosity in Centipoise

Even though viscosity will shift with temperature and pressure changes, the effect on the calculations is negligent. Therefore using a single value is appropriate in most cases. Enter viscosity in centipoise.

AGA7

K Factor	1000.000
Meter Factor	1.00000
Flow Cut Off Freq.	1

K FACTOR

K Factor is the number of pulses per unit volume, i.e. 1000 pulses/cf. The tag on the meter would normally indicate the K Factor.

Meter Factor

Meter Factor is a correction to the K Factor for this individual meter, applied multiply to the K factor.

FLOW CUTOFF FREQUENCY

The Smart Flow Computer will quit totalizing, when frequency is below the set limit. This feature is to reduce noise effect when the meter is down for period of time. The totalizer will stop totalizing when the frequency is below the cut off limit.

Configure I/O

Analog Output
Meter I/O
Status/Switch
Flow Computer Display

Analog Output

Ana.Out#1 Assign	1
Ana.Out#2 Assign	0
Ana.Out#3 Assign	0
Ana.Out#4 Assign	0

ASSIGNMENTS: 3 DIGITS

	Meter 1	Meter 2	Meter 3	Meter 4
Gross Flow Rate	111	211	311	411
Net Flow Rate	112	212	312	412
Mass Flow Rate	113	213	313	413
Energy Flow Rate	114	214	314	414
DP	121	221	321	421
Temperature	122	222	322	422
Pressure	123	223	323	423
Density	124	224	324	424
Dens.Temp.	125	225	325	425
Density.b	126	226	326	426
DP Low	127	227	327	427
DP High	128	228	328	428
SG	129	229	329	429

Station Gross Flow Rate	511
Station Net Flow Rate	512
Station Mass Flow Rate	513
Station Energy Flow Rate	514

ASSIGNMENTS- OTHER

	Assignment		
Analog Input #1	**1**	Spare Auxiliary#1	**11**
Analog Input #2	**2**	Spare Auxiliary#2	**12**
Analog Input #3	**3**	Spare Auxiliary#3	**13**
Analog Input #4	**4**	Spare Auxiliary#4	**14**
RTD Input	**5**	Spare Auxiliary#5	**15**
Remote Control	**6**	Spare Auxiliary#6	**16**
Meter #1 PID	**7**	Spare Auxiliary#7	**17**
Meter #2 PID	**8**	Spare Auxiliary#8	**18**
Meter #3 PID	**9**	Spare Auxiliary#9	**19**
Meter #4 PID	**10**	Spare Auxiliary#10	**20**
		Spare Auxiliary#11	**21**
		Spare Auxiliary#12	**22**

Meter I/O

Temperature
Pressure
DP
Densitometer

ASSIGNMENTS

0=	Not Used
1=	Analog#1
2=	Analog#2
3=	Analog#3

4=	Analog#4
5=	RTD
21=	Analog#5
22=	Analog#6

7 =	Dens.Freq (Not Selectable)
10 =	Multi. Variable Module
23=	Analog #7
24=	Analog #8
25=	Analog Input#9

4MA

Enter the 4mA value for the transducer.

20MA

Enter the 20mA value for the transducer.

Status Input /Switch Output Assignment

Status/Switch#1	000
Status/Switch#2	001
Status/Switch#3	000
Status/Switch#4	000

	Assignment	Comments
1.	**Spare**	
2.	Calibration Mode	
4.	Alarm Acknowledge	Reset the previous occurred alarms output bit

Switch Output Assignment

User can assign an output to each of the Micro MV Gas Flow Computer's output switches from this list. The Micro MV Gas Flow Computer switch outputs are sourcing through switch power input power.
Outputs in the top list, "Pulse Outputs", require a definition of pulse output per unit volume. Therefore a Pulse Output Width must be defined when one of these switch types are chosen. These outputs are available through switch 1 or 2 only.
Outputs in the bottom list, "Contact Type Outputs", are ON/OFF type outputs. They can be assigned to any of the four switch outputs.
Switches 1 and 2 can be pulse or contact type output; switches 3, 4 are contact-type output only.

Assignments - Pulse Outputs

	Meter 1	Meter 2	Meter 3	Meter 4
Gross	101	105	109	113
Net	102	106	110	114
Mass	103	107	111	115
Energy	104	108	112	116

Station Gross	117
Station Net	118
Station Mass	119
Station Energy	120

Assignments - Contact Type Outputs

	Meter 1	Meter 2	Meter 3	Meter 4
Meter Down	123	127	131	135
AGA8 Out of Range	124	128	132	136
Flow Rate High	125	129	133	137
Flow Rate Low	126	130	134	138

Day Ended	121
Month Ended	122
Analog Input #1 High	139
Analog Input #1 Low	140
Analog Input #2 High	141
Analog Input #2 Low	142
Analog Input #3 High	143
Analog Input #3 Low	144
Analog Input #4 High	145
Analog Input #4 Low	146
RTD Input High	147
RTD Input Low	148
Densitometer Failed	149
Density High	150
Density Low	151
Multi-Variable DP HI	152
Multi-Variable DP LO	153
Multi-Variable PF HI	154
Multi-Variable PF Low	155
Multi-Variable TF HI	156
Multi-Variable TF Low	157
Active Alarms	158
Occurred Alarms	159
Watchdog	160
Remote Control	161
Analog Input #5 High	162
Analog Input #5 Low	163
Analog Input #6 High	164
Analog Input #6 Low	165

Analog Input #7 High	166
Analog Input #7 Low	167
Analog Input #8 High	168
Analog Input #8 Low	169
Analog Input #9 High	170
Analog Input #9 Low	171
Spare Auxiliary I/O#1 Hi	172
Spare Auxiliary I/O#1 LO	173
Spare Auxiliary I/O#2 Hi	174
Spare Auxiliary I/O#2 LO	175
Spare Auxiliary I/O#3 Hi	176
Spare Auxiliary I/O#3 LO	177
Spare Auxiliary I/O#4 Hi	178
Spare Auxiliary I/O#4 LO	179
Spare Auxiliary I/O#5 HI	180
Spare Auxiliary I/O#5 LO	181
Spare Auxiliary I/O#6 HI	182
Spare Auxiliary I/O#6 LO	183
Spare Auxiliary I/O#7 HI	184
Spare Auxiliary I/O#7 LO	185
Spare Auxiliary I/O#8 HI	186
Spare Auxiliary I/O#8 LO	187
Spare Auxiliary I/O#9 HI	188
Spare Auxiliary I/O#9 LO	189
Spare Auxiliary I/O#10 HI	190
Spare Auxiliary I/O10 LO	191
Spare Auxiliary I/O#11 HI	192
Spare Auxiliary I/O11 LO	193
Spare Auxiliary I/O#12 HI	194
Spare Auxiliary I/O12 LO	195

Slave#1 DP HI	197
Slave#1 DP LO	198
Slave#1 P HI	199
Slave#1 P LO	200
Slave#1 T HI	201
Slave#1 T LO	202
Slave#2 DP HI	203
Slave#2 DP LO	204
Slave#2 P HI	205
Slave#2 P LO	206
Slave#2 T HI	207
Slave#2 T LO	208
Slave#3 DP HI	209
Slave#3 DP LO	210
Slave#3 P HI	211
Slave#3 P LO	212
Slave#3 T HI	213
Slave#3 T LO	214
Analog#1 Fail	215
Analog#2 Fail	216
Analog#3 Fail	217
Analog#4 Fail	218
RTD Fail	219
Analog#5 Fail	220
Analog#6 Fail	221
Analog#7 Fail	222
Analog#8 Fail	223
Analog#9 Fail	224

Flow Computer Display Assignment

FC.Display#1	000
FC.Display#2	001
FC.Display#3	000
FC.Display#4	000

Display assignment can be selected up to 16 assignments. The Micro MV Gas Flow Computer will scroll through them at the assigned delay time.

ASSIGNMENT

	Meter 1	Meter 2	Meter 3	Meter 4
Gross Flow Rate	101	201	301	401
Gross Daily Total	105	205	305	405
Gross Cumulative Total	109	209	309	409
Gross Month Total	113	213	313	413
Previous Gross Daily Total	117	217	317	417
Net Flow Rate	102	202	302	402
Net Daily Total	106	206	302	406
Net Cumulative Total	110	210	310	410
Net Month Total	114	214	314	414
Previous Net Daily Total	118	218	318	418
Mass Flow Rate	103	203	303	403
Mass Daily Total	107	207	307	407
Mass Cumulative Total	111	211	311	411
Mass Month Total	115	215	315	415
Previous Mass Daily Total	119	219	319	419
Energy Flow Rate	104	204	304	404
Energy Daily Total	108	208	308	408
Energy Cumulative Total	112	212	312	412
Energy Month Total	116	216	316	416
Previous Energy Daily Total	120	220	320	420

Station Gross Flow Rate	501
Station Net Flow Rate	502
Station Mass Flow Rate	503
Station Energy Flow Rate	504

	Meter 1	Meter 2	Meter 3	Meter 4
Temperature	121	221	321	421
Pressure	122	222	322	422
Density	123	223	323	423
DP	124	224	324	424
DP Low	125	225	325	425
DP High	126	226	326	426
Alarms	127	227	327	427
Orifice ID	128	228	328	428
Pipe ID	129	229	329	429
PID - Flow	130	230	330	430
PID – Pressure	131	231	331	431
PID – Output	132	232	332	432

Selection	Description		Selection	Description
701	Date/Time		**709**	Spare Auxiliary Var.#5/#6
702	Battery Voltage/Spare Variable #1		**710**	Spare Auxiliary Var.#7/#8
703	Spare Variable #2/#3		**711**	Spare Auxiliary Var.#9/#10
704	Spare Variable #4/#5		**712**	Spare Auxiliary Var.#11/#12
705	Spare Variable #6/#7		**713**	Program Variable #1/#2
706	Spare Variable #8/#9		**714**	Program Variable #3/#4
707	Spare Auxiliary Variable#1/#2		**715**	Program Variable #5/#6
708	Spare Auxiliary Variable#3/#4		**716**	Program Variable #7/#8

Pulse Output

Pulse Output	
#1 P/Unit#1	1.000
#2 P/Unit#2	1.000
Pulse Width	50

PULSE OUTPUT AND PULSE OUTPUT WIDTH

Pulse Output is used to activate a sampler or external totalizer. The number selected will be pulses per unit volume or per unit mass. If 0.1 pulse is selected, the one pulse will be given every 10 unit volumes has passed through the meter.

Pulse Output Width is the duration, in milliseconds, of one complete pulse cycle (where each cycle is the pulse plus a wait period, in a 50/50 ratio). For example: if POW = 500 msec, the Micro MV Gas Flow Computer at most can produce one pulse each second regardless of the pulse per unit volume selected (500 msec pulse + 500 msec wait). If POW = 10 msec the Micro MV Gas Flow Computer can produce up to 50 pulses per second.

The Micro MV Gas Flow Computer's maximum pulse output is 125 pulses/sec. The Pulse Output in combination with the Pulse Output Width should be set appropriately.

Others

Day Start Hour	7
Print Interval	1440
0=Hour,1=Day,2=Min	0
Disable Alarms	0

DAY START HOUR (0-23)

Day start hour is used for daily totalizer reset operation.

PRINT INTERVALS IN MINUTES (0-1440)

When the second port (RS-232) of the Micro MV Gas Flow Computer is configured as printer port, a snapshot report is generated every print interval (i.e., every five minutes, every hour, or every ten hours).

FLOW RATE SELECTION

The flow rate will be based on hourly basis, daily, or minute.

DISABLE ALARMS

Use Disable Alarms to ignore alarms. When the alarm function is disabled alarms are not logged. Alarms are also not logged if the DP is below the cut-off limit.

CHAPTER 4: FLOW EQUATIONS

Common Terms

The following terms are used throughout this chapter.

Term	Definition	US Units	Metric Unit	Examples
q	Flow rate: volume or mass displaced per unit time	See equations	See equations	q_{mass} , q_{energy}
T	Temperature	°F unless noted	°C unless noted	
DP	Differential Pressure across measuring device	Inches H_2O	m.Bar	
d	Orifice Diameter	Inches	Millimeter	d , d_r , d_m
D	Pipe Diameter	Inches	Millimeter	D , D_r , D_m
β	$= \frac{d}{D} = \frac{Orifice\ diameter}{Pipe\ diameter}$			β , β_r
ρ	Density (usually of the fluid)	Lb/ft^3	Kg/M^3	$\rho_{flowing}$, ρ_m
μ	Viscosity	centipoise	centipoise	
HN	Heating Value	BTU/ft^3	MJ/M^3	
Y	Expansion factor			

Subscripts: Conventions Used

This Subscript	Means	Examples
r	At reference conditions	$T_{r,p}$ = reference temperature of the pipe
O (letter o)	Refers to the orifice	$T_{r,O}$ = reference temperature of the orifice
P	Refers to the pipe	
flowing	At flow conditions	$\rho_{flowing}$ = density at flow conditions
cal	Calibration conditions	T_{cal} , P_{cal}
m	At measured conditions	D_m = pipe diameter at measured temp.

API 14.3

For more information, please see *Orifice Metering of Natural Gas*, 3rd edition.

Mass Flow Rate $= \frac{\pi}{4} \times N_c \times C_d \times E_v \times d^2 \times Y \times \sqrt{2DP \times Density} \times .001$

Net Flow Rate $= \frac{Mass\ Flow}{Base\ Density}$

Gross Flow Rate $= \frac{Mass\ Flow}{Flowing\ Density}$

Energy Flow Rate = Net Flow Rate × Heating Value × .001

Where:
N_c = *Units Conversion Constant*
C_d = *Orifice Plate Coefficient of Discharge*
$E_v = \frac{1}{\sqrt{1-\beta^4}}$ = *Velocity of Approach Factor*
d = *Orifice plate bore diameter*
Y = *Expansion Factor*
DP = *Orifice Differential Pressure*

	US unit	Metric Unit
N_c	323.279	.036
Density	lb/ft^3	kg/m^3
Gross Flow Rate/HR	MCF	KM3
Net Flow Rate/HR	MSCF	KSM3
Mass Flow Rate/HR	MLB	TON
Energy Flow Rate/HR	MMBTU	GJ

ISO5167 (Metric Unit Only)

$$\text{Mass Flowrate} = \frac{\pi}{4} \times N_c \times FA \times E_v \times d^2 Y \sqrt{2000 \times DP \times \rho}$$

$$= \boldsymbol{q_{mass}} \ \text{(TON/Hr)}$$

$$\text{Net Flowrate} = \frac{q_{mass}}{\rho_{reference}} = \text{KM3/Hr}$$

$$\text{Gross Flowrate} = \frac{q_{mass}}{\rho_{flowing}} = \text{KM3/Hr}$$

$$\text{Energy Flowrate} = \text{Net Flowrate} \times HeatingValue / 1000.0 = GJ / HR$$

Where :

$$N_c = ALPHA$$

$$Y = 10^{-6}$$

$$E_v = Exp. \times 3600$$

AGA 7

Please see ***Common Terms*** at the beginning of this chapter.

$$\text{Gross Flowrate (HOUR)} = \frac{\nu_{signal} \times F_M \times F_L \times 3.6}{F_K} = \boldsymbol{q_{gross}}$$

$$\text{Net Flowrate} = \frac{q_{gross}\rho_{flowing}}{\rho_{reference}}$$

$$\text{Mass Flowrate} = q_{gross}\rho_{flowing}$$

$$EnergyFlowrate = NetFlowrate \times HeatingValue / 1000.$$

ν_{signal} = *Frequency of the signal input, pulses/sec*

F_M = *Meter Factor*

F_L = *Linear Factor*

F_K = *Nominal K Factor*

Gross Flowrate in MCF for US unit or in KM3 for Metric Unit

Net Flowrate in MCF for US unit or in KM3 for Metric Unit

Mass Flowrate in MLB for US unit or in TON for Metric Unit

Energy Flowrate for MMBTU for US unit or in GJ for Metric Unit

V-Cone

$$\text{Mass Flowrate} = \frac{\pi}{4} \times \sqrt{2g_c \times \rho} \times \frac{D^2 \times \beta^2}{\sqrt{1-\beta^4}} \times Cf \times Y \times \sqrt{Psf} \times Fa$$

$$= \boldsymbol{q}_{\boldsymbol{mass/second}} \, (LB - US, KG - Metric)$$

$$\text{Net Flowrate} = \frac{q_{mass}}{\rho_{reference}}$$

$$\text{Gross Flowrate} = \frac{q_{mass}}{\rho_{flowing}}$$

$$\text{Energy Flowrate} = \text{Net Flowrate} \times HeatingValue / 1000$$

Where:

g_c = Dimensional Conversion Constant

C_f = Flow Coefficient of the Meter

ρ = Density (LB/FT3-US, KG/M3-Metric)

D = Meter Inside Diameter (Feet-US, Meters-Metric)

Psf = D.Pressure(Pounds force per square foot-US, Pascals-Metric)

Y = Adiabatic Expansion Factor for Contoured Elements

$$\beta = \sqrt{1 - \frac{d^2}{D^2}}$$

d = Cone Diameter, D=Meter Inside Diameter (Inches-US, Millimeters-Metric)

DENSITY EQUATIONS

Sarasota Density(GM/CC-US Unit, KG/M3-Metric Unit)

Sarasota density is calculated using the frequency signal produced by a Sarasota densitometer, and applying temperature and pressure corrections as shown below.

$$\text{Corrected Density} = DCF \times \frac{2D_0 (t - T_{0p})}{T_{0p} \times \frac{1 + K(t - T_{0p})}{2T_{0p}}}$$

Where:

$$T_{0p} = T_{coef} \times (T - T_{cal}) + P_{coef} \times (P - P_{cal}) + T_0$$

DCF = Density Correction Factor

D_0 = Calibration constant, mass/volume, gm/cm^3

t = Densitometer oscillation period in microseconds.

t_0 = A calibration constant in microseconds

T_{coef} = Temperature coefficient in microseconds/°F (US Unit) or °C (Metric Unit)

P = Flowing pressure in PSIG (US Unit), BAR, or KG/CM (Metric Unit)

P_{coef} = Pressure coefficient in microseconds/PSIG (US Unit), BAR, or KG/CM (Metric Unit)

P_{cal} = Calibration pressure in PSIG (US Unit), BAR, or KG/CM (Metric Unit)

UGC Density(GM/CC-US Unit, KG/M3-Metric Unit)

UGC density is calculated using the frequency signal produced by a UGC densitometer, and applying temperature and pressure corrections as shown below

$$\text{Corrected Density} = DCF \times P_{flowing}\{[K(P_{off}+d)\times 10^{-6}]+[K_T(T_{flowing}-T_{cal})] + d\}$$

$$Where:$$

$$d = K_0 + K_1 t + K_2 t^2$$

$$K_0, K_1, K_2 = Calibration\ Constants$$

$$t = Densitometer\ oscillation\ period\ in\ microseconds$$

$$DCF = Density\ Correction\ Factor$$

$$K = Pressure\ Constant$$

$$P_{off} = Pressure\ Offset$$

$$K_T = Temperature\ Coefficient$$

$$T_{cal} = Temperature\ coefficient\ in\ microseconds/^\circ F(US Unit), or ^\circ C(Metric Unit)$$

Solartron Density (GM/CC-US Unit, KG/M3-Metric Unit)

Solartron density is calculated using the frequency signal produced by a Solartron densitometer, and applying temperature and pressure corrections as shown below.

DENSITY AT 20 DEG.C AND 0 BAR

$$D = K_0 + K_1 t + K_2 t^2$$

Where :

$$t = \text{Densitometer Oscillation Period in microseconds}$$

$$K_0, K_1, K_2 = \text{Calibration Constants Supplied by Solartron}$$

TEMPERATURE CORRECTED DENSITY

$$DT = D[1 + K_{18}(T - 20) + K_{19}(T - 20)]$$

ADDITIONAL EQUATION FOR GAS OFFSET DATA

The following equation can provide more accurate measurement for Argon/Methane Gas Mixture over density range 60 to 200 kg/m^3.

$$DA = DT + (1 + K3/(DT + K4) x 0.00236 - G/(T + 273))$$

G = Gas Specific Gravity / Ratio of Specific Heats.

Density (GM/CC)= Density(KG/M3) / 1000.0

AGA8 Gross Method 1

Refer to Transmission Measurement Committee Report No. 8

AGA8 Gross Method 2

Refer to Transmission Measurement Committee Report No. 8

AGA8 Detail Method

Refer to Transmission Measurement Committee Report No. 8

CHAPTER 5: MODBUS DATA

MODBUS PROTOCOL

TRANSMISSION MODE

	ASCII	RTU
DATA BITS	7	8
START BITS	1	1
PARITY	EVEN, ODD	NONE
STOP BITS	1	1
ERROR CHECKING	LRC	CRC
BAUD RATE	1200-9600	1200-9600

ASCII FRAMING

Framing is accomplished by using colon (:) character indicating the beginning of frame and carriage (CR), line feed (LF) for the end of frame

ASCII MESSAGE FORMAT

	ADDRESS	FUNCTION	DATA	ERR\CHECK		
:	2 CHAR	2 CHAR	Nx2 CHAR	2 CHAR	CR	LF
8 BITS	16 BITS	16 BITS	Nx16 BITS	16 BITS	8 BITS	8 BITS

RTU FRAMING

Frame synchronization is done by time basis only. The Smart Flow Computer allows 3.5 characters time without new characters coming in before proceeding to process the message and resetting the buffer.

RTU MESSAGE FORMAT

ADDRESS	FUNCTION	DATA	CRC
8 BITS	8 BITS	Nx8 BITS	16 BITS

FUNCTION CODE

To inform the slave device of what function to perform

FUNCTION CODE	ACTION
01	
03	Read Strings or Multiple 16 Bits
16	Write Strings or Multiple 16 Bits

ERROR CHECK

LRC MODE

The LRC check is transmitted as two ASCII hexadecimal characters. First, the message has to be stripped of the: LF, CR, and then converted the HEX ASCII to Binary. Add the Binary bits and then two's complement the result.

CRC MODE

The entire message is considered in the CRC mode. Most significant bit is transmitted first. The message is pre-multiplied by 16. The integer quotient digits are ignored and the 16-bit remainder is appended to the message as the two CRC check bytes. The resulting message including the CRC, when divided by the same polynomial (X16+X15+X2+1) at the receiver, which will give zero remainder if no error, has occurred.

EXCEPTION RESPONSE

Exception response comes from the slave if it finds errors in communication. The slave responds to the master echoing the slave address, function code (with high bit set), exception code and error check. To indicate that the response is notification of an error, the high order bit of the function code is set to 1.

EXCEPTION CODE	DESCRIPTION
01	Illegal Function
02	Illegal Data Address
03	Illegal Data Value

BROADCAST COMMAND

All units listen to Unit ID Zero, and no one will respond when the write function is broadcasted.

MODBUS EXAMPLES

FUNCTION CODE 03 ***(Read Single or Multiple Register Points)***

RTU MODE - Read Address 3076

ADDR	FUNC CODE	STARTING POINT		# OF POINTS		CRC CHECK	
		HI	LO	HI	LO		
01	03	0C	04	00	01	C6	9B

Response

ADDR	FUNC CODE	BYTE COUNTS	DATA		CRC CHECK	
			HI	LO		
01	03	02	00	01	79	84

Write Address 3076

ADDR	FUNC CODE	START POINT		# OF POINTS		BYTE COUNTS	DATA		CRC CHECK	
		HI	LO	HI	LO		HI	LO		
01	10	0C	04	00	01	02	00	01	AA	14

Response

ADDR	FUNC CODE	START ADDR		# OF POINTS	CRC CHECK	
C	10	0C	04	01	43	58

ASCII MODE - Read Address 3076

ADDR			FUNC CODE		STARTING POINT				# OF POINTS				LRC CHECK			
					HI		LO		HI		LO					
:	30	31	30	33	30	43	30	43	30	30	30	31	45	42	CR	LF

Response

ADDR			FUNC CODE		BYTE COUNT		DATA				LRC CHECK			
							HI		LO					
:	30	31	30	33	30	32	30	30	30	31	46	39	CR	LF

2534	Flow Computer Display Delay	0 Inferred	Read/Write
2535	Flow Computer Assignment #1	0 Inferred	Read/Write
2536	Flow Computer Assignment #2	0 Inferred	Read/Write
2537	Flow Computer Assignment #3	0 Inferred	Read/Write
2538	Flow Computer Assignment #4	0 Inferred	Read/Write
2539	Flow Computer Assignment #5	0 Inferred	Read/Write
2540	Flow Computer Assignment #6	0 Inferred	Read/Write
2541	Flow Computer Assignment #7	0 Inferred	Read/Write
2542	Flow Computer Assignment #8	0 Inferred	Read/Write
2543	Flow Computer Assignment #9	0 Inferred	Read/Write
2544	Flow Computer Assignment #10	0 Inferred	Read/Write
2545	Flow Computer Assignment #11	0 Inferred	Read/Write
2546	Flow Computer Assignment #12	0 Inferred	Read/Write
2547	Flow Computer Assignment #13	0 Inferred	Read/Write
2548	Flow Computer Assignment #14	0 Inferred	Read/Write
2549	Flow Computer Assignment #15	0 Inferred	Read/Write
2550	Flow Computer Assignment #16	0 Inferred	Read/Write
2551	Flow Copmputer ID or Unit ID	0 Inferred	Read/Write
2552	reserved		
2553	Port 1 Modbus Type (0=RTU,1=ASCII)	0 Inferred	Read/Write
2554	Port 1 Parity(0=None,1=Odd,2=Even)	0 Inferred	Read/Write
2555	Port 1 Baud Rate(0=1200,1=2400,3=4800,4=9600)		
2556	reserved		
2557	Port 1 RTS Delay in Milliseconds	0 Inferred	Read/Write
2558-2559	reserved		
2560	Port 2 Select 0=RTS,1=Printer	0 Inferred	Read/Write
2561	Port 2 Modbus Type (0=RTU,1=ASCII)	0 Inferred	Read/Write
2562	Port 2 Parity(0=None,1=Odd,2=Even)	0 Inferred	Read/Write
2563	Port 2 Baud Rate(0=1200,1=2400,3=4800,4=9600)		
2564	Reserved		
2565	Port 2 RTS Delay in Milliseconds	0 Inferred	Read/Write
2566	Printer- Number of Nulls	0 Inferred	Read/Write
2567	Reserved		
2568	No. of Meters	0 Inferred	Read/Write
2569	Select 0=US, 1=Metric Unit	0 Inferred	Read/Write
2570	Metric Pressure Units? 0=Bar,1=KG/CM2	0 Inferred	Read/Write
2571	Flow Units? 0=MCF,1=KM3,	0 Inferred	Read/Write
2572	Common Temperature 1=Yes	0 Inferred	Read/Write
2573	Common Pressure 1=Yes	0 Inferred	Read/Write
2574	Common Density 1=Yes	0 Inferred	Read/Write
2575	Station Type? 0=None,1=Yes	0 Inferred	Read/Write
2576-2580	Spare		

Modbus Address Table – 16 Bits

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
2581	Flow Rate Display 0=Hour,1=Day,2=Minute	0 Inferred	Read/Write
2582	Flowrate Averaged Seconds (1-10)	0 Inferred	Read/Write
2583	Day Start Hour (0-23)	0 Inferred	Read/Write
2584	Disable Alarms ? (0=No, 1=Yes)	0 Inferred	Read/Write
2585	Print Interval in Minutes (0-1440)	0 Inferred	Read/Write
2586	Run Switch Delay	0 Inferred	Read/Write
2587	Pulse Width	0 Inferred	Read/Write
2588-2595	Spare		
2596	Status Input/Switch Output #1 Assign	0 Inferred	Read/Write
2597	Status Input/Switch Output #2 Assign	0 Inferred	Read/Write
2598	Status Input/Switch Output #3 Assign	0 Inferred	Read/Write
2599	Status Input/Switch Output #4 Assign	0 Inferred	Read/Write
2600	Analog Output #1 Assign	0 Inferred	Read/Write
2601	Analog Output #2 Assign	0 Inferred	Read/Write
2602	Analog Output #3 Assign	0 Inferred	Read/Write
2603	Analog Output #4 Assign	0 Inferred	Read/Write
2604-2610	Spare		
2611-2620	Company Name	40 Chars	Read/Write
2621-2630	Meter Location	40 Chars.	Read/Write
2631-2634	Meter #1 ID	8 Chars	Read/Write
2635-2638	Meter #2 ID	8 Chars	Read/Write
2639-2642	Meter #3 ID	8 Chars	Read/Write
2643-2646	Meter #4 ID	8 Chars	Read/Write
2647-2655	Reserved		
2656	Meter #1 Use Stack DP	0 Inferred	Read/Write
2657	Meter #1 Density Type	0 Inferred	Read/Write
2658	Meter #1 Density Unit	0 Inferred	Read/Write
2659	Meter #1 Flow Cut Off	0 Inferred	Read/Write
2660	Meter #1 Flow Equation	0 Inferred	Read/Write
2661	Meter #1 Y Factor Select	0 Inferred	Read/Write
2662	Meter #1 ISO5167 Dens Use up_stream Temp	0 Inferred	Read/Write
2663	Meter #1 Density Calculation Type	0 Inferred	Read/Write
2664	Meter #1 DP.Low Assignment	0 Inferred	Read/Write
2665	Meter #1 Temperature Assignment	0 Inferred	Read/Write
2666	Meter #1 Pressure Assignment	0 Inferred	Read/Write
2667	Meter #1 Density Assignment	0 Inferred	Read/Write
2668	Meter #1 DP.High Assignment	0 Inferred	Read/Write
2669-2675	Spare		
2676	Meter #2 Use Stack DP	0 Inferred	Read/Write
2677	Meter #2 Density Type	0 Inferred	Read/Write
2678	Meter #2 Density Unit	0 Inferred	Read/Write
2679	Meter #2 Flow Cut Off	0 Inferred	Read/Write
2680	Meter #2 Flow Equation	0 Inferred	Read/Write
2681	Meter #2 Y Factor Select	0 Inferred	Read/Write
2682	Meter #2 ISO5167 Dens Use up_stream Temp	0 Inferred	Read/Write
2683	Meter #2 Density Calculation Type	0 Inferred	Read/Write
2684	Meter #2 DP.Low Assignment	0 Inferred	Read/Write
2685	Meter #2 Temperature Assignment	0 Inferred	Read/Write

Modbus Address Table – 16 Bits

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
2686	Meter #2 Pressure Assignment	0 Inferred	Read/Write
2687	Meter #2 Density Assignment	0 Inferred	Read/Write
2688	Meter #2 DP.High Assignment	0 Inferred	Read/Write
2689-2695	Spare		
2696	Meter #3 Use Stack DP	0 Inferred	Read/Write
2697	Meter #3 Density Type	0 Inferred	Read/Write
2698	Meter #3 Density Unit	0 Inferred	Read/Write
2699	Meter #3 Flow Cut Off	0 Inferred	Read/Write
2700	Meter #3 Flow Equation	0 Inferred	Read/Write
2701	Meter #3 Y Factor Select	0 Inferred	Read/Write
2702	Meter #3 ISO5167 Dens Use up_stream Temp	0 Inferred	Read/Write
2703	Meter #3 Density Calculation Type	0 Inferred	Read/Write
2704	Meter #3 DP.Low Assignment	0 Inferred	Read/Write
2705	Meter #3 Temperature Assignment	0 Inferred	Read/Write
2706	Meter #3 Pressure Assignment	0 Inferred	Read/Write
2707	Meter #3 Density Assignment	0 Inferred	Read/Write
2708	Meter #3 DP.High Assignment	0 Inferred	Read/Write
2709-2715	Spare		
2716	Meter #4 Use Stack DP	0 Inferred	Read/Write
2717	Meter #4 Density Type	0 Inferred	Read/Write
2718	Meter #4 Density Unit	0 Inferred	Read/Write
2719	Meter #4 Flow Cut Off	0 Inferred	Read/Write
2720	Meter #4 Flow Equation	0 Inferred	Read/Write
2721	Meter #4 Y Factor Select	0 Inferred	Read/Write
2722	Meter #4 ISO5167 Dens Use up_stream Temp	0 Inferred	Read/Write
2723	Meter #4 Density Calculation Type	0 Inferred	Read/Write
2724	Meter #4 DP.Low Assignment	0 Inferred	Read/Write
2725	Meter #4 Temperature Assignment	0 Inferred	Read/Write
2726	Meter #4 Pressure Assignment	0 Inferred	Read/Write
2727	Meter #4 Density Assignment	0 Inferred	Read/Write
2728	Meter #4 DP.High Assignment	0 Inferred	Read/Write
2729-2735	Spare		
2736	Analog Input #1 Fail Code	0 Inferred	Read/Write
2737	Analog Input #2 Fail Code	0 Inferred	Read/Write
2738	Analog Input #3 Fail Code	0 Inferred	Read/Write
2739	Analog Input #4 Fail Code	0 Inferred	Read/Write
2740	RTD Input Fail Code	0 Inferred	Read/Write
2741	Muti.Var.DP Fail Code	0 Inferred	Read/Write
2742	Muti.Var.Pressure Fail Code	0 Inferred	Read/Write
2743	Muti.Var.Temperature Fail Code	0 Inferred	Read/Write
2744	Densitometer Fail Code	0 Inferred	Read/Write
2745	Densitometer Temperature Assignment	0 Inferred	Read/Write
2746	Densitometer Pressure Assignment	0 Inferred	Read/Write
2747-2750	Spare		
2751	Status Input/Switch Output #1 (0=OFF,1=ON)	0 Inferred	Read/Write
2752	Status Input/Switch Output #2 (0=OFF,1=ON)	0 Inferred	Read/Write
2753	Status Input/Switch Output #3 (0=OFF,1=ON)	0 Inferred	Read/Write
2754	Status Input/Switch Output #4 (0=OFF,1=ON)	0 Inferred	Read/Write
2755-2890	Spare		
2891-2894	Analog Input #1 Tag Name	8 Chars	Read/Write
2895-2898	Analog Input #2 Tag Name	8 Chars	Read/Write
2899-2902	Analog Input #3 Tag Name	8 Chars	Read/Write
2903-2906	Analog Input #4 Tag Name	8 Chars	Read/Write

Modbus Address Table – 16 Bits

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
2907-2910	RTD Input Tag Name	8 Chars	Read/Write
2911-2914	Density Input Tag Name	8 Chars	Read/Write
2915-2918	Analog Output #1 Tag Name	8 Chars	Read/Write
2919-2922	Analog Output #2 Tag Name	8 Chars	Read/Write
2923-2926	Analog Output #3 Tag Name	8 Chars	Read/Write
2927-2930	Analog Output #4 Tag Name	8 Chars	Read/Write
2931-2934	Multi.Var.#1 DP Tag	8 Chars.	Read/Write
2935-2938	Multi.Var.#1 Pressure Tag	8 Chars.	Read/Write
2939-2942	Multi.Var.#1 Temperature Tag	8 Chars.	Read/Write
2943	Meter#1 PID Auto/Manual	0 Inferred	Read/Write
2944	Meter#1 PID Flow Loop Used (1=Yes)	0 Inferred	Read/Write
2945	Meter#1 PID Flow Direct/Reverse Act	0 Inferred	Read/Write
2946	Meter#1 PID Pressure Loop Used (1=Yes)	0 Inferred	Read/Write
2947	Meter#1 PID Pressure Direct/Reverse Act	0 Inferred	Read/Write
2948	Meter#1 PID Flow Loop in Service	0 Inferred	Read/Write
2949	Meter#1 PID Pressure Loop in Service	0 Inferred	Read/Write
2950	Meter#1 PID 0=Low,1=High Signal	0 Inferred	Read/Write
2951	Meter#1 PID Flow Base 0=Gross,1=Net,2=Mass	0 Inferred	Read/Write
2952	Meter#2 PID Auto/Manual	0 Inferred	Read/Write
2953	Meter#2 PID Flow Loop Used (1=Yes)	0 Inferred	Read/Write
2954	Meter#2 PID Flow Direct/Reverse Act	0 Inferred	Read/Write
2955	Meter#2 PID Pressure Loop Used (1=Yes)	0 Inferred	Read/Write
2956	Meter#2 PID Pressure Direct/Reverse Act	0 Inferred	Read/Write
2957	Meter#2 PID Flow Loop in Service	0 Inferred	Read/Write
2958	Meter#2 PID Pressure Loop in Service	0 Inferred	Read/Write
2959	Meter#2 PID 0=Low,1=High Signal	0 Inferred	Read/Write
2960	Meter#2 PID Flow Base 0=Gross,1=Net,2=Mass	0 Inferred	Read/Write
2961	Meter#3 PID Auto/Manual	0 Inferred	Read/Write
2962	Meter#3 PID Flow Loop Used (1=Yes)	0 Inferred	Read/Write
2963	Meter#3 PID Flow Direct/Reverse Act	0 Inferred	Read/Write
2964	Meter#3 PID Pressure Loop Used (1=Yes)	0 Inferred	Read/Write
2965	Meter#3 PID Pressure Direct/Reverse Act	0 Inferred	Read/Write
2966	Meter#3 PID Flow Loop in Service	0 Inferred	Read/Write
2967	Meter#3 PID Pressure Loop in Service	0 Inferred	Read/Write
2968	Meter#3 PID 0=Low,1=High Signal	0 Inferred	Read/Write
2969	Meter#3 PID Flow Base 0=Gross,1=Net,2=Mass	0 Inferred	Read/Write
2970	Meter#4 PID Auto/Manual	0 Inferred	Read/Write
2971	Meter#4 PID Flow Loop Used (1=Yes)	0 Inferred	Read/Write
2972	Meter#4 PID Flow Direct/Reverse Act	0 Inferred	Read/Write
2973	Meter#4 PID Pressure Loop Used (1=Yes)	0 Inferred	Read/Write
2974	Meter#4 PID Pressure Direct/Reverse Act	0 Inferred	Read/Write
2975	Meter#4 PID Flow Loop in Service	0 Inferred	Read/Write
2976	Meter#4 PID Pressure Loop in Service	0 Inferred	Read/Write
2977	Meter#4 PID 0=Low,1=High Signal	0 Inferred	Read/Write
2978	Meter#4 PID Flow Base 0=Gross,1=Net,2=Mass	0 Inferred	Read/Write
2979-2984	Spare		
2985	Analog Output#1 –Remote Control (0-100)	0 Inferred	Read/Write
2986	Analog Output#2 –Remote Control (0-100)	0 Inferred	Read/Write
2987	Analog Output#3 –Remote Control (0-100)	0 Inferred	Read/Write
2988	Analog Output#4 –Remote Control (0-100)	0 Inferred	Read/Write

Modbus Address Table – 16 Bits

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
3001	Version Number	2 Inferred	Read
3002-3006	Spare		
3007	Meter #1 Product Used	0 Inferred	Read
3008-3011	Meter #1 ID	8 Chars	Read
3012	Spare		
3013	Meter #2 Product Used	0 Inferred	Read
3014-3017	Meter #2 ID	8 Chars	Read
3018	Flow Computer Unit Number	0 Inferred	Read
3019	Disable Alarms (1=Yes)	0 Inferred	Read
3020-3023	Spare		
3024	Enable Calibration Mode (1=Yes)	0 Inferred	Read
3025	Calibration – Set Time (1-9 Hours)	0 Inferred	Read
3026	Last Daily Report Request (1=Latest,32=Oldest) Daily Data Area in Location 3431-3747	0 Inferred	Read/Write
3027	Last Monthly Report Request(1=Latest,12=Oldest) Set Last Monthly Report Request to 1 Monthly Data Area in Location 3431-3747	0 Inferred	Read/Write
3028	Reserved		
3029	Last Hourly Report Request(1=Latest,768=Oldest)	0 Inferred	Read/Write
3030	Last Alarm Report Request	0 Inferred	Read/Write
3031	Last Audt Report Request	0 Inferred	Read/Write
3032-3122	Spare		

Modbus 16-bit Address Table Ends

Modbus Address Table – 32 Bits

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
***Non-resettable accumulated volume will roll over at 9999999.**			
3131	Meter #1 Daily Gross Total	1 inferred	Read
3133	Meter #1 Daily Net Total	1 inferred	Read
3135	Meter #1 Daily Mass Total	1 inferred	Read
3137	Meter #1 Daily Energy Total	1 inferred	Read
3139	Meter #1 Hourly Gross Total	1 Inferred	Read
3141	Meter #1 Hourly Net Total	1 Inferred	Read
3143	Meter #1 Hourly Mass Total	1 Inferred	Read
3145	Meter #1 Hourly Energy Total	1 Inferred	Read
3147	Meter #1 Monthly Gross Total	1 Inferred	Read
3149	Meter #1 Monthly Net Total	1 Inferred	Read
3151	Meter #1 Monthly Mass Total	1 Inferred	Read
3153	Meter #1 Monthly Energy Total	1 Inferred	Read
3155	Meter #1 Cumulative Gross Total*	0 Inferred	Read
3157	Meter #1 Cumulative Net Total*	0 Inferred	Read
3159	Meter #1 Cumulative Mass Total*	0 Inferred	Read
3161	Meter #1 Cumulative Energy Total*	0 Inferred	Read
3163	Meter #1 Meter Factor	6 Inferred	Read
3165	Meter #1 Linear Factor	6 Inferred	Read
3167-3169	Spare		
3171	Meter #2 Daily Gross Total	1 inferred	Read
3173	Meter #2 Daily Net Total	1 inferred	Read
3175	Meter #2 Daily Mass Total	1 inferred	Read
3177	Meter #2 Daily Energy Total	1 inferred	Read
3179	Meter #2 Hourly Gross Total	1 Inferred	Read
3181	Meter #2 Hourly Net Total	1 Inferred	Read
3183	Meter #2 Hourly Mass Total	1 Inferred	Read
3185	Meter #2 Hourly Energy Total	1 Inferred	Read
3187	Meter #2 Monthly Gross Total	1 Inferred	Read
3189	Meter #2 Monthly Net Total	1 Inferred	Read
3191	Meter #2 Monthly Mass Total	1 Inferred	Read
3193	Meter #2 Monthly Energy Total	1 Inferred	Read
3195	Meter #2 Cumulative Gross Total*	0 Inferred	Read
3197	Meter #2 Cumulative Net Total*	0 Inferred	Read
3199	Meter #2 Cumulative Mass Total*	0 Inferred	Read
3201	Meter #2 Cumulative Energy Total*	0 Inferred	Read
3203	Meter #2 Meter Factor	6 Inferred	Read
3205	Meter #2 Linear Factor	6 Inferred	Read
3207-3209	Spare		

Modbus Address Table – 32 Bits

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
3211	Meter #3 Daily Gross Total	1 inferred	Read
3213	Meter #3 Daily Net Total	1 inferred	Read
3215	Meter #3 Daily Mass Total	1 inferred	Read
3217	Meter #3 Daily Energy Total	1 inferred	Read
3219	Meter #3 Hourly Gross Total	1 Inferred	Read
3221	Meter #3 Hourly Net Total	1 Inferred	Read
3223	Meter #3 Hourly Mass Total	1 Inferred	Read
3225	Meter #3 Hourly Energy Total	1 Inferred	Read
3227	Meter #3 Monthly Gross Total	1 Inferred	Read
3229	Meter #3 Monthly Net Total	1 Inferred	Read
3231	Meter #3 Monthly Mass Total	1 Inferred	Read
3233	Meter #3 Monthly Energy Total	1 Inferred	Read
3235	Meter #3 Cumulative Gross Total*	0 Inferred	Read
3237	Meter #3 Cumulative Net Total*	0 Inferred	Read
3239	Meter #3 Cumulative Mass Total*	0 Inferred	Read
3241	Meter #3 Cumulative Energy Total*	0 Inferred	Read
3243	Meter #3 Meter Factor	6 Inferred	Read
3245	Meter #3 Linear Factor	6 Inferred	Read
3247-3249	Spare		
3251	Meter #4 Daily Gross Total	1 inferred	Read
3253	Meter #4 Daily Net Total	1 inferred	Read
3255	Meter #4 Daily Mass Total	1 inferred	Read
3257	Meter #4 Daily Energy Total	1 inferred	Read
3259	Meter #4 Hourly Gross Total	1 Inferred	Read
3261	Meter #4 Hourly Net Total	1 Inferred	Read
3263	Meter #4 Hourly Mass Total	1 Inferred	Read
3265	Meter #4 Hourly Energy Total	1 Inferred	Read
3267	Meter #4 Monthly Gross Total	1 Inferred	Read
3269	Meter #4 Monthly Net Total	1 Inferred	Read
3271	Meter #4 Monthly Mass Total	1 Inferred	Read
3273	Meter #4 Monthly Energy Total	1 Inferred	Read
3275	Meter #4 Cumulative Gross Total*	0 Inferred	Read
3277	Meter #4 Cumulative Net Total*	0 Inferred	Read
3279	Meter #4 Cumulative Mass Total*	0 Inferred	Read
3281	Meter #4 Cumulative Energy Total*	0 Inferred	Read
3283	Meter #4 Meter Factor	6 Inferred	Read
3285	Meter #4 Linear Factor	6 Inferred	Read
3287-3289	Spare		
3291	Station Gross Flowrate	2 Inferred	Read
3293	Station Net Flowrate	2 Inferred	Read
3295	Station Mass Flowrate	2 Inferred	Read
3297	Station Energy Flowrate	2 Inferred	Read
3299	Station Daily Gross Total	1 Inferred	Read
3301	Station Daily Net Total	1 Inferred	Read
3303	Station Daily Mass Total	1 Inferred	Read
3305	Station Daily Energy Total	1 Inferred	Read
3307	Spare		
3309	Spare		
3311	Spare		
3313	Spare		
3315-3381	Spare		

Modbus Address Table – 32 Bits

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
3383	Analog Output #1 Output %	2 Inferred	Read
3385	Analog Output #2 Output %	2 Inferred	Read
3387	Analog Output #3 Output %	2 Inferred	Read
3389	Analog Output #4 Output %	2 Inferred	Read
3391	Uncorrected Density	6 Inferred	Read
3395-3429	Spare		

Modbus Address Table – 32 Bits

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE

Last Daily or Monthly Data Area

Set Last Daily Report Request (3026) to 1=Latest,32=Oldtest
Daily Data Area in Location 3431-3753

Set Last Monthly Report Request (3027) to 1=Latest,2=Oldtest
Monthly Data Area in Location 3431-3753

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
3431	Batch Type/Disp/Bank/Station Flag	0 Inferred	Read
3433	Day/Month Start Date	0 Inferred	Read
3435	Day/Month Start Time	0 Inferred	Read
3437-3439	Meter#1 ID	8 Chars.	Read
3441	Meter#1 Flowing Time	1 Inferred	Read
3443	Meter #1 Daily/Monthly Gross Total	1 Inferred	Read
3445	Meter #1 Daily/Monthly Net Total	1 Inferred	Read
3447	Meter #1 Daily/Monthly Mass Total	1 Inferred	Read
3449	Meter #1 Daily/Monthly Energy Total	1 Inferred	Read
3451	Meter #1 Average DP	4 Inferred	Read
3453	Meter #1 Average Temperature	2 Inferred	Read
3455	Meter #1 Average Pressure	2 Inferred	Read
3457	Meter #1 Average DP_EXT	4 Inferred	Read
3459	Meter #1 Average Heating Value	3 Inferred	Read
3461	Meter #1 Average SG	6 Inferred	Read
3473	Meter #1 Average N2	4 Inferred	Read
3475	Meter #1 Average CO2	4 Inferred	Read
3477	Meter #1 Average Methane	4 Inferred	Read
3479	Meter #1 Average Ethane	4 Inferred	Read
3481	Meter #1 Average Propane	4 Inferred	Read
3483	Meter #1 Average Water	4 Inferred	Read
3485	Meter #1 Average H2S	4 Inferred	Read
3487	Meter #1 Average H2	4 Inferred	Read
3489	Meter #1 Average CO	4 Inferred	Read
3481	Meter #1 Average Oxygen	4 Inferred	Read
3483	Meter #1 Average i-Butane	4 Inferred	Read
3485	Meter #1 Average n-Butane	4 Inferred	Read
3487	Meter #1 Average i-Pentane	4 Inferred	Read
3489	Meter #1 Average n-Pentane	4 Inferred	Read
3491	Meter #1 Average n-Hexane	4 Inferred	Read
3493	Meter #1 Average n-Heptane	4 Inferred	Read
3495	Meter #1 Average n-Octane	4 Inferred	Read
3497	Meter #1 Average n-Nonane	4 Inferred	Read
3499	Meter #1 Average n-Decane	4 Inferred	Read
3501	Meter #1 Average Helium	4 Inferred	Read
3503	Meter #1 Average Argon	4 Inferred	Read
3505	Meter #1 Cumulative Gross Total	0 Inderred	Read
3507	Meter #1 Cumulative Net Total	0 Inderred	Read
3509	Meter #1 Cumulative Mass Total	0 Inderred	Read
3511	Meter #1 Cumulative Energy Total	0 Inderred	Read
3513-3515	Meter#2 ID	8 Chars.	Read
3517	Meter#2 Flowing Times	1 Inferred	Read
3519	Meter#2 Daily/Monthly Gross Total	1 Inferred	Read
3521	Meter #2 Daily/Monthly Net Total	1 Inferred	Read

Modbus Address Table – 32 Bits

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
3523	Meter #2 Daily/Monthly Mass Total	1 Inferred	Read
3525	Meter #2 Daily/Monthly Energy Total	1 Inferred	Read
3527	Meter #2 Average DP	4 Inferred	Read
3529	Meter #2 Average Temperature	2 Inferred	Read
3531	Meter #2 Average Pressure	2 Inferred	Read
3533	Meter #2 Average DP_EXT	4 Inferred	Read
3535	Meter #2 Average Heating Value	3 Inferred	Read
3537	Meter #2 Average SG	6 Inferred	Read
3539	Meter #2 Average N2	4 Inferred	Read
3541	Meter #2 Average CO2	4 Inferred	Read
3543	Meter #2 Average Methane	4 Inferred	Read
3545	Meter #2 Average Ethane	4 Inferred	Read
3547	Meter #2 Average Propane	4 Inferred	Read
3549	Meter #2 Average Water	4 Inferred	Read
3551	Meter #2 Average H2S	4 Inferred	Read
3553	Meter #2 Average H2	4 Inferred	Read
3555	Meter #2 Average CO	4 Inferred	Read
3557	Meter #2 Average Oxygen	4 Inferred	Read
3559	Meter #2 Average i-Butane	4 Inferred	Read
3561	Meter #2 Average n-Butane	4 Inferred	Read
3563	Meter #2 Average i-Pentane	4 Inferred	Read
3565	Meter #2 Average n-Pentane	4 Inferred	Read
3567	Meter #2 Average n-Hexane	4 Inferred	Read
3569	Meter #2 Average n-Heptane	4 Inferred	Read
3571	Meter #2 Average n-Octane	4 Inferred	Read
3573	Meter #2 Average n-Nonane	4 Inferred	Read
3575	Meter #2 Average n-Decane	4 Inferred	Read
3577	Meter #2 Average Helium	4 Inferred	Read
3579	Meter #2 Average Argon	4 Inferred	Read
3581	Meter #2 Cumulative Gross Total	0 Inderred	Read
3583	Meter #2 Cumulative Net Total	0 Inderred	Read
3585	Meter #2 Cumulative Mass Total	0 Inderred	Read
3587	Meter #2 Cumulative Energy Total	0 Inderred	Read
3589-3591	Meter#3 ID	8 Chars.	Read
3593	Meter#3 Flowing Times	1 Inferred	Read
3595	Meter#3 Daily/Monthly Gross Total	1 Inferred	Read
3597	Meter#3 Daily/Monthly Net Total	1 Inferred	Read
3599	Meter #3 Daily/Monthly Mass Total	1 Inferred	Read
3601	Meter #3 Daily/Monthly Energy Total	1 Inferred	Read
3603	Meter #3 Average DP	4 Inferred	Read
3605	Meter #3 Average Temperature	2 Inferred	Read
3607	Meter #3 Average Pressure	2 Inferred	Read
3609	Meter #3 Average DP_EXT	4 Inferred	Read
3611	Meter #3 Average Heating Value	3 Inferred	Read
3613	Meter #3 Average SG	6 Inferred	Read
3615	Meter #3 Average N2	4 Inferred	Read
3617	Meter #3 Average CO2	4 Inferred	Read
3619	Meter #3 Average Methane	4 Inferred	Read
3621	Meter #3 Average Ethane	4 Inferred	Read
3623	Meter #3 Average Propane	4 Inferred	Read
3625	Meter #3 Average Water	4 Inferred	Read
3627	Meter #3 Average H2S	4 Inferred	Read

Modbus Address Table – 32 Bits

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
3629	Meter #3 Average H2	4 Inferred	Read
3631	Meter #3 Average CO	4 Inferred	Read
3633	Meter #3 Average Oxygen	4 Inferred	Read
3635	Meter #3 Average i-Butane	4 Inferred	Read
3637	Meter #3 Average n-Butane	4 Inferred	Read
3639	Meter #3 Average i-Pentane	4 Inferred	Read
3641	Meter #3 Average n-Pentane	4 Inferred	Read
3643	Meter #3 Average n-Hexane	4 Inferred	Read
3645	Meter #3 Average n-Heptane	4 Inferred	Read
3647	Meter #3 Average n-Octane	4 Inferred	Read
3649	Meter #3 Average n-Nonane	4 Inferred	Read
3651	Meter #3 Average n-Decane	4 Inferred	Read
3653	Meter #3 Average Helium	4 Inferred	Read
3655	Meter #3 Average Argon	4 Inferred	Read
3657	Meter #3 Cumulative Gross Total	0 Inderred	Read
3659	Meter #3 Cumulative Net Total	0 Inderred	Read
3661	Meter #3 Cumulative Mass Total	0 Inderred	Read
3663	Meter #3 Cumulative Energy Total	0 Inderred	Read
3665-3667	Meter#4 ID	8 Chars.	Read
3669	Meter#4 Flowing Times	1 Inferred	Read
3671	Meter#4 Daily/Monthly Gross Total	1 Inferred	Read
3673	Meter#4 Daily/Monthly Net Total	1 Inferred	Read
3675	Meter #4 Daily/Monthly Mass Total	1 Inferred	Read
3677	Meter #4 Daily/Monthly Energy Total	1 Inferred	Read
3679	Meter #4 Average DP	4 Inferred	Read
3681	Meter #4 Average Temperature	2 Inferred	Read
3683	Meter #4 Average Pressure	2 Inferred	Read
3685	Meter #4 Average DP_EXT	4 Inferred	Read
3687	Meter #4 Average Heating Value	3 Inferred	Read
3689	Meter #4 Average SG	6 Inferred	Read
3691	Meter #4 Average N2	4 Inferred	Read
3693	Meter #4 Average CO2	4 Inferred	Read
3695	Meter #4 Average Methane	4 Inferred	Read
3697	Meter #4 Average Ethane	4 Inferred	Read
3699	Meter #4 Average Propane	4 Inferred	Read
3701	Meter #4 Average Water	4 Inferred	Read
3703	Meter #4 Average H2S	4 Inferred	Read
3705	Meter #4 Average H2	4 Inferred	Read
3707	Meter #4 Average CO	4 Inferred	Read
3709	Meter #4 Average Oxygen	4 Inferred	Read
3711	Meter #4 Average i-Butane	4 Inferred	Read
3713	Meter #4 Average n-Butane	4 Inferred	Read
3715	Meter #4 Average i-Pentane	4 Inferred	Read
3717	Meter #4 Average n-Pentane	4 Inferred	Read
3719	Meter #4 Average n-Hexane	4 Inferred	Read
3721	Meter #4 Average n-Heptane	4 Inferred	Read
3723	Meter #4 Average n-Octane	4 Inferred	Read
3725	Meter #4 Average n-Nonane	4 Inferred	Read
3727	Meter #4 Average n-Decane	4 Inferred	Read
3729	Meter #4 Average Helium	4 Inferred	Read
3731	Meter #4 Average Argon	4 Inferred	Read
3733	Meter #4 Cumulative Gross Total	0 Inderred	Read

Modbus Address Table – 32 Bits

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
3735	Meter #4 Cumulative Net Total	0 Inderred	Read
3737	Meter #4 Cumulative Mass Total	0 Inderred	Read
3739	Meter #4 Cumulative Energy Total	0 Inderred	Read
3741	Station Daily/Monthly Gross Total	1 Inferred	Read
3743	Station Daily/Monthly Net Total	1 Inferred	Read
3745	Station Daily/Monthly Mass Total	1 Inferred	Read
3747	Station Daily/Monthly Energy Total	1 Inferred	Read
3749	Spare		

LAST DAILY OR MONTHLY DATA AREA ENDS

Modbus Address Table – 32 Bits

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
3751-3765	Spare		
3767-3785	Reserved		
3787	Request Start Date	0 Inferred	Read/Write
3789-4109	Reserved		
4111	Meter #1 PID – Pressure	2 Inferred	Read
4113	Meter #1 PID – Flow	2 Inferred	Read
4115	Meter #1 PID – Output %	2 Inferred	Read
4117	Meter #1 PID – Flow Output %	2 Inferred	Read
4119	Meter #1 PID – Pressure Output %	2 Inferred	Read
4121	Meter #2 PID – Pressure	2 Inferred	Read
4123	Meter #2 PID – Flow	2 Inferred	Read
4125	Meter #2 PID – Output %	2 Inferred	Read
4127	Meter #2 PID – Flow Output %	2 Inferred	Read
4129	Meter #2 PID – Pressure Output %	2 Inferred	Read
4131	Meter #3 PID – Pressure	2 Inferred	Read
4133	Meter #3 PID – Flow	2 Inferred	Read
4135	Meter #3 PID – Output %	2 Inferred	Read
4137	Meter #3 PID – Flow Output %	2 Inferred	Read
4139	Meter #3 PID – Pressure Output %	2 Inferred	Read
4141	Meter #4 PID – Pressure	2 Inferred	Read
4143	Meter #4 PID – Flow	2 Inferred	Read
4145	Meter #4 PID – Output %	2 Inferred	Read
4147	Meter #4 PID – Flow Output %	2 Inferred	Read
4149	Meter #4 PID – Pressure Output %	2 Inferred	Read
4151	Densitometer Period	3 Inferred	Read
4153-4199	Spare		
4201	Date (MMDDYY)	0 Inferred	Read/Write
4203	Time (HHMMSS)	0 Inferred	Read/Write

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4205	Meter#1 Mol % of Carbon Dioxide	4 Inferred	Read/Write
4207	Meter#1 Mol % of Hydrogen	4 Inferred	Read/Write
4209	Meter#1 Mol % of Carbon Monoxide	4 Inferred	Read/Write
4211-4245	Spare		
4247	Meter#2 Mol % of Carbon Dioxide	4 Inferred	Read/Write
4249	Meter#2 Mol % of Hydrogen	4 Inferred	Read/Write
4251	Meter#2 Mol % of Carbon Monoxide	4 Inferred	Read/Write
4253-4287	Spare		
4287	Meter#3 Mol % of Carbon Dioxide	4 Inferred	Read/Write
4289	Meter#3 Mol % of Hydrogen	4 Inferred	Read/Write
4291	Meter#3 Mol % of Carbon Monoxide	4 Inferred	Read/Write
4293-4329	Spare		
4331	Meter#4 Mol % of Carbon Dioxide	4 Inferred	Read/Write
4333	Meter#4 Mol % of Hydrogen	4 Inferred	Read/Write
4335	Meter#4 Mol % of Carbon Monoxide	4 Inferred	Read/Write
4337-4371	Spare		

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4205	Meter#1 Mol % of Nitrogen	4 Inferred	Read/Write
4207	Meter#1 Mol % of Carbon Dioxide	4 Inferred	Read/Write
4209	Meter#1 Mol % of Hydrogen	4 Inferred	Read/Write
4211	Meter#1 Mol % of Carbon Monoxide	4 Inferred	Read/Write

Modbus Address Table – 32 Bits

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
4213-4245	Spare		
4247	Meter#2 Mol % of Nitrogen	4 Inferred	Read/Write
4249	Meter#2 Mol % of Carbon Dioxide	4 Inferred	Read/Write
4251	Meter#2 Mol % of Hydrogen	4 Inferred	Read/Write
4253	Meter#2 Mol % of Carbon Monoxide	4 Inferred	Read/Write
4255-4287	Spare		
4289	Meter#3 Mol % of Nitrogen	4 Inferred	Read/Write
4291	Meter#3 Mol % of Carbon Dioxide	4 Inferred	Read/Write
4293	Meter#3 Mol % of Hydrogen	4 Inferred	Read/Write
4295	Meter#3 Mol % of Carbon Monoxide	4 Inferred	Read/Write
4297-4329	Spare		
4331	Meter#4 Mol % of Nitrogen	4 Inferred	Read/Write
4333	Meter#4 Mol % of Carbon Dioxide	4 Inferred	Read/Write
4335	Meter#4 Mol % of Hydrogen	4 Inferred	Read/Write
4337	Meter#4 Mol % of Carbon Monoxide	4 Inferred	Read/Write
4339-4371	Spare		

Modbus Address Table – 32 Bits

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
AGA 8 Detail Method			
4205	Meter#1 Mol % of Methane	4 Inferred	Read/Write
4207	Meter#1 Mol % of Nitrogen	4 Inferred	Read/Write
4209	Meter#1 Mol % of Carbon Dioxide	4 Inferred	Read/Write
4211	Meter#1 Mol % of Ethane	4 Inferred	Read/Write
4213	Meter#1 Mol % of Propane	4 Inferred	Read/Write
4215	Meter#1 Mol % of Water	4 Inferred	Read/Write
4217	Meter#1 Mol % of Hydrogen Sulfide	4 Inferred	Read/Write
4219	Meter#1 Mol % of Hydrogen	4 Inferred	Read/Write
4221	Meter#1 Mol % of Carbon Monoxide	4 Inferred	Read/Write
4223	Meter#1 Mol % of Oxygen	4 Inferred	Read/Write
4225	Meter#1 Mol % of i-Butane	4 Inferred	Read/Write
4227	Meter#1 Mol % of n-Butane	4 Inferred	Read/Write
4229	Meter#1 Mol % of i-Pentane	4 Inferred	Read/Write
4231	Meter#1 Mol % of n-Pentane	4 Inferred	Read/Write
4233	Meter#1 Mol % of i-Hexane	4 Inferred	Read/Write
4235	Meter#1 Mol % of n-Heptane	4 Inferred	Read/Write
4237	Meter#1 Mol % of i-Octane	4 Inferred	Read/Write
4239	Meter#1 Mol % of i-Nonane	4 Inferred	Read/Write
4241	Meter#1 Mol % of i-Decane	4 Inferred	Read/Write
4243	Meter#1 Mol % of Helium	4 Inferred	Read/Write
4245	Meter#1 Mol % of Argon	4 Inferred	Read/Write
4247	Meter#2 Mol % of Methane	4 Inferred	Read/Write
4249	Meter#2 Mol % of Nitrogen	4 Inferred	Read/Write
4251	Meter#2 Mol % of Carbon Dioxide	4 Inferred	Read/Write
4253	Meter#2 Mol % of Ethane	4 Inferred	Read/Write
4255	Meter#2 Mol % of Propane	4 Inferred	Read/Write
4257	Meter#2 Mol % of Water	4 Inferred	Read/Write
4259	Meter#2 Mol % of Hydrogen Sulfide	4 Inferred	Read/Write
4261	Meter#2 Mol % of Hydrogen	4 Inferred	Read/Write
4263	Meter#2 Mol % of Carbon Monoxide	4 Inferred	Read/Write
4265	Meter#2 Mol % of Oxygen	4 Inferred	Read/Write
4267	Meter#2 Mol % of i-Butane	4 Inferred	Read/Write
4269	Meter#2 Mol % of n-Butane	4 Inferred	Read/Write
4271	Meter#2 Mol % of i-Pentane	4 Inferred	Read/Write
4273	Meter#2 Mol % of n-Pentane	4 Inferred	Read/Write
4275	Meter#2 Mol % of i-Hexane	4 Inferred	Read/Write
4277	Meter#2 Mol % of n-Heptane	4 Inferred	Read/Write
4279	Meter#2 Mol % of i-Octane	4 Inferred	Read/Write
4281	Meter#2 Mol % of i-Nonane	4 Inferred	Read/Write
4283	Meter#2 Mol % of i-Decane	4 Inferred	Read/Write
4285	Meter#2 Mol % of Helium	4 Inferred	Read/Write
4287	Meter#2 Mol % of Argon	4 Inferred	Read/Write
4289	Meter#3 Mol % of Methane	4 Inferred	Read/Write
4291	Meter#3 Mol % of Nitrogen	4 Inferred	Read/Write
4293	Meter#3 Mol % of Carbon Dioxide	4 Inferred	Read/Write
4295	Meter#3 Mol % of Ethane	4 Inferred	Read/Write
4297	Meter#3 Mol % of Propane	4 Inferred	Read/Write
4299	Meter#3 Mol % of Water	4 Inferred	Read/Write
4301	Meter#3 Mol % of Hydrogen Sulfide	4 Inferred	Read/Write
4303	Meter#3 Mol % of Hydrogen	4 Inferred	Read/Write
4305	Meter#3 Mol % of Carbon Monoxide	4 Inferred	Read/Write

Modbus Address Table – 32 Bits

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
4307	Meter#3 Mol % of Oxygen	4 Inferred	Read/Write
4309	Meter#3 Mol % of i-Butane	4 Inferred	Read/Write
4311	Meter#3 Mol % of n-Butane	4 Inferred	Read/Write
4313	Meter#3 Mol % of i-Pentane	4 Inferred	Read/Write
4315	Meter#3 Mol % of n-Pentane	4 Inferred	Read/Write
4317	Meter#3 Mol % of i-Hexane	4 Inferred	Read/Write
4319	Meter#3 Mol % of n-Heptane	4 Inferred	Read/Write
4321	Meter#3 Mol % of i-Octane	4 Inferred	Read/Write
4323	Meter#3 Mol % of i-Nonane	4 Inferred	Read/Write
4325	Meter#3 Mol % of i-Decane	4 Inferred	Read/Write
4327	Meter#3 Mol % of Helium	4 Inferred	Read/Write
4329	Meter#3 Mol % of Argon	4 Inferred	Read/Write
4331	Meter#4 Mol % of Methane	4 Inferred	Read/Write
4333	Meter#4 Mol % of Nitrogen	4 Inferred	Read/Write
4335	Meter#4 Mol % of Carbon Dioxide	4 Inferred	Read/Write
4337	Meter#4 Mol % of Ethane	4 Inferred	Read/Write
4339	Meter#4 Mol % of Propane	4 Inferred	Read/Write
4341	Meter#4 Mol % of Water	4 Inferred	Read/Write
4343	Meter#4 Mol % of Hydrogen Sulfide	4 Inferred	Read/Write
4345	Meter#4 Mol % of Hydrogen	4 Inferred	Read/Write
4347	Meter#4 Mol % of Carbon Monoxide	4 Inferred	Read/Write
4349	Meter#4 Mol % of Oxygen	4 Inferred	Read/Write
4351	Meter#4 Mol % of i-Butane	4 Inferred	Read/Write
4353	Meter#4 Mol % of n-Butane	4 Inferred	Read/Write
4355	Meter#4 Mol % of i-Pentane	4 Inferred	Read/Write
4357	Meter#4 Mol % of n-Pentane	4 Inferred	Read/Write
4359	Meter#4 Mol % of i-Hexane	4 Inferred	Read/Write
4361	Meter#4 Mol % of n-Heptane	4 Inferred	Read/Write
4363	Meter#4 Mol % of i-Octane	4 Inferred	Read/Write
4365	Meter#4 Mol % of i-Nonane	4 Inferred	Read/Write
4367	Meter#4 Mol % of i-Decane	4 Inferred	Read/Write
4369	Meter#4 Mol % of Helium	4 Inferred	Read/Write
4371	Meter#4 Mol % of Argon	4 Inferred	Read/Write

AGA 8 DETAIL METHOD ENDS

Modbus Address Table – 32 Bits

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
4375	Meter #1 Density Dry Air	5 Inferred	Read/Write
4377	Meter #1 Relative Density	6 Inferred	Read/Write
4379	Meter #1 Ratio of Heat	4 Inferred	Read/Wirte
4381	Meter #1 Viscosity	6 Inferred	Read/Write
4383	Meter #1 Pipe Thermal E-6	2 Inferred	Read/Write
4385	Meter #1 Orifice Thermal E-6	2 Inferred	Read/Write
4387	Meter #1 Reference Temperature of Pipe	2 Inferred	Read/Write
4389	Meter #1 Reference Temperature of Orifice	2 Inferred	Read/Write
4391	Meter #1 ISO5167 up-stream Tapping	2 Inferred	Read/Write
4393	Meter #1 ISO5167 down-stream Tapping	2 Inferred	Read/Write
4395	Meter #1 DP Cut Off	4 Inferred	Read/Write
4397	Meter #1 DP Switch High %	2 Inferred	Read/Write
4399	Meter #1 Meter Factor	6 Inferred	Read/Write
4401	Meter #1 Flow Threshold #1	2 Inferred	Read/Write
4403	Meter #1 Flow Threshold #2	2 Inferred	Read/Write
4405	Meter #1 Flow Threshold #3	2 Inferred	Read/Write
4407	Meter #1 Flow Threshold #4	2 Inferred	Read/Write
4409	Meter #1 Linear Factor #1	6 Inferred	Read/Write
4411	Meter #1 Linear Factor #2	6 Inferred	Read/Write
4413	Meter #1 Linear Factor #3	6 Inferred	Read/Write
4415	Meter #1 Linear Factor #4	6 Inferred	Read/Write
4417	Meter #2 Density Dry Air	5 Inferred	Read/Write
4419	Meter #2 Relative Density	6 Inferred	Read/Write
4421	Meter #2 Ratio of Heat	4 Inferred	Read/Wirte
4423	Meter #2 Viscosity	6 Inferred	Read/Write
4425	Meter #2 Pipe Thermal E-6	2 Inferred	Read/Write
4427	Meter #2 Orifice Thermal E-6	2 Inferred	Read/Write
4429	Meter #2 Reference Temperature of Pipe	2 Inferred	Read/Write
4431	Meter #2 Reference Temperature of Orifice	2 Inferred	Read/Write
4433	Meter #2 ISO5167 up-stream Tapping	2 Inferred	Read/Write
4435	Meter #2 ISO5167 down-stream Tapping	2 Inferred	Read/Write
4437	Meter #2 DP Cut Off	4 Inferred	Read/Write
4439	Meter #2 DP Switch High %	2 Inferred	Read/Write
4441	Meter #2 Meter Factor	6 Inferred	Read/Write
4443	Meter #2 Flow Threshold #1	2 Inferred	Read/Write
4445	Meter #2 Flow Threshold #2	2 Inferred	Read/Write
4447	Meter #2 Flow Threshold #3	2 Inferred	Read/Write
4449	Meter #2 Flow Threshold #4	2 Inferred	Read/Write
4451	Meter #2 Linear Factor #1	6 Inferred	Read/Write
4453	Meter #2 Linear Factor #2	6 Inferred	Read/Write
4455	Meter #2 Linear Factor #3	6 Inferred	Read/Write
4457	Meter #2 Linear Factor #4	6 Inferred	Read/Write
4459	Meter #3 Density Dry Air	5 Inferred	Read/Write
4461	Meter #3 Relative Density	6 Inferred	Read/Write
4463	Meter #3 Ratio of Heat	4 Inferred	Read/Write
4465	Meter #3 Viscosity	6 Inferred	Read/Write
4467	Meter #3 Pipe Thermal E-6	2 Inferred	Read/Write
4469	Meter #3 Orifice Thermal E-6	2 Inferred	Read/Write
4471	Meter #3 Reference Temperature of Pipe	2 Inferred	Read/Write
4473	Meter #3 Reference Temperature of Orifice	2 Inferred	Read/Write
4475	Meter #3 ISO5167 up-stream Tapping	2 Inferred	Read/Write

Modbus Address Table – 32 Bits

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
4477	Meter #3 ISO5167 down-stream Tapping	2 Inferred	Read/Write
4479	Meter #3 DP Cut Off	4 Inferred	Read/Write
4481	Meter #3 DP Switch High %	2 Inferred	Read/Write
4483	Meter #3 Meter Factor	6 Inferred	Read/Write
4485	Meter #3 Flow Threshold #1	2 Inferred	Read/Write
4487	Meter #3 Flow Threshold #2	2 Inferred	Read/Write
4489	Meter #3 Flow Threshold #3	2 Inferred	Read/Write
4491	Meter #3 Flow Threshold #4	2 Inferred	Read/Write
4493	Meter #3 Linear Factor #1	6 Inferred	Read/Write
4495	Meter #3 Linear Factor #2	6 Inferred	Read/Write
4497	Meter #3 Linear Factor #3	6 Inferred	Read/Write
4499	Meter #3 Linear Factor #4	6 Inferred	Read/Write
4501	Meter #4 Density Dry Air	5 Inferred	Read/Write
4503	Meter #4 Relative Density	6 Inferred	Read/Write
4505	Meter #4 Ratio of Heat	4 Inferred	Read/Wirte
4507	Meter #4 Viscosity	6 Inferred	Read/Write
4509	Meter #4 Pipe Thermal E-6	2 Inferred	Read/Write
4511	Meter #4 Orifice Thermal E-6	2 Inferred	Read/Write
4513	Meter #4 Reference Temperature of Pipe	2 Inferred	Read/Write
4515	Meter #4 Reference Temperature of Orifice	2 Inferred	Read/Write
4517	Meter #4 ISO5167 up-stream Tapping	2 Inferred	Read/Write
4519	Meter #4 ISO5167 down-stream Tapping	2 Inferred	Read/Write
4521	Meter #4 DP Cut Off	4 Inferred	Read/Write
4523	Meter #4 DP Switch High %	2 Inferred	Read/Write
4525	Meter #4 Meter Factor	6 Inferred	Read/Write
4527	Meter #4 Flow Threshold #1	2 Inferred	Read/Write
4529	Meter #4 Flow Threshold #2	2 Inferred	Read/Write
4531	Meter #4 Flow Threshold #3	2 Inferred	Read/Write
4533	Meter #4 Flow Threshold #4	2 Inferred	Read/Write
4535	Meter #4 Linear Factor #1	6 Inferred	Read/Write
4537	Meter #4 Linear Factor #2	6 Inferred	Read/Write
4539	Meter #4 Linear Factor #3	6 Inferred	Read/Write
4541	Meter #4 Linear Factor #4	6 Inferred	Read/Write
4543	Density Correction Factor	5 Inferred	Read/Write
4545	Densitometer Period Low Limit	3 Inferred	Read/Write
4547	Densitometer Period High Limit	3 Inferred	Read/Write
4549	Multi.Var. DP Low Limit	4 Inferred	Read/Write
4551	Multi.Var. DP High Limit	4 Inferred	Read/Write
4553	Multi.Var. DP Maintenance	4 Inferred	Read/Write
4555	Multi.Var. Pressure Low Limit	2 Inferred	Read/Write
4557	Multi.Var. Pressure High Limit	2 Inferred	Read/Write
4559	Multi.Var. Pressure Maintenance	2 Inferred	Read/Write
4561	Multi.Var. Temperature Low Limit	2 Inferred	Read/Write
4563	Multi.Var. Temperature High Limit	2 Inferred	Read/Write
4565	Multi.Var. Temperature Maintenance	2 Inferred	Read/Write
4567	Multi.Var DP Override	4 Inferred	Read/Write
4569	Multi.Var Pressure Override	2 Inferred	Read/Write
4571	Multi.Var Temperature Override	2 Inferred	Read/Write
4573-4655	Spare		

Modbus Address Table – 32 Bits

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
4657	Meter #1 Heating Value Override	3 Inferred	Read/Write
4659	Meter #2 Heating Value Override	3 Inferred	Read/Write
4661	Meter #3 Heating Value Override	3 Inferred	Read/Write
4663	Meter #4 Heating Value Override	3 Inferred	Read/Write
4665	Meter #1 FPV Override	3 Inferred	Read/Write
4667	Meter #2 FPV Override	3 Inferred	Read/Write
4669	Meter #3 FPV Override	3 Inferred	Read/Write
4671	Meter #4 FPV Override	3 Inferred	Read/Write
4673	Meter #1 Temperature Override	2 Inferred	Read/Write
4675	Meter #2 Temperature Override	2 Inferred	Read/Write
4677	Meter #3 Temperature Override	2 Inferred	Read/Write
4679	Meter #4 Temperature Override	2 Inferred	Read/Write
4681	Meter #1 Pressure Override	2 Inferred	Read/Write
4683	Meter #2 Pressure Override	2 Inferred	Read/Write
4685	Meter #3 Pressure Override	2 Inferred	Read/Write
4687	Meter #4 Pressure Override	2 Inferred	Read/Write
4689-4821	Spare		
4823	Run Switch Low Set Point	2 Inferred	Read/Write
4825	Run Switch High Set Point	2 Inferred	Read/Write
4827	Pulse Output Volume #1 Pulses/Unit	3 Inferred	Read/Write
4829	Pulse Output Volume #2 Pulses/Unit	3 Inferred	Read/Write
4831	Meter #1 PID Output %	2 nferred	Read/Write
4833	Meter #1 PID Flow	2 Inferred	Read/Write
4835	Meter #1 PID Flow Set Point	2 Inferred	Read/Write
4837	Meter #1 PID Flow Controller Gain	2 Inferred	Read/Write
4839	Meter #1 PID Flow Controller Reset	2 Inferred	Read/Write
4841	Meter #1 PID Pressure Maximum	2 Inferred	Read/Write
4843	Meter #1 PID Pressure Set Point	2 Inferred	Read/Write
4845	Meter #1 PID Flow Controller Gain	2 Inferred	Read/Write
4847	Meter #1 PID Flow Controller Reset	2 Inferred	Read/Write
4849	Meter #1 PID Mininum Output %	2 Inferred	Read/Write
4851	Meter #1 PID Maxinum Output %	2 Inferred	Read/Write
4853	Meter #2 PID Output %	2 nferred	Read/Write
4855	Meter #2 PID Flow	2 Inferred	Read/Write
4857	Meter #2 PID Flow Set Point	2 Inferred	Read/Write
4859	Meter #2 PID Flow Controller Gain	2 Inferred	Read/Write
4861	Meter #2 PID Flow Controller Reset	2 Inferred	Read/Write
4863	Meter #2 PID Pressure Maximum	2 Inferred	Read/Write
4865	Meter #2 PID Pressure Set Point	2 Inferred	Read/Write
4867	Meter #2 PID Flow Controller Gain	2 Inferred	Read/Write
4869	Meter #2 PID Flow Controller Reset	2 Inferred	Read/Write
4871	Meter #2 PID Mininum Output %	2 Inferred	Read/Write
4873	Meter #2 PID Maxinum Output %	2 Inferred	Read/Write
4875	Meter #3 PID Output %	2 nferred	Read/Write
4877	Meter #3 PID Flow	2 Inferred	Read/Write
4879	Meter #3 PID Flow Set Point	2 Inferred	Read/Write
4881	Meter #3 PID Flow Controller Gain	2 Inferred	Read/Write
4883	Meter #3 PID Flow Controller Reset	2 Inferred	Read/Write
4885	Meter #3 PID Pressure Maximum	2 Inferred	Read/Write
4887	Meter #3 PID Pressure Set Point	2 Inferred	Read/Write
4889	Meter #3 PID Flow Controller Gain	2 Inferred	Read/Write
4891	Meter #3 PID Flow Controller Reset	2 Inferred	Read/Write

Modbus Address Table – 32 Bits

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
4893	Meter #3 PID Mininum Output %	2 Inferred	Read/Write
4895	Meter #3 PID Maxinum Output %	2 Inferred	Read/Write
4897	Meter #4 PID Output %	2 nferred	Read/Write
4899	Meter #4 PID Flow	2 Inferred	Read/Write
4901	Meter #4 PID Flow Set Point	2 Inferred	Read/Write
4903	Meter #4 PID Flow Controller Gain	2 Inferred	Read/Write
4905	Meter #4 PID Flow Controller Reset	2 Inferred	Read/Write
4907	Meter #4 PID Pressure Maximum	2 Inferred	Read/Write
4909	Meter #4 PID Pressure Set Point	2 Inferred	Read/Write
4911	Meter #4 PID Flow Controller Gain	2 Inferred	Read/Write
4913	Meter #4 PID Flow Controller Reset	2 Inferred	Read/Write
4915	Meter #4 PID Mininum Output %	2 Inferred	Read/Write
4917	Meter #4 PID Maxinum Output %	2 Inferred	Read/Write
4919-5029	Resserved		

Modbus Address Table – 32 Bits

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE

Scratch Pad for Program Variables – (Long Integer) 5031,5033-5069

5031	Sratch Pad – Program Variable Integer		
5033			
5035			
5037			
5039			
5041			
5043			
5045			
5047			
5049			
5051			

Modbus Address Table – 32 Bits

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
3029 =	**Last Hourly Report Request (16 bits) (1=Lastest, 768=Oldest)**		

Last Hourly Data Area

8001	Date (mm/dd/yy)	0 Inferred	Read
8003	Time (hh/mm/ss)	0 Inferred	Read
8005	Meter#1 Hourly Duration of Flow	1 Inferred	Read
8007	Meter#1 GrossTotal	1 Inferred	Read
8009	Meter#1 Net Total	1 Inferred	Read
8011	Meter#1 Mass Total	1 Inferred	Read
8013	Meter#1 Energy Total	1 Inferred	Read
8015	Meter#1 Average Temperature	0 Inferred	Read
8017	Meter#1 Average Pressure	0 Inferred	Read
8019	Meter#1 Average DP	4 Inferred	Read
8021	Meter#1 Average DP EXT	4 Inferred	Read
8023	Meter#1 Average SG	6 Inferred	Read
8025	Meter#2 Hourly Duration of Flow	1 Inferred	Read
8027	Meter#2 Gross Total	1 Inferred	Read
8029	Meter#2 Net Total	1 Inferred	Read
8031	Meter#2 Mass Total	1 Inferred	Read
8033	Meter#2 Energy Total	1 Inferred	Read
8035	Meter#2 Average Temperature	0 Inferred	Read
8037	Meter#2 Average Pressure	0 Inferred	Read
8039	Meter#2 Average DP	4 Inferred	Read
8041	Meter#2 Average DP EXT	4 Inferred	Read
8043	Meter#2 Average SG	6 Inferred	Read
8045	Meter#3 Hourly Duration of Flow	1 Inferred	Read
8047	Meter#3 Gross Total	1 Inferred	Read
8049	Meter#3 Net Total	1 Inferred	Read
8051	Meter#3 Mass Total	1 Inferred	Read
8053	Meter#3 Energy Total	1 Inferred	Read
8055	Meter#3 Average Temperature	0 Inferred	Read
8057	Meter#3 Average Pressure	0 Inferred	Read
8059	Meter#3 Average DP	4 Inferred	Read
8061	Meter#3 Average DP EXT	4 Inferred	Read
8063	Meter#3 Average SG	6 Inferred	Read
8065	Meter#4 Hourly Duration of Flow	1 Inferred	Read
8067	Meter#4 Gross Total	1 Inferred	Read
8069	Meter#4 Net Total	1 Inferred	Read
8071	Meter#4 Mass Total	1 Inferred	Read
8073	Meter#4 Energy Total	1 Inferred	Read
8075	Meter#4 Average Temperature	0 Inferred	Read
8077	Meter#4 Average Pressure	0 Inferred	Read
8079	Meter#4 Average DP	4 Inferred	Read
8081	Meter#4 Average DP EXT	4 Inferred	Read
8083	Meter#4 Average SG	6 Inferred	Read

LAST HOURLY DATA AREA ENDS

Modbus Address Table – 32 Bits

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE

***Non-resettable accumulated volume will roll over at 9999999.**

CURRENT DATA AREA

9001	Meter #1 Calculation Type	0 Inferred	Read
9003	Meter #1 Flow Flag	0 Inferred	Read
9005	Meter #1 Alarm Status Flag	0 Inferred	Read
9007	Meter #1 Daily Gross Total	1 inferred	Read
9009	Meter #1 Daily Net Total	1 inferred	Read
9011	Meter #1 Daily Mass Total	1 inferred	Read
9013	Meter #1 Daily Energy Total	1 inferred	Read
9015	Meter #1 Cum. Gross Total*	0 Inferred	Read
9017	Meter #1 Cum. Net Total*	0 Inferred	Read
9019	Meter #1 Cum. Mass Total*	0 Inferred	Read
9021	Meter #1 Cum. Energy Total*	0 Inferred	Read
9023	Meter #1 N2	4 Inferred	Read
9025	Meter #1 Co2	4 Inferred	Read
9027	Meter #1 Methane	4 Inferred	Read
9029	Meter #1 Ethane	4 Inferred	Read
9031	Meter #1 Propane	4 Inferred	Read
9033	Meter #1 Water	4 Inferred	Read
9035	Meter #1 H2S	4 Inferred	Read
9037	Meter #1 H2	4 Inferred	Read
9039	Meter #1 CO	4 Inferred	Read
9041	Meter #1 Oxygen	4 Inferred	Read
9043	Meter #1 I-Butane	4 Inferred	Read
9045	Meter #1 n-Butane	4 Inferred.	Read
9047	Meter #1 I-Pentane	4 Inferred	Read
9049	Meter #1 n-Pentane	4 Inferred	Read
9051	Meter #1 n-Hexane	4 Inferred	Read
9053	Meter #1 n-Heptane	4 Inferred	Read
9055	Meter #1 n-Octane	4 Inferred	Read
9057	Meter #1 n-Nonane	4 Inferred	Read
9059	Meter #1 n-Decane	4 Inferred	Read
9061	Meter #1 Helium	4 Inferred	Read
9063	Meter #1 Argon	4 Inferred	Read
9065	Meter#1 Heating Value	3 Inferred	Read
9067	Meter #1 Gross Flowrate	2 Inferred	Read
9069	Meter #1 Net Flowrate	2 Inferred	Read
9071	Meter #1 Mass Flowrate	2 Inferred	Read
9073	Meter #1 Energy Flowrate	2 Inferred	Read
9075	Meter #1 Product	0 Inferred	Read
9077-9079	Meter #1 Meter ID	8 Chars.	Read
9081	Meter #1 Pipe ID	5 Inferred	Read
9083	Meter #1 Orifice ID	5 Inferred	Read
9085	Meter #1 Density Correction Factor	5 Inferred	Read
9087	Meter #1 Density of Dry Air	5 Inferred	Read
9089	Meter #1 K Factor	3 Inferred	Read
9091	Date(mmddyy)	0 Inferred	Read
9093	Time (hhmmss)	0 Inferred	Read
9095	Meter #1 DP	4 Inferred	Read
9097	Meter #1 Temperature	2 Inferred	Read
9099	Meter #1 Pressure	2 Inferred	Read

Modbus Address Table – 32 Bits

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
9101	Meter #1 Density	6 Inferred	Read
9103	Meter #1 Dens.b	6 Inferred	Read
9105	Meter #1 SG	6 Inferred	Read
9107	Meter #1 Y Factor	6 Inferred	Read
9109	Meter #1 K /CD/LMF	6 Inferred	Read
9111	Meter #1 DP EXT	4 Inferred	Read
9113	Meter #1 FPV	6 Inferred	Read
9115-9119	Spare		
9121	Meter #2 Calculation Type	0 Inferred	Read
9123	Meter #2 Flow Flag	0 Inferred	Read
9125	Meter #2 Alarm Status Flag	0 Inferred	Read
9127	Meter #2 Daily Gross Total	1 inferred	Read
9129	Meter #2 Daily Net Total	1 inferred	Read
9131	Meter #2 Daily Mass Total	1 inferred	Read
9133	Meter #2 Daily Energy Total	1 inferred	Read
9135	Meter #2 Cum. Gross Total*	0 Inferred	Read
9137	Meter #2 Cum. Net Total*	0 Inferred	Read
9139	Meter #2 Cum. Mass Total*	0 Inferred	Read
9141	Meter #2 Cum. Energy Total*	0 Inferred	Read
9143	Meter #2 N2	4 Inferred	Read
9145	Meter #2 Co2	4 Inferred	Read
9147	Meter #2 Methane	4 Inferred	Read
9149	Meter #2 Ethane	4 Inferred	Read
9151	Meter #2 Propane	4 Inferred	Read
9153	Meter #2 Water	4 Inferred	Read
9155	Meter #2 H2S	4 Inferred	Read
9157	Meter #2 H2	4 Inferred	Read
9159	Meter #2 CO	4 Inferred	Read
9161	Meter #2 Oxygen	4 Inferred	Read
9163	Meter #2 I-Butane	4 Inferred	Read
9165	Meter #2 n-Butane	4 Inferred.	Read
9167	Meter #2 I-Pentane	4 Inferred	Read
9169	Meter #2 n-Pentane	4 Inferred	Read
9171	Meter #2 n-Hexane	4 Inferred	Read
9173	Meter #2 n-Heptane	4 Inferred	Read
9175	Meter #2 n-Octane	4 Inferred	Read
9177	Meter #2 n-Nonane	4 Inferred	Read
9179	Meter #2 n-Decane	4 Inferred	Read
9181	Meter #2 Helium	4 Inferred	Read
9183	Meter #2 Argon	4 Inferred	Read
9185	Meter #2 Heating Value	3 Inferred	Read
9187	Meter #2 Gross Flowrate	2 Inferred	Read
9189	Meter #2 Net Flowrate	2 Inferred	Read
9191	Meter #2 Mass Flowrate	2 Inferred	Read
9193	Meter #2 Energy Flowrate	2 Inferred	Read
9195	Meter #2 Product	0 Inferred	Read

Modbus Address Table – 32 Bits

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
9197-9199	Meter #2 Meter ID	8 Chars.	Read
9201	Meter #2 Pipe ID	5 Inferred	Read
9203	Meter #2 Orifice ID	5 Inferred	Read
9205	Meter #2 Density Correction Factor	5 Inferred	Read
9207	Meter #2 Density of Dry Air	5 Inferred	Read
9209	Meter #2 K Factor	3 Inferred	Read
9211	Date(mmddyy)	0 Inferred	Read
9213	Time (hhmmss)	0 Inferred	Read
9215	Meter #2 DP	4 Inferred	Read
9217	Meter #2 Temperature	2 Inferred	Read
9219	Meter #2 Pressure	2 Inferred	Read
9221	Meter #2 Density	6 Inferred	Read
9223	Meter #2 Dens.b	6 Inferred	Read
9225	Meter #2 SG	6 Inferred	Read
9227	Meter #2 Y Factor	6 Inferred	Read
9229	Meter #2 K /CD/LMF	6 Inferred	Read
9231	Meter #2 DP EXT	4 Inferred	Read
9233	Meter #2 FPV	6 Inferred	Read
9235-9239	Spare		
9241	Meter #3 Calculation Type	0 Inferred	Read
9243	Meter #3 Flow Flag	0 Inferred	Read
9245	Meter #3 Alarm Status Flag	0 Inferred	Read
9247	Meter #3 Daily Gross Total	1 inferred	Read
9249	Meter #3 Daily Net Total	1 inferred	Read
9251	Meter #3 Daily Mass Total	1 inferred	Read
9253	Meter #3 Daily Energy Total	1 inferred	Read
9255	Meter #3 Cum. Gross Total*	0 Inferred	Read
9257	Meter #3 Cum. Net Total*	0 Inferred	Read
9259	Meter #3 Cum. Mass Total*	0 Inferred	Read
9261	Meter #3 Cum. Energy Total*	0 Inferred	Read
9263	Meter #3 N2	4 Inferred	Read
9265	Meter #3 Co2	4 Inferred	Read
9267	Meter #3 Methane	4 Inferred	Read
9269	Meter #3 Ethane	4 Inferred	Read
9271	Meter #3 Propane	4 Inferred	Read
9273	Meter #3 Water	4 Inferred	Read
9275	Meter #3 H2S	4 Inferred	Read
9277	Meter #3 H2	4 Inferred	Read
9279	Meter #3 CO	4 Inferred	Read
9281	Meter #3 Oxygen	4 Inferred	Read
9283	Meter #3 I-Butane	4 Inferred	Read
9285	Meter #3 n-Butane	4 Inferred.	Read
9287	Meter #3 I-Pentane	4 Inferred	Read
9289	Meter #3 n-Pentane	4 Inferred	Read
9291	Meter #3 n-Hexane	4 Inferred	Read
9293	Meter #3 n-Heptane	4 Inferred	Read
9295	Meter #3 n-Octane	4 Inferred	Read
9297	Meter #3 n-Nonane	4 Inferred	Read
9299	Meter #3 n-Decane	4 Inferred	Read

Modbus Address Table – 32 Bits

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
9301	Meter #3 Helium	4 Inferred	Read
9303	Meter #3 Argon	4 Inferred	Read
9305	Meter #3 Heating Value	3 Inferred	Read
9307	Meter #3 Gross Flowrate	2 Inferred	Read
9309	Meter #3 Net Flowrate	2 Inferred	Read
9311	Meter #3 Mass Flowrate	2 Inferred	Read
9313	Meter #3 Energy Flowrate	2 Inferred	Read
9315	Meter #3 Product	0 Inferred	Read
9317-9319	Meter #3 Meter ID	8 Chars.	Read
9321	Meter #3 Pipe ID	5 Inferred	Read
9323	Meter #3 Orifice ID	5 Inferred	Read
9325	Meter #3 Density Correction Factor	5 Inferred	Read
9327	Meter #3 Density of Dry Air	5 Inferred	Read
9329	Meter #3 K Factor	3 Inferred	Read
9331	Date(mmddyy)	0 Inferred	Read
9333	Time (hhmmss)	0 Inferred	Read
9335	Meter #3 DP	4 Inferred	Read
9337	Meter #3 Temperature	2 Inferred	Read
9339	Meter #3 Pressure	2 Inferred	Read
9341	Meter #3 Density	6 Inferred	Read
9343	Meter #3 Dens.b	6 Inferred	Read
9345	Meter #3 SG	6 Inferred	Read
9347	Meter #3 Y Factor	6 Inferred	Read
9349	Meter #3 K /CD/LMF	6 Inferred	Read
9351	Meter #3 DP EXT	4 Inferred	Read
9353	Meter #3 FPV	6 Inferred	Read
9355-9359	Spare		
9361	Meter #4 Calculation Type	0 Inferred	Read
9363	Meter #4 Flow Flag	0 Inferred	Read
9365	Meter #4 Alarm Status Flag	0 Inferred	Read
9367	Meter #4 Daily Gross Total	1 inferred	Read
9369	Meter #4 Daily Net Total	1 inferred	Read
9371	Meter #4 Daily Mass Total	1 inferred	Read
9373	Meter #4 Daily Energy Total	1 inferred	Read
9375	Meter #4 Cum. Gross Total*	0 Inferred	Read
9377	Meter #4 Cum. Net Total*	0 Inferred	Read
9379	Meter #4 Cum. Mass Total*	0 Inferred	Read
9381	Meter #4 Cum. Energy Total*	0 Inferred	Read
9383	Meter #4 N2	4 Inferred	Read
9385	Meter #4 Co2	4 Inferred	Read
9387	Meter #4 Methane	4 Inferred	Read
9389	Meter #4 Ethane	4 Inferred	Read
9391	Meter #4 Propane	4 Inferred	Read
9393	Meter #4 Water	4 Inferred	Read
9395	Meter #4 H2S	4 Inferred	Read
9397	Meter #4 H2	4 Inferred	Read
9399	Meter #4 CO	4 Inferred	Read
9401	Meter #4 Oxygen	4 Inferred	Read
9403	Meter #4 I-Butane	4 Inferred	Read
9405	Meter #4 n-Butane	4 Inferred.	Read
9407	Meter #4 I-Pentane	4 Inferred	Read

Modbus Address Table – 32 Bits

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
9409	Meter #4 n-Pentane	4 Inferred	Read
9411	Meter #4 n-Hexane	4 Inferred	Read
9413	Meter #4 n-Heptane	4 Inferred	Read
9415	Meter #4 n-Octane	4 Inferred	Read
9417	Meter #4 n-Nonane	4 Inferred	Read
9419	Meter #4 n-Decane	4 Inferred	Read
9421	Meter #4 Helium	4 Inferred	Read
9423	Meter #4 Argon	4 Inferred	Read
9425	Meter #4 Heating Value	3 Inferred	Read
9427	Meter #4 Gross Flowrate	2 Inferred	Read
9429	Meter #4 Net Flowrate	2 Inferred	Read
9431	Meter #4 Mass Flowrate	2 Inferred	Read
9433	Meter #4 Energy Flowrate	2 Inferred	Read
9435	Meter #4 Product	0 Inferred	Read
9437-9439	Meter #4 Meter ID	8 Chars.	Read
9441	Meter #4 Pipe ID	5 Inferred	Read
9443	Meter #4 Orifice ID	5 Inferred	Read
9445	Meter #4 Density Correction Factor	5 Inferred	Read
9447	Meter #4 Density of Dry Air	5 Inferred	Read
9449	Meter #4 K Factor	3 Inferred	Read
9451	Date(mmddyy)	0 Inferred	Read
9453	Time (hhmmss)	0 Inferred	Read
9455	Meter #4 DP	4 Inferred	Read
9457	Meter #4 Temperature	2 Inferred	Read
9459	Meter #4 Pressure	2 Inferred	Read
9461	Meter #4 Density	6 Inferred	Read
9463	Meter #4 Dens.b	6 Inferred	Read
9465	Meter #4 SG	6 Inferred	Read
9467	Meter #4 Y Factor	6 Inferred	Read
9469	Meter #4 K /CD/LMF	6 Inferred	Read
9471	Meter #4 DP EXT	4 Inferred	Read
9473	Meter #4 FPV	6 Inferred	Read
9435-9439	Spare		

FLOATING POINT

FLOATING POINT - DATA AREA

7001	Sarasota Constant D0
7002	Sarasota Constant T0
7003	Sarasota Constant K
7004	Sarasota Constant Temperature Coefficient
7005	Sarasota Constant Temperature Cal
7006	Sarasota Constant Pressure Coefficient
7007	Sarasota Constant Pressure Cal
7008	UGC Constant K0
7009	UGC Constant K1
7010	UGC Constant K2
7011	UGC Constant KT
7012	UGC Constant Temperature Cal
7013	UGC Constant K
7014	UGC Constant PO
7015	Solartron Constant K0
7016	Solartron Constant K1
7017	Solartron Constant K2
7018	Solartron Constant K18
7019	Solartron Constant K19
7020	Solartron Constant K3
7021	Solartron Constant K4
7022	Spare
7023	Spare
7024	Spare
7025	Spare
7026	Meter #1 Orifice ID
7027	Meter #1 Pipe ID
7028	Meter #1 K Factor
7029	Meter #1 Low Limit
7030	Meter #1 High Limit
7031	Meter #2 Orifice ID
7032	Meter #2 Pipe ID
7033	Meter #2 K Factor
7034	Meter #2 Low Limit
7035	Meter #2 High Limit
7036	Meter #3 Orifice ID
7037	Meter #3 Pipe ID
7038	Meter #3 K Factor
7039	Meter #3 Low Limit
7040	Meter #3 High Limit
7041	Meter #4 Orifice ID
7042	Meter #4 Pipe ID
7043	Meter #4 K Factor
7044	Meter #4 Low Limit
7045	Meter #4 High Limit
7046	Base Temperature
7047	Base Presure
7048	Atmospheric Pressure
7049	Densitometer Low Limit
7050	Densitometer High Limit
7051	Densitometer Maintance Value
7052	Spare
7901	Analog Input #1 @4mA
7902	Analog Input #1 @20mA

FLOATING POINT

7903	Analog Input #1 Low Limit	
7904	Analog Input #1 High Limit	
7905	Analog Input #1 Maintenance	
7906	Analog Input #2 @4mA	
7907	Analog Input #2 @20mA	
7908	Analog Input #2 Low Limit	
7909	Analog Input #2 High Limit	
7910	Analog Input #2 Maintenance	
7911	Analog Input #3 @4mA	
7912	Analog Input #3 @20mA	
7913	Analog Input #3 Low Limit	
7914	Analog Input #3 High Limit	
7915	Analog Input #3 Maintenance	
7916	Analog Input #4 @4mA	
7917	Analog Input #4 @20mA	
7918	Analog Input #4 Low Limit	
7919	Analog Input #4 High Limit	
7920	Analog Input #4 Maintenance	
7921	Spare	
7922	Spare	
7923	RTD Input Low Limit	
7924	RTD Input High Limit	
7925	RTD Input Maintenance	
7926	Analog Input #1 Override	
7927	Analog Input #2 Override	
7928	Analog Input #3 Override	
7929	Analog Input #4 Override	
7930	RTD Input Override	
7931	Analog Output #1 @4mA	
7932	Analog Output #1 @20mA	
7933	Analog Output #2 @4mA	
7934	Analog Output #2 @20mA	
7935	Analog Output #3 @4mA	
7936	Analog Output #3 @20mA	
7937	Analog Output #4 @4mA	
7938	Analog Output #4 @20mA	
7939	Meter #1 Density.b Override	
7940	Meter #2 Density.b Override	
7941	Meter #3 Density.b Override	
7942	Meter #4 Density.b Override	
7943	Meter#3 CO2 Mol. Percentage	Read/Write
7944	Meter#3 N2 Mol Percentage	Read/Write
7945	Meter#3 Relative Density (SG)	Read/Write
7946	Meter#3 BTU Override	Read/Write
7947	Meter#4 CO2 Mol. Percentage	Read/Write
7948	Meter#4 N2 Mol Percentage	Read/Write
7949	Meter#4 Relative Density (SG)	Read/Write
7950	Meter#4 BTU Override	Read/Write
7951	Spare	

FLOATING POINT

7952	Analog Input #1 Live Value (for checking alarms only)
7953	Analog Input #2 Live Value (for checking alarms only)
7954	Analog Input #3 Live Value (for checking alarms only)
7955	Analog Input #4 Live Value (for checking alarms only)
7956	RTD Live Value (for checking alarms only)
7957	Analog Input #1 Value (used in the calculation)
7958	Analog Input #2 Value (used in the calculation)
7959	Analog Input #3 Value (used in the calculation)
7960	Analog Input #4 Value (used in the calculation)
7961	RTD Value (used in the calculation)
7962	Analog Output #1 Value
7963	Analog Output #2 Value discard
7964	Analog Output #3 Value
7965	Analog Output #4 Value

FLOATING POINT

7098 **Current Daily Archive Record Number**
7099 **Current Hourly Archive Record Number**

FLOATING POINT - CURRENT DATA AREA – METER #1

7100	Spare
7101	Meter #1 Gross Flowrate
7102	Meter #1 Net Flowrate
7103	Meter #1 Mass Flowrate
7104	Meter #1 Energy Flowrate
7105	Meter #1 Daily Gross Total
7106	Meter #1 Daily Net Total
7107	Meter #1 Daily Mass Total
7108	Meter #1 Daily Energy Total
7109	Meter #1 Cum. Gross Total
7110	Meter #1 Cum. Net Total
7111	Meter #1 Cum. Msss Total
7112	Meter #1 Cum. Energy Total
7113	Meter#1 Dp
7114	Meter #1 Temperature
7115	Meter #1 Pressure
7116	Meter #1 Density
7117	Meter #1 Heating Value
7118	Meter #1 Dens.b
7119	Meter #1 SG
7120	Meter #1 Y Factor
7121	Meter #1 K/CD/LMF
7122	Spare
7123	Meter #1 FPV
7124	Meter #1 N2
7125	Meter #1 CO2
7126	Meter #1 Methane
7127	Meter #1 Etnane
7128	Meter #1 Propane
7129	Meter #1 Water
7130	Meter #1 H2S
7131	Meter #1 H2
7132	Meter #1 CO
7133	Meter #1 Oxygen
7134	Meter #1 I-Butane
7135	Meter #1 n-Butane
7136	Meter #1 I-Pentane
7137	Meter #1 n-Pentane
7138	Meter #1 n-Hexane
7139	Meter #1 n-Heptane
7140	Meter #1 n-Octane
7141	Meter #1 n-Nonane
7142	Meter #1 n-Decane
7143	Meter #1 Helium
7144	Meter #1 Argon
7145	Meter#1 Current Day Flow Time in Minutes
7146	Meter#1 Current Hour Flow Time in Minutes
7147	Meter#1 Current Month Flow Time in Hours

FLOATING POINT

FLOATING POINT- CURRENT DATA AREA – METER #3

7148	Meter#2 Current Month Flow Time in Hours
7149	Meter#3 Current Month Flow Time in Hours
7150	Meter#4 Current Month Flow Time in Hours
7151	Date – Floating
7152	Time - Floating
7153	Meter#3 Current Day Flow Time in Minutes
7154	Meter#3 Current Hour Flow Time in Minutes
7155	Meter #3 Gross Flowrate
7156	Meter #3 Net Flowrate
7157	Meter #3 Mass Flowrate
7158	Meter #3 Energy Flowrate
7159	Meter #3 Daily Gross Total
7160	Meter #3 Daily Net Total
7161	Meter #3 Daily Mass Total
7162	Meter #3 Daily Energy Total
7163	Meter #3 Cum. Gross Total
7164	Meter #3 Cum. Net Total
7165	Meter #3 Cum. Msss Total
7166	Meter #3 Cum. Energy Total
7167	Meter #3 Dp
7168	Meter #3 Temperature
7169	Meter #3 Pressure
7170	Meter #3 Density
7171	Meter #3 Heating Value
7172	Meter #3 Dens.b
7173	Meter #3 SG
7174	Meter #3 Y Factor
7175	Meter #3 K/CD/LMF
7176	Spare
7177	Meter #3 FPV
7178	Meter #3 N2
7179	Meter #3 CO2
7180	Meter #3 Methane
7181	Meter #3 Etnane
7182	Meter #3 Propane
7183	Meter #3 Water
7184	Meter #3 H2S
7185	Meter #3 H2
7186	Meter #3 CO
7187	Meter #3 Oxygen
7188	Meter #3 I-Butane
7189	Meter #3 n-Butane
7190	Meter #3 I-Pentane
7191	Meter #3 n-Pentane
7192	Meter #3 n-Hexane
7193	Meter #3 n-Heptane
7194	Meter #3 n-Octane
7195	Meter #3 n-Nonane
7196	Meter #3 n-Decane
7197	Meter #3 Helium
7198	Meter #3 Argon

FLOATING POINT

FLOATING POINT- CURRENT DATA AREA – METER #2

7301	Meter #2 Gross Flowrate
7302	Meter #2 Net Flowrate
7303	Meter #2 Mass Flowrate
7304	Meter #2 Energy Flowrate
7305	Meter #2 Daily Gross Total
7306	Meter #2 Daily Net Total
7307	Meter #2 Daily Mass Total
7308	Meter #2 Daily Energy Total
7309	Meter #2 Cum. Gross Total
7310	Meter #2 Cum. Net Total
7311	Meter #2 Cum. Msss Total
7312	Meter #2 Cum. Energy Total
7313	Meter#2 Dp
7314	Meter #2 Temperature
7315	Meter #2 Pressure
7316	Meter #2 Density
7317	Meter #2 Heating Value
7318	Meter #2 Dens.b
7319	Meter #2 SG
7320	Meter #2 Y Factor
7321	Meter #2 K/CD/LMF
7322	Spare
7323	Meter #2 FPV
7324	Meter #2 N2
7325	Meter #2 CO2
7326	Meter #2 Methane
7327	Meter #2 Etnane
7328	Meter #2 Propane
7329	Meter #2 Water
7330	Meter #2 H2S
7331	Meter #2 H2
7332	Meter #2 CO
7333	Meter #2 Oxygen
7334	Meter #2 I-Butane
7335	Meter #2 n-Butane
7336	Meter #2 I-Pentane
7337	Meter #2 n-Pentane
7338	Meter #2 n-Hexane
7339	Meter #2 n-Heptane
7340	Meter #2 n-Octane
7341	Meter #2 n-Nonane
7342	Meter #2 n-Decane
7343	Meter #2 Helium
7344	Meter #2 Argon
7345	Meter#2 Current Day Flow Time in Minutes
7346	Meter#2 Current Hour Flow Time in Minutes

FLOATING POINT

FLOATING POINT- CURRENT DATA AREA – METER #4

7347-7352	Spare
7353	Meter#4 Current Day Flow Time in Minutes
7354	Meter#4 Current Hour Flow Time in Minutes
7355	Meter #4 Gros Meter#1
7356	Meter #4 Net Flowrate
7357	Meter #4 Mass Flowrate
7358	Meter #4 Energy Flowrate
7359	Meter #4 Daily Gross Total
7360	Meter #4 Daily Net Total
7361	Meter #4 Daily Mass Total
7362	Meter #4 Daily Energy Total
7363	Meter #4 Cum. Gross Total
7364	Meter #4 Cum. Net Total
7365	Meter #4 Cum. Mass Total
7366	Meter #4 Cum. Energy Total
7367	Meter #4 Dp
7368	Meter #4 Temperature
7369	Meter #4 Pressure
7370	Meter #4 Density
7371	Meter #4 Heating Value
7372	Meter #4 Dens.b
7373	Meter #4 SG
7374	Meter #4 Y Factor
7375	Meter #4 K/CD/LMF
7376	Spare
7377	Meter #4 FPV
7378	Meter #4 N2
7379	Meter #4 CO2
7380	Meter #4 Methane
7381	Meter #4 Etnane
7382	Meter #4 Propane
7383	Meter #4 Water
7384	Meter #4 H2S
7385	Meter #4 H2
7386	Meter #4 CO
7387	Meter #4 Oxygen
7388	Meter #4 I-Butane
7389	Meter #4 n-Butane
7390	Meter #4 I-Pentane
7391	Meter #4 n-Pentane
7392	Meter #4 n-Hexane
7393	Meter #4 n-Heptane
7394	Meter #4 n-Octane
7395	Meter #4 n-Nonane
7396	Meter #4 n-Decane
7397	Meter #4 Helium
7398	Meter #4 Argon
7399	Spare

FLOATING POINT

FLOATING POINT – Yesterday's Data Area – Meter #1

7271	Flow Time in Minutes	
7272	Average DP	
7273	Average Temperature	
7274	Average Pressure	
7275	Average SG	
7276	Gross Total	
7277	Net Total	
7278	Mass Total	
7279	Energy Total	

FLOATING POINT – Yesterday's Data Area – Meter #2

7471	Flow Time in Minutes	Read
7472	Average DP	Read
7473	Average Temperature	Read
7474	Average Pressure	Read
7475	Average SG	Read
7476	Gross Total	Read
7477	Net Total	Read
7478	Mass Total	Read
7479	Energy Total	Read

FLOATING POINT – Yesterday's Data Area – Meter #3

7671	Flow Time in Minutes	Read
7672	Average DP	Read
7673	Average Temperature	Read
7674	Average Pressure	Read
7675	Average SG	Read
7676	Gross Total	Read
7677	Net Total	Read
7678	Mass Total	Read
7679	Energy Total	Read

FLOATING POINT – Yesterday's Data Area – Meter #4

7771	Flow Time in Minutes	Read
7772	Average DP	
7773	Average Temperature	Read
7774	Average Pressure	Read
7775	Average SG	Read
7776	Gross Total	Read
7777	Net Total	Read
7778	Mass Total	Read
7779	Energy Total	Read

FLOATING POINT

FLOATING POINT – Last Month Data Area – Meter #1

7257	Flow Time (Hours)	Read
7258	Gross Total	Read
7259	Net Total	Read
7260	Mass Total	Read
7261	Energy Total	Read

FLOATING POINT – Last Month Data Area – Meter #2

7457	Flow Time (Hours)	Read
7458	Gross Total	Read
7459	Net Total	Read
7460	Mass Total	Read
7461	Energy Total	Read

FLOATING POINT – Last Month Data Area – Meter #3

7657	Flow Time (Hours)	Read
7658	Gross Total	Read
7659	Net Total	Read
7660	Mass Total	Read
7661	Energy Total	Read

FLOATING POINT – Last Month Data Area – Meter #4

7664	Flow Time (Hours)	Read
7665	Gross Total	Read
7666	Net Total	Read
7667	Mass Total	Read
7668	Energy Total	Read

FLOATING POINT

FLOATING POINT – Previous Daily Data Area – Meter #1

3026	**Last Daily Report Request (1=Latest,32=Oldest)**	**0 Inferred**	**Read/Write**

7201	Date
7202	Time
7203	Flow Time (Hour)
7204	Meter #1 Average DP
7205	Meter #1 Average Pressure
7206	Meter #1 Average Temperature
7207	Meter #1 Average DP/EXT
7208	Meter #1 Gross Total
7209	Meter #1 Net Total
7210	Meter #1 Mass Total
7211	Meter #1 Energy Total
7212	Meter #1 Average Heating Value
7213	Meter #1 Average SG
7214	Meter #1 Average N2
7215	Meter #1 Average CO2
7216	Meter #1 Average Methane
7217	Meter #1 Average Ethane
7218	Meter #1 Average Propane
7219	Meter #1 Average Water
7220	Meter #1 Average H2S
7221	Meter #1 Average H2
7222	Meter #1 Average CO
7223	Meter #1 Average Oxygen
7224	Meter #1 Average I-Butane
7225	Meter #1 Average n-Butane
7226	Meter #1 Average I-Pentane
7227	Meter #1 Average n-Pentane
7228	Meter #1 Average n-Hexane
7229	Meter #1 Average n-Heptane
7230	Meter #1 Average n-Octane
7231	Meter #1 Average n-Nonane
7232	Meter #1 Average n-Decane
7233	Meter #1 Average Helium
7234	Meter #1 Average Argon

FLOATING POINT

FLOATING POINT – Previous Hourly Data Area – Meter #1

3029	**Last Hourly Report Request(1=Latest,768=Oldest)**	**0 Inferred**	**Read/Write**
7241	Date		
7242	Time		
7243	Flow Time		
7244	Meter #1 Average DP		
7245	Meter #1 Average Pressure		
7246	Meter #1 Average Temperature		
7247	Meter #1 Average DP/EXT		
7248	Meter #1 Hourly Gross		
7249	Meter #1 Hourly Net		
7250	Meter #1 Hourly Mass		
7251	Meter #1 Hourly Energy		
7252	Program Variable #1		
7253	Program Variable #2		
7254	Program Variable #3		
7255	Program Variable #4		
7256	Program Variable #5		
7257	Program Variable #6		
7258	Program Variable #7		
7259	Program Variable #8		
7260	Program Variable #9		
7261	Program Variable #10		

FLOATING POINT – Previous Daily Data Area – Prog.Var

3026	**Last Daily Report Request (1=Latest,32=Oldest)**	**0 Inferred**	**Read/Write**
7262	Flow Time (Min)		
7263	Program Variable #1		
7264	Program Variable #2		
7265	Program Variable #3		
7266	Program Variable #4		
7267	Program Variable #5		
7268	Program Variable #6		
7269	Program Variable #7		
7270	Program Variable #8		
7271	Program Variable #9		
7272	Program Variable #10		

FLOATING POINT

FLOATING POINT – Previous Daily Data Area – Meter #2

3026	**Last Daily Report Request (1=Latest,32=Oldest)**	**0 Inferred**	**Read/Write**

7401	Date
7402	Time
7403	Flow Time (Min)
7404	Meter #2 Average DP
7405	Meter #2 Average Pressure
7406	Meter #2 Average Temperature
7407	Meter #2 Average DP/EXT
7408	Meter #2 Gross Total
7409	Meter #2 Net Total
7410	Meter #2 Mass Total
7411	Meter #2 Energy Total
7412	Meter #2 Average Heating Value
7413	Meter #2 Average SG
7414	Meter #2 Average N2
7415	Meter #2 Average CO2
7416	Meter #2 Average Methane
7417	Meter #2 Average Ethane
7418	Meter #2 Average Propane
7419	Meter #2 Average Water
7420	Meter #2 Average H2S
7421	Meter #2 Average H2
7422	Meter #2 Average CO
7423	Meter #2 Average Oxygen
7424	Meter #2 Average I-Butane
7425	Meter #2 Average n-Butane
7426	Meter #2 Average I-Pentane
7427	Meter#2 Average n-Pentane
7428	Meter #2 Average n-Hexane
7429	Meter #2 Average n-Heptane
7430	Meter #2 Average n-Octane
7431	Meter #2 Average n-Nonane
7432	Meter #2 Average n-Decane
7433	Meter #2 Average Helium
7434	Meter #2 Average Argon

FLOATING POINT

FLOATING POINT – Previous Hourly Data Area _Meter #2

3029	**Last Hourly Report Request(1=Latest,768=Oldest)0 Inferred**	**Read/Write**
7441	Date	
7442	Time	
7443	Meter#1 Flow Time	
7444	Meter #2 Average DP	
7445	Meter #2 Average Pressure	
7446	Meter #2 Average Temperature	
7447	Meter #2 Average DP/EXT	
7448	Meter #2 Hourly Gross Total	
7449	Meter #2 Hourly Net Total	
7450	Meter #2 Hourly Mass Total	
7451	Meter #2 Hourly Energy Total	

FLOATING POINT

FLOATING POINT – Previous Daily Data Area – Meter #3

3026	**Last Daily Report Request (1=Latest,32=Oldest)**	**0 Inferred**	**Read/Write**

7601	Date
7602	Time
7603	Flow Time
7604	Meter #3 Average DP
7605	Meter #3 Average Pressure
7606	Meter #3 Average Temperature
7607	Meter #3 Average DP/EXT
7608	Meter #3 Gross Total
7609	Meter #3 Net Total
7610	Meter #3 Mass Total
7611	Meter #3 Energy Total
7612	Meter #3 Average Heating Value
7613	Meter #3 Average SG
7614	Meter #3 Average N2
7615	Meter #3 Average CO2
7616	Meter #3 Average Methane
7617	Meter #3 Average Ethane
7618	Meter #3 Average Propane
7619	Meter #3 Average Water
7620	Meter #3 Average H2S
7621	Meter #3 Average H2
7622	Meter #3 Average CO
7623	Meter #3 Average Oxygen
7624	Meter #3 Average I-Butane
7625	Meter #3 Average n-Butane
7626	Meter #3 Average I-Pentane
7627	Meter #3 Average n-Pentane
7628	Meter #3 Average n-Hexane
7629	Meter #3 Average n-Heptane
7630	Meter #3 Average n-Octane
7631	Meter #3 Average n-Nonane
7632	Meter #3 Average n-Decane
7633	Meter #3 Average Helium
7634	Meter #3 Average Argon

FLOATING POINT

FLOATING POINT – Previous Hourly Data Area _Meter #3

3029	**Last Hourly Report Request(1=Latest,768=Oldest)**	**0 Inferred**	**Read/Write**
7641	Date		
7642	Time		
7643	Meter #3 Flow Time		
7644	Meter #3 Average DP		
7645	Meter #3 Average Pressure		
7646	Meter #3 Average Temperature		
7647	Meter #3 Average DP/EXT		
7648	Meter #3 Hourly Gross Total		
7649	Meter #3 Hourly Net Total		
7650	Meter #3 Hourly Mass Total		
7651	Meter #3 Hourly Energy Total		

FLOATING POINT

FLOATING POINT – Previous Daily Data Area – Meter #4

3026	**Last Daily Report Request (1=Latest,32=Oldest)**	**0 Inferred**	**Read/Write**

7701	Date
7702	Time
7703	Flow Time
7704	Meter #4 Average DP
7705	Meter #4 Average Pressure
7706	Meter #4 Average Temperature
7707	Meter #4 Average DP/EXT
7708	Meter #4 Gross Total
7709	Meter #4 Net Total
7710	Meter #4 Mass Total
7711	Meter #4 Energy Total
7712	Meter #4 Average Heating Value
7713	Meter #4 Average SG
7714	Meter #4 Average N2
7715	Meter #4 Average CO2
7716	Meter #4 Average Methane
7717	Meter #4 Average Ethane
7718	Meter #4 Average Propane
7719	Meter #4 Average Water
7720	Meter #4 Average H2S
7721	Meter #4 Average H2
7722	Meter #4 Average CO
7723	Meter #4 Average Oxygen
7724	Meter #4 Average I-Butane
7725	Meter #4 Average n-Butane
7726	Meter #4 Average I-Pentane
7727	Meter #4 Average n-Pentane
7728	Meter #4 Average n-Hexane
7729	Meter #4 Average n-Heptane
7730	Meter #4 Average n-Octane
7731	Meter #4 Average n-Nonane
7732	Meter #4 Average n-Decane
7733	Meter #4 Average Helium
7734	Meter #4 Average Argon

FLOATING POINT

FLOATING POINT – Previous Hourly Data Area _Meter #4

3029	**Last Hourly Report Request(1=Latest,768=Oldest)0 Inferred**	**Read/Write**

7741	Date
7742	Time
7743	Meter #4 Flow Time
7744	Meter #4 Average DP
7745	Meter #4 Average Pressure
7746	Meter #4 Average Temperature
7747	Meter #4 Average DP/EXT
7748	Meter #4 Hourly Gross Total
7749	Meter #4 Hourly Net Total
7750	Meter #4 Hourly Mass Total
7751	Meter #4 Hourly Energy Total

FLOATING POINT

Hourly and Daily archive flow data 701-706 are fixed length arrays. The data field is used to address an individual record.(Daily Data 1=Latest, 32=Oldest, Hourly Data 1=Latest,768=Oldest)

Read Archive Record Quary Message – Read archive registers 701 record number 10

RTU MODE -

ADDR	FUNC CODE	STARTING POINT		# OF POINTS		CRC CHECK	
		HI	LO	HI	LO		
01	03	02	BD	00	0A	54	51

Response

ADDR	FUNC CODE	BYTE COUNTS	DATA …(Repeat n Times)		CRC CHECK	
			HI	LO ..		
01	03	58	00	01..		

FLOATING POINT – (701) Previous Daily Data Area – Meter #1

701 Date
Time
Average Heating Value
Average SG
Average Carbon Dioxide
Average Nitrogen
Average Methane
Average Ethane
Average Propane
Average Iso-Butane
Average n-Butane
Average I-Pentane
Average n-Pentane
Average Hexane
Average Heptane
Average Nonane
Average Octane
Average H2S
Average Hydrogen
Average Helium
Average Oxygen
Average Carbon Monoxide

FLOATING POINT

FLOATING POINT – (702) Previous Daily Data Area – Meter #2

702	Date
	Time
	Average Heating Value
	Average SG
	Average Carbon Dioxide
	Average Nitrogen
	Average Methane
	Average Ethane
	Average Propane
	Average Iso-Butane
	Average n-Butane
	Average I-Pentane
	Average n-Pentane
	Average Hexane
	Average Heptane
	Average Nonane
	Average Octane
	Average H2S
	Average Hydrogen
	Average Helium
	Average Oxygen
	Average Carbon Monoxide

FLOATING POINT – (703) Previous Daily Data Area – Meter #1

703	Date
	Time
	Flow Time (Min.)
	Average Pressure
	Average Temperature
	Gross Total
	Net Total
	Mass Total
	Energy
	Average DP
	Average DP/EXT

FLOATING POINT – (704) Previous Hourly Data Area – Meter #1

704	Date
	Time
	Flow Time (Min.)
	Average Pressure
	Average Temperature
	Gross Total
	Net Total
	Mass Total
	Energy Total
	Average DP
	Average DP/EXT

FLOATING POINT

FLOATING POINT – (705) Previous Daily Data Area – Meter #2

705 Date
Time
Flow Time (Min.)
Average Pressure
Average Temperature
Gross Total
Net Total
Mass Total
Energy Total
Average DP
Average DP/EXT

FLOATING POINT – (706) Previous Hourly Data Area – Meter #2

706 Date
Time
Flow Time (Min.)
Average Pressure
Average Temperature
Gross Total
Net Total
Mass Total
Energy Total
Average DP
Average DP/EXT

FLOATING POINT

FLOATING POINT – (707) Previous Daily Data Area – Meter #3

707 Date
Time
Average Heating Value
Average SG
Average Carbon Dioxide
Average Nitrogen
Average Methane
Average Ethane
Average Propane
Average Iso-Butane
Average n-Butane
Average I-Pentane
Average n-Pentane
Average Hexane
Average Heptane
Average Nonane
Average Octane
Average H2S
Average Hydrogen
Average Helium
Average Oxygen
Average Carbon Monoxide

FLOATING POINT

FLOATING POINT – (708) Previous Daily Data Area – Meter #4

708 Date
Time
Average Heating Value
Average SG
Average Carbon Dioxide
Average Nitrogen
Average Methane
Average Ethane
Average Propane
Average Iso-Butane
Average n-Butane
Average I-Pentane
Average n-Pentane
Average Hexane
Average Heptane
Average Nonane
Average Octane
Average H2S
Average Hydrogen
Average Helium
Average Oxygen
Average Carbon Monoxide

FLOATING POINT – (709) Previous Daily Data Area – Meter #3

709 Date
Time
Flow Time (Min.)
Average Pressure
Average Temperature
Gross Total
Net Total
Mass Total
Energy
Average DP
Average DP/EXT

FLOATING POINT – (710) Previous Hourly Data Area – Meter #3

710 Date
Time
Flow Time (Min.)
Average Pressure
Average Temperature
Gross Total
Net Total
Mass Total
Energy Total
Average DP
Average DP/EXT

FLOATING POINT

FLOATING POINT – (711) Previous Daily Data Area – Meter #4

711	Date
	Time
	Flow Time (Min.)
	Average Pressure
	Average Temperature
	Gross Total
	Net Total
	Mass Total
	Energy
	Average DP
	Average DP/EXT

FLOATING POINT – (712) Previous Hourly Data Area – Meter #4

712	Date
	Time
	Flow Time (Min.)
	Average Pressure
	Average Temperature
	Gross Total
	Net Total
	Mass Total
	Energy Total
	Average DP
	Average DP/EXT

FLOATING POINT

Programmable Floating Point Variable

Scratch Pad for Floating Point Variables – 7801-7830
7791-7800 – Last Hour Program Variables
7801-7810 –5 Variables, will be reset at the end of hour.
7831-7899 – Programmable Variable Statements

Hourly Programmable Variables 7052-7061
3029 = Last Hourly Report Request (16 bits)
Set last hourly report request to 1 for latest
7052 Hourly Programmable Variables #1
7053 Hourly Programmable Variables #2
7054 Hourly Programmable Variables #3
7055 Hourly Programmable Variables #4
7056 Hourly Programmable Variables #5

FLOATING POINT

7952	Analog Input #1 Live Value (for checking alarms only)	Read
7953	Analog Input #2 Live Value (for checking alarms only)	Read
7954	Analog Input #3 Live Value (for checking alarms only)	Read
7955	Analog Input #4 Live Value (for checking alarms only)	Read
7956	RTD Live Value (for checking alarms only)	Read
7957	Analog Input #1 Value (used in the calculation)	Read
7958	Analog Input #2 Value (used in the calculation)	Read
7959	Analog Input #3 Value (used in the calculation)	Read
7960	Analog Input #4 Value (used in the calculation)	Read
7961	RTD Value (used in the calculation)	Read
7962	Analog Output #1 Value	Read
7963	Analog Output #2 Value	Read
7964	Analog Output #3 Value	Read
7965	Analog Output #4 Value	Read

Alarms and Status Codes

PREVIOUS DATA ALARM AREA

Set last alarm status request (3030) to 1.

4001	last alarm date mmddyy
4003	last alarm time hhmmss
4005	last alarm flag - IDx1000000 + CODE x10000 +ACODEx100 +STATUS

Last Alarm Flag

ID	CODE	ACODE	STATUS

ID

0	Analog Input #1	17	Event Status
1	Analog Input #2	18	Calibration Mode
2	Analog Input #3	20	Multi.Var. DP
3	Analog Input #4	21	Multi.Var. Pressurer
4	RTD Input	22	Multi.Var. Temperature
5	Analog Output #1		
6	Analog Output #2		
7	Analog Output #3	11	Meter #1
8	Analog Output #4	12	Meter #2
9	Density	13	Meter #3
10	Density	14	Meter #4

CODE (ONLY FOR ID=METER#1,2,3,4)

1	Mass Flowrate (Gross –AGA7)		
2	AGA8 Out of Range	7	Down
3	AGA8 Out of Range	8	Start

ACODE

N/A

STATUS

0	ID = 10:	FAILED OK
	ID = 5 –8:	OVERRANGE OK
	ID=18	OFF
	ID=Others	OK
Others	Not Used	
]		

1	ID=18	Calib.Mode
	ID=Others	HI
2	LO	
4	FAILED	
5	OVERRANGE	
6	FAIL OK	
7	FAIL	

Example: Last Alarm Flag – (Hex:A8EA33, Decimal:11070003)
ID= 11, CODE=7,ACODE=0,STATUS=3 -> METER #1 DOWN

PREVIOUS ALARM DATA AREA ENDS

Previous Audit Data Area

Set last audit data request (3031) to 1.

8101	Last Audit Date mmddyy
8103	Last Audit Time hhmmss
8105	Old Value (Decimal Inferred in the 4th byte of 8109)
8107	New Vaule(Decimal Inferred in the 4th byte of 8109)
8109	Code Flag-Given in four hexadecimal bytes (no,audit code,dec)

Code Flag

	No.	Audit Code	Old/New Value Decimal Inferred

NO.

The following table is only for audit code is less than 200

Value 0 : this field is not used.

1	Meter #1
2	Meter #2
3	Meter #3
4	Meter #4

Tag ID Assignments

201	Analog Input #1
202	Analog Input #2
203	Analog Input #3
204	Analog Input #4
205	RTD
211	Multi.Var.DP
212	Multi.Var.Pressure
213	Multi.Var.Temperature

Audit Codes

1	DP Cut Off
2	DP High Switch Percentage
3	
4	
5	Base Density Override
6	Pipe ID
7	Orifice ID
8	Temperature Override
9	Pressure Override
10	Density Dry Air
11	Base SG
12	Ratio of Heat
13	Viscosity
14	Pipe Thermal Expansion E-6
15	Orifice Thermal Expansion E-6
16	Reference Temperature of Pipe
17	Reference Temperature of Orifice
18	MOL% of Methane (nx19,aga8d) CO2 (AGA8 Gross Method 1) Nitrogen(AGA8 Gross Method 2)
19	MOL% of Ethane (NX19) Hydrogen (AGA8 Gross Method 1) CO2 (AGA8 Gross Method 2) Nitrogen(AGA8 Detail Method)
20	MOL% of Propane (NX19)

142	Flow Rate Threshold #1
143	Flow Rate Threshold #2
144	Flow Rate Threshold #3
145	Flow Rate Threshold #4
146	Linearization Factor #1
147	Linearization Factor #2
148	Linearization Factor #3
149	Linearization Factor #4
150	Common Temperature
151	Common Pressure
152	Station Type
153	Flow Rate Display
154	Calculation Type
155	Y Factor Select
156	
157	Use Stack DP 0=No, 1=Yes
158	Densitometer Type
159	Density Unit

	CO (AGA8 Gross Method 1) Hydrogen(AGA8 Gross Method 2) CO2 (AGA8 Detail Method)
21	MOL% of Iso-Butane CO (AGA8 Gross Method 2) Ethane (AGA8 Detail Method)
22	MOL% of n-Butane (NX19) Propane (AGA8 Detail Method)
23	MOL% of Iso-Pentane (NX19) Water (AGA8 Detail Method)
24	MOL% of n-Pentane (NX19) H2S (AGA8 Detail Method)
25	MOL% of n-Hexane (NX19) Hydrogen (AGA8 Detail Method)
26	MOL% of n-Heptane (NX19) CO (AGA8 Detail Method)
27	MOL% of n-Octane (NX19) Oxygen (AGA8 Detail Method)
28	MOL% of Carbon Dioxide (NX19) i-Butane (AGA8 Detail Method)
29	MOL% of Nitrogen (NX19) n-Butane (AGA8 Detail Method)
58	Density Correction Factor
60	Base Temperature
61	Base Pressure
62	Atmospheric Pressure
63	Pulse Output #1 Volume
64	Pulse Output #2 Volume
65	Mol % of I-Pentane
66	Mol % of n-Pentane
67	Mol % of n-Hexane
68	Mol % of n-Heptane
69	Mol % of n-Octane
70	Mol % of n-Nonane
71	Mol % of n-Decane
72	Mol % of Helium
73	Mol % of Argon
131	Fail Code
132	@4mA
133	@20mA
134	Maintenance
135	Override
137	Maintenance
138	Override

161	Day Start Hour
162	Disable Alarms
163	Number of Meters
164	Density Calculation Type
165	DP Low Assignment
166	Temperature Assignment
167	Pressure Assignment
168	Densitometer Assignment
170	DP High Assignment
171	Pressure Unit
173	Flow Unit
176	Common Density
180	*****SEE NOTE (next page)**
181	Flow Cut Off Hertz
182	K Factor
183	Meter Factor
201	Analog Input #1 Calibration Data
202	Analog Input #2 Calibration Data
203	Analog Input #3 Calibration Data
204	Analog Input #4 Calibration Data
205	RTD Input Calibration Data
207	Analog Output#1 Calibration Data
208	Analog Output#2 Calibration Data
209	Analog Output#3 Calibration Data
210	Analog Output#4 Calibration Data
211	Multi.Var DP Calibration Data
212	Multi.Var. Pressure Calib. Data
213	Multi.Var. Temperature Calib. Data

***Example*:**M2 Density Correction Factor change from 1.00000 to 1.10000

8101 **Last Audit Date mmddyy**
00 00 C8 C8 (Hex), 051400 (Decimal) – May 14, 2000

8103 **Last Audit Time hhmmss**
00 03 0d 40 (Hex), 200000(Decimal) – 8 PM

8105 **Old Value (Decimal Inferred in the 4th byte of 8113)**
00 01 86 a0 (Hex) 100000 (Decimal)
4th byte of 8513 = 5 (Decimal Places)
result = 1.00000

8107 **New Vaule(Decimal Inferred in the 4th byte of 8113)**
00 01 ad b0 (Hex) 110000 (Decimal)
4th byte of 8513 = 5 (Decimal Places)
Rsult = 1.10000

8109 **Code Flag**
00 26 3a 05 in Hex
2nd Byte – NO 26 (Hex) 38 (Decimal) Meter#2 Density,
3rd Byte – Audit Code – 3A(Hex) 58 (Decimal) – Density Correction Factor
4th Byte – Decimal Places – 05(Hex) – 5 Decimal Places

NOTE:

When Audit Code = 180, then the following Modbus Addresses store the parameters indicated.

8101 System Start Date

8103 System Start Time

8105 System Failed Date

8107 System Failed Time

8109 Not Used

8111 Not Used

PREVIOUS AUDIT DATA AREA ENDS

CURRENT ALARM STATUS

4 Bytes in Hex - FF FF FF FF

METER#1: MODBUS ADDRESS 9533

METER#2: MODBUS ADDRESS 9535

METER#3: MODBUS ADDRESS 9537

METER#4: MODBUS ADDRESS 9539

The Current Alarm Status is a 4-byte string that resides at **Modbus address 9533 for Meter #1, 9535 for Meter #2, 9537 for Meter#3, and 9539 for Meter#4**. The alarm status codes are the same for all meters.

1st byte	2nd byte	3rd byte	4th byte	
01	00	00	00	Meter Down
02	00	00	00	Meter AGA8 Out of Range
04	00	00	00	Net Flow Rate High
08	00	00	00	Net Flow Rate Low

OTHER ALARMS (MODBUS ADDRESS 9531)

4 Bytes in Hex - FF FF FF FF

01	00	00	00	Analog Input #1 High
02	00	00	00	Analog Input #1 Low
04	00	00	00	Analog Input #2 High
08	00	00	00	Analog Input #2 Low
10	00	00	00	Analog Input #3 High
20	00	00	00	Analog Input #3 Low
40	00	00	00	Analog Input #4 High
80	00	00	00	Analog Input #4 Low
00	01	00	00	RTD Input High
00	02	00	00	RTD Input Low
00	04	00	00	Calibration Mode ON
00	08	00	00	N/A
00	10	00	00	Analog Output #1 Overrange
00	20	00	00	Analog Output #2 Overrange
00	40	00	00	Analog Output #3 Overrange
00	80	00	00	Analog Output #4 Overrange
00	00	01	00	Analog Input #1 Failed
00	00	02	00	Analog Input #2 Failed
00	00	04	00	Analog Input #3 Failed
00	00	08	00	Analog Input #4 Failed
00	00	10	00	RTD Input Failed
00	00	20	00	Densitometer Failed
00	00	40	00	Densitometer High
00	00	80	00	Densitometer Low
00	00	00	01	Multi.Var.DP High
00	00	00	02	Multi.Var.DP Low
00	00	00	04	Multi.Var.Pressure High
00	00	00	08	Multi.Var.Pressure Low
00	00	00	10	Multi.Var.Temperature High
00	00	00	20	Multi.Var.Temperature Low

CURRENT ALARMS STATUS SECTION ENDS

INPUT ASSIGNMENTS

1 – Analog Input #1
2 – Analog Input #2
3 – Analog Input #3
4 – Analog Input #4
5 – RTD
10 – Multi.Variable #1
11 – Multi.Variable #2

ADDRESS	**DESCRIPTION**	
2664	Meter #1 DP Assignment	
2665	Meter #1 Temperature Assignment	
2666	Meter #1 Pressure Assignment	
2667	Meter #1 Density Assignment	
2668	Meter #1 DP High Assignment	
2684	Meter #2 DP Assignment	
2685	Meter #2 Temperature Assignment	
2686	Meter #2 Pressure Assignment	
2687	Meter #2 Density Assignment	
2688	Meter #2 DP High Assignment	
2704	Meter #3 DP Assignment	
2705	Meter #3 Temperature Assignment	
2706	Meter #3 Pressure Assignment	
2707	Meter #3 Density Assignment	
2708	Meter #3 DP High Assignment	
2724	Meter #4 DP Assignment	
2725	Meter #4 Temperature Assignment	
2726	Meter #4 Pressure Assignment	
2727	Meter #4 Density Assignment	
2728	Meter #4 DP High Assignment	
2891-2894	Analog Input #1 TAG ID	8 Chars.
2895-2898	Analog Input #2 TAG ID	8 Chars.
2899-2902	Analog Input #3 TAG ID	8 Chars.
2903-2906	Analog Input #4 TAG ID	8 Chars.
2907-2910	RTD TAG ID	8 Chars.
2911-2914	Densitometer TAG ID	8 Chars
2915-2918	Analog Output #1 TAG ID	8 Chars
2919-2922	Analog Output #2 TAG ID	8 Chars
2923-2926	Analog Output #3 TAG ID	8 Chars
2927-2930	Analog Output #4 TAG ID	8 Chars

CHAPTER 6: Installation Drawings

Explosion-Proof Installation Drawings

REVISIONS				
REV	DESCRIPTION	CHG. NO.	APP'D	DATE
AA				

⚠12 INSTALLATION TO BE IN ACCORDANCE WITH NATIONAL ELECTRICAL CODE.

⚠9 NON-INCENDIVE FIELD WIRING METHODS MAY BE USED FOR CONNECTING THE TEMPERATURE SENSING ASSEMBLY. WHEN USING NON-INCENDIVE FIELD WIRING, THE CONNECTION HEAD AND TEMPERATURE SENSOR ASSEMBLY NEED NOT BE EXPLOSION PROOF, BUT ALL COMPONENTS CONNECTED TO THE TEMP SENSOR CONNECTOR MUST BE CLASSIFIED "SIMPLE APPARATUS". SIMPLE APPARATUS ARE DEVICES WHICH ARE INCAPABLE OF GENERATING OR STORING MORE THAN 1.2V, 0.1A, 25MW, OR 20uJ (RTD'S QUALIFY AS SIMPLE APPARATUS).

⚠8 DIVISION 2 WIRING METHOD.

6. CLASS II INSTALLATIONS MUST USE A CSA APPROVED DUST-INGITIONPROOF SENSOR.

5. IN AMBIENTS GREATER THAN 40°C, SPRING LOADED TEMPERATURE SENSORS USED WITHOUT AN EXPLOSION PROOF THERMOWELL MUST BE RATED FOR AT LEAST 85°C.

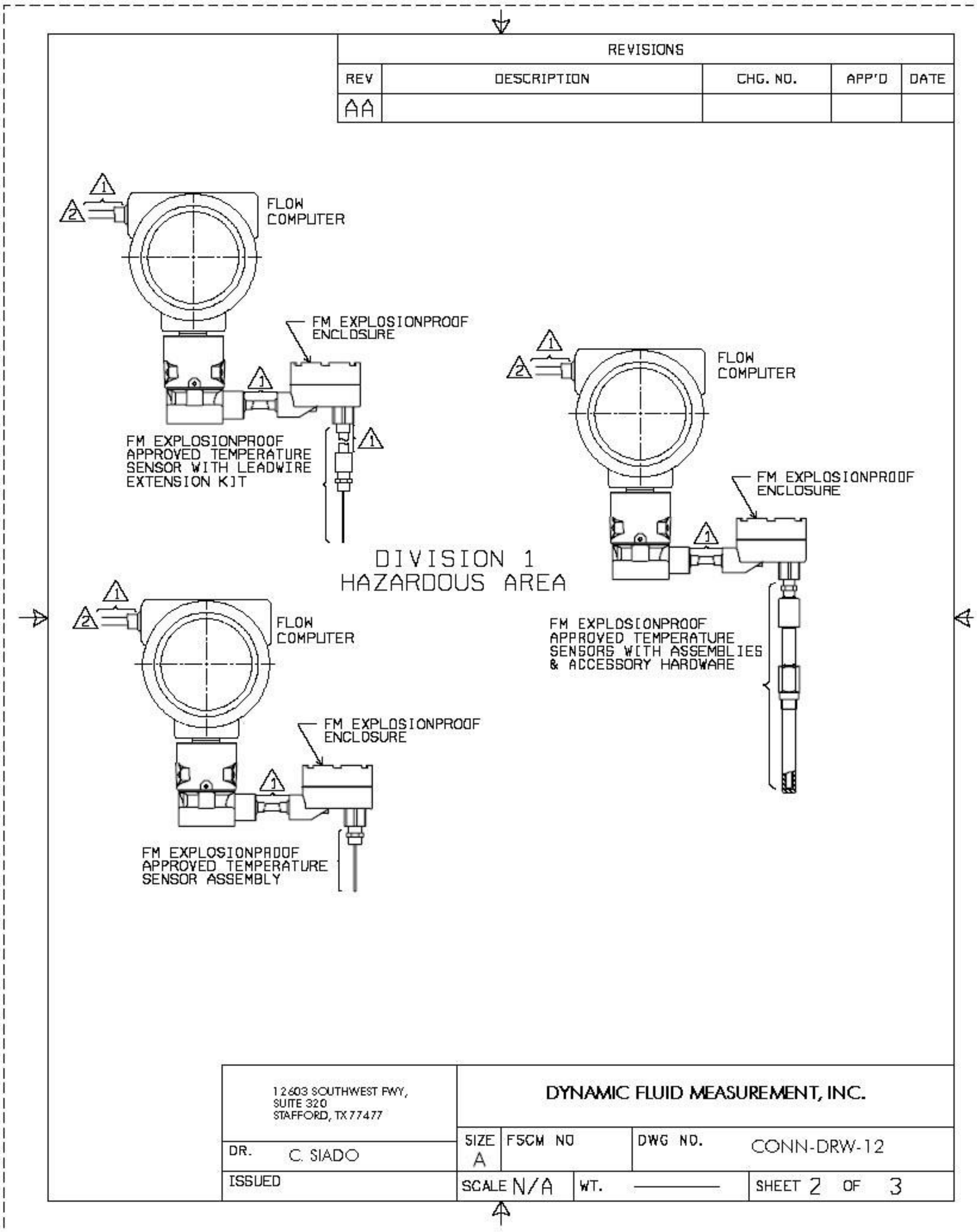
4. COMPONENTS REQUIRED TO BE APPROVED MUST BE FOR GAS GROUP APPROPIATE TO AREA CLASSIFICATION.

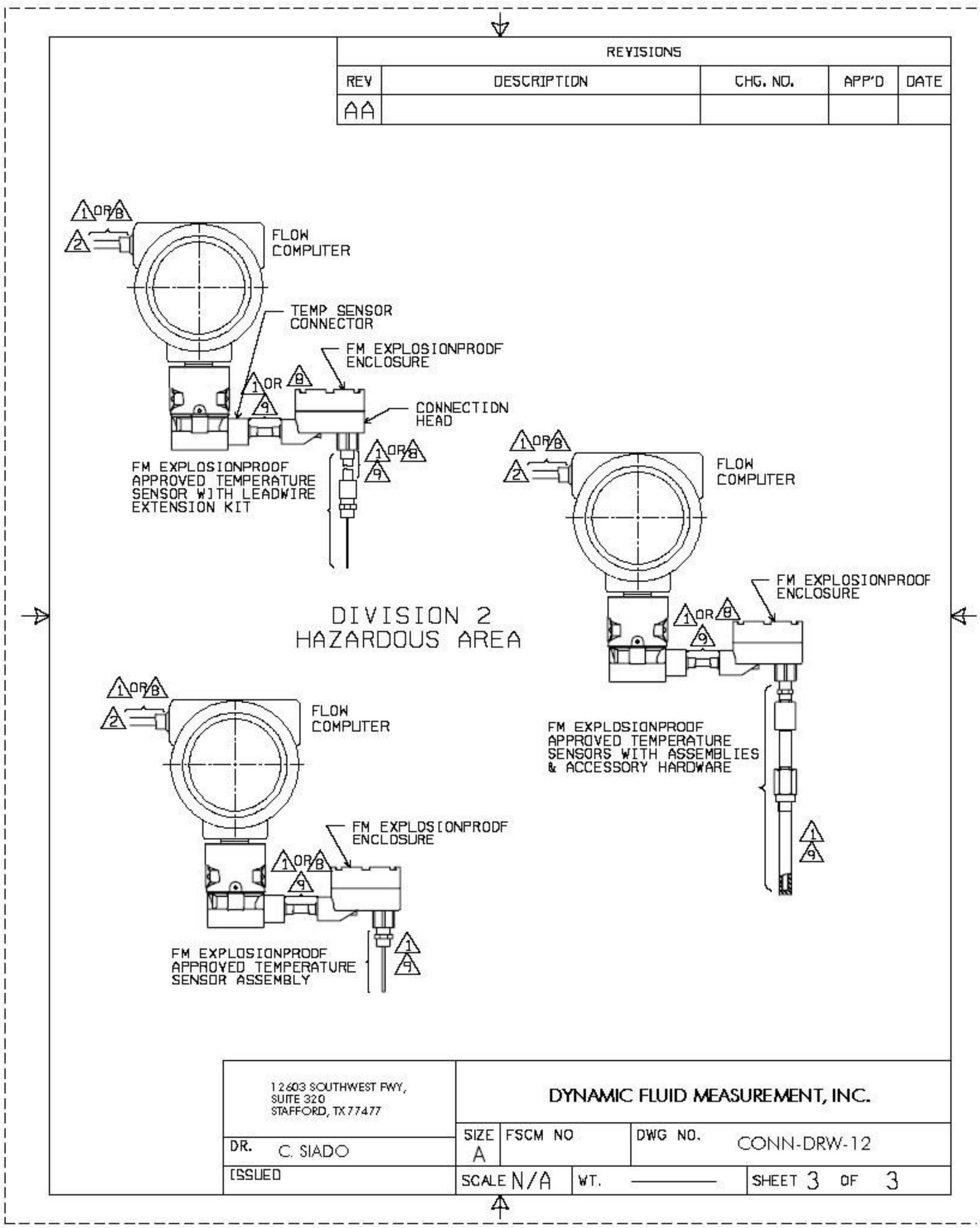
3. ALL CONDUITS THREADS TO BE ASSEMBLED WITH FIVE FULL THREADS MINIMUM.

⚠2 TRANSMITTER MUST NOT BE CONNECTED TO EQUIPMENT GENERATING MORE THAN 250VAC.

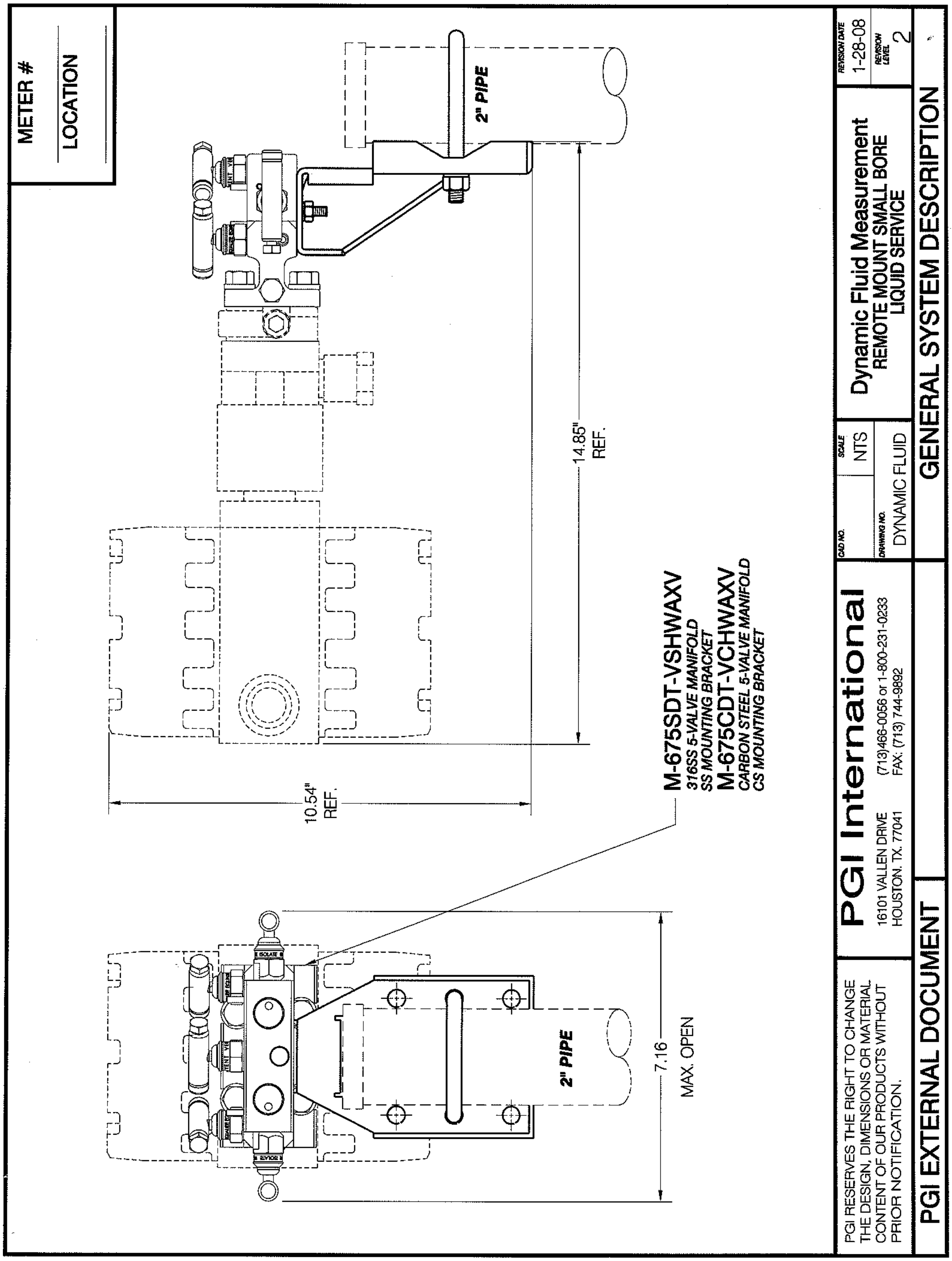
⚠1 WIRING METHOD SUITABLE FOR CLASS I, DIV 1, ANY LENGTH.

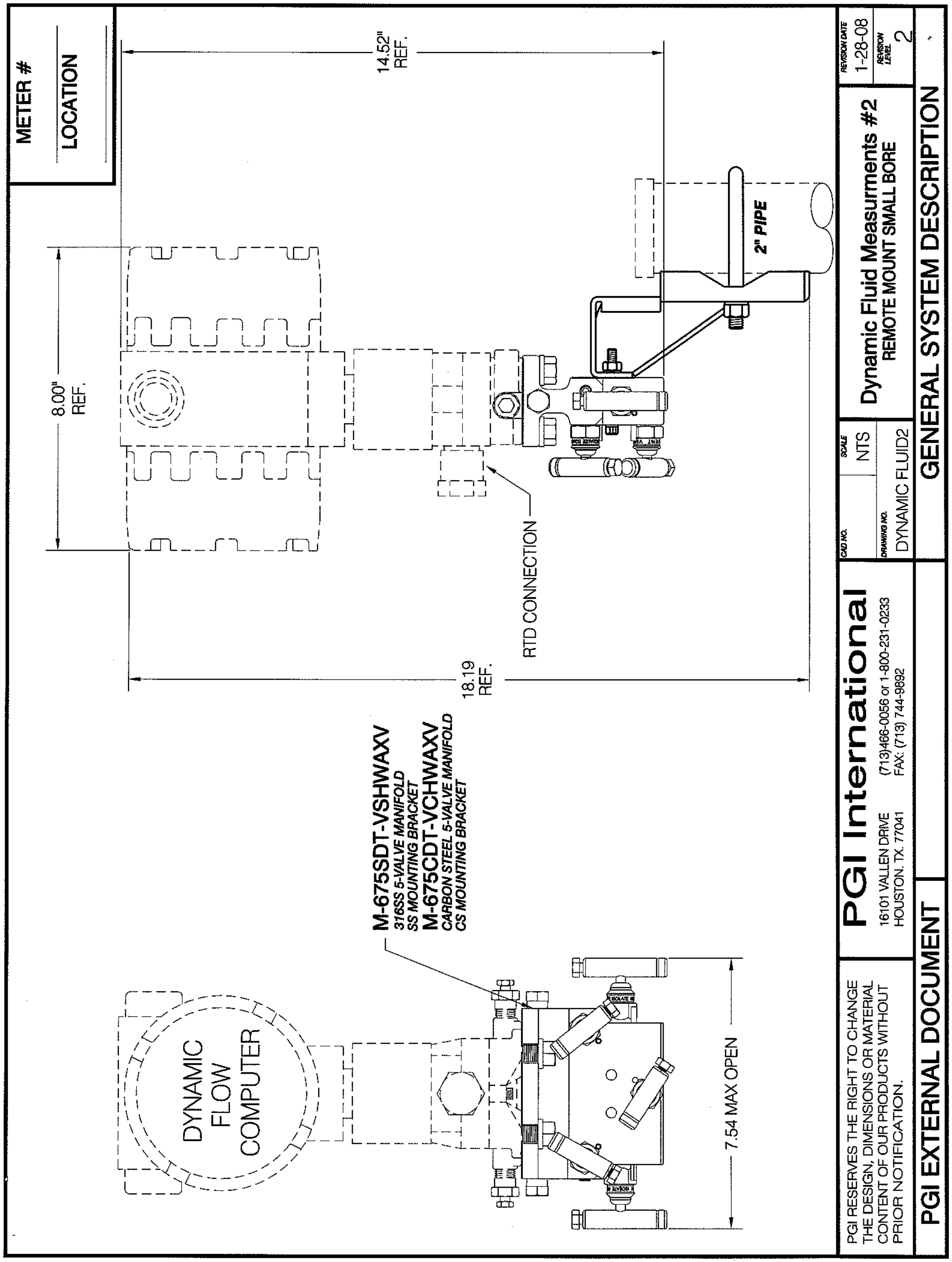
UNLESS OTHERWISE SPECIFIED DIMENSIONS IN INCHES [mm]. REMOVE ALL BURRS AND SHARP EDGES. MACHINE SURFACE FINISH 125	CONTRACT NO.	DYNAMIC FLUID MEASUREMENT, INC.	12603 SOUTHWEST FWY, SUITE 320 STAFFORD, TX 77477
	DR. C. SIADO	TITLE MODEL MICROMV AND ECHART EXPLOSIONPROOF INSTALLATION DRAWING, FACTORY MUTUAL	
-TOLERANCE- .X ± .1 [2.5] .XX ± .02 [0.5] .XXX ± .010 [0.25] FRACTIONS ± 1/32 ANGLES ± 2°	CHK'D		
	APP'D. S. HALILAH		
		SIZE A FSCM NO	DWG NO. CONN-DRW-12
DO NOT SCALE PRINT	APP'D. GOVT.	SCALE WT.	SHEET 1 OF 3

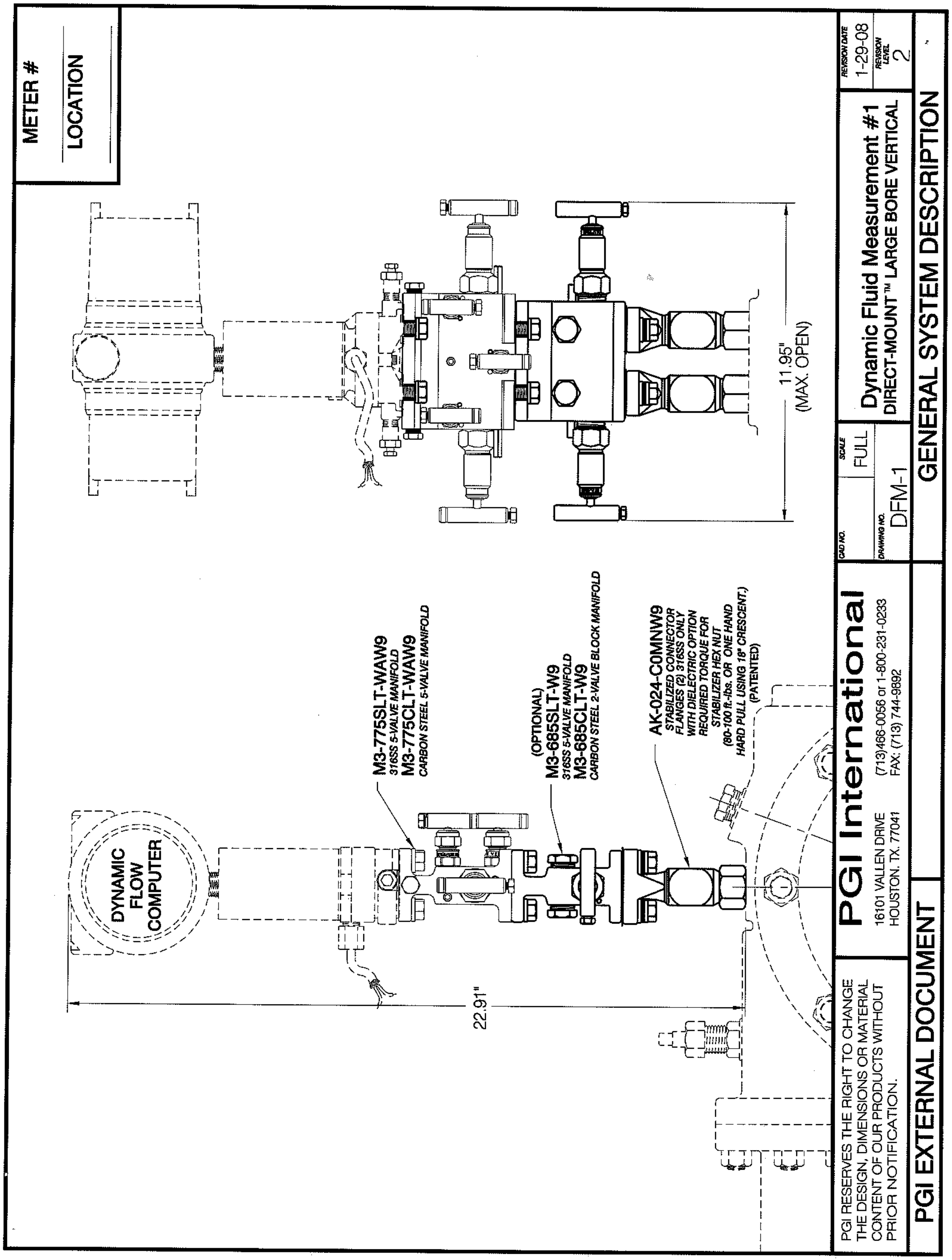

REVISIONS
REV
DESCRIPTION
CHG. NO.
APP'D
DATE
AA
FLOW COMPUTER
FM EXPLOSIONPROOF ENCLOSURE
FM EXPLOSIONPROOF APPROVED TEMPERATURE SENSOR WITH LEADWIRE EXTENSION KIT
DIVISION 1 HAZARDOUS AREA
FLOW COMPUTER
FM EXPLOSIONPROOF ENCLOSURE
FM EXPLOSIONPROOF APPROVED TEMPERATURE SENSORS WITH ASSEMBLIES & ACCESSORY HARDWARE
FLOW COMPUTER
FM EXPLOSIONPROOF ENCLOSURE
FM EXPLOSIONPROOF APPROVED TEMPERATURE SENSOR ASSEMBLY
12603 SOUTHWEST FWY, SUITE 320 STAFFORD, TX 77477
DYNAMIC FLUID MEASUREMENT, INC.
DR. C. SIADO
SIZE A
FSCM NO
DWG NO. CONN-DRW-12
ISSUED
SCALE N/A
WT.
SHEET 2 OF 3


REVISIONS
REV
DESCRIPTION
CHG. NO.
APP'D
DATE
AA
FLOW COMPUTER
TEMP SENSOR CONNECTOR
FM EXPLOSIONPROOF ENCLOSURE
CONNECTION HEAD
FM EXPLOSIONPROOF APPROVED TEMPERATURE SENSOR WITH LEADWIRE EXTENSION KIT
DIVISION 2 HAZARDOUS AREA
FM EXPLOSIONPROOF APPROVED TEMPERATURE SENSORS WITH ASSEMBLIES & ACCESSORY HARDWARE
FM EXPLOSIONPROOF APPROVED TEMPERATURE SENSOR ASSEMBLY
12603 SOUTHWEST FWY, SUITE 320 STAFFORD, TX 77477
DYNAMIC FLUID MEASUREMENT, INC.
DR. C. SIADO
ISSUED
SIZE A
FSCM NO
DWG NO. CONN-DRW-12
SCALE N/A
WT.
SHEET 3 OF 3

Manifold Installation Drawings




METER #
LOCATION
14.52" REF.
8.00" REF.
2" PIPE
RTD CONNECTION
18.19 REF.
M-675SDT-VSHWAXV
316SS 5-VALVE MANIFOLD
SS MOUNTING BRACKET
M-675CDT-VCHWAXV
CARBON STEEL 5-VALVE MANIFOLD
CS MOUNTING BRACKET
DYNAMIC
FLOW
COMPUTER
7.54 MAX OPEN
PGI RESERVES THE RIGHT TO CHANGE
THE DESIGN, DIMENSIONS OR MATERIAL
CONTENT OF OUR PRODUCTS WITHOUT
PRIOR NOTIFICATION.
PGI International
16101 VALLEN DRIVE
HOUSTON, TX. 77041
(713)466-0056 or 1-800-231-0233
FAX: (713) 744-9892
CAD NO.
DRAWING NO.
DYNAMIC FLUID2
SCALE
NTS
Dynamic Fluid Measurments #2
REMOTE MOUNT SMALL BORE
REVISION DATE
1-28-08
REVISION LEVEL
2
PGI EXTERNAL DOCUMENT
GENERAL SYSTEM DESCRIPTION


METER #
LOCATION
DYNAMIC FLOW COMPUTER
22.91"
M3-775SLT-WAW9
316SS 5-VALVE MANIFOLD
M3-775CLT-WAW9
CARBON STEEL 5-VALVE MANIFOLD
(OPTIONAL)
M3-685SLT-W9
316SS 5-VALVE MANIFOLD
M3-685CLT-W9
CARBON STEEL 2-VALVE BLOCK MANIFOLD
AK-024-C0MNW9
STABILIZED CONNECTOR FLANGES (2) 316SS ONLY WITH DIELECTRIC OPTION
REQUIRED TORQUE FOR STABILIZER HEX NUT (80-100 ft.-lbs. OR ONE HAND HARD PULL USING 18" CRESCENT.)
(PATENTED)
11.95"
(MAX. OPEN)
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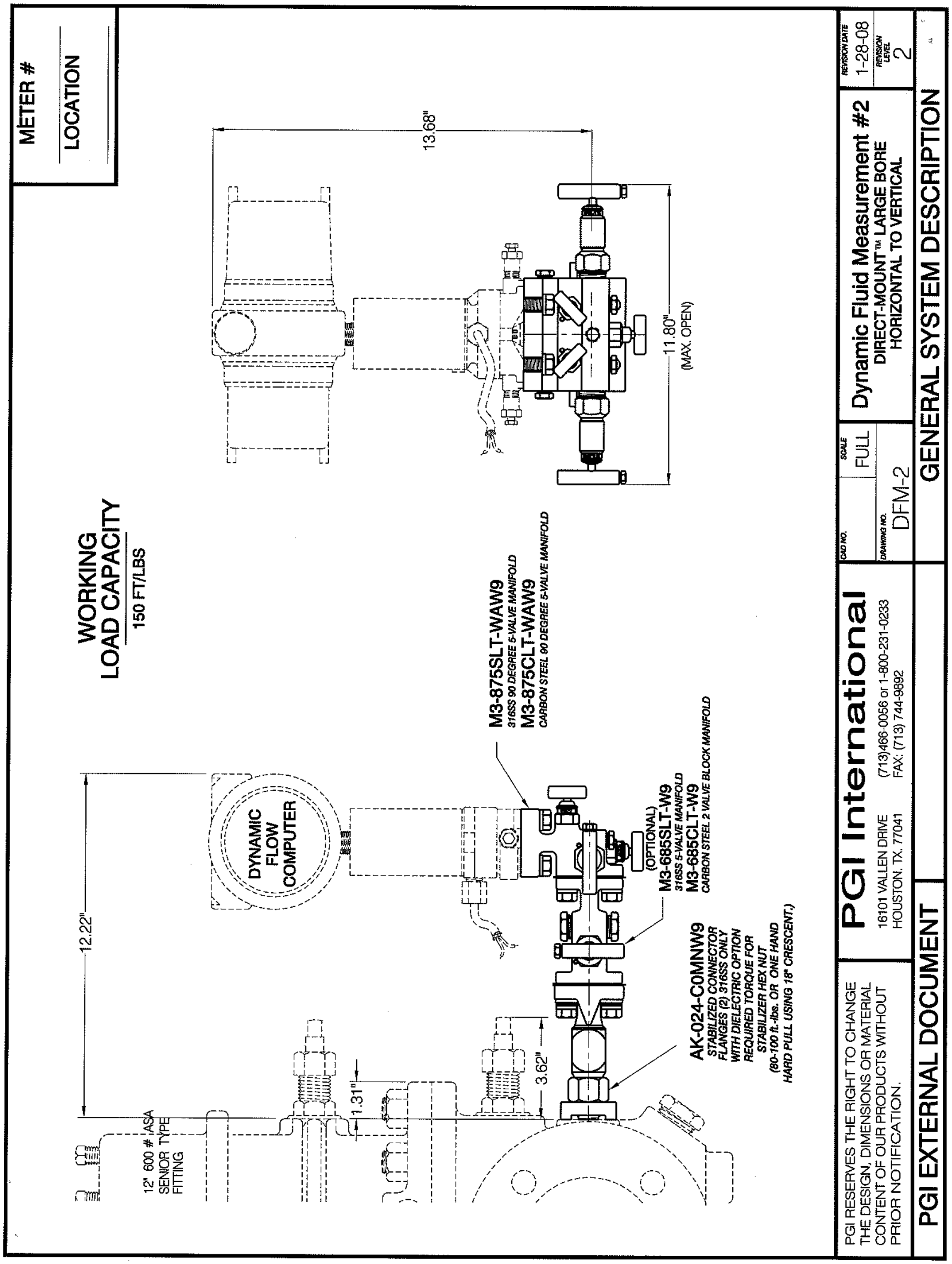
PGI International
16101 VALLEN DRIVE HOUSTON, TX. 77041
(713)466-0056 or 1-800-231-0233 FAX: (713) 744-9892
CAD NO.
DRAWING NO. DFM-1
SCALE FULL
Dynamic Fluid Measurement #1
DIRECT-MOUNT™ LARGE BORE VERTICAL
REVISION DATE 1-29-08
REVISION LEVEL 2
PGI EXTERNAL DOCUMENT
GENERAL SYSTEM DESCRIPTION


METER #
LOCATION
13.68"
11.80"
(MAX. OPEN)
WORKING
LOAD CAPACITY
150 FT/LBS
M3-875SLT-WAW9
316SS 90 DEGREE 5-VALVE MANIFOLD
M3-875CLT-WAW9
CARBON STEEL 90 DEGREE 5-VALVE MANIFOLD
DYNAMIC
FLOW
COMPUTER
12.22"
(OPTIONAL)
M3-685SLT-W9
316SS 5-VALVE MANIFOLD
M3-685CLT-W9
CARBON STEEL 2 VALVE BLOCK MANIFOLD
AK-024-COMNW9
STABILIZED CONNECTOR
FLANGES (2) 316SS ONLY
WITH DIELECTRIC OPTION
REQUIRED TORQUE FOR
STABILIZER HEX NUT
(80-100 ft.-lbs. OR ONE HAND
HARD PULL USING 18" CRESCENT.)
3.62"
1.31"
12" 600 # ASA
SENIOR TYPE
FITTING
PGI RESERVES THE RIGHT TO CHANGE
THE DESIGN, DIMENSIONS OR MATERIAL
CONTENT OF OUR PRODUCTS WITHOUT
PRIOR NOTIFICATION.
PGI International
16101 VALLEN DRIVE
HOUSTON, TX. 77041
(713)466-0056 or 1-800-231-0233
FAX: (713) 744-9892
CAD NO.
DRAWING NO.
DFM-2
SCALE
FULL
Dynamic Fluid Measurement #2
DIRECT-MOUNT™ LARGE BORE
HORIZONTAL TO VERTICAL
REVISION DATE
1-28-08
REVISION LEVEL
2
PGI EXTERNAL DOCUMENT
GENERAL SYSTEM DESCRIPTION