MicroMS4/Micro100 GAS OPERATORS MANUAL

Flow Computer
Gas Version

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Date: 9/28/2022

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:
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Date: 9/28/2022

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:

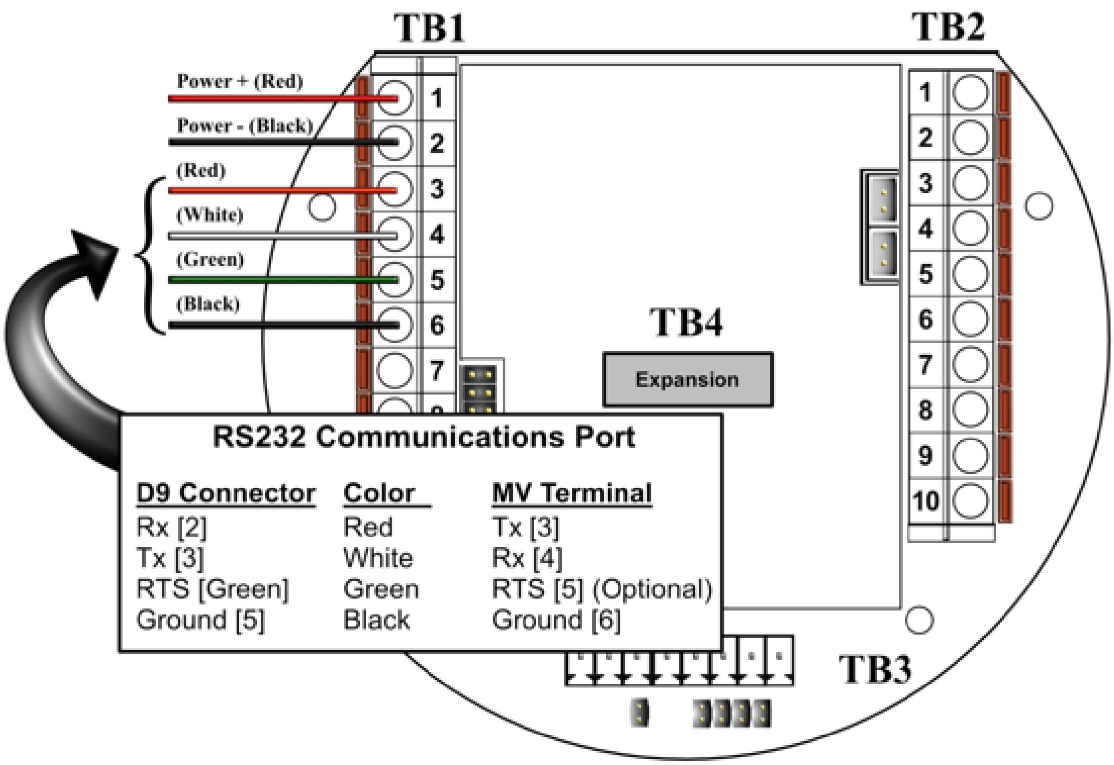
- **User Friendly**
- **Flexible**
- **Easy to understand and configure**
- **Rugged**
- **Economical to install and maintain**
- **Accurate**

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 35 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

Version 2 - MicroMV Main/Memory Boards (Micro2009 and Later Model)

Main Board

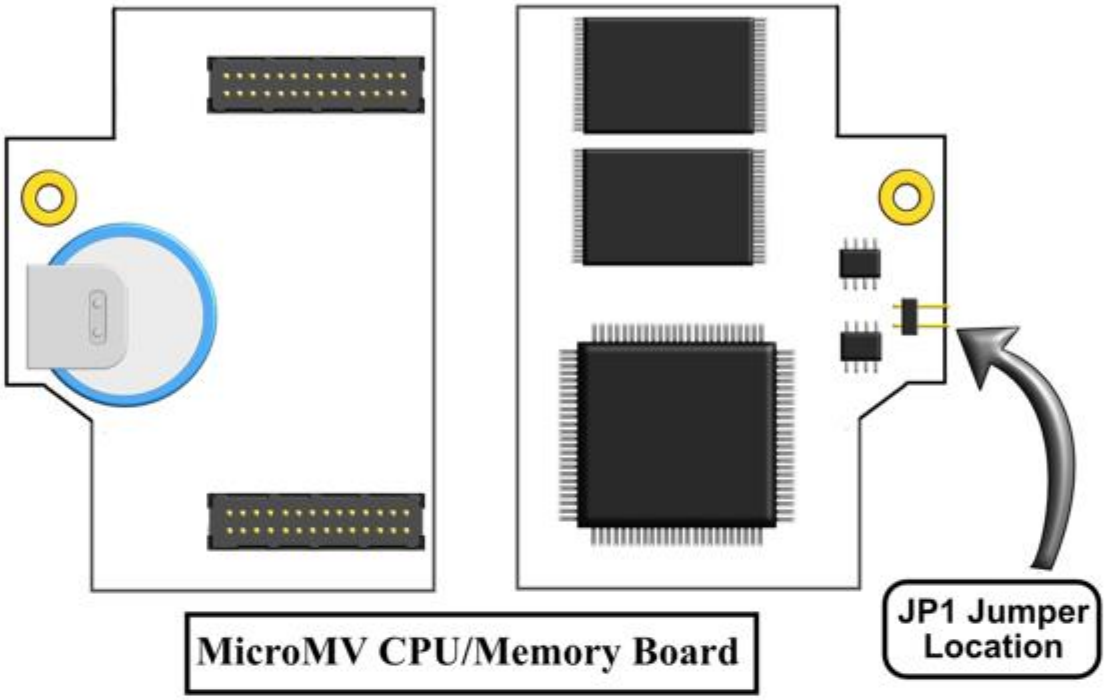


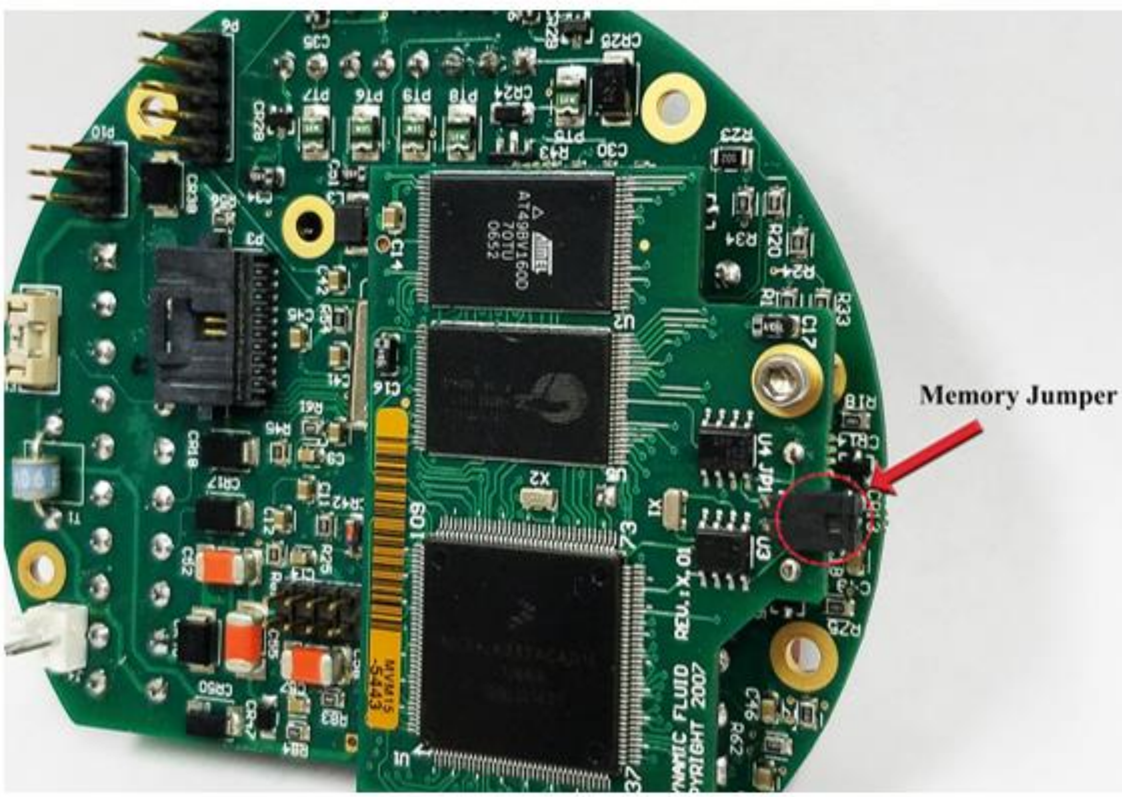
MV Step by Step Startup:

1. Connect power supply cable
2. Connect RS-232 Communications
3. Ensure jumper JP1 is installed on memory board
4. Energize power supply (24 Volts Recommended)
5. Verify display comes on
6. Run DFC Software
7. Configure the Micro MV device

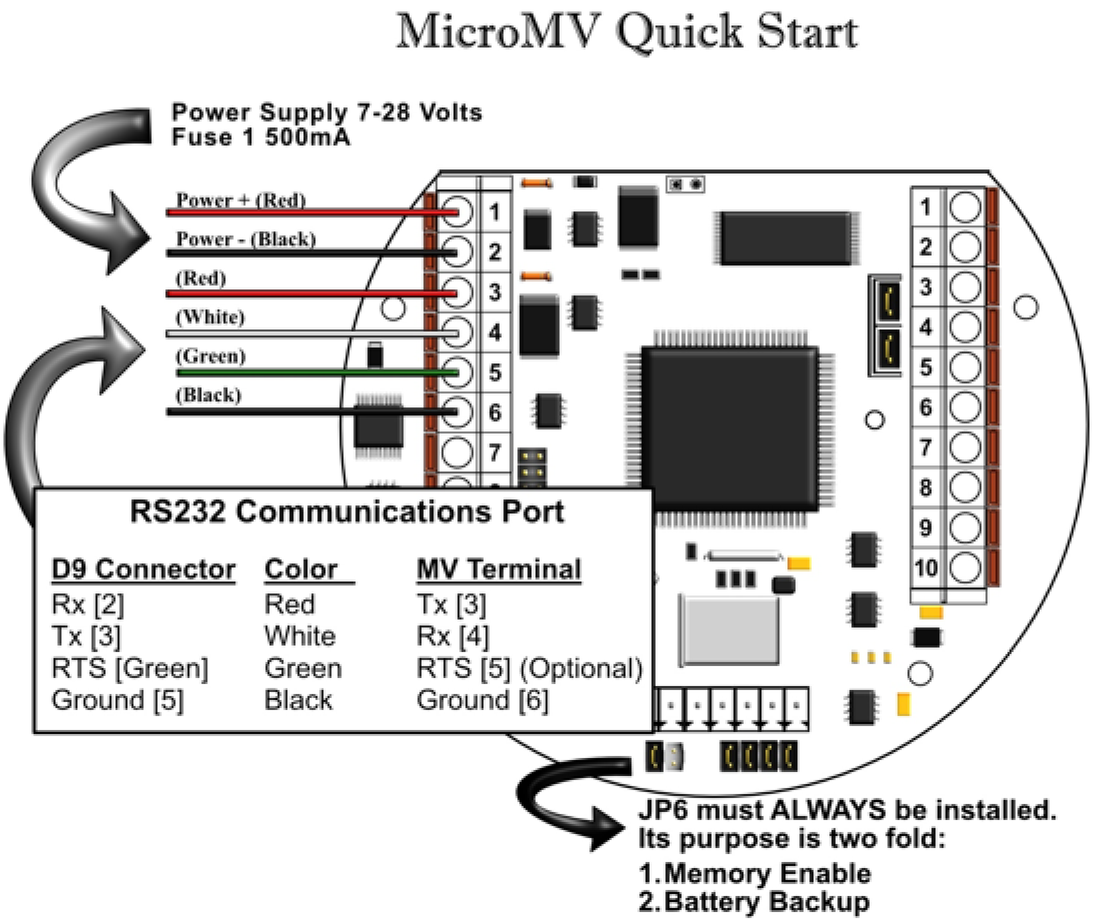
Version 2 - MicroMV Main/Memory Boards (Micro2009 and Later Model)

Memory/CPU Board





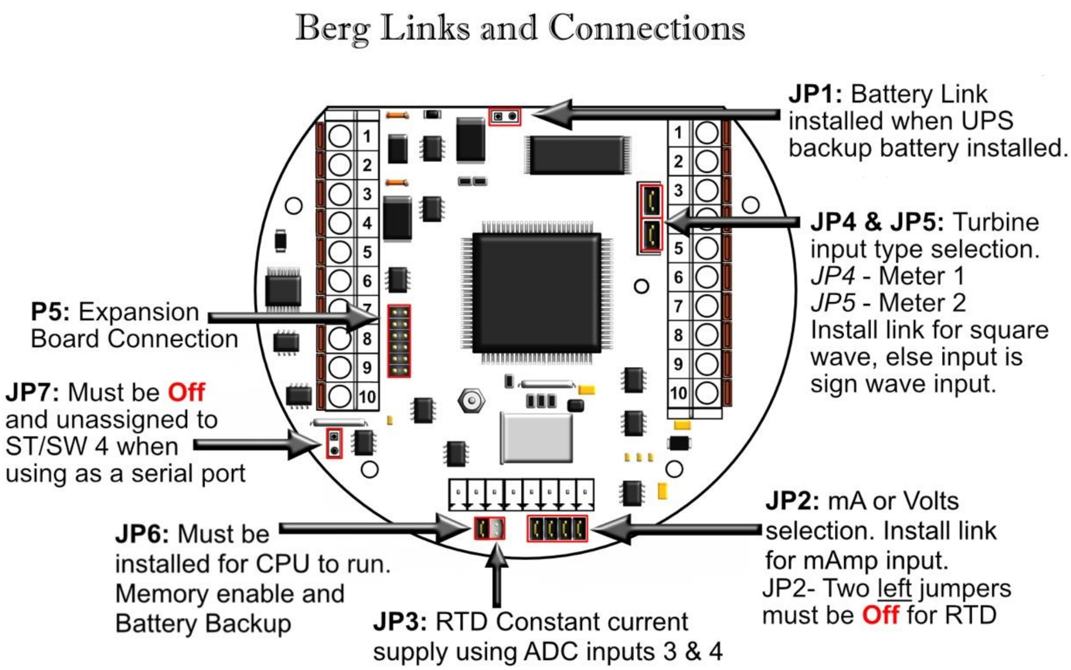
Version 1 - MicroMV Board (Older MicroMV Models)

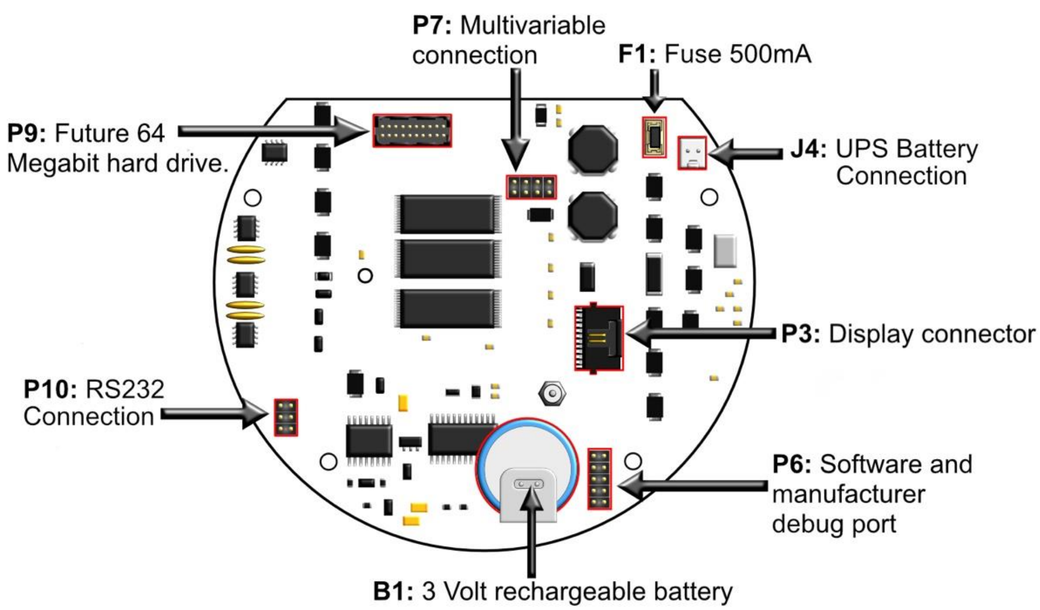


MV Step by Step Startup:

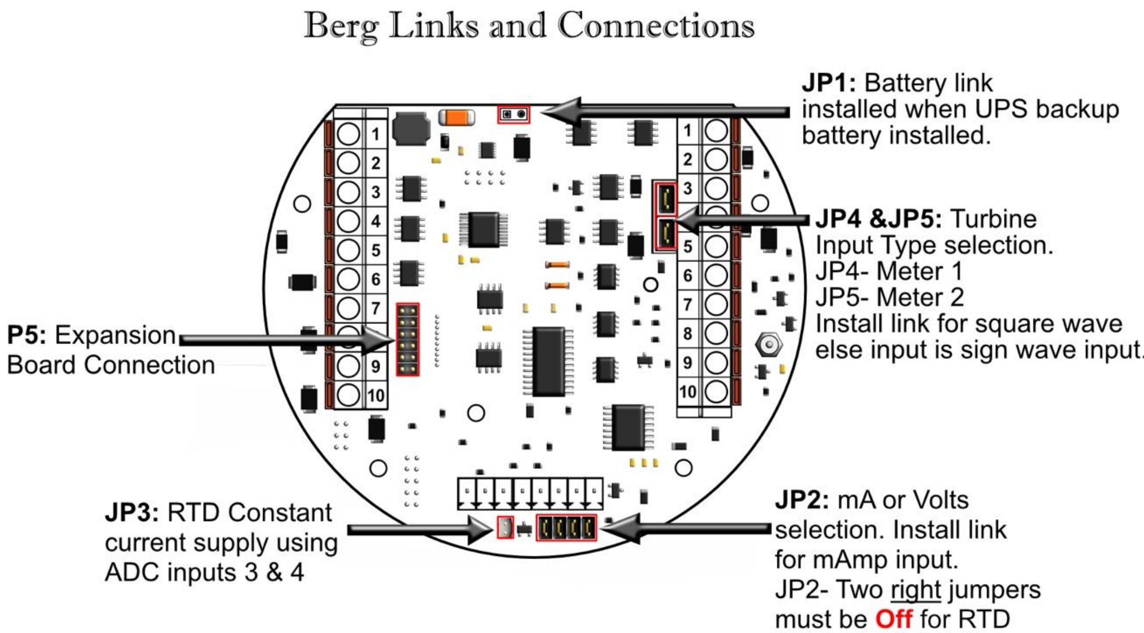
1. Connect power supply cable
2. Connect RS-232 Communications
3. Ensure jumper JP6 is installed
4. Energize voltage (24 Volts Recommended)
5. Verify DynacomTM Software
6. Run DynacomTM Software
7. Configure the Micro MV unit
8. Consult the Faultfinding if a problem is incurred

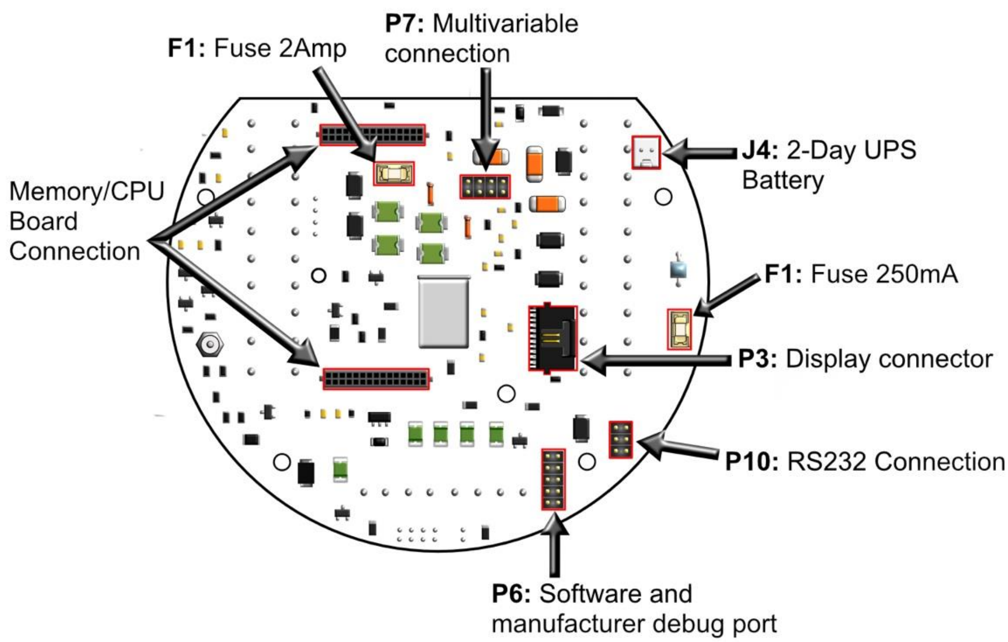
Version 1 - MicroMV Board (Older MicroMV Models)



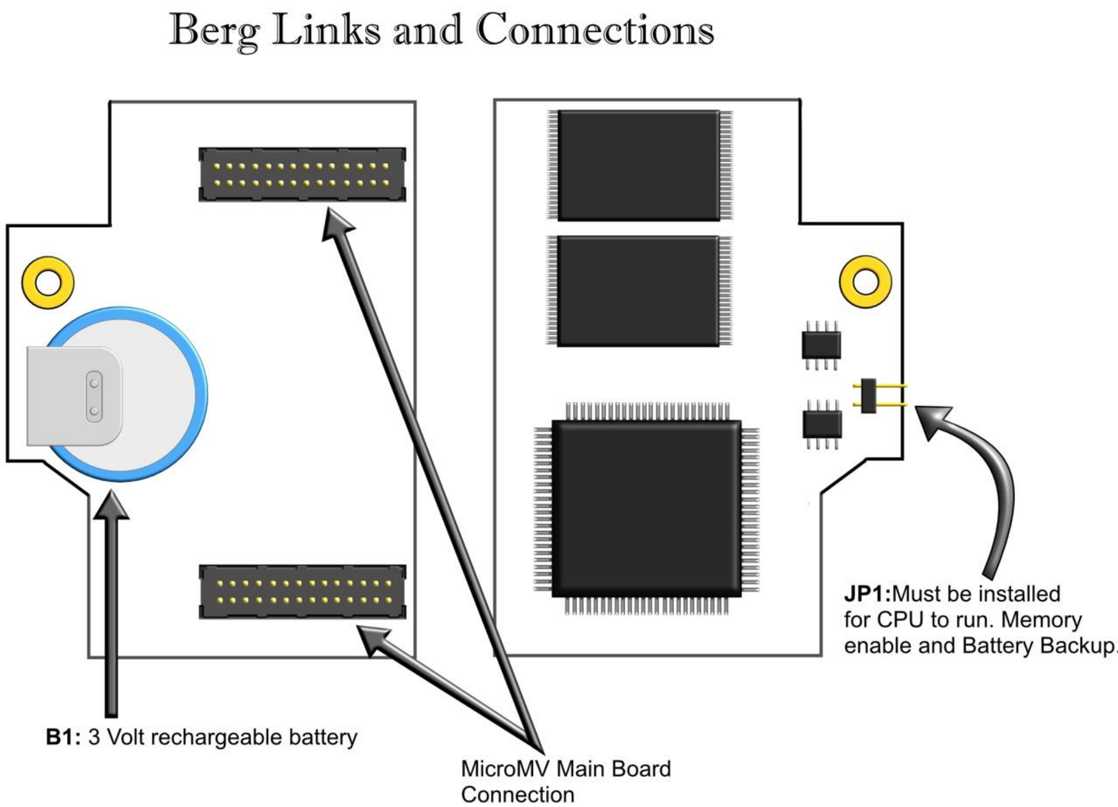


Version 2 - MicroMV Main Board (Micro2009 and Later Model)





Version 2 - MicroMV Memory/CPU Board



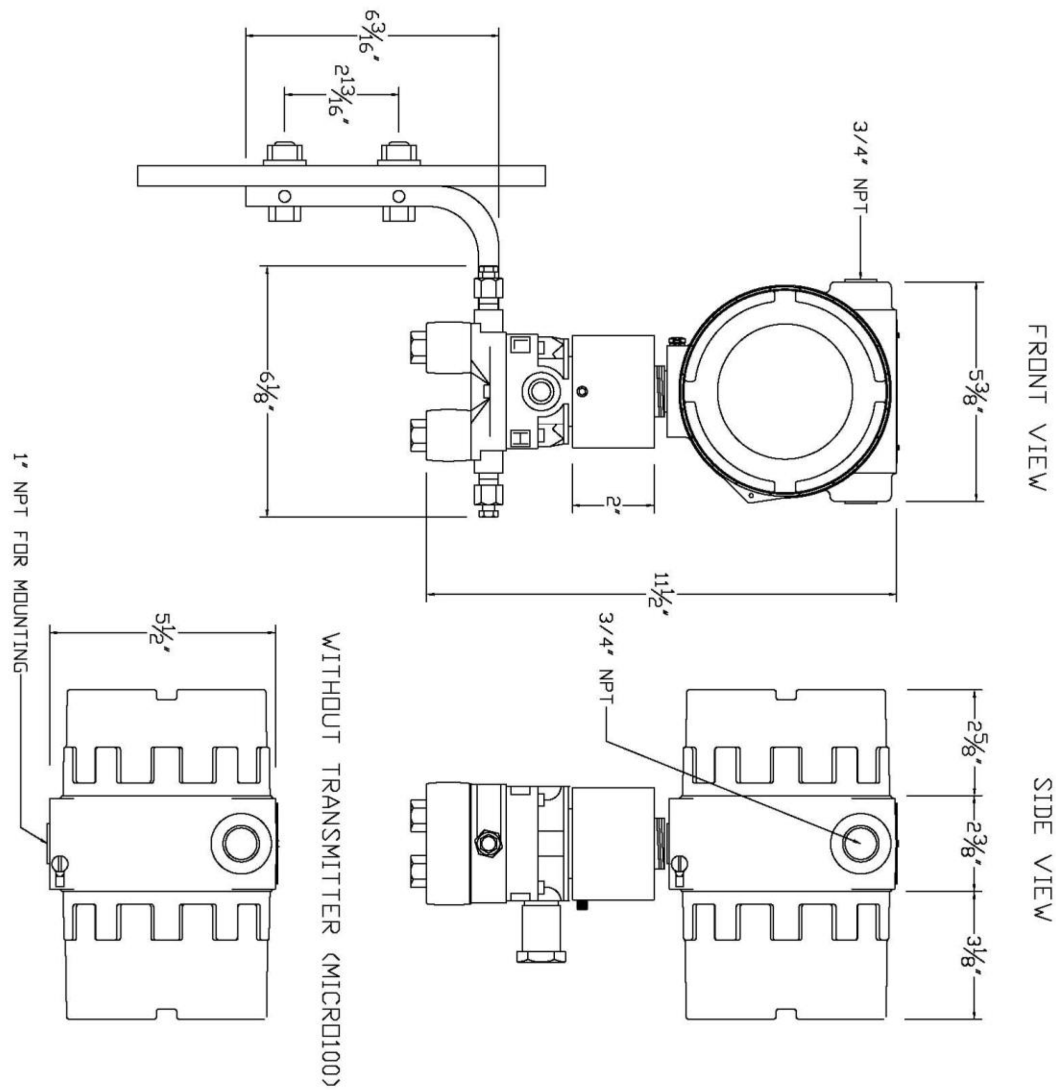
Technical Data

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 AND < 12 VOLTS FOR SQUARE WAVE - CHANNELS 1 & 2
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 @ 9600 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 (Vista, Windows 7, Windows 10)
- For Windows 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?

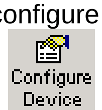
The configuration file is an archive that contains the data used by the flow computer to determine calculation settings (Pipe ID, Flow Equation, Meter ID, etc.) and input/output assignments.

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

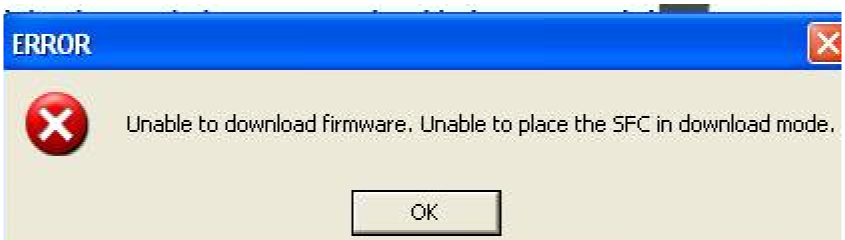
- Download an image file through **RS232 port** only.
- To Download an Image File to the Flow Computer select the **Tools | Download Program** option form the main menu or press the  button in the toolbar.
- A small dialog will appear asking for the file name of the image file (Image file have the extension .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.

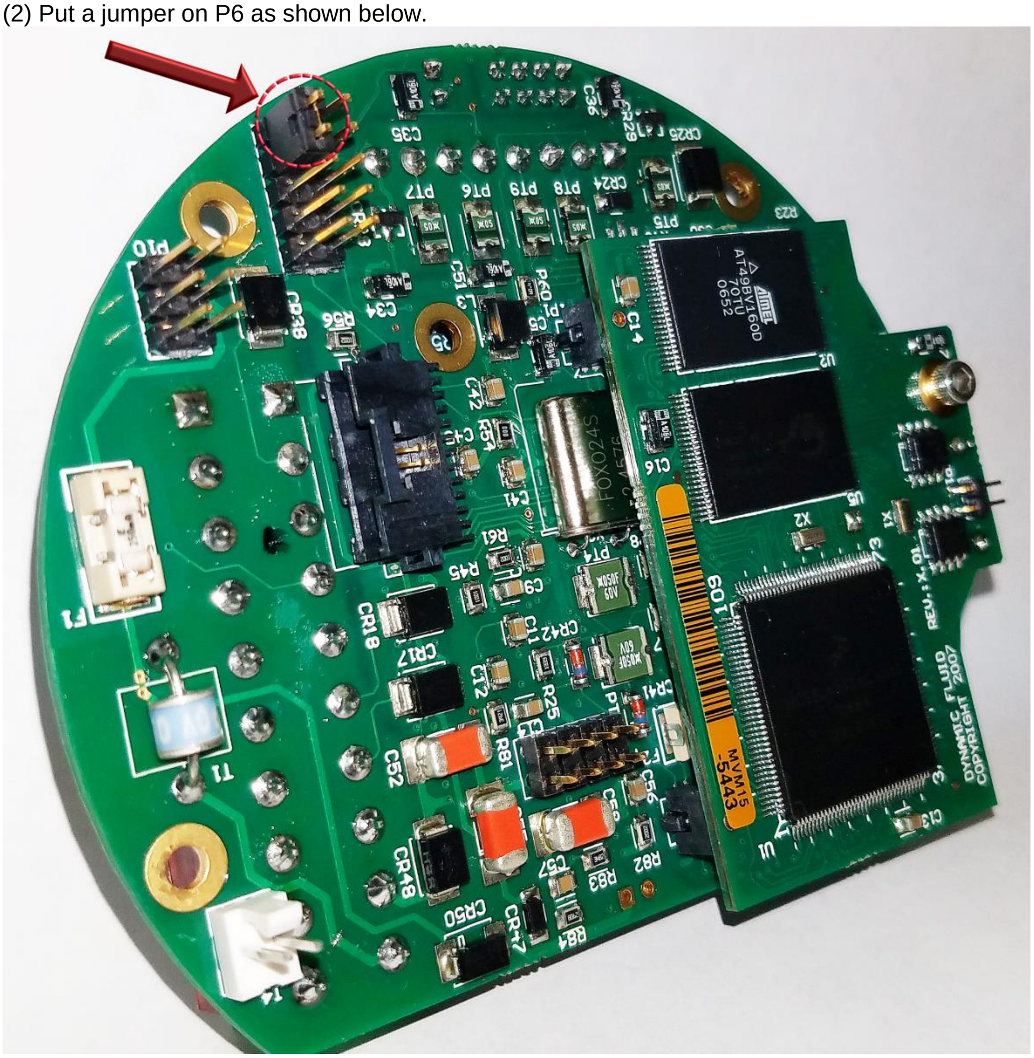
The download task will take about 7 minutes to be completed. Once the image file is in place, the flow computer is ready to be configured (enter calculation parameters and I/O assignments).

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**. MicroMS4 Windows Software version 2.18 or higher is required. 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.

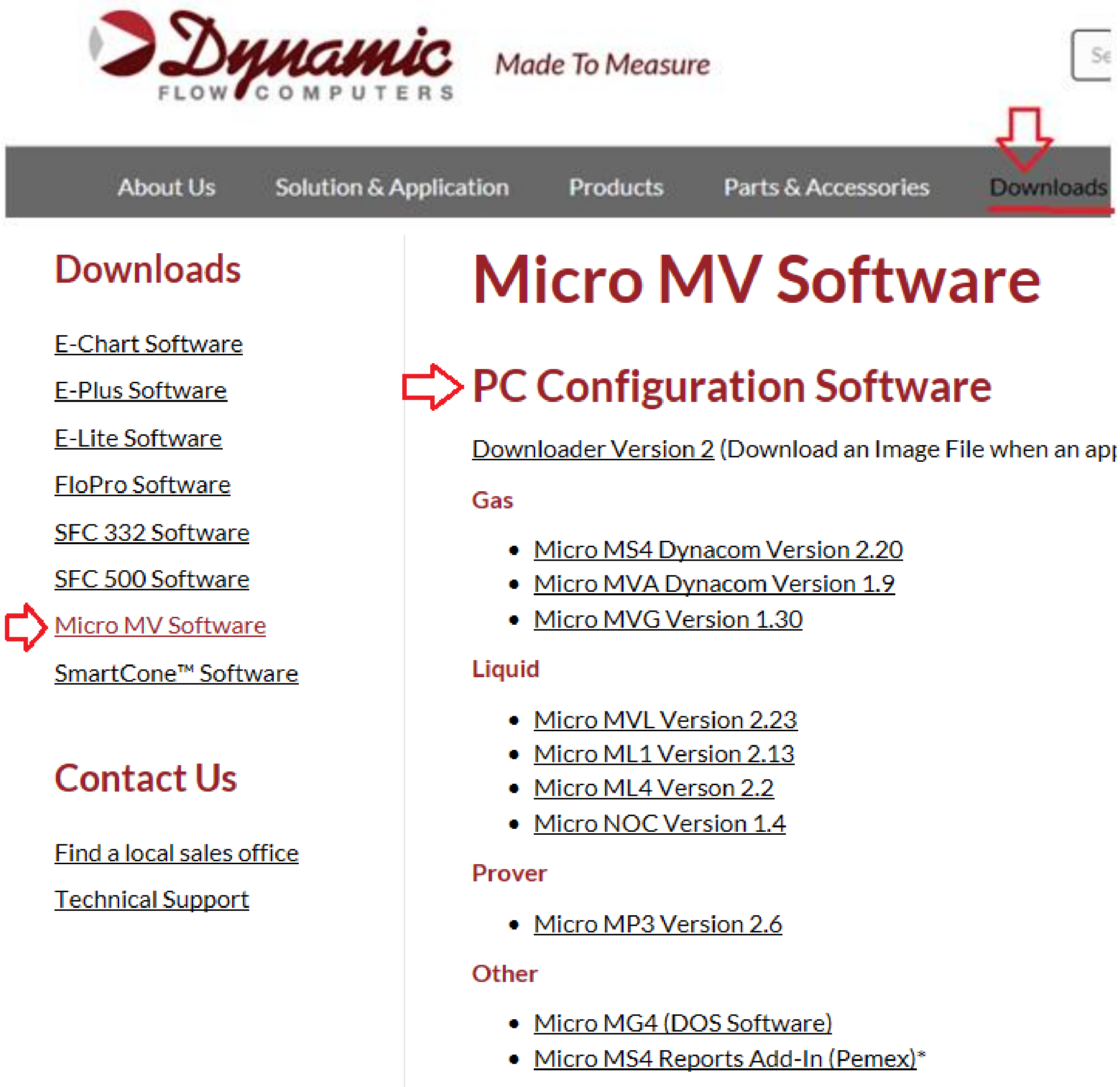


(3) Power up the board
(4) Board is in download mode
(5) Download image
(6) Remove power and jumper on P6 after a new image is loaded
(7) Board is ready

Website - DFC Configuration Software

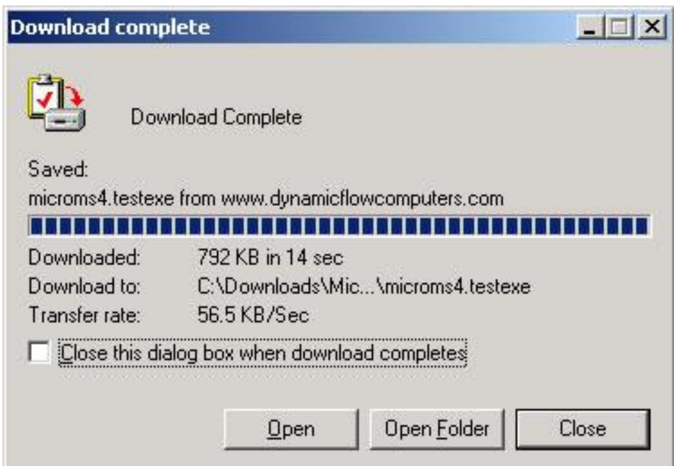
Step 1. Go to our website WWW.DYNAMICFLOWCOMPUTERS.COM

Step 2 Click on the "**Downloads**"



Step 3. Select application 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 your 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.

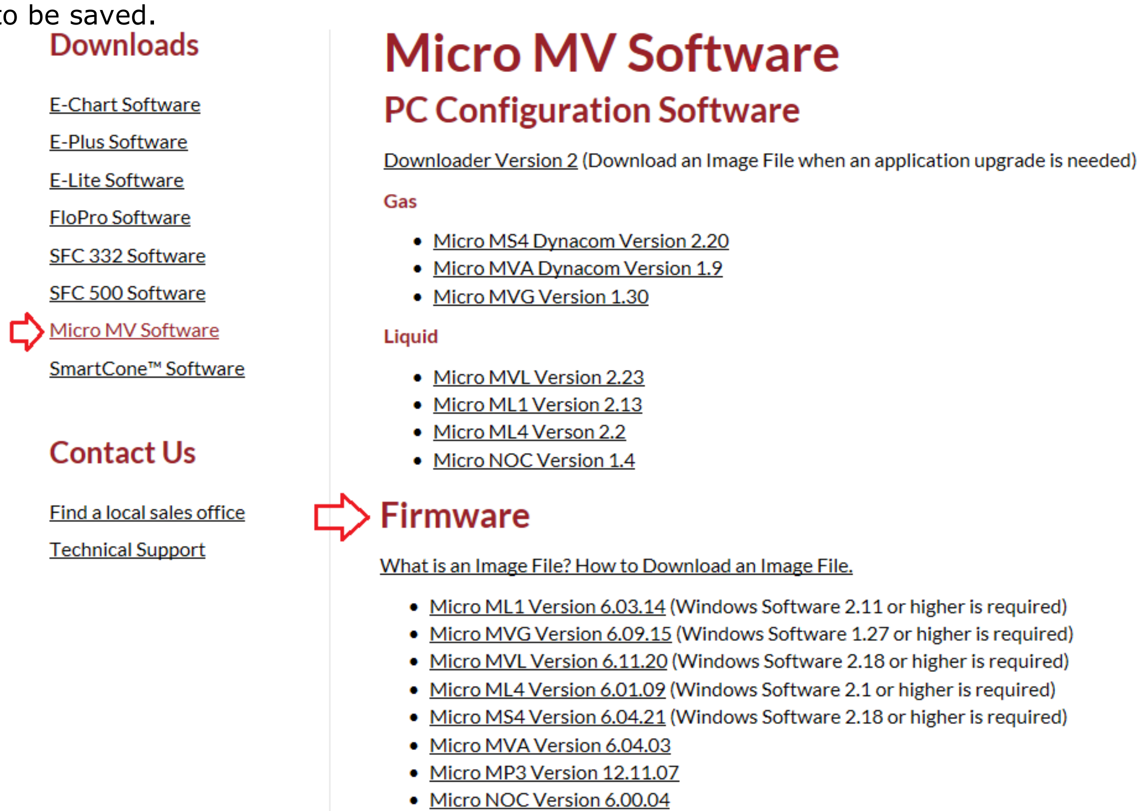
Website – Image File (Firmware)

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 "**Downloads**"

Step 3. On the new screen presented to you click on the application firmware 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:

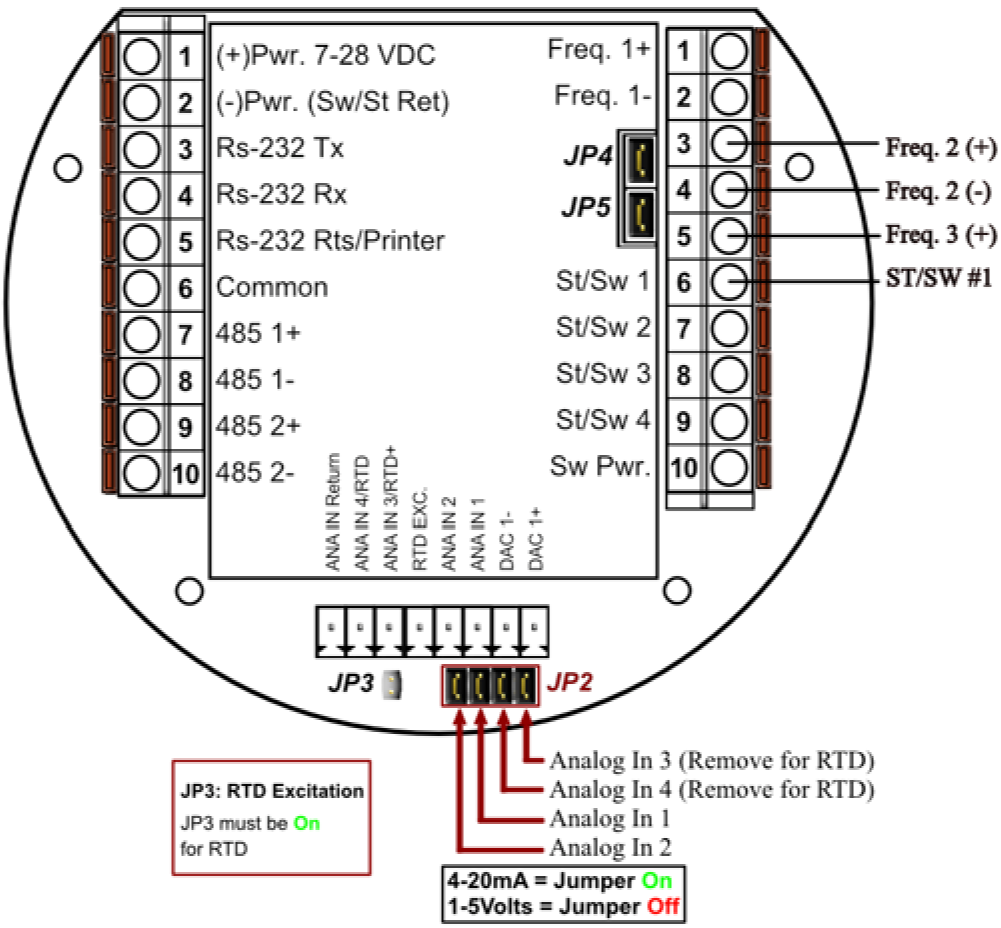
The back terminal wiring indicates the overall positions of the terminal plugs and their functions. Though the back panel's jumpers are also shown, refer to the next drawing, "Back Panel Jumpers", for information on their settings and functions.

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.

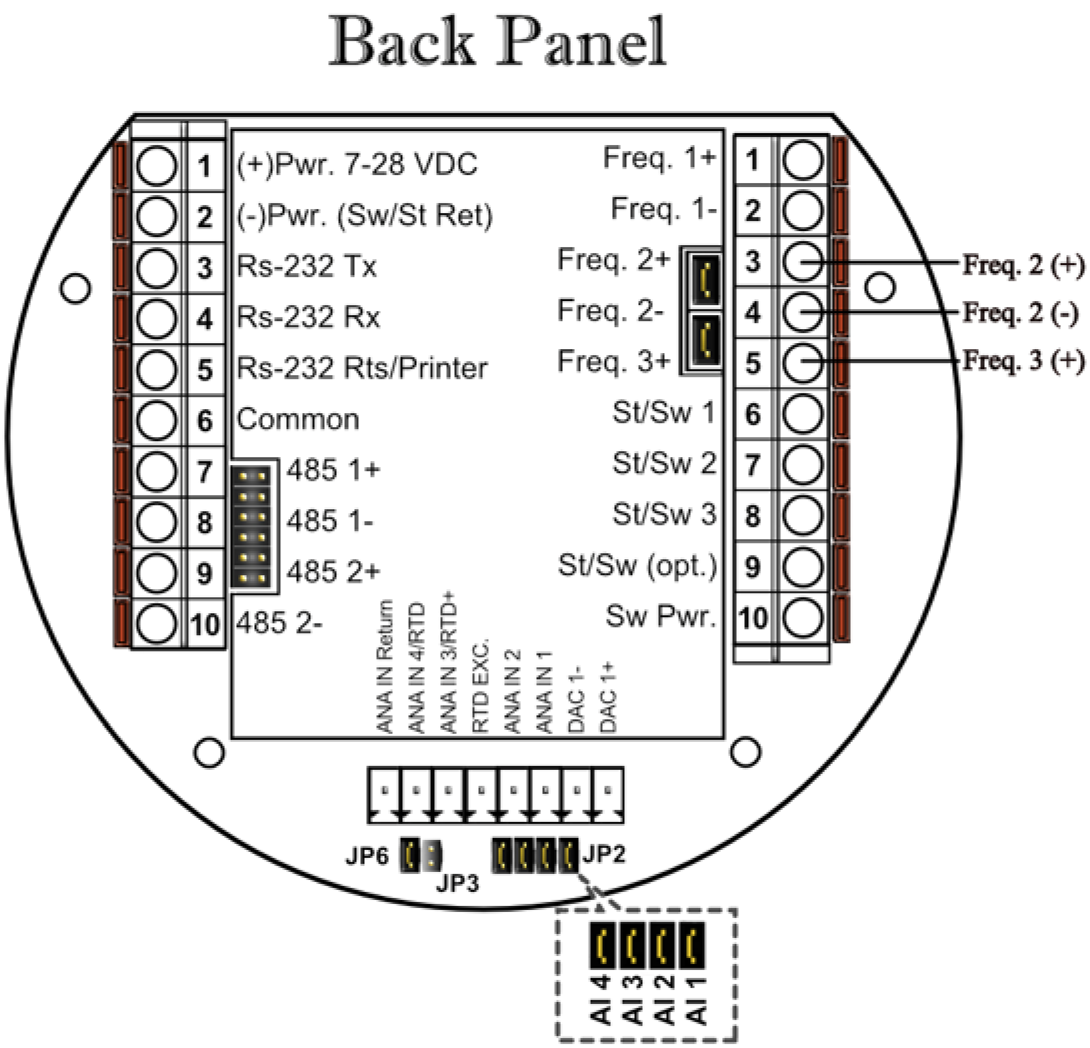
Terminal P3, at the lower bottom, handles analog inputs/RTD and analog output.

VERSION 2 - MICROMV MAIN/MEMORY BOARDS (MICRO2009 AND LATER MODEL)



JP4: When ON Meter 1 Uses Square Wave. When OFF Meter 1 Uses Sine Wave
JP5: When ON Meter 2 Uses Square Wave. When OFF Meter 2 Uses Sine Wave

VERSION 1 - MICROMV BOARD (OLDER MICROMV MODELS)



JP2: Must be installed for 4-20mA inputs. When removed, the analog input is used as 1 to 2.5 Volts Input. JP2 consists of 4 links, each link corresponds to one analog input.

JP3: Is RTD Excitation and should never be installed when Analog 3 & 4 are used as Analog inputs (See RTD Connection for details).

JP4: When ON, Meter 1 Uses Square wave.When OFF, Meter 1 Uses Sine wave

JP5: When ON, Meter 2 Uses Square Wave. When OFF, Meter 2 Uses Sine Wave

JP6: Always installed. It can be removed after power is removed to clear RAM memory.

INPUT/OUTPUT: Assigning and Ranging Inputs

Input/Output Assignment

We will now configure your MicroMS4 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. High limit must be set greater than 1
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). Failed condition for analog inputs is less than 3.25mA or greater than 21.mA. *Alarm high limit must be greater than 1 to enable using the maintenance value if failed.*

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:

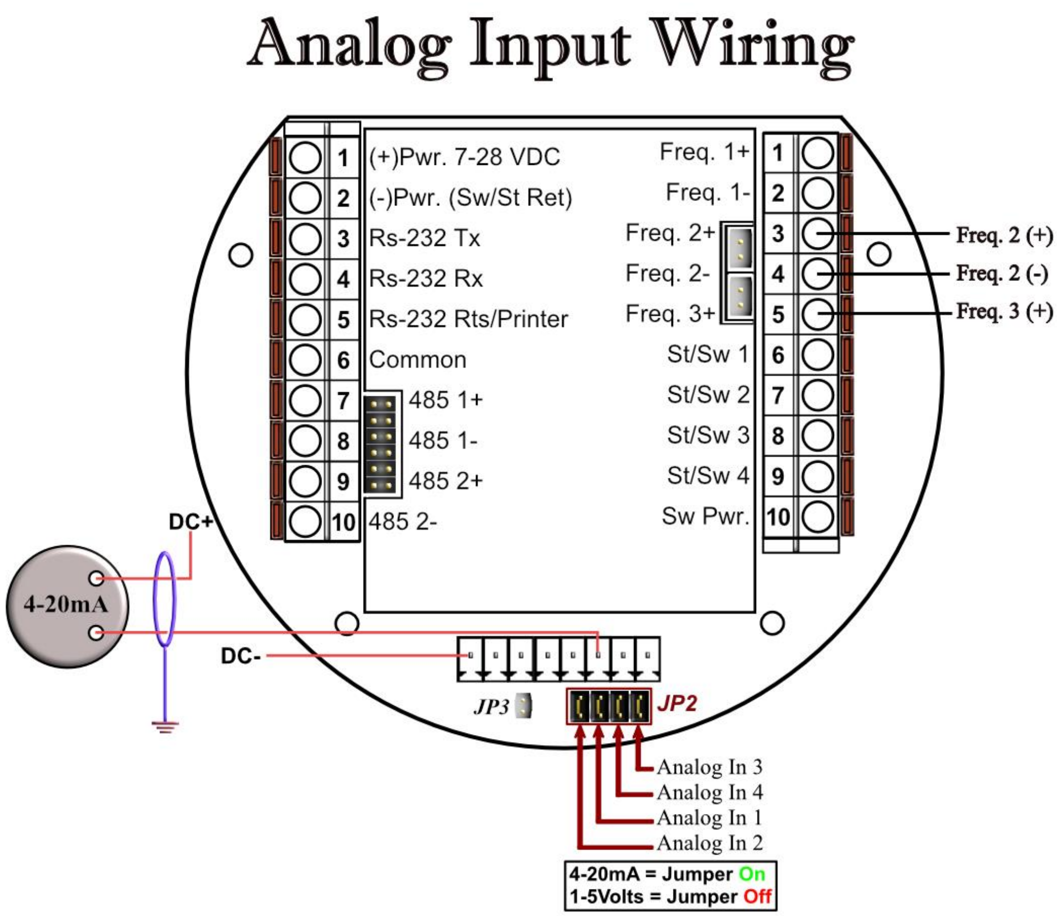
Wiring to the flow computer is very straightforward and simple. But still it is very important to get familiar with the wiring diagram.

Wiring of Analog Inputs: Version 2 Board

MicroMV Main/Memory Boards (Micro2009 and Later Model)

Typical wiring for analog inputs 2 and 1 are shown in the drawing. Analog inputs 4 and 3 are to the left of analog 2 and 1 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. Signal line impedance provided by our flow computer is 250Ω.

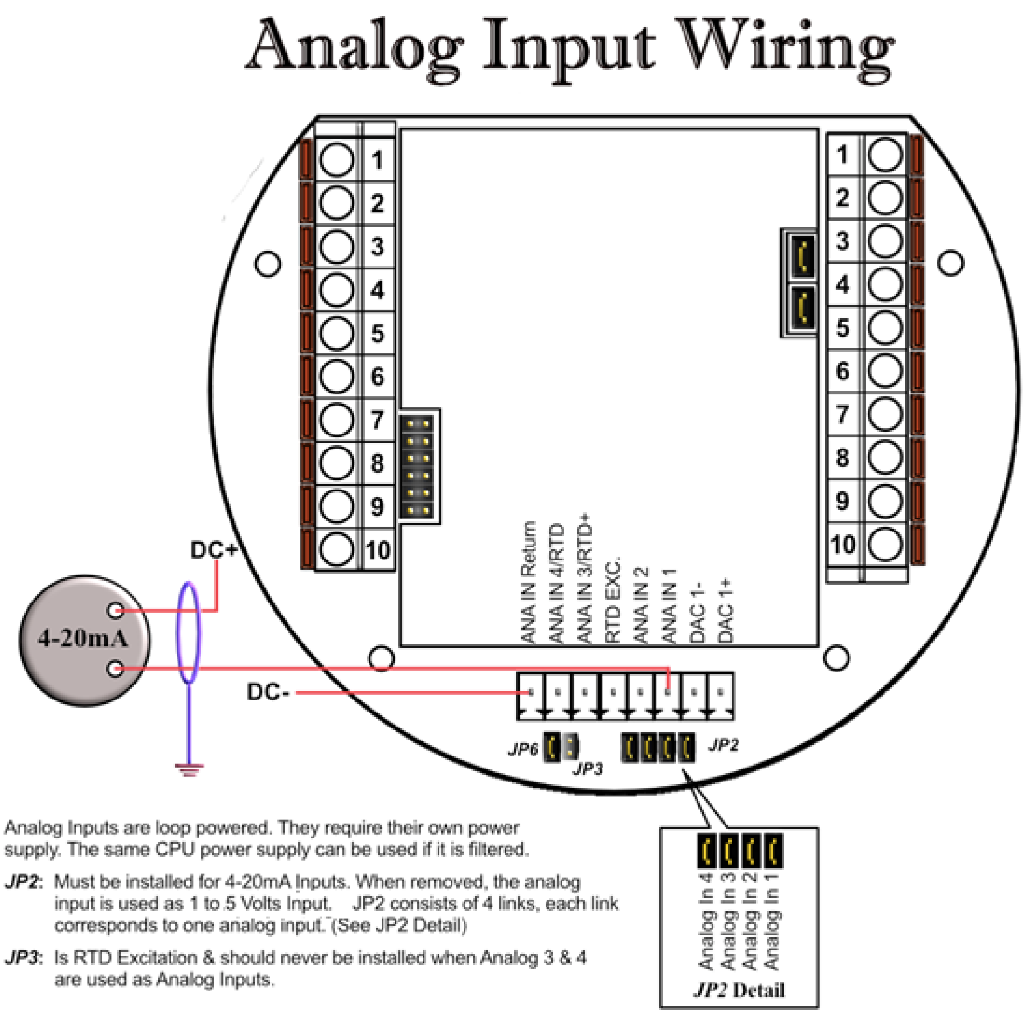


Wiring of Analog Inputs: Version 1 Board

MicroMV Board (Older MicroMV Models)

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.

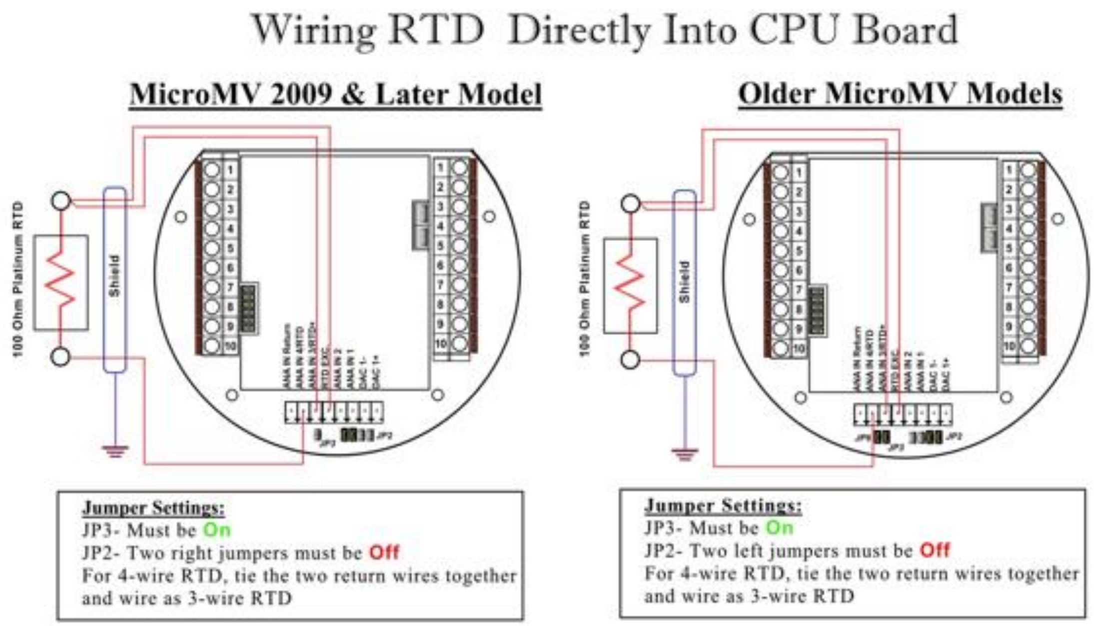
When wiring **1-5 volts**, **make sure to calibrate** the flow computer for the 1-5 volt signal because the flow computer calibration defaults for the 4-20 ma, which is different from the 1-5 volts. JP2 must be removed for 1-5 volt inputs. Signal line impedance provided by our flow computer is 250Ω.

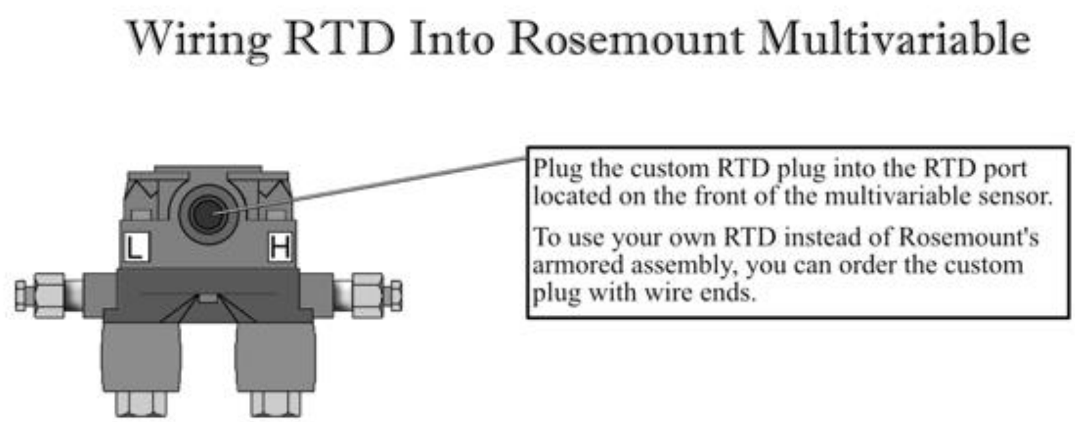


NOTE: The 4-20mA or 1-5 volt DOES NOT source power to the transmitters. You can use the DC power feeding the flow computer to power the 4-20mA loops IF that power supply is FILTERED.

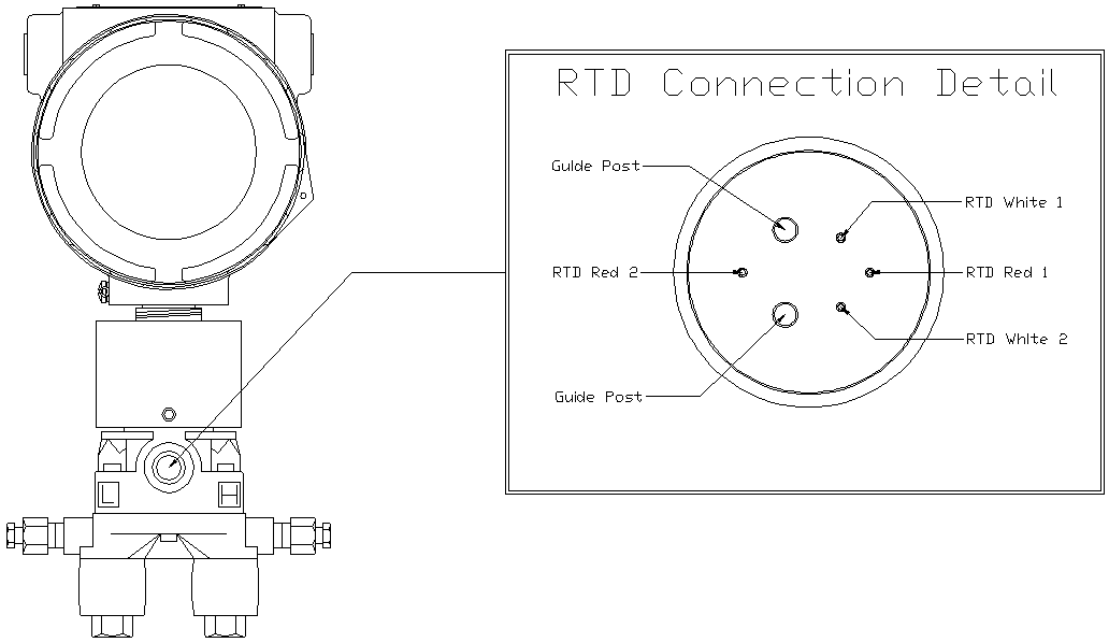
Wiring of RTD

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 (JP3) 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.

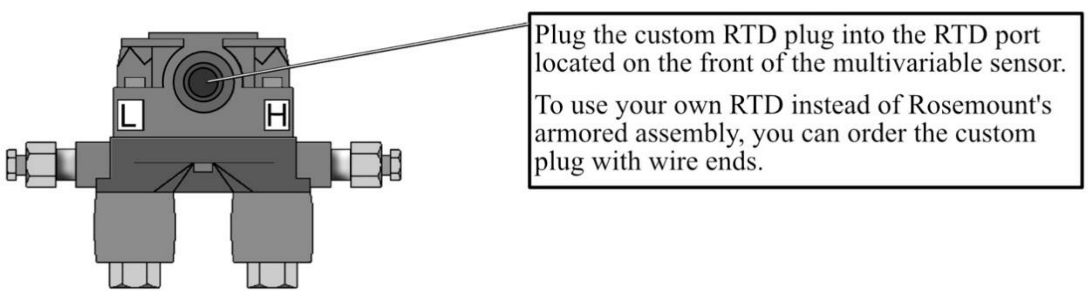




Rosemount RTD Connection

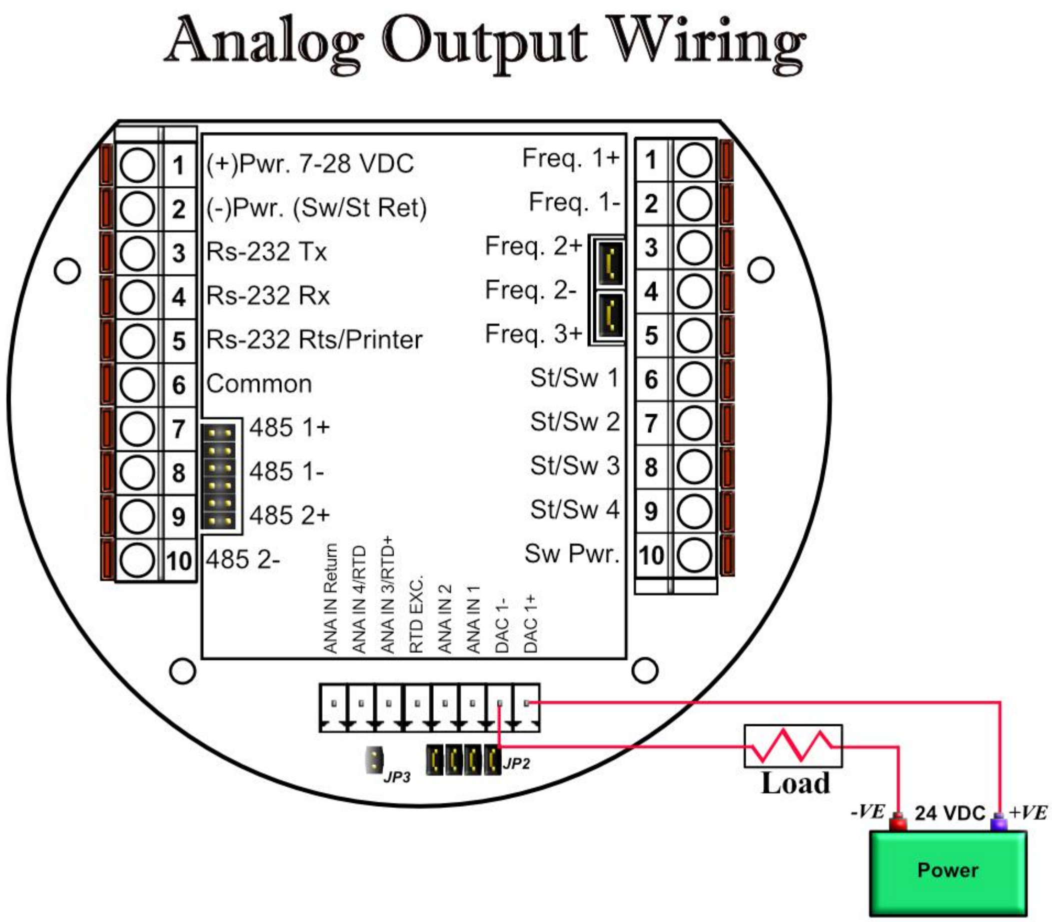


Wiring RTD Into Rosemount Multivariable



Wiring of Analog Output:

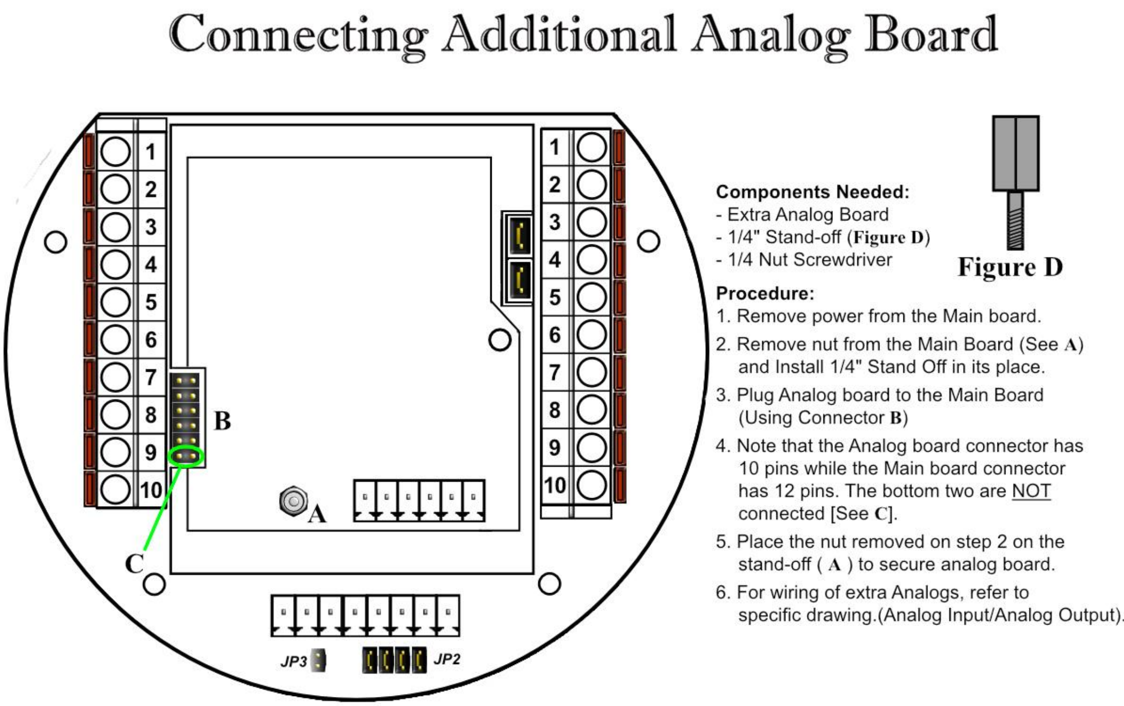
Wiring diagram shows typical Analog output wiring. Notice that analog outputs will regulate 4-20 mA current loops but DOES NOT source the power for it. External power is required.



Assigning/Ranging the 4-20mA Analog Outputs:

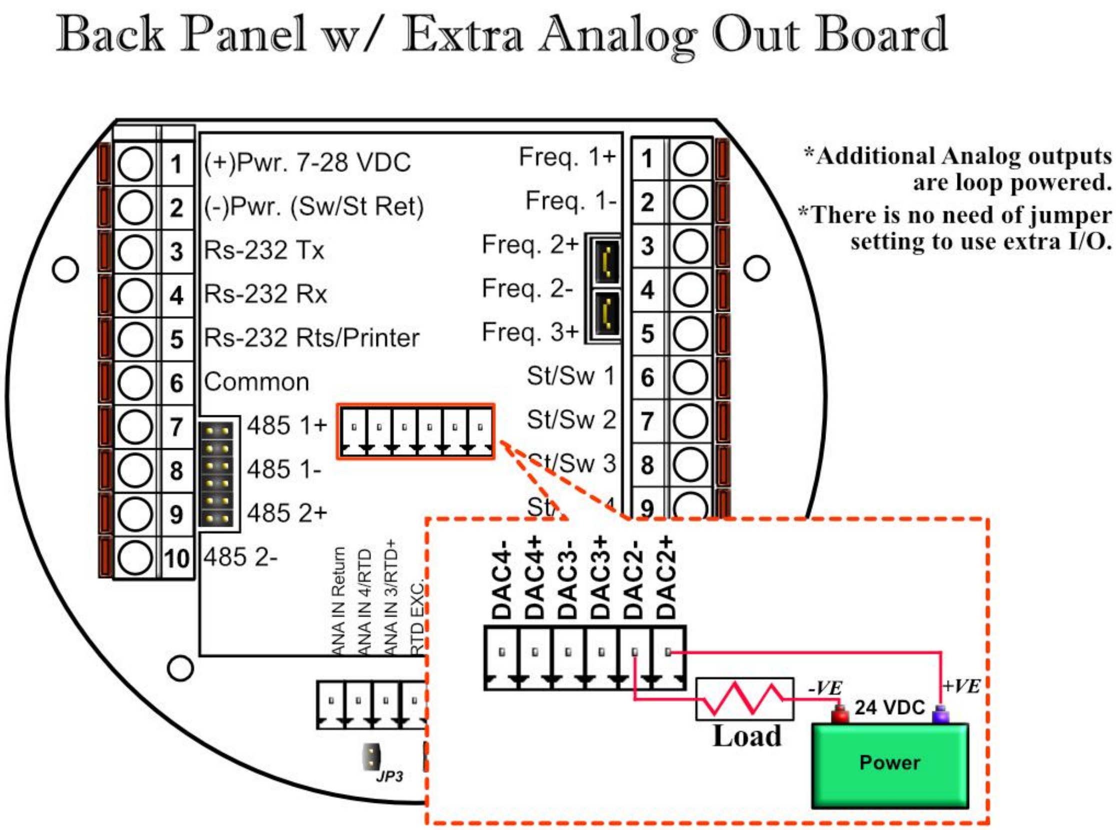
Go to the **`I/O`** assignment main menu and click **`Analog Output Assignment`**. A selection menu is prompted. Select the analog output number, and then enter what the 4 mA output will indicate and the 20 mA. Make sure that the 20 mA assignment value exceeds the upper range limit of what you assigned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

Additional Analog Outputs or Analog Inputs – Board Installation



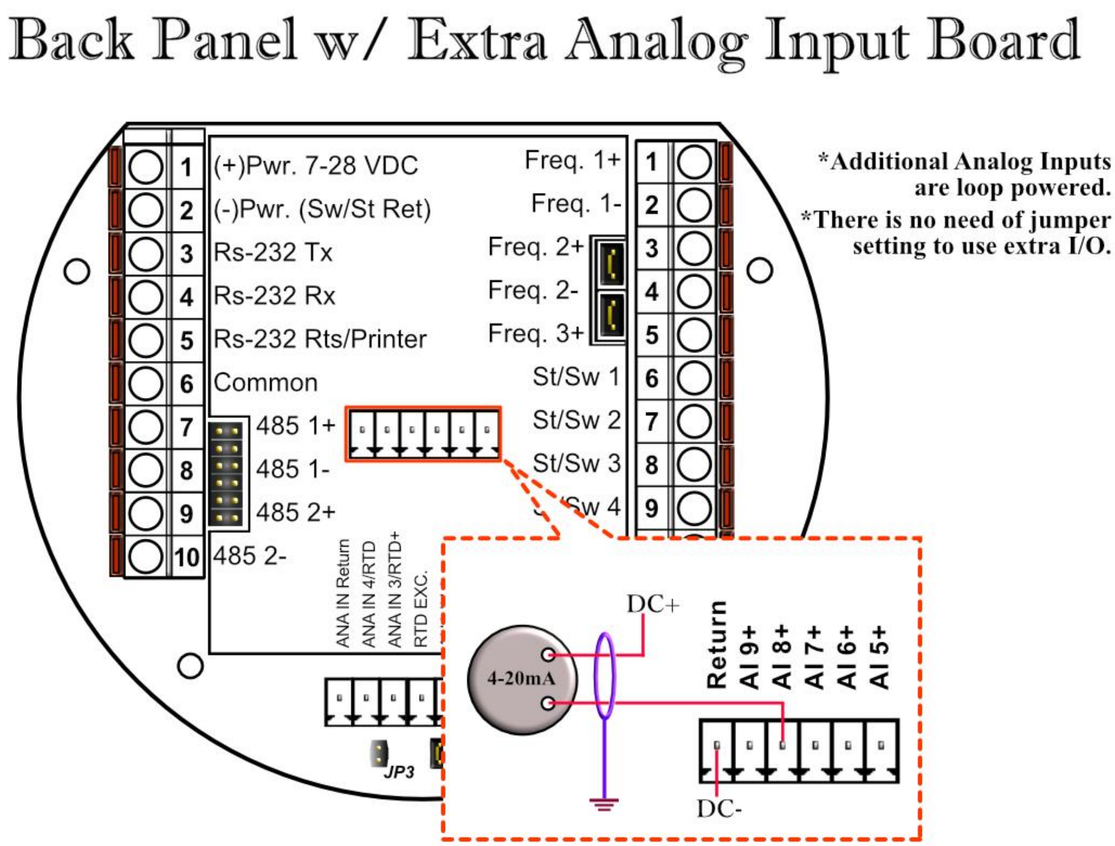
Back Panel - Additional Analog Outputs

Additional analog output board is required for three additional analog outputs.



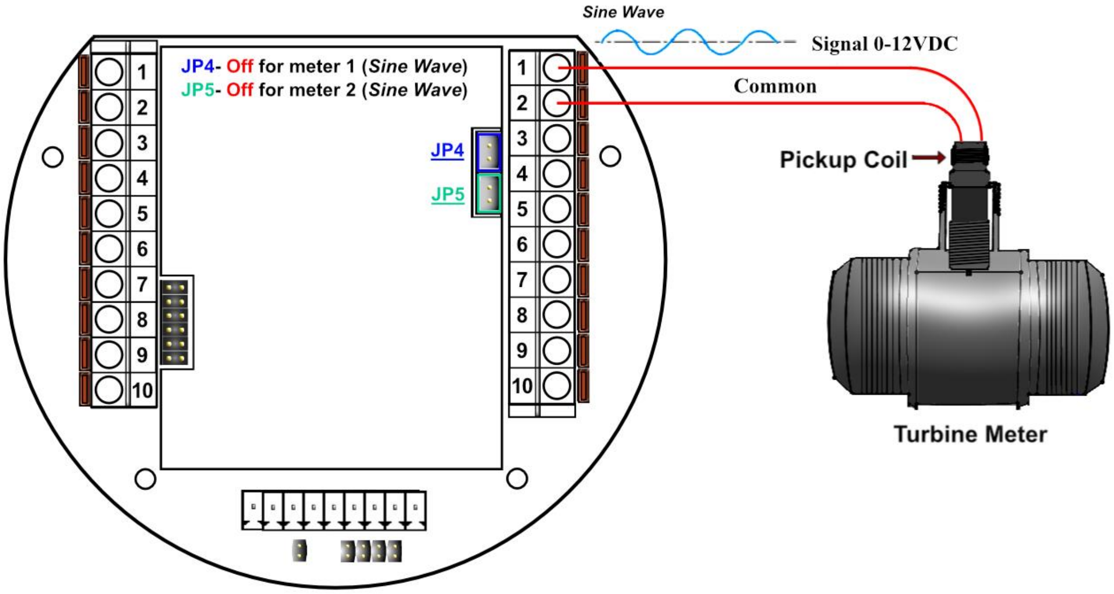
Back Panel - Additional Analog Inputs

Additional analog input board is required for five additional analog inputs.



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 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 when using square wave.**



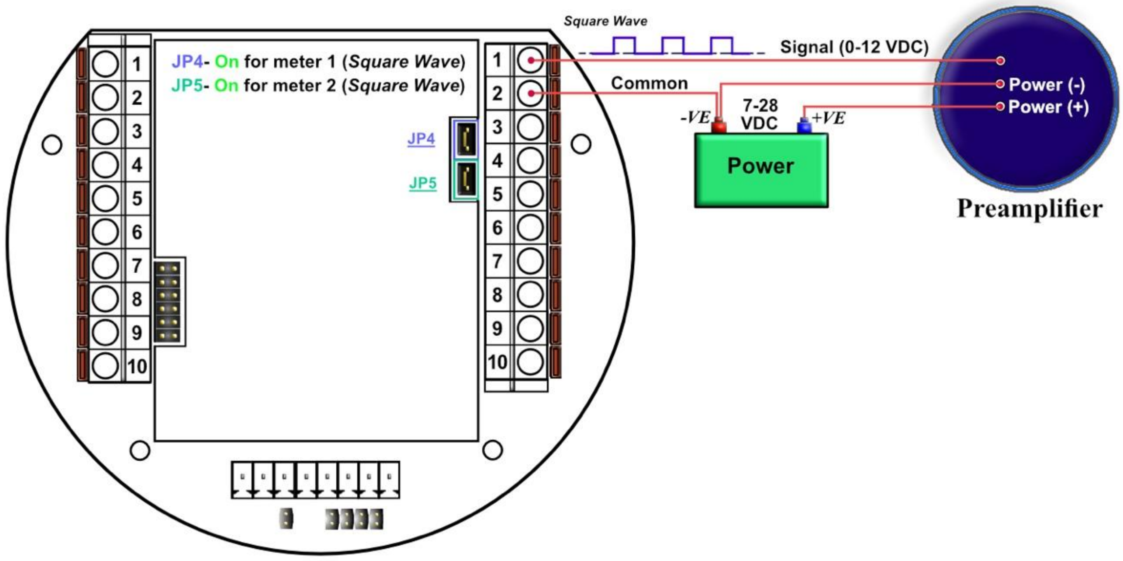
Note:	*When connecting square wave input, the JP4 and JP5 connect the turbine return to the flow computer power return. Therefore, signal polarity is very important. Reverse polarity could result in some **damage or power loss**. When sine wave is used the signal polarity is usually of no significance.*

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.

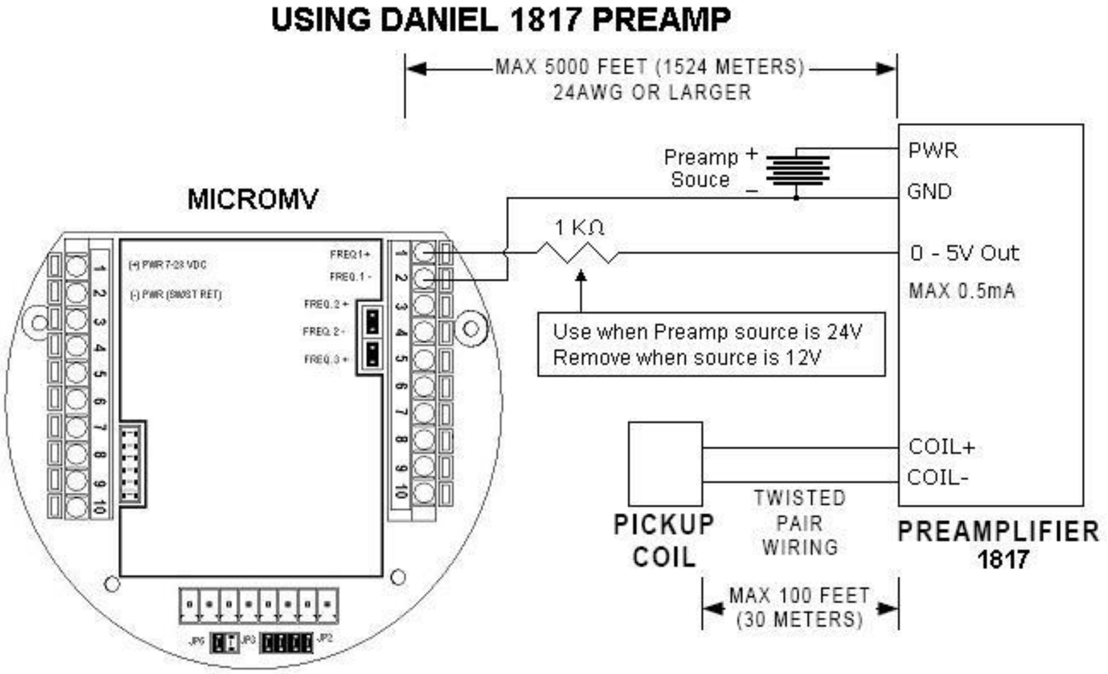
Turbine Input Wiring

For square wave, the voltage is 5 to 12 VDC. Do not exceed 12 VDC
(Terminal 1-Frequency#1 input+ and Terminal 3-Frequency#2 input+).

Using Daniel 1818 Preamp



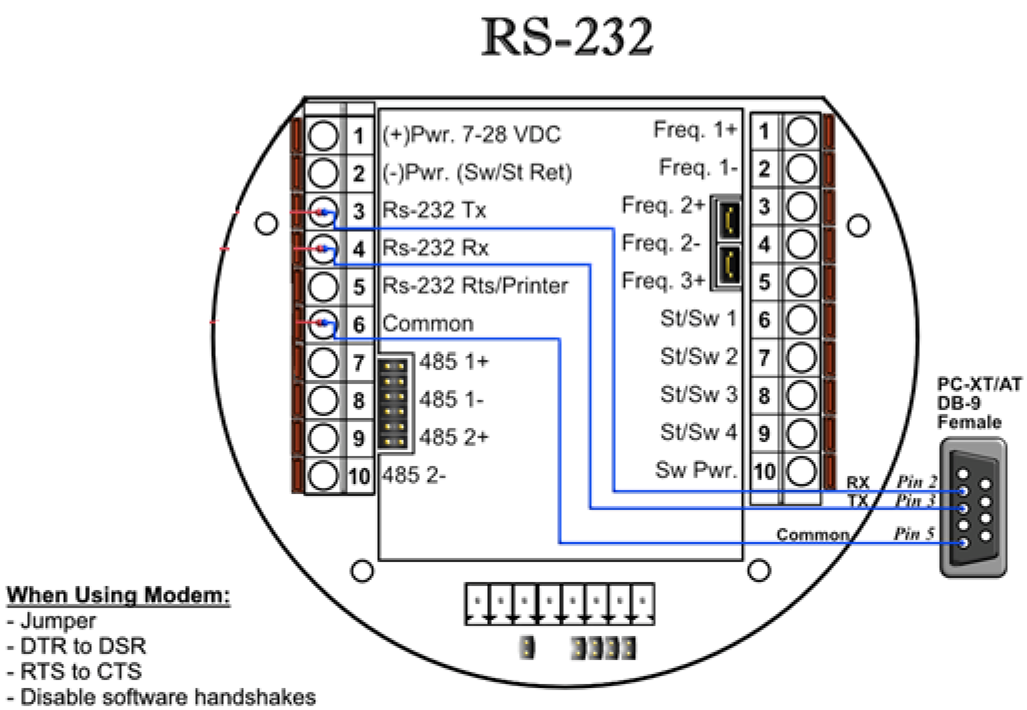
Turbine Input Wiring – Using Daniel 1817 Preamp



RS-232 Connection:

The RS-232 is located on the left terminal block. The third, fourth, fifth, and sixth pins of the RS232 are below the power input.

Note: Twisted shielded cable is required.



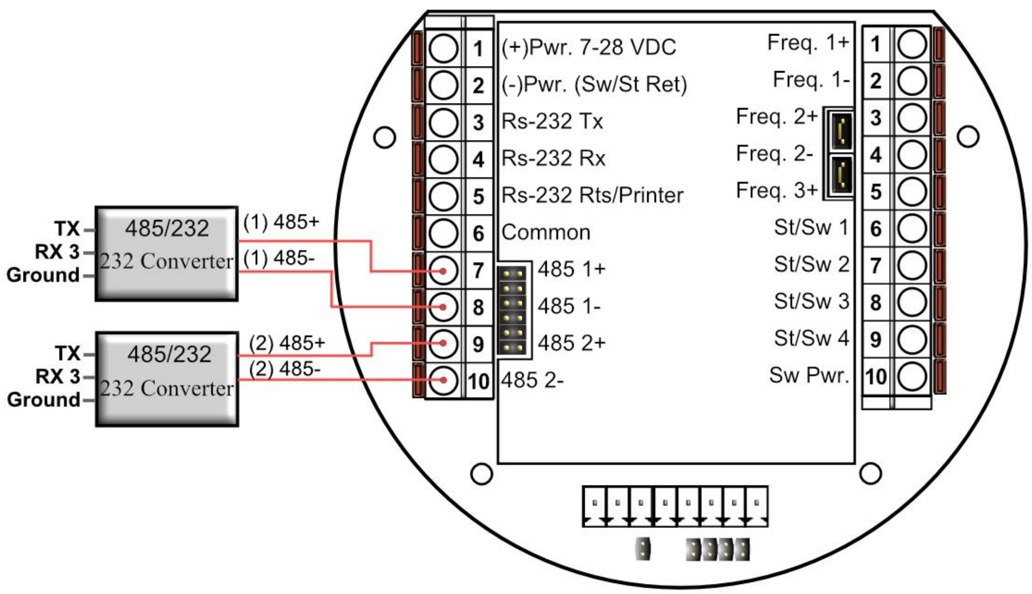
WARNING: *When the RS-232 terminal is used with a modem, external protection on the phone line is required. Jumper DTR to DSR, RTS to CTS, and disable software handshake on the modem RS232 connection*

RS-485 Connection:

RS-485 wiring is shown in the wiring diagram under **RS-485**. Two Rs485 channels are available for Modbus communication. The second 485 channel is also available 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.

RS-485



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

RS485/232 Adapter

Dynamic recommends B&B Electronics. We generally use Model 485D9TB, which is a port power converter requiring only a 2-Wire connection. The 485D9TB has a terminal block which makes the wiring more convenient and provides the option of external 12V power for low power serial ports. Model 485SD9R can also be used, but it has a DB9 terminal which requires additional cables. With Model 485SD9R the pins that connect to the flow computer are pin 3 on the DB9 to TX on the flow computer and pin 8 on the DB9 goes to RX on the flow computer. For a USB to RS485 converter, we recommend Model USTL4 which is also port powered and supports half and full duplex networks.

***Note**

Version 1: MicroMV Board (Older MicroMV Models)

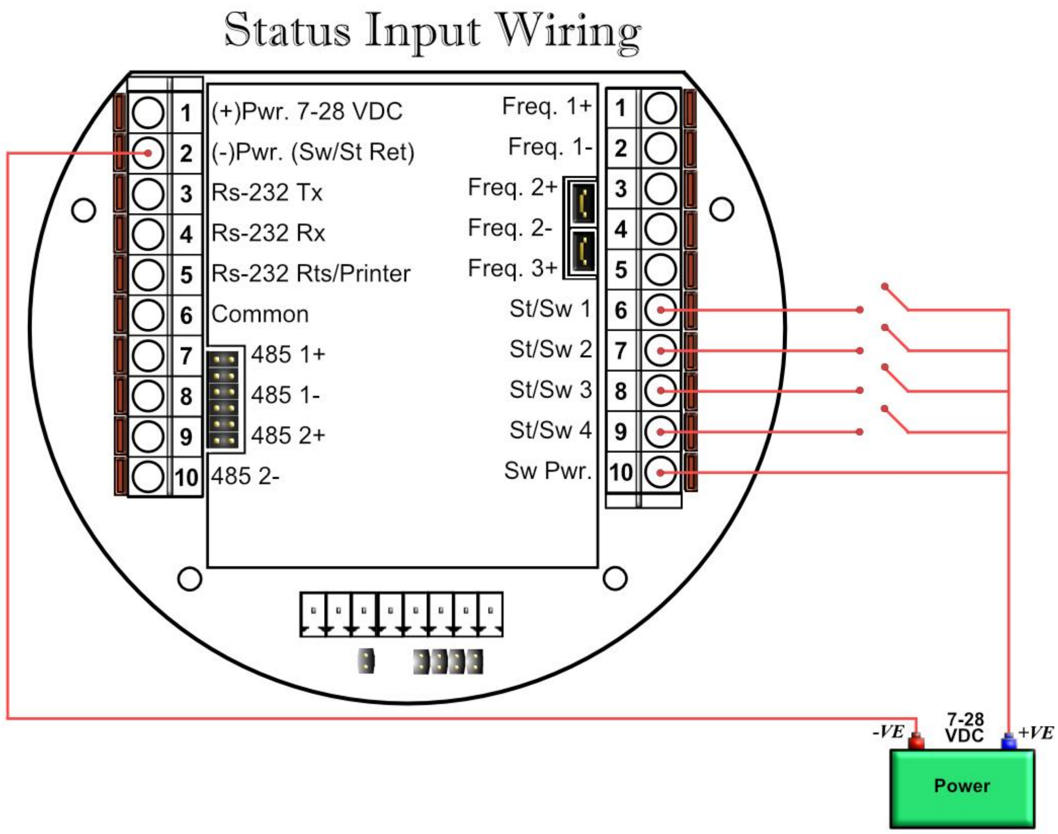
The second RS485 gets disabled if ST/SW#4 is used. They cannot be used at same time.
To use ST/SW#4 as a serial port, JP7 must be OFF and no assignment for ST/SW#4, otherwise serial port#3(Second 485 Port) gets burned if voltage is applied.

Version 2: Main/Mem MicroMV Boards (Micro2009 and Later Model)

ST/SW#4 and the second RS485 can be used be used at same time.

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 standard status input has 4 volts of noise hysteresis, with on trigger point of 5 volts and an off point of 1 Volt.



***Note**

Version 1: MicroMV Board (Older MicroMV Models)

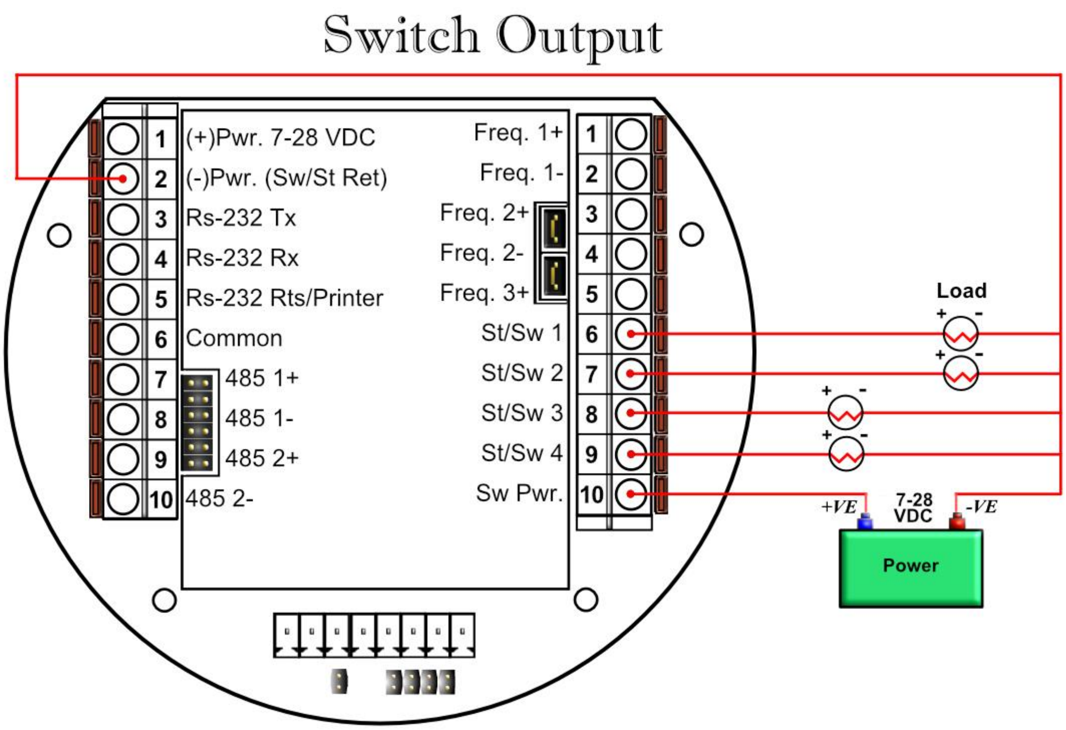
The fourth digital I/O is optional and can only be use if the 2nd RS485 is not used.
The second RS485 gets disabled if ST/SW#4 is used. They cannot be used at same time.
To use Status 4 JP7 Must be ON otherwise OFF

Version 2: Main/Mem MicroMV Boards (Micro2009 and Later Model)

ST/SW#4 and the second RS485 can be used be used at same time.

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	

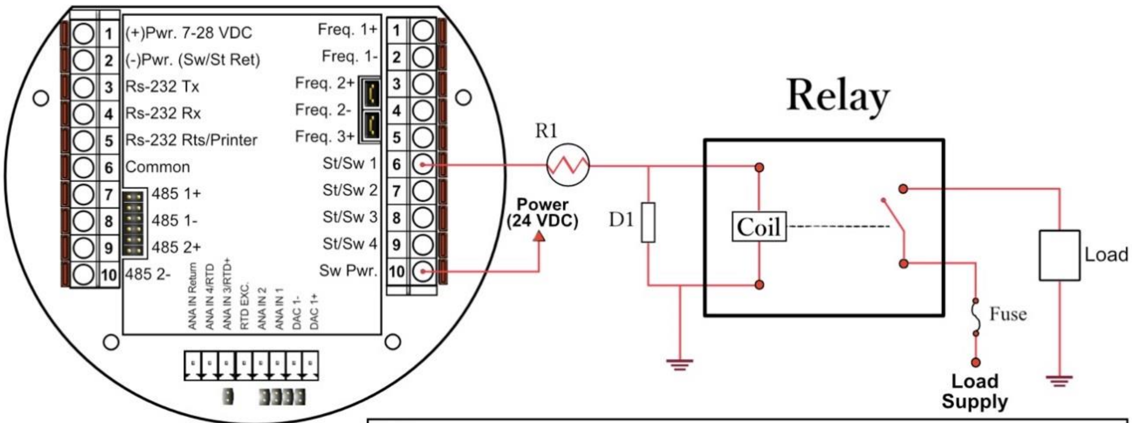


***Note**
Version 1: MicroMV Board (Older MicroMV Models)
The fourth digital I/O is optional and can only be use if the 2nd RS485 is not used.
When using ST/SW#4, the second RS485 gets disabled. They cannot be used at same time.

Version 2: Main/Mem MicroMV Boards
ST/SW#4 and the second RS485 can be used be used at 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.



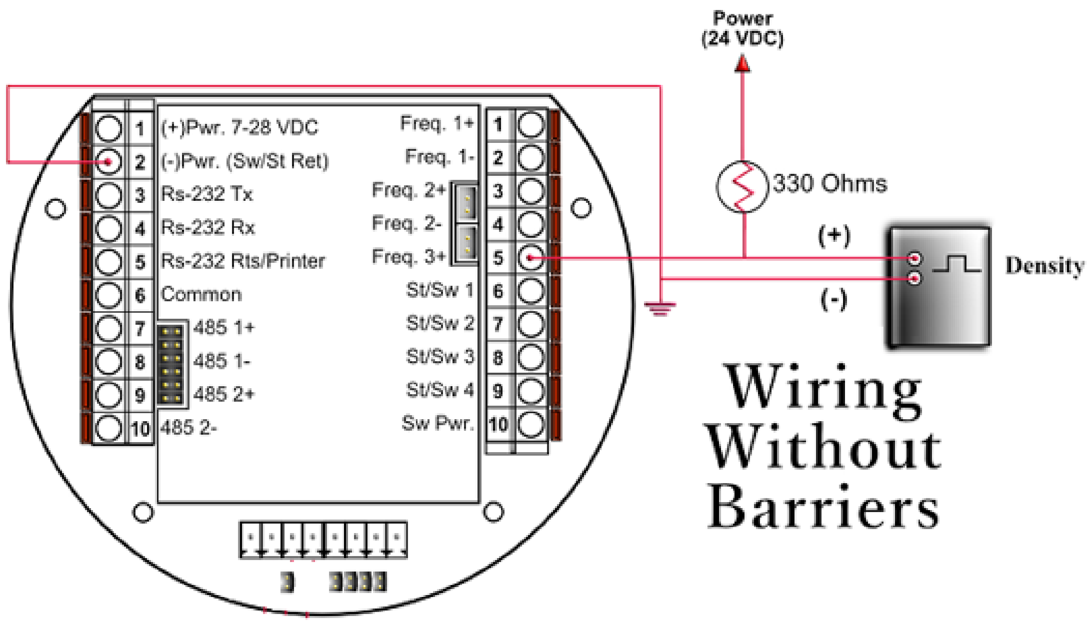
Note:

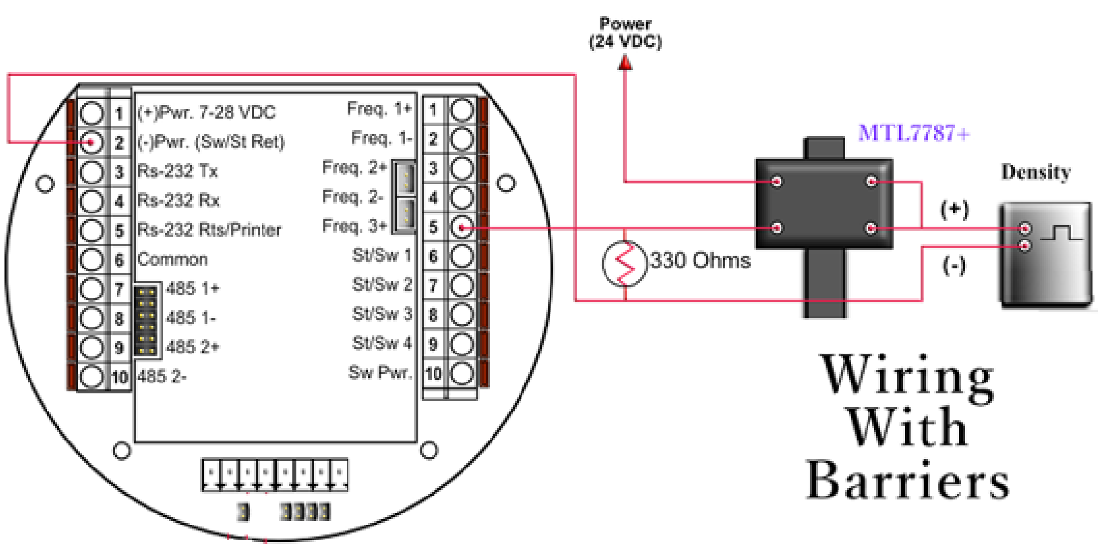
R1- Current limiting resistor. Current must not exceed 250mA.

D1- Use on relay or any inductive load
Transient voltage suppressor. Part No. 1.5KE30CA
It is a bidirectional part, so wiring polarity is indifferent.
Unidirection part No. 1.5KE30A may also be used. In such case, the stripped side is to be connected to the Switch Output side and the other side to ground.

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.





MTL7787+: Barrier for **switches** or **digital inputs**

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 analoginput 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 onetime 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.

Calibration Procedures through Windows™ Software

At the top menu, go to Calibration and Select RTD Input.

RESET TO DEFAULT CALIBRATION

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

OFFSET CALIBRATION:

1. Select offset calibration method.
2. Induce a live value and wait for 10 seconds for the reading to stabilize. Then enter the live value. The value entered must be in Ohm only.
3. **Now verify the live reading against the flow computer reading**

FULL SCALE CALIBRATION:

1. Prepare low range resistive input (i.e., 80 Ohm.) and High range resistive input (i.e., 120. Ohm).
2. Go to the calibration menu and select RTD full calibration method. Induce the low end (80 Ohm.) resistive signal and then wait 10 seconds, enter 80 Ohm, and click OK button.
3. Induce the High range signal (120 Ohm.) and wait 10 seconds, then enter the Ohm and click OK button.
4. **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 pressure or DP.
2. Select Multivariable DP 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 pressure or DP.
2. Select Multivariable DP 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, temperature, 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

RTD Calibration is a 2-step process. The first step is a onetime 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.

Calibration Procedures through Windows™ Software

At the top menu, go to Calibration and Select RTD Input.

RESET TO DEFAULT CALIBRATION

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

OFFSET CALIBRATION:

1. Select offset calibration method.
2. Induce a live value and wait for 10 seconds for the reading to stabilize. Then enter the live value. The value entered must be in Degrees only.
3. **Now verify the live reading against the flow computer reading**

FULL SCALE CALIBRATION:

1. Prepare low range resistive input (i.e., 80 Ohm.) and High range resistive input (i.e., 120. Ohm).
2. Go to the calibration menu and select RTD full calibration method. Induce the low end (80 Ohm.) resistive signal and then wait 10 seconds, enter the equivalent temperature in degrees, and click OK button.
3. Induce the High range signal (120 Ohm.) and wait 10 seconds, then enter the temperature degrees equivalent to 120 Ohm and click OK button.
4. **Now verify the live reading against the flow computer reading**.

Example: Screenshots of Full Calibration (*Assumption: not flowing*)

Diagnostics

I/O Raw Values

Unit ID: 1 Frequency 1: 0 Frequency 2: 0 Densit. Frequency: 0

Switch Output Diagnostic: OFF Enable/Disable Diagnostic

ST/SW 1: OFF ST/SW 2: OFF ST/SW3: OFF ST/SW4: OFF

Analog In	Tag ID	4-20 mA	Live Value	Numerical	Fail Code	
1	AIN1	0.011	0	0	0	Calibrate
2	AIN2	0.011	0	0	0	Calibrate
3	AIN3	0.011	0	0	0	Calibrate
4	AIN4	0.01	0	0	0	Calibrate
5	N/A	0.000	0	0	0	Calibrate
6	N/A	0.000	0	0	0	Calibrate
7	N/A	0.000	0	0	0	Calibrate
8	N/A	0.000	0	0	0	Calibrate
9	N/A	0.000	0	0	0	Calibrate
RTD	N/A	0.551	-401.4	-401.4	0	Calibrate

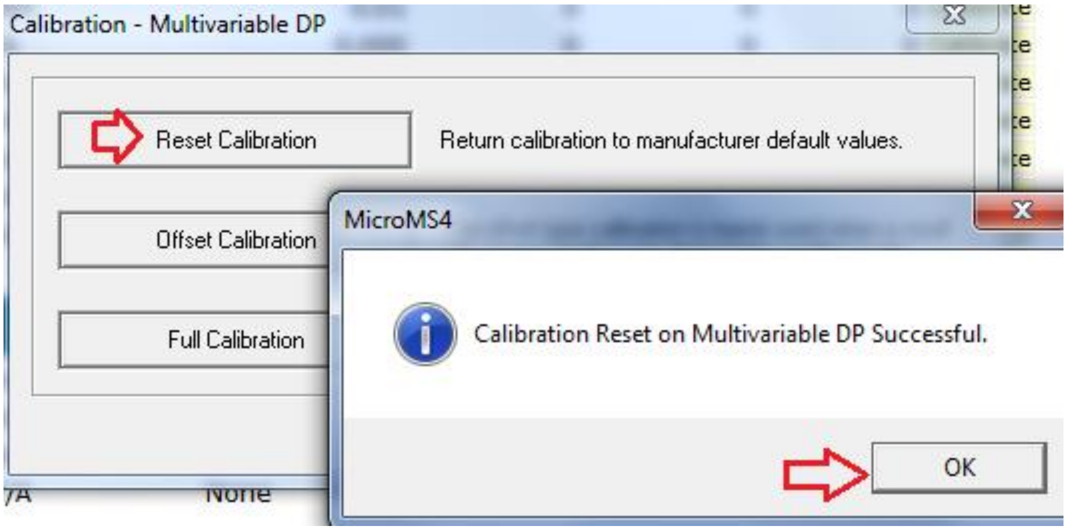
Analog Out	Tag ID	Assigment	4-20 mA	Value	
1	N/A	None	4	0	Calibrate
2	N/A	None	4	0	Calibrate
3	N/A	None	4	0	Calibrate
4	N/A	None	4	0	Calibrate

Multivariable	Tag	Value	
DP	MDP	-0.412	Calibrate
Pressure	MPF	-1.26	Calibrate
Temperature	MTF	70	Calibrate

Multivariable Connection: OK

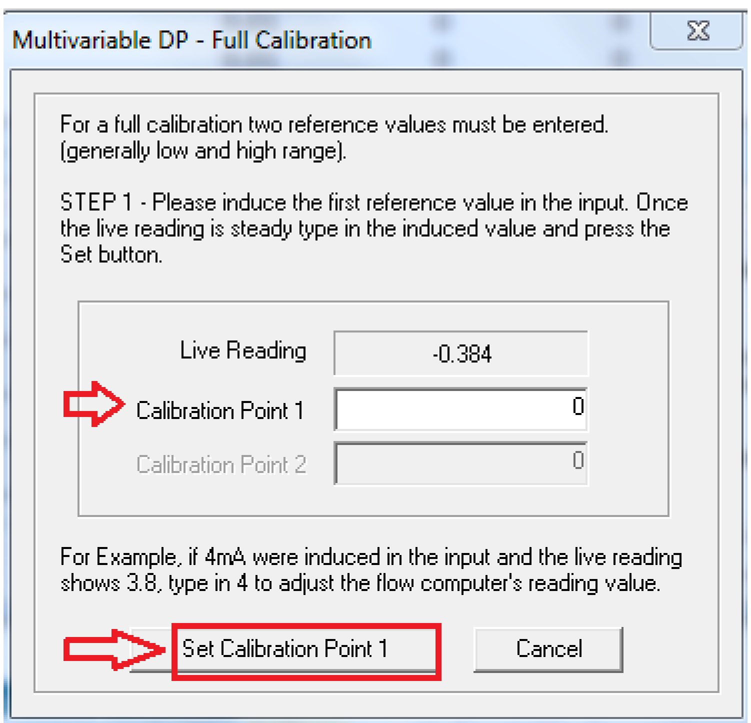
Battery Voltage: 7.2

Select Reset Calibration – Return calibration to manufacturer default DP value

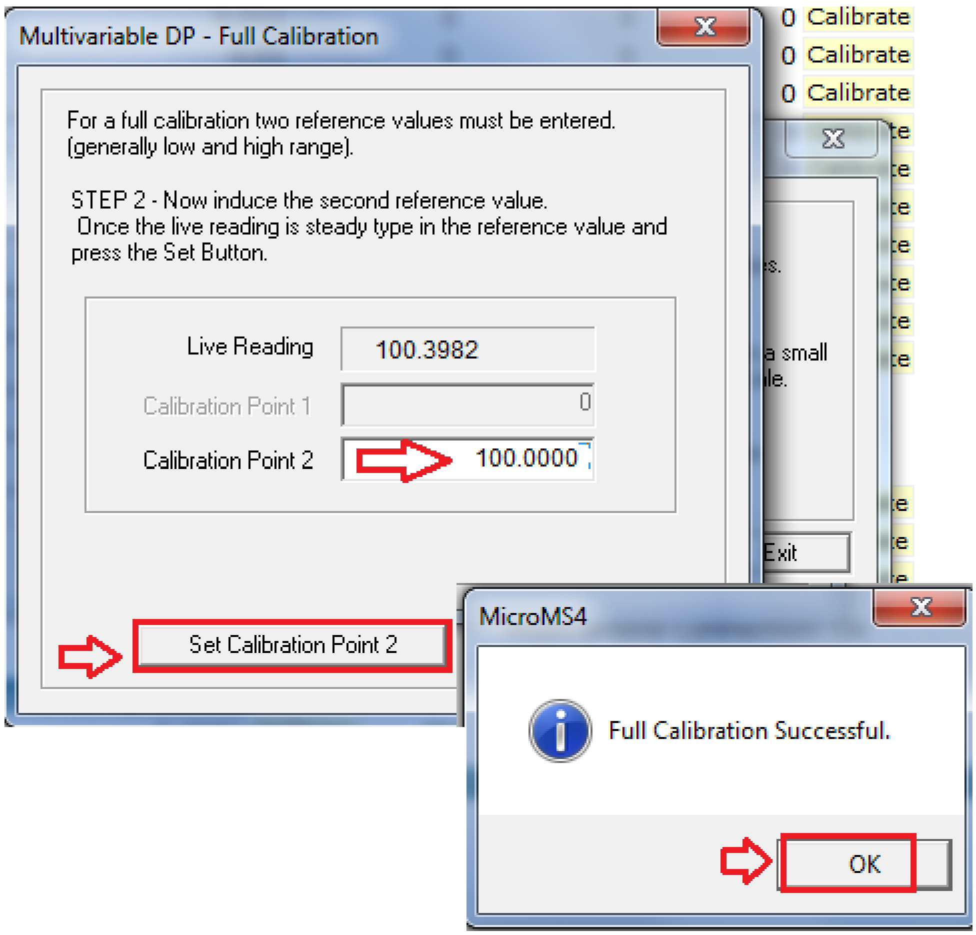


Select Full Calibration - To configure zero and span values of the signal

Induce the low range signal, enter the first point, and then click OK button.



Induce the high range signal, enter the second point, and then click OK button.



Now verify the live reading against the flow computer reading.

Data Verification

Data verification will not affect the calibration, but will be documented into calibration and verification report.

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. . To activate the switch outputs to the on and off position, click on "Enable/Disable Diagnostic" button in the diagnostic menu. After the screen freeze, click on "Toggle ON/OFF" button to toggle the switch on/off . To exit, click on "Enable/Disable Diagnostic" button again. 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 MicroMS4 software is constructed around a menu-driven organization

Configuration File

We will begin with the DYNACOM PC software menu. Create a new configuration file, and save it.

1. The software opens ready for you with a default configuration file. To choose an existing file go to the **Configuration File | Open...** and provide the configuration file name. If you want to create a new file, select **Configuration File | New.**
2. Now go back to **Configuration File**. Use the down arrow key to move the cursor to **Save** and press ENTER. You have just saved the file you just created. Notice that now the file name will appears in the left top corner of the screen. This indicates the name of the currently active file; if you change parameters and **save** again, the changes will be saved to your file.

Configuration File Menu

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 (files with extension .SFC). Use the cursor arrow keys to move the cursor to your selection. This function also can be reached pressing on the toolbar.

Open a New File

Create a new file to store all the programmed information for one Micro MV Liquid Flow Computer. You are prompted for the new file's name. If you enter the name of a pre-existing file, the software informs you of this and prompts you if you want to overwrite the old file. After a file is opened it becomes the currently active file; its contents can be viewed and its parameters can be edited. This option can be activated pressing on the toolbar.

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. If you enter the name of a pre-existing file, the software asks you if you want to overwrite the old file. 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. The system will ask you for the name you want for this file. You can also save pressing on the toolbar.

Exit

Exit the application, if changes were made to the configuration and haven't been saved you will be asked if you want to save them.

Before the Exit option there is a list of the most recently used configuration files so you can select one of them without looking for it in the disk.

VIEW

View Drawings

To view the wiring drawings for the Flow Computer go to the **View** menu and then select **Wiring.** The drawings available for this device will be listed.

- Back Panel
- Analog Input
- RTD
- Analog Output
- Status Input
- Switch Output
- Turbine
- Densitometer
- RS 232
- RS 485

TOOLS

Communication Port Settings

You can access this window either through the **Tools | Comm Settings** menu option or the Comm button on the toolbar.

This window let you set the port settings in order to communicate with the Flow Computer. You have the following options available:

SERIAL PARAMETERS

Port - Communication Port Number

Enter the PC port used to communicate with the MicroMS4 Flow Computer.

Baud Rate

Note: this parameter must be set the same for both the PC and the MicroMS4 Flow Computer for communication to occur.

Baud rate is defined as number of bits per second. The available selections are 1200, 2400, 4800, 9600, or 19200.

Parity

Note: this parameter must be set the same for both the PC and the MicroMS4 Flow Computer for communication to occur.

RTU - NONE
ASCII - EVEN or ODD

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

Data Bits

Options available: 5, 6, 7, or 8. Generally used: 8 for RTU mod, 7 for ASCII mode.

Stop Bits

Options available: 1, 1.5,or28. Generally used: 1.

Modbus Type

Note: this parameter must be set the same for both the PC and the MicroMS4 Flow Computer for communication to occur.

The Modbus Communication Specification is either Binary RTU or ASCII.

Auto Detect Settings

Click this button and the configuration program will attempt to communicate with a single MicroMS4 Flow Computer at different baud rates and formats.
Failure to communicate can occur because of a wiring problem, wrong PC port selection, communication parameter mismatch between PC and MicroMS4 Flow Computer (Modbus type, parity, baud rate, etc.) or lack of power to the MicroMS4 Flow Computer. To use this feature, the user must insure that only one MicroMS4 Flow Computer is connected to the PC. More than one MicroMS4 Flow Computer in the loop will cause data collisions and unintelligible responses

FLOW CONTROL

RTS Flow Control

Turns the RTS flow control on and off. The Enable option turns ON the RTS line during the connection. The Handshake option turns on RTS handshaking. Disable turns OFF the RTS line. Toggle specifies that the RTS line is high if bytes are available for transmission. After all buffered bytes have been sent the RTS line will be low.

DTR Flow Control

Specifies the DTR flow control. Enable turns ON the DTR line during the connection. Handshake turns on DTR handshaking. Disable turns off the DTR line.

CST Flow Control

Turns the CTS flow control on and off. To use RTS/CTS flow control, specify Enable for this option and Handshake control for the RTS option.

USE INTERNET PROTOCOL

Check the box if you are planning to communicate using an Ethernet connection instead of a serial connection.

IP Address

IP Address of the target Flow Computer. This address must follow the addressing standard xxx.xxx.xxx.xxx. You must provide both IP Address and Port in order to communicate with a flow computer.

Port

In conjunction with the IP Address, a port number must be specified. The default port number for Modbus/Ethernet bridges is 502 but it can be any number.

Protocol

Protocol to be used through the Ethernet connection. Modbus TCP, also known as Modbus Ethernet consists of a Modbus message without CRC wrapped by a TCP/IP message. This protocol is generally used by industrial Modbus to Ethernet converters. The TCP/IP encapsulation also known as TCP/IP Pass Through Mode consists of a regular Modbus message embedded in a TCP/IP message. This protocol is generally used by general purpose Ethernet to Serial converters.

UNIT ID NUMBER

The Unit ID Number is used strictly for communication purposes; it can take any value from 1 to 247. Only one master can exist in each loop.

> *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.*

TIME OUT

The amount of time in seconds the program will wait for an answer from the flow computer.

RETRY TIMES

Retry times for the program to communicate with the flow computer in case of timeout.

Meter Configuration

METER SETTINGS

Meter Set Up

Select Unit

Selection	Description	Temperature	Pressure	DP
0	US Unit	DEG.F	PSIG	Inches of Water
1	Metric Unit	DEG.C	BAR, KG/CM	KPA, m.Bar

Metric Pressure Units

Selection	Description	Pressure
0	Metric Unit	BAR
1	Metric Unit	KG/CM2
2	Metric Unit	KPA

Flow Units

Selection	Description
0	MCF
1	KM3

Metric DP Units

Selection	Description
0	m.BAR
1	KPA

Meter Application

Selection	Description
0	Gas Meter
1	Liquid Meter - BBLS
2	Liquid Meter - M3

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.

Day Start Hour (0-23)

Day start hour is used for batch operation. If daily batch is selected, the batch will end at day start hour, all batch totalizers and flow-weighted values are reset.

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.

Alarm Delay Timer

Enter delay timer in seconds for logging the alarms.

Disable Cry-Out Message

When a new alarm is occurred, the flow computer will send out an alarm message through the RS232 port. Check this option to disable this feature.

Cry-Out Alarm Message Delay Time

Enter delay time in seconds for sending out cry-out message.

Number of Meters

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

Flow Rate Selection

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

Flow Rate Average 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.

Atmospheric Pressure

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

Base Pressure

The basis reference pressure is used 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.

Base Temperature

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

Common Parameters

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.

Analog Input Expansion #5-#9

Enter '1' to use analog input expansion #5-#9.

Use Battery Voltage Reading and Alarm

A battery low alarm occurs when battery voltage is below 11.2 volts. Only the certain new CPU boards have this feature. Check this option to enable this feature.

Daylight Saving Time (DST)

Enabling Daylight Saving Time (also called “Summer Time”) sets the Flow Computer to automatically forward its time by one hour at 2:00 AM on a preset day (“Spring Forward”) of the year and roll back on a second date(“Fall Back”).

If left in auto mode, the computer calculates the DST dates based on USA standards, which are, Spring Forward the first Sunday of April and Fall Back the last Sunday of October.

For countries with other DST dates, the user can enter dates manually. For example, European Summer Time starts the last Sunday in March and ends the last Sunday in October.

Effects of DST on Historical Data

Given the sudden time change that DST creates, the historical reports will show an hour with zero flow at 2:00 AM of Spring Forward Day and an hour with double flow at 1:00 AM of Fall Back Day, to achieve consistent 24-Hour a day flow records.

SLAVE UNITS CONFIGURATION

The Micro MV can poll up to 3 other slaves, 4 MicroMS4 Slaves, or 4 E-Chart Slaves.

Slave Type

Selection	Description
0	Others
1	MicroMS4
2	Foxboro
3	E-Chart
4	MicroMV and E-Chart Combination – Slave Type – 0 - E-Chart, 1 – MicroMVL, 2 – MicroMS4

Slave Unit ID

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

VT – Variable Type for Slave Type 0 Only

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	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 for Slave Type 0 Only

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

*Note: DB – Density at Base Condition.

Slave Units Configuration - Example

Slave Type 0 – Other Slaves (up to 3 slaves)

Example : Read Meter #1 Density of MicroMS4 from the Micro Motion.

Slave ID	ID	Micro Motion ID
VT – Variable Type	2	2 registers of 16 bits floating (Words Order–Low, High)
DEST - Destination Address	22	Meter #1 Density
ADDR – Slave Modbus Address	248	Modbus Address of Micro Motion Density

Slave Type 1– MicroMS4 (up to 4 slaves)

Slave **ID**	ID	MicoMS4 Unit ID

The MicroMS4 will poll variables are used in the slave. Variables are 4 analog inputs and multi-variables – DP, Pressure, and Temperature. The slave calibrations can be done through the master unit.

Slave Type 2– Foxboro (up to 4 slaves)

Slave **ID**	ID	FOXBORO Unit ID

The MicroMS4 will poll variables are used in the slave. Variables are mass flow rate, mass cumulative totals, and density,

Slave Type 3– E-Chart (up to 4 slaves)

Slave **ID**	ID	E-Chart Unit ID

The MicroMS4 will poll variables are used in the slave. Variables are multi-variables – DP, Pressure, and Temperature.

Slave Type 4– MicroMS4, E-Chart, or MicroMVL Combination (up to 4 slaves)

Slave **ID**	ID	E-Chart Unit ID

The MicroMS4 will poll variables are used in the slave. Variables are multi-variables – DP, Pressure, and Temperature.

METER DATA

Meter ID
Up to 8 characters. This function will serve as meter tag.

Gas or Liquid Application
Enter ‘0’ to select gas application, or ‘1’ to select liquid application.

Flow Equation Type
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 = FOXBORO (Assume: US unit – Mass in LB/HR, Density LB/CF, Metric Unit- Mass in M3, Density in KG/M3)
6= Natural Gas @20 Deg.C
7= Verabar
8= Pitot Tube
9= ISO 6976
10= Venturi
11= Accelabar
12= Dynacone Wet Gas

Select the desired calculation mode. API 14.3 is the latest orifice calculations introduced in 1994 All new installations are recommended to use API 14.3 for orifice calculations.

On the right hand side of the selection box is a property button  that when pressed pops up a window with the flow equation settings.

API 14.3 Data (new AGA3)

Flow Equation Type = 0

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 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 or in KPA (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 downstream 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

Flow Equation Type = 1

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 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 or in KPA (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.

AGA7 Data (Frequency)

Frequency IO Position

Enter '0' to select frequency #1, or enter '1' to select frequency #2.

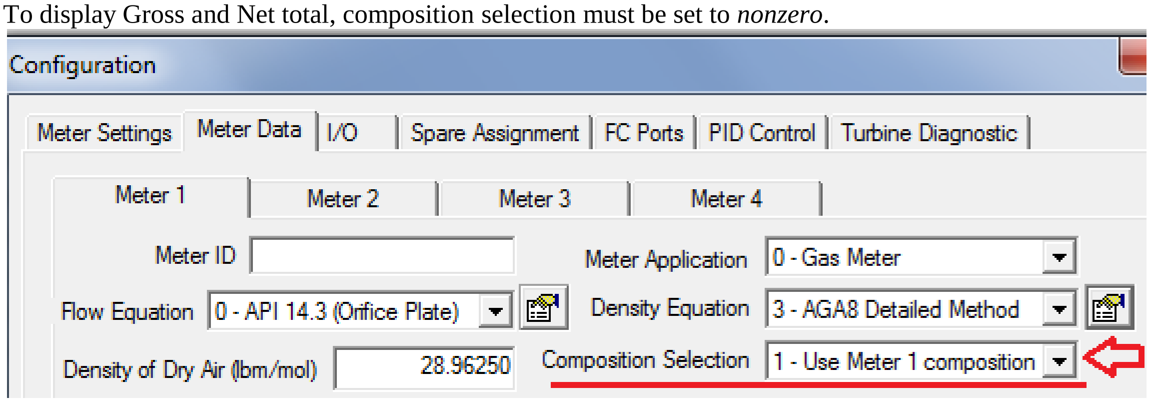
K Factor

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.

Liquid Meter		**Gas Meter**	
Set Composition Selection to Zero		Set Composition Selection to Zero	
US Units	**Metric Units**	**US Units**	**Metric Units**
K Factor: Pulses/BBL	K Factor: Pulses/M3	K Factor: Pulses/CF	K Factor: Pulses/M3
Hourly Report: Gross and Net Total BBL (US), M3(Metric)		*Hourly Report: Net and Energy Net: MCF or KM3, Energy: MMBTU(US),GJ(Metric)	

***Note (Available for firmware version 6.04.13 or newer)**

To display Gross and Net total, composition selection must be set to *nonzero*.



After downloading this configuration, the MicroMS4 will force a Gas Meter to a Liquid meter but use the AGA8 detailed method. Composition selection and Gas Composition data are required for this setup.

Force a Gas Meter to a Liquid Meter	
Set Composition Selection to nonzero	
US Units	**Metric Units**
K Factor: Pulses/CF	K Factor: Pulses/M3
Hourly Report: Gross and Net BBL(US), M3 (Metric)	

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.

Flow Rate 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.

Cone/Smart Cone Data

Flow Equation Type = 3

Pipe I.D.

Cone ID

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

Selection	Description
0	Non-Compressible
1	Compressible Fluids – Precision
2	Compressible Fluids – Wafer & 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 Thermal Expansion Coefficient E-6

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

Cone Thermal Expansion Coefficient E-6

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

Natural Gas @20 Deg.C

Flow Equation Type = 6

Pipe I.D.

Orifice ID

Pipe ID in millimeter (metric unit) is the measured inside pipe diameter at reference conditions. Orifice ID 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 or in KPA (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 downstream 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

Verabar Data

`Flow Equation Type = 7`

To set Verabar flow parameters, set **`Meter`**|**`Meter Data`**|**`Flow Equation Type = 7`**. You will then access a submenu in which you can set the parameters below.

Pipe I.D.

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

Blockage No – PW

$$Beta = The Sensor Blockage = \frac{4 \times PW}{\pi \times D}$$

$$where\ D = Pipe\ I.D.\ in\ Inches$$

$$PW = The\ Sensor's\ Probe\ Width\ in\ Inches$$

$$PW = .336"\ for\ a\ \text{-}05\ sensor$$

$$PW = .614"\ for\ a\ \text{-}10\ Sensor$$

$$PW = 1.043"\ for\ a\ \text{-}15\ Sensor$$

$$\pi = 3.141592654$$

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.

Flow Coefficient K

Enter flow coefficient for pipe dimension and wall thickness.

Ratio of Specific Heat

Fluid isentropic exponent at flowing conditions.

Pitot Tube Data

Flow Equation Type = 8

Pipe I.D.

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

Pitot Flow Coefficient

Enter flow coefficient of the meter.

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.

Pipe Thermal Expansion Coefficient E-6

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

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.

Fluid Humidity

Enter Fluid Humidity in Percent.

ISO 6976

Flow Equation Type = 9

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 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 or in KPA (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 downstream 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

*Note
Set Heating Value to zero if ISO6976 method is used. The heating value is calculated from composition.

Venturi Data

Flow Equation Type = 10

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 is the measured diameter of the orifice at reference conditions.

DP Cutoff

The EPLUS Flow Computer suspends flow rate calculations whenever the DP, in inches of water column (us unit) or in mbar or in KPA (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 downstream of the orifice plate. When multi-variable is used, the pressure sensor is always upstream and set Y to 1.

Selection	Description
0	None
1	Upstream
2	Downstream

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.

Reference Temperature of Orifice

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.

Thermal Expansion Coefficient E-6

Pipe Coefficient Corner Tap E-6

	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

Discharge Coefficient C

This value is the discharge coefficient for Venturi flow equations.

Accelabar Data

To set Accelabar flow parameters, set **`Meter Data|Flow Equation Type = 11`**. You will then access a submenu in which you can set the parameters below.

Accelabar Size

Selection	Size	Throat Diameter	Flow Constant
0	2"	.9"	0.4650
1	3"	1.289"	0.6566
2	4"	1.700"	0.7106
3	6"	2.560"	0.6779
4	8"	3.389"	0.7123
5	10"	4.251"	0.7329
6	12"	5.056	0.7455

Pipe Material

Selection	Pipe Material
0	CS
1	SS
2	Chrome-Molly
3	P91
4	Monel
5	Others

DP Cutoff

The Flow Computer suspends all calculations whenever the DP 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.

Isentropic Exponent (Specific Heat)

Isentropic exponent for a real gas (approximately 1.3 for natural gas).

Dynacone Wet Gas Data
`Flow Equation Type = 12`

On the right hand side of the selection box is a property button  that when pressed pops up a window with the Dynacone flow equation data settings.

Meter#1 is for a Gas meter, meter#2 is for an Oil meter, and meter#3 is for a Water Meter

Gas/Oil/Water Meter I.D.
Up to 8 characters. This function will serve as meter tag.

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

Pitot Flow Coefficient
Enter flow coefficient of the meter.

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.

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

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.

AGA8 Detailed Method Mol Percentage
Refer to Transmission Measurement Committee Report No. 8

Gas Meter Gross Flow Units

Selection	Description
0	MCF
1	KM3
2	CF
3	M3

Gas Meter Mass Flow Units

Selection	Description
0	LB
1	MLB
2	KG
3	TONNE

Oil and Water Meter Gross Flow Units

Selection	Description
0	MCF
1	KM3
2	CF
3	M3

Oil and Water Meter Mass Flow Units

Selection	Description
0	BBL
1	GAL
2	M3
3	LIT
4	CF
5	MCF

Meter Data Entries for Flow Equation 0 - 11

Flow Rate Low/High Limit

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

Density Equation- Gas Meter: Specifies the equation used to calculate density.

Select	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)
4	NIST10 Superheated Steam	Pressure > 2.06843 MPA, Temperature > 533.15 Deg.K

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

On the right hand side of the selection box is a property button that when pressed pops up a window with the density equation settings.

Density Equation- Liquid Meter:

	Calculation Type	Comments and Limitations
US Unit	Table 24A/Chapter.11.2.1	SG .637 – 1.076, Temperature 0-300 DEG.F
Metric Unit	0=Crude Volume to 20 Deg.C	
Metric Unit	1=Crude Volume to 15 Deg.C	

On the right hand side of the selection box is a property button that when pressed pops up a window with the SG-US unit, Density- Metric settings.

Composition Set Selection

This entry is for gas meter only.

Selection	Description
0	Use This Meter Composition
1	Meter#1 Composition
2	Meter#2 Composition
3	Meter#3 Composition
4	Meter#4 Composition

Density of Dry Air

Typical value would be 28.9625

Relative Density

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).

Base Density Factor

Enter a correction factor for density at base.

Heating Value

The energy totalizer requires the heating value entry. (US Unit – BTU/SCF, Metric Unit- MJ/M3)

Input Position

This section allows the user to assign analog inputs to the process variables. The available options are displayed in the selection box. The configuration of the analog inputs is done in the I/O section (explained later on).

Input Position Assignment

1: Analog Input#1
2: Analog Input#2
3: Analog Input#3
4: Analog Input#4
5: RTD Input
7. Frequency Input (Not Selectable)
10. Multi-Variable Module (Master)
11. Multi-Variable Module Slave #1
12. Multi-Variable Module Slave #2
13. Multi-Variable Module Slave #3
21. Analog Input #5
22. Analog Input #6
23. Analog Input #7
24. Analog Input #8
25. Analog Input #9

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. Set density type to zero if liquid application is selected.

Density Type	Densitometer
Type 0	None
Type 1	4–20 mA
Type 2	UGC
Type 3	Sarasota
Type 4	Solartron

Density 4–20 mA Type*	
Type 0	Density Signal 4-20mA in LB/FT3 (us unit) or in KG/M3 (metric unit)
Type 1	SG Signal 4-20mA

Density 4-20mA Type

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

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.

INPUT/OUTPUT

ANALOG INPUTS

In order for the Flow Computer to use the live input, the input must be properly assigned and properly wired

TAG No

Select the following tag no to use default tag, or select ‘0’ to enter tag id.

11	TubingP1	**21**	TubingP2	**31**	TubingP3	**41**	TubingP4
12	CasingP1	**22**	CasingP2	**32**	CasingP3	**42**	CasingP4
13	OilTank1	**23**	OilTank2	**33**	OilTank3	**43**	OilTank4
14	WatTank1	**24**	WatTank2	**34**	WatTank3	**44**	WatTank4
15	Suction1	**25**	Suction2	**35**	Suction3	**45**	Suction4
16	Dischag1	**26**	Dischag2	**36**	Dischag3	**46**	Dischag4
17	CompreT1	**27**	CompreT2	**37**	CompreT3	**47**	CompreT4

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, an alarm log will be generated.

Maintenance Value

The value is to be used when the transmitter fails, or while calibrating. 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)

RTD INPUTS

In order for the Flow Computer to use the live input, the input must be properly assigned and properly wired

TAG No

Select the following tag no to use default tag, or select ‘0’ to enter tag id.

11	TubingP1	**21**	TubingP2	**31**	TubingP3	**41**	TubingP4
12	CasingP1	**22**	CasingP2	**32**	CasingP3	**42**	CasingP4
13	OilTank1	**23**	OilTank2	**33**	OilTank3	**43**	OilTank4
14	WatTank1	**24**	WatTank2	**34**	WatTank3	**44**	WatTank4
15	Suction1	**25**	Suction2	**35**	Suction3	**45**	Suction4
16	Dischag1	**26**	Dischag2	**36**	Dischag3	**46**	Dischag4
17	CompreT1	**27**	CompreT2	**37**	CompreT3	**47**	CompreT4

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.

Low/High Limit

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

Maintenance Value

The value is to be used when the transmitter fails, or while calibrating. 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., OHMs is above 156 or below 50)

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:

	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
Densitometer Temp.	125	225	325	425
Density at base	126	226	326	426
DP Low	127	227	327	427
DP High	128	228	328	428
SG	129	229	329	429
BS&W	130	230	330	430

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

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**
			Analog Input #5	**23**
			Analog Input #6	**24**
			Analog Input #7	**25**
			Analog Input #8	**26**
			Analog Input #9	**27**

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

Selection	Description
21	Analog Input #5
22	Analog Input #6
23	Analog Input #7
24	Analog Input #8
25	Analog Input #9

Densitometer Pressure IO Position

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

Selection	Description
21	Analog Input #5
22	Analog Input #6
23	Analog Input #7
24	Analog Input #8
25	Analog Input #9

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 is 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.)

Sarasota, UGC, or Solartron Constants

Enter the densitometer constants accordingly with the type selection.

SPARE AUXILIARY I/O

The Flow Computer can be configured to be master unit through the second RS485 (port#3). The master unit can connect up to three "MicroMV Flow Computer" slave units. Each slave unit has four analog inputs. In order to use spare auxiliary inputs, the input must be properly assigned. Enter spare auxiliary 1-4 input data entries are for slave#1, 5-8 input data entries for slave#2, and 9-12 input data entries for slave#3.

TAG No

Select the following tag no to use default tag, or select '0' to enter tag id.

11	TubingP1	**21**	TubingP2	**31**	TubingP3	**41**	TubingP4
12	CasingP1	**22**	CasingP2	**32**	CasingP3	**42**	CasingP4
13	OilTank1	**23**	OilTank2	**33**	OilTank3	**43**	OilTank4
14	WatTank1	**24**	WatTank2	**34**	WatTank3	**44**	WatTank4
15	Suction1	**25**	Suction2	**35**	Suction3	**45**	Suction4
16	Dischag1	**26**	Dischag2	**36**	Dischag3	**46**	Dischag4
17	CompreT1	**27**	CompreT2	**37**	CompreT3	**47**	CompreT4

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, an alarm log will be generated.

Maintenance Value

The value is to be used when the transmitter fails, or while calibrating. 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)

MULTI.VARIABLE SETTINGS

In order for the Flow Computer to use the live input, the input must be properly assigned and properly wired The Flow Computer can be configured to be master unit through the second RS485 (port#3). The master unit can connect up to three "MicroMV Flow Computer" slave units. Each slave unit has multivariable – DP, pressure, and temperature.

TAG ID

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

Low/High Limit

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

Maintenance Value

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

Fail Code

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

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
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

Assignments – Contact Type Outputs

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

Display assignment selections are up to 12 assignments. Each screen has two selections. The Micro MV Gas Flow Computer will scroll through them at the assigned delay time.

	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
Test Status	133	233	333	433
Test Gross	134	234	334	434
Test Net	135	235	335	435
BS&W	136	236	336	436

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

MODBUS SHIFT- 2 OR 4 BYTES

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)

***Note: Modbus shift registers are READ ONLY registers.**

BOOLEAN STATEMENTS

From the MicroMV Flow Computer Configuration Software, Point cursor to **'I/O',** scroll down to **'Boolean Statements'** and a window will pop up allowing you to enter the statements.

Boolean Points – 4 digits (0001-0800, 7831-7899)

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

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, 3rd and 4th digit-Selection

0n01	Spare
0n02	Spare
0n03	Spare
0n04	Spare
0n05	Meter Active
0n06	Spare
0n07	Any Active Alarms
0n08-0n10	Spare
0n11	DP Override in use
0n12	Temperature Override in use
0n13	Pressure Override in use
0n14	AGA8 Out of Range
0n15	Flow Rate High Alarm
0n16	Flow Rate Low Alarm
0n17-0n99	Spare

Other Alarms

0401	Analog Input #1 High Alarm
0402	Analog Input #1 Low Alarm
0403	Analog Input #2 High Alarm
0404	Analog Input #2 Low Alarm
0405	Analog Input #3 High Alarm
0406	Analog Input #3 Low Alarm
0407	Analog Input #4 High Alarm
0408	Analog Input #4 Low Alarm
0409	RTD Input High Alarm
0410	RTD Input Low Alarm
0411	Calibration Mode
0412	Battery Voltage Low Alarm
0413	Analog Output #1 Out of Range Alarm
0414	Analog Output #2 Out of Range Alarm
0415	Analog Output #3 Out of Range Alarm
0416	Analog Output #4 Out of Range Alarm
0417	Analog Input #1 Failed
0418	Analog Input #2 Failed
0419	Analog Input #3 Failed
0420	Analog Input #4 Failed
0421	RTD Input Failed
0422	Densitometer Failed
0423	Densitometer High Alarm
0424	Densitometer Low Alarm

Other Alarms

0425	Multivariable DP High
0426	Multivariable DP Low
0427	Multivariable Pressure High
0428	Multivariable Pressure Low
0439	Multivariable Temperature High
0440	Multivariable Temperature Low
0441-0442	Spare
0443	Analog Input #1 Live/Manual
0444	Analog Input #2 Live/Manual
0445	Analog Input #3 Live/Manual
0446	Analog Input #4 Live/Manual
0447	RTD Input Live/Manual
0448	Densitometer Live/Manual
0449	Densitometer Temperature Live/Manual
0450	Densitometer Pressure Live/Manual
0451	Multivariable DP Live/Manual
0452	Multivariable Pressure Live/Manual
0453	Multivariable Temperature Live/Manual
0454	Spare
0455	Spare Input #1 Live/Manual
0456	Spare Input #2 Live/Manual
0457	Spare Input #3 Live/Manual
0458	Spare Input #4 Live/Manual
0459	G.C. Communication
0460	Slave ID #1 Communication
0461	Slave ID #2Communication
0462	Slave ID #3Communication
0463	MPU12 Alarms
0464	Slave ID #4 Communication
0465	Spare
0466	Spare
0467	Analog Input #21 High
0468	Analog Input #21 Low
0469	Analog Input #22 High
0470	Analog Input #22 Low
0471	Analog Input #23 High
0472	Analog Input #23 Low
0473	Analog Input #24 High
0474	Analog Input #24 Low
0475	Analog Input #25 High
0476	Analog Input #25 Low
0477	
0478	Spare Input #5 Live/Manual
0479	Spare Input #6 Live/Manual
0480	Spare Input #7 Live/Manual
0481	Spare Input #8 Live/Manual
0482	Spare Input #9 Live/Manual

0483	Analog Input #5 Live/Manual
0484	Analog Input #6 Live/Manual
0485	Analog Input #7 Live/Manual
0486	Analog Input #8 Live/Manual
0487	Analog Input #9 Live/Manual
0488	Spare
0489	Spare
0490	Spare
0491	Auxiliary Input #1 High Alarm
0492	Auxiliary Input #1 Low Alarm
0493	Auxiliary Input #2 High Alarm
0494	Auxiliary Input #2 Low Alarm
0495	Auxiliary Input #3 High Alarm
0496	Auxiliary Input #3 Low Alarm
0497	Auxiliary Input #4 High Alarm
0498	Auxiliary Input #4 Low Alarm
0499	Auxiliary Input #5 High Alarm
0500	Auxiliary Input #5 Low Alarm
0501	Auxiliary Input #6 High Alarm
0502	Auxiliary Input #6 Low Alarm
0503	Auxiliary Input #7 High Alarm
0504	Auxiliary Input #7 Low Alarm
0505	Auxiliary Input #8 High Alarm
0506	Auxiliary Input #8 Low Alarm
0507	Auxiliary Input #9 High Alarm
0508	Auxiliary Input #9 Low Alarm
0509	Auxiliary Input #10 High Alarm
0510	Auxiliary Input #10 Low Alarm
0511	Auxiliary Input #11 High Alarm
0512	Auxiliary Input #11 Low Alarm
0513	Auxiliary Input #12 High Alarm
0514	Auxiliary Input #12 Low Alarm
0515	Analog Input #5 Failed
0516	Analog Input #6 Failed
0517	Analog Input #7 Failed
0518	Analog Input #8 Failed
0519	Analog Input #9 Failed
0520	
0521	
0522	
0523	Slave ID #1 DP High Alarm
0524	Slave ID #1 DP Low Alarm
0525	Slave ID #1 Pressure High Alarm
0526	Slave ID #1 Pressure Low Alarm
0527	Slave ID #1 Temperature High Alarm
0528	Slave ID #1 Temperature Low
0529	
0530	

0531	Slave ID #2 DP High Alarm
0532	Slave ID #2 DP Low Alarm
0533	Slave ID #2 Pressure High Alarm
0534	Slave ID #2 Pressure Low Alarm
0535	Slave ID #2 Temperature High Alarm
0536	Slave ID #2 Temperature Low
0537	
0538	
0539	Slave ID #3 DP High Alarm
0540	Slave ID #3 DP Low Alarm
0541	Slave ID #3 Pressure High Alarm
0542	Slave ID #3 Pressure Low Alarm
0543	Slave ID #3 Temperature High Alarm
0544	Slave ID #3 Temperature Low
0545	
0546	
0701	Day Ended Flag (Last 5 Seconds)
0702	Month Ended Flag (Last 5 Seconds)

0801 through 0899 Command Boolean Points

0801	Alarm Acknowledge

Program Variable Statements

From the MicroMV Flow Computer Configuration Software, Point cursor to **'I/O',** scroll down to **'Program Variable Statements'** and a window will pop up allowing you to enter the statements.

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

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 – 7071- 7075 will be **reset** at the end of hour.
Variables stored on the daily report – 7076 – 7080 will be **reset** at the end of day.
Variables stored on the month report – 7081- 7085 will be **reset** at the end of month.

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

7262-7266 – Last Hour Program Variables (Read Only)
7434-7438 – Yesterday Program Variables (Read Only)
7466-7470 – Last Month Program Variables (Read Only)

Spare Assignment

Spare inputs are not used in the calculation and just for indication, display and alarm purpose only.

FC PORTS

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.

Flow Computer Ports

Port #1/#3 Modbus Type

> *Note: this parameter must be set the same for both the PC and the MicroMS4 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 MicroMS4 Flow Computer for communication to occur.*

RTU – NONE

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 MicroMS4 Flow Computer for communication to occur.*

Baud rate is defined as number of bits per second. The available selections are 1200, 2400, 4800, 9600, or 19200.

Port #1/#3 RTS Delay

This function allows modem delay time before transmission. The MicroMS4 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, 9600, or 19200.

Port #2 Modbus Type

> *Note: this parameter must be set the same for both the PC and the MicroMS4 Flow Computer for communication to occur.*

The Modbus Communication Specification is either Binary RTU or ASCII.

Port #2 Parity

RTU – NONE

ASCII – EVEN or ODD

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

Select 0=RTS, 1=Printer (N/A)

RTS line has dual function selection: either RTS for driving request to send or transmit to serial printer. To use serial printer interface for printing reports, i.e. batch, daily, and interval Connect the serial printer to RTS and common return, and select 1 for printer. Serial printer function is not available.

Port 2 RTS Delay

This function allows modem delay time before transmission. The MicroMS4 Flow Computer will turn the RTS line high before transmission for the entered time delay period.

Printer Baud Rate (N/A)

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

Printer Number of Nulls (N/A)

This function is used because no hand shaking with the printer is available and data can become garbled as the printer's buffer is filled. The MicroMS4 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.

PID Parameters

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 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 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.

PID Flow Base

PID flow rate base can be gross, net, or mass flow rate.

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 downstream 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 downstream 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 Pressure Base

PID pressure base can be meter pressure or spare#1-#9.

System Data Minimum Output

Enter the minimum output percent (default to 0)

System Data Maximum Output

Enter the maximum output percent (default to 100.0)

Signal Selection

If flow and pressure loops are both configured in the PID control loop, select high or low signal to be the output.

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 adjusts 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.

Download Firmare/Image File

To Download an Image File to the Flow Computer select the Tools option form the menu, and then Download Program.
A small dialog will appear asking for the file name of the image file. Type it in or use the Browse option to locate it. Once the file name is in place press Download. This task will take about 5 minutes to be completed.

Security Codes

The desktop application provides 4 security areas to prevent users from entering data into certain areas. The four areas are:

Configuration: Allow user to modify device configuration settings.

Override: Allow user to change values directly on the device.

Calibration: Let the user to calibrate the device inputs.

Image File Download: Let user download an image file to the device. This procedure will erase all the information and configuration stored in the device.

Master Access: Once the master access is granted, the user can access to all four areas.

Use the **Tools|Security Codes** option to modify the access code; a form will appear showing the five different security areas and the actual access status (at bottom of the form). To put a new access code log in to the desired security area and press Change security Code, type in the code and retype it on the confirm space to avoid mistyped codes. Then click [OK].

The system will update the security access every time the application connects to the device and every time data is written to the device it will check for security access before writing.

NOTE: In case the access code is forgotten contact our offices for a reset code.

Connect to Device

Click 

to establish the communication. If the communication is failed, check information in the "Communication Port Settings".

Go Offline

Click 

to disconnect the communication.

Modbus Driver

DFM provides this tool to read and write Modbus registers from and to the MicroMV flow computers.
It will display transmitting and receiving message in HEX format. It should be used for testing purpose only.

PID OPERATING

Click PID Loops icon to display PID output percentage, flow, and pressure data. To change setup, select entries under PID menu.

CALIBRATION

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

View Diagnostic Data

Diagnostic data will show live data changing real time. To control the switch outputs manually, check "Enable Switch Output Diagnostic Mode".

Calibrate Mode

To calibrate Flow Computer, totalizers 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 CALIBRATION METER

Set the meter to be calibrated.

SET CALIBRATION TIME (1-9 HOUR)

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

Calibration

See details in chapter 1.

Parameter Overrides:

Temperature Override

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

Pressure Override

Pressure override can be used when no live pressure transmitter is connected to the MicroMS4 Flow Computer.

Heating Value Override

BTU override is used in the AGA8 calculation Gross Method 1. In addition the heating value totalizer requires the heating value.

Orifice ID Override

Orifice ID is the measured diameter of the orifice at reference conditions.

FPV Override

Entering a value to override NZ19 super-compressibility factor. Using zero is a command to use the live value.

Base Density Override

In the event the user would like to override the calculated base density. This number would affect the net calculations only. Using zero is a command to use the live value. Base density is used to convert mass volume into corrected standard volume

Venturi C Override

The value is the discharge coefficient for Venturi flow equations. The default value is .9950

BS&W Override

The value is used in the liquid net flow calculation.

Multi-variables Input Override

The value can be used when the transmitter fails.

Analog Input Override

The value can be used when the transmitter fails, or while calibrating.

RTD Input Override

The value can be used when the transmitter fails, or while calibrating.

SYSTEM

DATE AND TIME

Change the date and time for the flow computer.

RESET CUMULATIVE TOTALIZER

Enter reset code to reset cumulative totalizer.
Non-resettable accumulated volume will roll over at 999999.

CLEAR SYSTEM

Enter reset system code to reset all data.

Meter Test

Well Number
Enter test well number. The test is referred to according to the WELL NUMBER.

Test Period in Minutes
It is time duration for the test. The flow computer will start collecting data for the gas and liquid streams for the pre-set time.

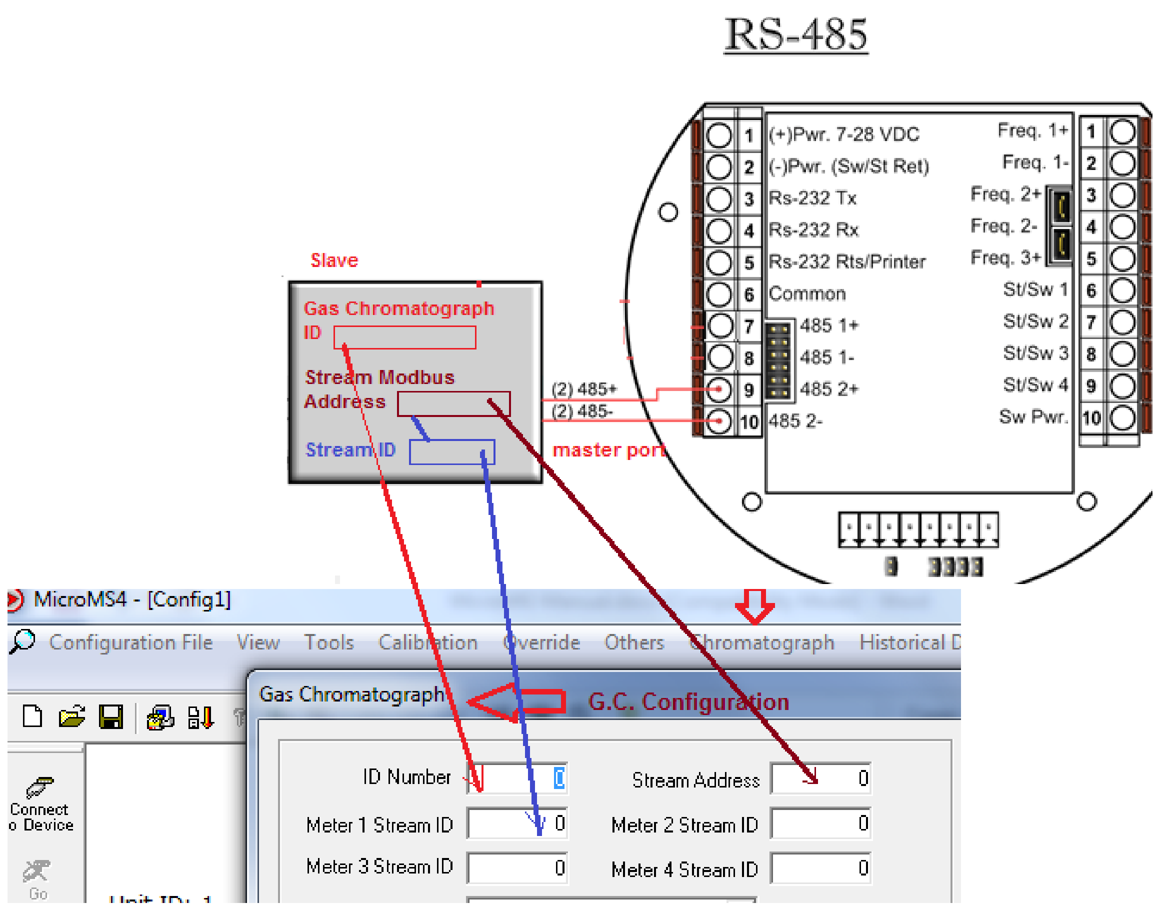
Test Request
Enter '1' to start the test, or '2' to start the test that is based on the entered date and time. The flow computer will continuously totalize the gas, oil, and water meters for the pre-set time. Five previous test data can be archived.

View Meter Test
Test snapshot data will show test status and data.

Previous Test Reports
Up to 5 previous test data can be retrieved. Starting from the most recent to the oldest.

Gas Chromatograph Communcation Set up(RS485 Master Port)

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



Gas Chromatograph Unit ID

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

Gas Chromatograph Stream Address

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.
GC Stream address configured in GC and the Modbus address range is from 3001 to 3999 and stream number is a16 bits integer format

Meter Stream ID

The stream ID for the flow computer to recognize the current stream meter composition.

GC Floating Register Settings

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

ADDR - Source Address

Source address defines the actual register being polled from the slave device. Source address is considered to be continuous without zero address in between and range must in 7000s area (IEEE Floating Point)

Example: Heating Value BTU

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

HISTORICAL DATA

VIEW, CAPTURE AND STORE

To retrieve historical data, go to **Historical Data** menu. The **View** option retrieves the data from the flow computer but does not store the information into the database. The second option, **Capture and Store**, retrieves the information, shows it on the screen and stores it on the database.

On any of these options, a small dialog like the following appears to select the amount of reports to get and from which one to start.

The valid data entries are shown at the bottom of the dialog. The available types of reports are:

PREVIOUS HOURLY DATA

Up to 840 previous hourly data are stored in the Flow Computer. Enter starting hour and the Flow Computer will go backward from that selected time. Current hour cannot be selected.

PREVIOUS DAILY DATA

Up to 35 previous daily reports can be retrieved.

LAST MONTH DATA

Month of daily data is stored in the Flow Computer. Select meter number to display, print, or capture. Current month data cannot be retrieved.

ALARM REPORT

Up to 80 previous alarm data can be retrieved. The data are starting from the most recent to the oldest.

AUDIT REPORT

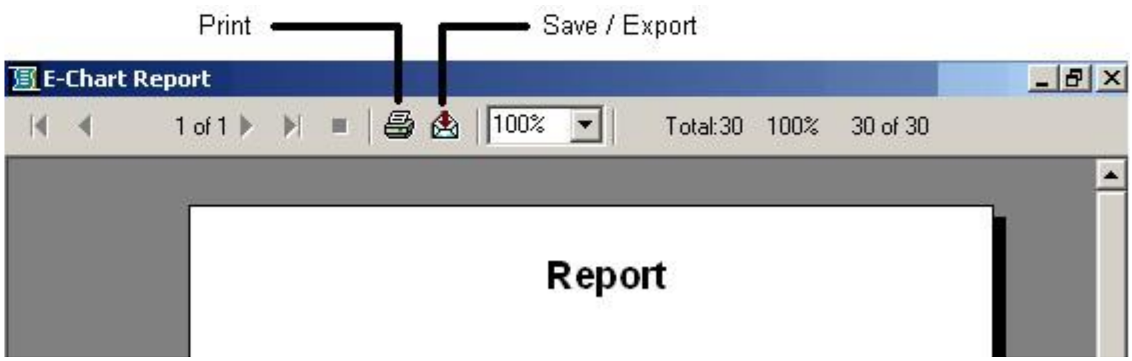
The audit trail report shows configuration parameters that have changed which could influence the calculated numbers. The Flow Computer provides up to 80 event logs. One purpose for audit trail is to back track calculation errors that result from mistakes by the operator of the flow computer operator.

Viewing previously captured reports

Once a report is stored in the database using the **Historical Data|Capture and Store** option it can be seen using the **Previously Captured Reports** option under the Historical Data Menu.

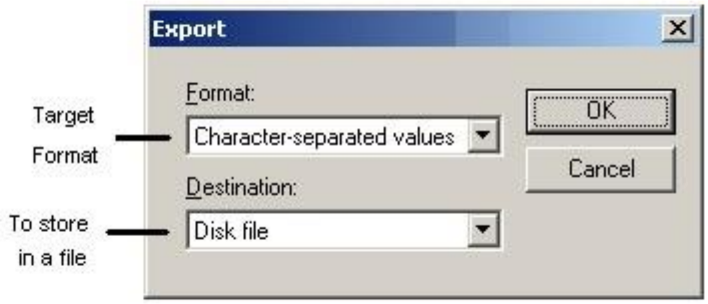
When the option is selected, a dialog will appear asking for the name of the report you want to see. There is a "View last captured report" option than will show the data acquired the last time from a device. If you want to see another report different than the last one just type the name of the report in the space provided. The browse button can be used to see the list of reports stored in the database.

Exporting or Printing Reports



Once the data is retrieved from the Flow Computer it is shown in a report format, like the picture above. On this window there are several buttons.

- **Arrow** buttons let you go through all the reports captured.
- The **Print** Button (shown o the picture) lets you print the report to any printer installed in your computer. The printed version will look just like it is shown on the screen.
- The **Export** Button allows the user to save the report in different formats. Once the button is pressed a small dialog appears showing the different formats available (see following picture).



In the first box select the format you want the file to have. **Excel**, **Word** or **HTML** formats are recommended because they preserve the report format. The plain text formats (text-format, CSV comma separated values, tab-separated values) include all the information but will require user modification to improve readability. The other text formats are **text** or **paginated text**. **IMPORTANT:** when a report is exported to text format it can only be 80 character wide, thus, some numbers might appear together making it hard to determine their original values. (i.e. values 1.2543 and 34.2342 on following columns might appear as 1.254334.2342).

Once the export format is selected, press OK and a dialog will appear asking for the file name that you want for the report. Type in the name and press SAVE.

SCHEDULED AUTO POLLING

Automatic Data Polling

Use the **Historical Data|Scheduled Auto Polling** to retrieve report information from devices in a periodic basis automatically.

These are the following settings:

Enable Automatic Data Retrieval: Check this option to enable the automatic polling. If the automatic polling function is enabled an "AUTOPOLL" message will appear on the application's status bar (bottom-right corner of the application window).

Reports to Retrieve: check the reports you want to get from the devices, you can select as many as you want, just make sure the polling interval is long enough to allow the PC to retrieve the archive. For example, if the computer is programmed to poll 100 reports every 10 seconds, there will not be enough time to get the report before the next poll starts and data will be overlapped.

Report Name: provide a name to the reports captured so they will be available for viewing, printing and exporting.

Starting Day: Type the date where the poll is going to start. Select "Every Day" is the date doesn't matter.

Polling Time: select the time you want the automatic polling to start, then select "Poll One Time" if you want to execute these poll only once or select "Poll Every…" and type the polling interval for periodic polls. For example, to poll every hour and a half select "Poll Every…" and type 90 in the Minutes field. **IMPORTANT:** Do not use straight hours as starting time (i.e. 7:00, 8:00). The flow computer calculates and updates its information at the beginning of the hour so if data is retrieved at this time it might be erroneous. Allow about 5 minutes for the flow computer to update the data.

Polling List: Add all the units you want to get data from on every poll. You can add up to 100 units. To add a unit just click "Add" and then type the unit's **Modbus** ID number.

NOTE: The file C:\AutoPoll.log will contain all the logs for the automatic poll, it will tell if there was a problem or if the data was retrieved successfully.

Histsorical Data

Hourly Report

Company Name: **Meter Location:** **Unit No.** 1

Meter Number	1	Day Start Hour	0
Meter ID	Meter1	Base Pressure	101.353 KPA
Pipe ID (mm)	200.00000	Atmospheric Press.	101.325 KPA
Orifice ID (mm)	100.000000	Base Temperature	15 °C
		Application	Gas

Date: 11/04/21

Hour	Flow Time (Hours)	Net Flow Total KSM3	Energy Total GJ	Average Pressure (KPA)	Average Temperature (°C)	Average DP (mBAR)	DPExt
0	1.00	147.0	4,996.3	2,001.00	11.0	52.1	330.9

Date: 11/03/21

Hour	Flow Time (Hours)	Net Flow Total KSM3	Energy Total GJ	Average Pressure (KPA)	Average Temperature (°C)	Average DP (mBAR)	DPExt
23	1.00	147.0	4,996.4	2,001.00	11.0	52.1	330.9
22	1.00	146.9	4,996.4	2,001.00	11.0	52.1	330.9
21	1.00	147.0	4,996.4	2,001.00	11.0	52.1	330.9
20	1.00	147.0	4,996.4	2,001.00	11.0	52.1	330.9
19	1.00	147.0	4,996.4	2,001.00	11.0	52.1	330.9
18	1.00	146.9	4,996.4	2,001.00	11.0	52.1	330.9
17	1.00	147.0	4,996.4	2,001.00	11.0	52.1	330.9
16	1.00	147.0	4,996.5	2,001.00	11.0	52.1	330.9
15	1.00	147.0	4,996.4	2,001.00	11.0	52.1	330.9
14	1.00	146.9	4,996.4	2,001.00	11.0	52.1	330.9
13	1.00	147.0	4,996.4	2,001.00	11.0	52.1	330.9
12	1.00	147.0	4,996.4	2,001.00	11.0	52.1	330.9
11	1.00	147.0	4,996.4	2,001.00	11.0	52.1	330.9
10	1.00	146.9	4,996.4	2,001.00	11.0	52.1	330.9
9	1.00	147.0	4,996.5	2,001.00	11.0	52.1	330.9
8	1.00	147.0	4,996.4	2,001.00	11.0	52.1	330.9
7	1.00	147.0	4,996.4	2,001.00	11.0	52.1	330.9
6	1.00	146.9	4,996.4	2,001.00	11.0	52.1	330.9
5	1.00	147.0	4,996.4	2,001.00	11.0	52.1	330.9
4	1.00	147.0	4,996.4	2,001.00	11.0	52.1	330.9
3	1.00	147.0	4,996.5	2,001.00	11.0	52.1	330.9
2	1.00	146.9	4,996.4	2,001.00	11.0	52.1	330.9
1	1.00	147.0	4,996.4	2,001.00	11.0	52.1	330.9
0	1.00	147.0	4,996.4	2,001.00	11.0	52.1	330.9

Previous Daily Report

Company Name: **Meter Location:** **Unit No.** 1

Meter Number	1	Base Pressure	101.353 KPA	Application:	Gas
Meter ID	Meter1	Atmospheric Press.	101.325 KPA		
Pipe ID (mm)	200.0000	Base Temperature	15 °C		
Orifice ID (mm)	100.0000				

Date	Day Start Hour	FlowingTime (Hours)	Net Flow Total KSM3	Energy Total GJ	Average Pressure (KPA)	Average Temperat. (°C)	Average DP (mBAR)	DPExt
11/03/21	0	24.00	3,527.4	119,914.0	2,001.00	11.0	52.1	330.9
11/02/21	0	24.00	3,505.5	119,167.2	2,001.00	11.0	51.4	328.9
11/01/21	0	24.00	2,401.1	81,627.0	2,001.00	11.0	50.0	324.2

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.

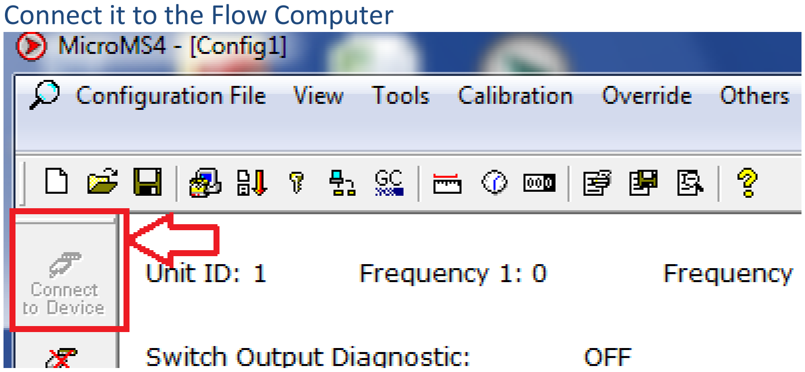
Select/Enter Key
It is used to stop screen from scrolling, to select data entry, and accept the data configurations. It is on/off type key. Place the reflective object in front of key, and then move away before the next step.

↓ Key, → Key

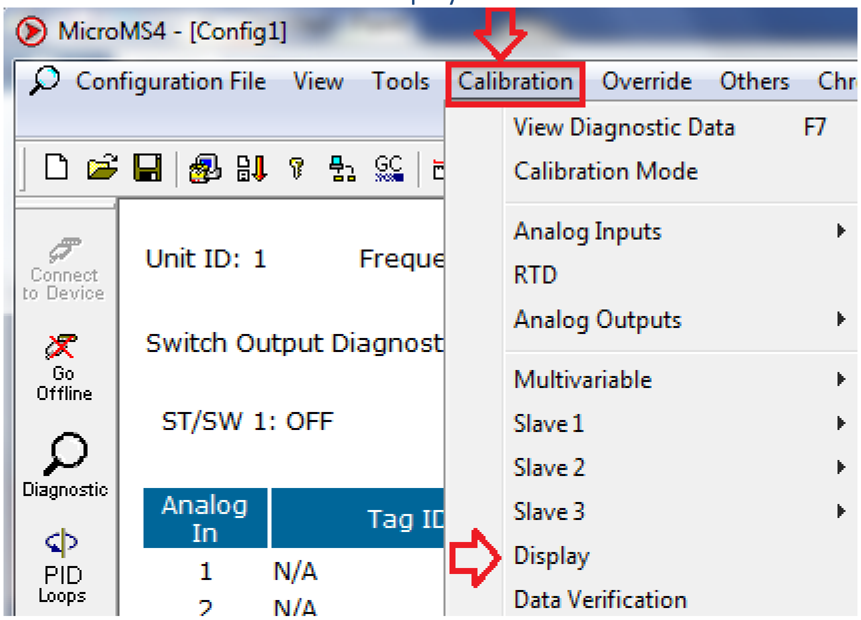
Scrolling keys, the → **Key** function is to scroll → way for selecting the number to be changed, and then changing the number by using ↓ **Key**

Steps to "Enable or Disable" the front panel keys

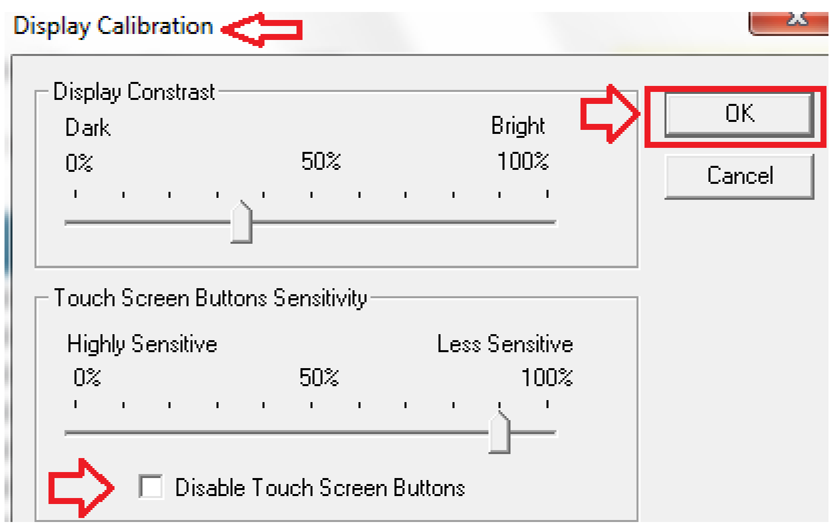
(1) Run PC configuration software
(2) Connect it to the Flow Computer



(3) Go to "Calibration" and select "Display"



(4) Check the "Disable Touch Screen Buttons" box to disable the front panel keys or uncheck the "Disable Touch Screen Buttons" box to enable the front panel keys, and then click on "OK" button



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
```

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

Configigue Meter

Flow Equation 0-10 1
0=New AGA3,1=ISO5167
2=AGA7,3=V-Cone,4,5,6 ...

Flow Equation Type (0-10)

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 = FOXBORO (Assume: US unit – Mass in LB/HR, Density LB/CF, Metric Unit- Mass in M3, Density in KG/M3)
6= Natural Gas @20 Deg.C
7= Verabar
8= Pitot Tube
9= ISO 6976
10= Venturi
11= Accelabar
12= Dynacone Wet Gas

New AGA3/ISO5167/V-Cone/Natural Gas @20 Deg.C/Venturi

Orifice ID	10.00000
Pipe ID,	5.00000
DP Cut Off	1.0000
Vis/Coeff	.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 centipoises.

Discharage Coefficient C

This value is the discharge coefficient for Venturi flow equations.

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
BS&W	130	230	330	430

	Gross	Net	Mass	Energy
Station Flow Rate	511	512	513	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**
		Analog Input #5	**23**
		Analog Input #6	**24**
		Analog Input #7	**25**
		Analog Input #8	**26**
		Analog Input #9	**27**

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 #1
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
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
Test Status	133	233	333	433
Test Gross	134	234	334	434
Test Net	135	235	335	435
BS&W	136	236	336	436

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.

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 $= \frac{Mass\ Flow}{Base\ Density} \times Conversion\ Factor$

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

Energy Flow Rate $= Net\ Flow \times Heating\ Value \times Conversion\ Factor$

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	Selectable by Data Entry	Selectable by Data Entry
Net Flow Rate/HR	Selectable by Data Entry	Selectable by Data Entry
Mass Flow Rate/HR	MLB	TONNE
Energy Flow Rate/HR	MMBTU	GJ

ISO5167

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

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

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

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

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

Where :

$$N_c = ALPHA$$

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

$$E_v = Exp. \times 3600$$

AGA7

Density Units: LB/CF (US Units), KG/M3 (Metric Units)

Gas Application

<table>
<tr><th colspan="2">Gas Meter</th></tr>
<tr><td colspan="2">Set Composition Selection to Zero</td></tr>
<tr><td>US Units</td><td>Metric Units</td></tr>
<tr><td>K Factor: Pulses/CF</td><td>K Factor: Pulses/M3</td></tr>
<tr><td colspan="2">*Hourly Report: Net and Energy
Net: MCF or KM3 (User Selectable)
Energy: MMBTU(US Units),GJ(Metric Units)</td></tr>
</table>

Gross Flow Rate (Hour) = Frequency / K Factor x 3.6 * Linear Factor*Meter Factor*Units Conversion

Net Flow Rate (Hour) = Gross*Flowing Density / Reference Density

Mass Flow Rate = Gross Flow*Flowing Density*Units Conversion

Energy Flow Rate = Net Flow * Heating Value*Units Conversion / 1000

Liquid Application

<table>
<tr><th colspan="2">Liquid Meter</th><th colspan="2">Force a Gas Meter to a Liquid Meter</th></tr>
<tr><td colspan="2">Set Composition Selection to Zero</td><td colspan="2">Set Composition Selection to Nonzero</td></tr>
<tr><td>US Units</td><td>Metric Units</td><td>US Units</td><td>Metric Units</td></tr>
<tr><td>K Factor: Pulses/BBL</td><td>K Factor: Pulses/M3</td><td>K Factor: Pulses/CF</td><td>K Factor: Pulses/M3</td></tr>
<tr><td colspan="2">Hourly Report: Gross and Net Total
BBL (US), M3(Metric)</td><td colspan="2">Hourly Report: Net and Energy
Available for firmware version 6.04.13 or newer
Net: MCF or KM3 (User Selectable)
Energy: MMBTU(US),GJ(Metric)</td></tr>
</table>

Firmware Version 6.04.10 or newer

Gross Flow Rate (Hour) = Frequency / K Factor *3.6*Units Conversion

Net Flow Rate = Gross Flow *Meter Factor* Linear Factor* C t,ant x (1-BSW)%

Mass Flow Rate = Gross Flow* Flowing Density*Units Conversion

Note:

C t,ant = CTPL = CTL x CPL ***(API2004)***

Firmware Version 6.04.09 or older

Gross Flow Rate = Frequency / K Factor * 3.6*Units Conversion

Net Flow Rate= Gross Flow*Meter Factor * Linear Factor *CTL* CPL* C t,ant * (1-BSW)%

Mass Flow Rate = Gross Flow *Flowing Density*Units Conversion

Note:

US Unit, Metric Unit @15 Deg.C

C t,ant = 1

Metric Unit @20 Deg.C (*Petroleum Measurement Paper No3 - 1988)*

C t,ant = factor to correct CTL

Cone/SMART Cone

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

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

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

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

$$\text{Energy Flowrate(MMBTU)} = \text{Net Flowrate} \times HeatingValue(MBTU) \times ConverswionFactor / 1000$$

$$EnergyFlowRate(GJ) = NetFlowRate \times HeatingValue(MJ) \times ConversionFactor$$

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, Pascal-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)

Fa = Thermal Expansion Factor

Verabar – Gas

Net Flow in MSCF/Day

N x K x Y x D x D / SQRT(G) x SQRT(Hw x Pfa /Tfa)

Mass Flow in MLB/Day

Net Flow x Base Density

Gross Flow in MSCF/Day

Net flow x Base Density / Flowing Density

Where:
N = 5.2436
K = Flow Coefficient
Y = Expansion Factor
D = Pipe ID
G = Ideal Gas Specific Gravity

Hw = Differential Pressure in H2O (68F)

Pfa = Flowing Pressure + 14.7

Tfa = Flowing Temperature + 459.67

Verabar – Liquid

Net Flow in Barrel/Day

N x K x D x D x SQRT(Hw) / SQRT(Gf)

Mass Flow in MLB/Day

Net Flow x Base Density x Unit Conversion Factor

Gross Flow in Barrel/Day

Net flow x Base Density / Flowing Density

Where:
N = 194.2784725
K = Flow Coefficient
D = Pipe ID
Gf = Flowing Specific Gravity

Hw = Differential Pressure in H2O (68F)

Venturi

$$\text{Mass Flowrate} = 0.0997424 \times 3.6 \times \sqrt{\rho \times DP} \times \frac{C \times Y \times F_a \times d^2}{\sqrt{1-\beta^4}}$$

$$= (\text{MLb/Hr})$$

$$\text{Net Flowrate} = \frac{\textit{Mass Flowrate (MLb/Hr)}}{\textit{Reference Density}}$$

$$= (\text{MCF/Hr})$$

$$\text{Gross Flowrate} = \frac{\textit{Mass Flowrate (MLb/Hr)}}{\textit{Flowing Density}}$$

$$= (\text{MCF/Hr})$$

Where $C = \textit{discharge coefficient C (manual entry)}$

$Y = \textit{expansion factor}$

$\beta = \frac{d}{D} = \frac{\textit{venturi bore diameter at reference}}{\textit{meter tube internal diameter at reference}}$

$\rho = \textit{density of the fluid at flowing conditions}$

$DP = \textit{differential pressure}$

Metric Unit for Mass Flow is in TON.

(Refer to **Miller Measurement Engineering Handbook**)

Accelabar

$$\boldsymbol{Mass\ Flow\ LB/Hour} = N \times K \times Y \times Fa \times D^2 \times \sqrt{\rho \times Dp} \times 3600$$

$$= \boldsymbol{q_{mass}}\ \text{(Hour)}$$

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

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

$$\text{Energy Flowrate(MMBTU)} = \text{Net Flowrate} \times HeatingValue(MBTU) \times ConversionFactor\ /1000$$

$Where:$

$K = Flow\ Constant$

$N = .0997429$

$Density = FlowingFluidDensity(LB/FT3)$

$D = ThroatDiameter$

$Fa = ThermalExpansionCoefficient$

$Y = Accelabar\ Gas\ Expansion\ Factor\ (Y = 1\ for\ Liquid\ Application)$

$Dp = Different\ Pressure\ IN\ H2O(68F)$

Refer to VERIS Accelabar Meter

The unit of Mass Flow (ELITE-EXP)

Mass Unit	Description
MLB	US unit
TONNE	Metric Ton

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/°F (US Unit), or °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

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

$$Where:$$

$$t = Densitometer\ Oscillation\ Period\ in\ microseconds$$

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

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.

$$DA = DT + (1 + K3/(DT + K4)x0.00236 - G/(T + 273))$$

G = Gas Specific Gravity / Ratio of Specific Heats.

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

AGA8 Gross Method 1- Gas Meter

Refer to Transmission Measurement Committee Report No. 8

AGA8 Gross Method 2 – Gas Meter

Refer to Transmission Measurement Committee Report No. 8

AGA8 Detail Method – Gas Meter

Refer to Transmission Measurement Committee Report No. 8

Table 24A/ Chapter 11.2.1 - Liquid Meter

	Calculation Type	**Comments and Limitations**
US Unit	Table 24A/Chapter.11.2.1	SG .637 – 1.076 Temperature 0-300 DEG.F
Metric Unit	0=Crude Volume to 20 Deg.C	
Metric Unit	1=Crude Volume to 15 Deg.C	

NIST10 Superheated Steam – Gas Meter

Refer to National Institute of Standards and Technology

NIST10 Superheated Steam	Pressure > 2.06843 MPA, Temperature > 533.15 Deg.K

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)

Each Modbus System has a different Modbus address range. For example, 40000 or 90000 is the high level message generated through the host Modbus system. The set up and offset are different for each host Modbus system.

READ A SHORT (SINGLE) WORD NUMERIC VARIABLE

The short word numeric variable is a 16-bit integer
Data: 16 bits (short word: two 8-bit bytes - high byte, low byte),
Short Integer Variable Modbus Address: from 1801 to 3030

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

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

READ A LONG WORD NUMERIC VARIABLE

The long word numeric variable is a *two 16-bit integers* with decimal inferred
Data: two 16-bit (32 bits, two words: high word, low word).
Sign bit - first bit of high word (0:positive, 1:negative)
Long Integer Variable Modbus Address: from 3131 to 9645

Read Address 3131

ADDR	FUNC CODE	STARTING Address		# OF Registers		CRC CHECK	
		HI	LO	HI	LO		
01	03	0C	3B	00	**02**	B6	96

Response - Data **- 4 Bytes - 00 05 6A 29 (Hex), 611 (Decimal)**

ADDR	FUNC CODE	BYTE COUNTS	**DATA**				CRC CHECK	
			HI Word		**LO Word**			
01	03	04	**00**	**05**	**6A**	**29**	05	4C

Data Bytes - 00 05 6A 29 (Hex) = 354857 (decimal)
Data with 2 decimal places inferred = 3548.57

For Example:
Honeywell Modbus System - read address **93131**
Delta-V Modbus system - read address **43131**
Data Calculation
Value = High Word x 65536 + Low Word

High Word = 00 05 (Hex), 5 (Decimal)
Low Word = 6A 29 (Hex), 27177 (Decimal)
= 5 x 65536 + 27177
= 354857
Two decimal places inferred
= 3548.57

READ A FLOATING POINT VARIABLE

The floating point variable is a single precision floating point value. The format can be configured as

Number of Bytes (Modbus Address2368)

Selection	Description
0: 4 Bytes	One Register - 4 Bytes
1: 2 Bytes	Two Registers – 4 Bytes

Bytes Order (Modbus Address 2369)

Selection	Description
0: HI, LO	Data - 4 Bytes HI HI LO LO
1: LO, HI	Data - 4 Bytes LO LO HI HI

IEEE Floating Point Format

Sign	Exponent	Mantissa
1 bit	8 bits	23 bits

Byte 3	Byte 2	Byte 1	Byte 0
SEEEEEEE	EMMMMMMM	MMMMMMMM	MMMMMMMM

Modbus Address: From 7001 to 7999

Example: Read one register with 4 data bytes (High and Low words)

Read Register 7047

ADDR	FUNC CODE	STARTING Address		# OF Registers		CRC CHECK	
		HI	LO	HI	LO		
01	03	1B	87	00	**01**	32	C7

Response - Four Data Bytes - **47 6C 4A 00 (HEX) = 60490.0**

ADDR	FUNC CODE	BYTE COUNTS	**DATA**				CRC CHECK	
			HI Word		**LO Word**			
01	03	04	**47**	**6C**	**4A**	**00**	19	FA

Modbus Address Table – 16 Bits Integer

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
1801	Gas Chromatograph Unit ID	0 Inferred	Read/Write
1802	Gas Chromatograph Stream Address	0 Inferred	Read/Write
1803	Meter#1 Gas Chromatograph Stream ID	0 Inferred	Read/Write
1804	Meter#2 Gas Chromatograph Stream ID	0 Inferred	Read/Write
1805	Meter#3 Gas Chromatograph Stream ID	0 Inferred	Read/Write
1806	Meter#4 Gas Chromatograph Stream ID	0 Inferred	Read/Write
1807	Variable Type	0 Inferred	Read/Write
1808	Variable#1 Destination	0 Inferred	Read/Write
1809	Variable#2 Destination	0 Inferred	Read/Write
1810	Variable#3 Destination	0 Inferred	Read/Write
1811	Variable#4 Destination	0 Inferred	Read/Write
1812	Variable#5 Destination	0 Inferred	Read/Write
1813	Variable#6 Destination	0 Inferred	Read/Write
1814	Variable#7 Destination	0 Inferred	Read/Write
1815	Variable#8 Destination	0 Inferred	Read/Write
1816	Variable#9 Destination	0 Inferred	Read/Write
1817	Variable#10 Destination	0 Inferred	Read/Write
1818	Variable#11 Destination	0 Inferred	Read/Write
1819	Variable#12 Destination	0 Inferred	Read/Write
1820	Variable#13 Destination	0 Inferred	Read/Write
1821	Variable#14 Destination	0 Inferred	Read/Write
1822	Variable#15 Destination	0 Inferred	Read/Write
1823	Variable#16 Destination	0 Inferred	Read/Write
1824	Variable#17 Destination	0 Inferred	Read/Write
1825	Variable#18 Destination	0 Inferred	Read/Write
1826	Variable#19 Destination	0 Inferred	Read/Write
1827	Variable#20 Destination	0 Inferred	Read/Write
1828	Variable#1 Source Address	0 Inferred	Read/Write
1829	Variable#2 Source Address	0 Inferred	Read/Write
1830	Variable#3 Source Address	0 Inferred	Read/Write
1831	Variable#4 Source Address	0 Inferred	Read/Write
1832	Variable#5 Source Address	0 Inferred	Read/Write
1833	Variable#6 Source Address	0 Inferred	Read/Write
1834	Variable#7 Source Address	0 Inferred	Read/Write
1835	Variable#8 Source Address	0 Inferred	Read/Write
1836	Variable#9 Source Address	0 Inferred	Read/Write
1837	Variable#10 Source Address	0 Inferred	Read/Write
1838	Variable#11 Source Address	0 Inferred	Read/Write
1839	Variable#12 Source Address	0 Inferred	Read/Write
1840	Variable#13 Source Address	0 Inferred	Read/Write
1841	Variable#14 Source Address	0 Inferred	Read/Write
1842	Variable#15 Source Address	0 Inferred	Read/Write
1843	Variable#16 Source Address	0 Inferred	Read/Write
1844	Variable#17 Source Address	0 Inferred	Read/Write
1845	Variable#18 Source Address	0 Inferred	Read/Write
1846	Variable#19 Source Address	0 Inferred	Read/Write
1847	Variable#20 Source Address	0 Inferred	Read/Write
1848	Spare		
1849	MicroMV Slave (1=Yes)	0 Inferred	Read/Write
1850	Slave Unit#4 ID	0 Inferred	Read/Write

Modbus Address Table – 16 Bits Integer

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
1851	Slave#1 Unit ID	0 Inferred	Read/Write
1852	Slave#1 Variable#1 Type	0 Inferred	Read/Write
1853	Slave#1 Variable#2 Type	0 Inferred	Read/Write
1854	Slave#1 Variable#3 Type	0 Inferred	Read/Write
1855	Slave#1 Variable#4 Type	0 Inferred	Read/Write
1856	Slave#1 Variable#5 Type	0 Inferred	Read/Write
1857	Slave#1 Variable#1 Desitination	0 Inferred	Read/Write
1858	Slave#1 Variable#2 Desitination	0 Inferred	Read/Write
1859	Slave#1 Variable#3 Desitination	0 Inferred	Read/Write
1860	Slave#1 Variable#4 Desitination	0 Inferred	Read/Write
1861	Slave#1 Variable#5 Desitination	0 Inferred	Read/Write
1862	Slave#1 Variable#1 Source Address	0 Inferred	Read/Write
1863	Slave#1 Variable#2 Source Address	0 Inferred	Read/Write
1864	Slave#1 Variable#3 Source Address	0 Inferred	Read/Write
1865	Slave#1 Variable#4 Source Address	0 Inferred	Read/Write
1866	Slave#1 Variable#5 Source Address	0 Inferred	Read/Write
1867	Slave#2 Unit ID	0 Inferred	Read/Write
1868	Slave#2 Variable#1 Type	0 Inferred	Read/Write
1869	Slave#2 Variable#2 Type	0 Inferred	Read/Write
1870	Slave#2 Variable#3 Type	0 Inferred	Read/Write
1871	Slave#2 Variable#4 Type	0 Inferred	Read/Write
1872	Slave#2 Variable#5 Type	0 Inferred	Read/Write
1873	Slave#2 Variable#1 Desitination	0 Inferred	Read/Write
1874	Slave#2 Variable#2 Desitination	0 Inferred	Read/Write
1875	Slave#2 Variable#3 Desitination	0 Inferred	Read/Write
1876	Slave#2 Variable#4 Desitination	0 Inferred	Read/Write
1877	Slave#2 Variable#5 Desitination	0 Inferred	Read/Write
1878	Slave#2 Variable#1 Source Address	0 Inferred	Read/Write
1879	Slave#2 Variable#2 Source Address	0 Inferred	Read/Write
1880	Slave#2 Variable#3 Source Address	0 Inferred	Read/Write
1881	Slave#2 Variable#4 Source Address	0 Inferred	Read/Write
1882	Slave#2 Variable#5 Source Address	0 Inferred	Read/Write
1883	Slave#3 Unit ID	0 Inferred	Read/Write
1884	Slave#3 Variable#1 Type	0 Inferred	Read/Write
1885	Slave#3 Variable#2 Type	0 Inferred	Read/Write
1886	Slave#3 Variable#3 Type	0 Inferred	Read/Write
1887	Slave#3 Variable#4 Type	0 Inferred	Read/Write
1888	Slave#3 Variable#5 Type	0 Inferred	Read/Write
1889	Slave#3 Variable#1 Desitination	0 Inferred	Read/Write
1890	Slave#3 Variable#2 Desitination	0 Inferred	Read/Write
1891	Slave#3 Variable#3 Desitination	0 Inferred	Read/Write
1892	Slave#3 Variable#4 Desitination	0 Inferred	Read/Write
1893	Slave#3 Variable#5 Desitination	0 Inferred	Read/Write
1894	Slave#3 Variable#1 Source Address	0 Inferred	Read/Write
1895	Slave#3 Variable#2 Source Address	0 Inferred	Read/Write
1896	Slave#3 Variable#3 Source Address	0 Inferred	Read/Write
1897	Slave#3 Variable#4 Source Address	0 Inferred	Read/Write
1898	Slave#3 Variable#5 Source Address	0 Inferred	Read/Write
1899	Slave Unit Update Flag (1=Slave,2=G.C,3=MPU)	0 Inferred	Read/Write
1900-1920	Spare		

Modbus Address Table – 16 Bits Integer

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
1916	Spring Forward Month	0 Inferred	Read/Write
1917	Spring Forward Day	0 Inferred	Read/Write
1918	Fall Back Month	0 Inferred	Read/Write
1919	Fall Back Day	0 Inferred	Read/Write
1920	Enable Daylight Time Saving	0 Inferred	Read/Write
1921	DFM Display Screen#9 Assignment #1	0 Inferred	Read/Write
1922	DFM Display Screen#9 Assignment #2	0 Inferred	Read/Write
1923	DFM Display Screen#10 Assignment #1	0 Inferred	Read/Write
1924	DFM Display Screen#10 Assignment #2	0 Inferred	Read/Write
1925	DFM Display Screen#11 Assignment #1	0 Inferred	Read/Write
1926	DFM Display Screen#11 Assignment #2	0 Inferred	Read/Write
1927	DFM Display Screen#12 Assignment #1	0 Inferred	Read/Write
1928	DFM Display Screen#12 Assignment #2	0 Inferred	Read/Write
1929	Analog Input#1 Tag Number	0 Inferred	Read/Write
1930	Analog Input#2 Tag Number	0 Inferred	Read/Write
1931	Analog Input#3 Tag Number	0 Inferred	Read/Write
1932	Analog Input#4 Tag Number	0 Inferred	Read/Write
1933	Analog Input#5 Tag Number	0 Inferred	Read/Write
1934	Analog Input#6 Tag Number	0 Inferred	Read/Write
1935	Analog Input#7 Tag Number	0 Inferred	Read/Write
1936	Analog Input#8 Tag Number	0 Inferred	Read/Write
1937	Analog Input#9 Tag Number	0 Inferred	Read/Write
1938	Auxiliary I/O #1 Tag Number	0 Inferred	Read/Write
1939	Auxiliary I/O #2 Tag Number	0 Inferred	Read/Write
1940	Auxiliary I/O #3 Tag Number	0 Inferred	Read/Write
1941	Auxiliary I/O #4 Tag Number	0 Inferred	Read/Write
1942	Auxiliary I/O #5 Tag Number	0 Inferred	Read/Write
1943	Auxiliary I/O #6 Tag Number	0 Inferred	Read/Write
1944	Auxiliary I/O #7 Tag Number	0 Inferred	Read/Write
1945	Auxiliary I/O #8 Tag Number	0 Inferred	Read/Write
1946	Auxiliary I/O #9 Tag Number	0 Inferred	Read/Write
1947	Auxiliary I/O #10 Tag Number	0 Inferred	Read/Write
1948	Auxiliary I/O #11 Tag Number	0 Inferred	Read/Write
1949	Auxiliary I/O #12 Tag Number	0 Inferred	Read/Write

Modbus Address Table – 16 Bits Integer

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
1950	Slave#1 DP Calib. Index	0 Inferred	Read/Write
1951	Slave#1 Pressure Calib. Index	0 Inferred	Read/Write
1952	Slave#1 Temperature Calib. Index	0 Inferred	Read/Write
1953	Spare Auxiliary I/O#1 Calib. Index	0 Inferred	Read/Write
1954	Spare Auxiliary I/O#2 Calib. Index	0 Inferred	Read/Write
1955	Spare Auxiliary I/O#3 Calib. Index	0 Inferred	Read/Write
1956	Spare Auxiliary I/O#4 Calib. Index	0 Inferred	Read/Write
1957	Slave#2 DP Calib. Index	0 Inferred	Read/Write
1958	Slave#2 Pressure Calib. Index	0 Inferred	Read/Write
1959	Slave#2 Temperature Calib. Index	0 Inferred	Read/Write
1960	Spare Auxiliary I/O#5 Calib. Index	0 Inferred	Read/Write
1961	Spare Auxiliary I/O#6 Calib. Index	0 Inferred	Read/Write
1962	Spare Auxiliary I/O#7 Calib. Index	0 Inferred	Read/Write
1963	Spare Auxiliary I/O#8 Calib. Index	0 Inferred	Read/Write
1964	Slave#3 DP Calib. Index	0 Inferred	Read/Write
1965	Slave#3 Pressure Calib. Index	0 Inferred	Read/Write
1966	Slave#3 Temperature Calib. Index	0 Inferred	Read/Write
1967	Spare Auxiliary I/O#9 Calib. Index	0 Inferred	Read/Write
1968	Spare Auxiliary I/O#10 Calib. Index	0 Inferred	Read/Write
1969	Spare Auxiliary I/O#11 Calib. Index	0 Inferred	Read/Write
1970	Spare Auxiliary I/O#12 Calib. Index	0 Inferred	Read/Write

Modbus Address Table – 16 Bits Integer

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
1971	Analog Input #5 Calib. Index	0 Inferred	Read/Write
1972	Analog Input #6 Calib. Index	0 Inferred	Read/Write
1973	Analog Input #7 Calib. Index	0 Inferred	Read/Write
1974	Analog Input #8 Calib. Index	0 Inferred	Read/Write
1975	Analog Input #9 Calib. Index	0 Inferred	Read/Write
1976	Spare Auxiliary I/O #1 Decimal Places	0 Inferred	Read
1977	Spare Auxiliary I/O #2 Decimal Places	0 Inferred	Read
1978	Spare Auxiliary I/O #3 Decimal Places	0 Inferred	Read
1979	Spare Auxiliary I/O #4 Decimal Places	0 Inferred	Read
1980	Spare Auxiliary I/O #5 Decimal Places	0 Inferred	Read
1981	Spare Auxiliary I/O #6 Decimal Places	0 Inferred	Read
1982	Spare Auxiliary I/O #7 Decimal Places	0 Inferred	Read
1983	Spare Auxiliary I/O #8 Decimal Places	0 Inferred	Read
1984	Spare Auxiliary I/O #9 Decimal Places	0 Inferred	Read
1985	Spare Auxiliary I/O #10 Decimal Places	0 Inferred	Read
1986	Spare Auxiliary I/O #11 Decimal Places	0 Inferred	Read
1987	Spare Auxiliary I/O #12 Decimal Places	0 Inferred	Read
1988	Turbine Diagnostic Data #1–Update Seconds(1-60)	0 Inferred	Read
1989	Turbine Diagnostic Data #1 – Sensitive Factor	0 Inferred	Read
1990	Turbine Diagnostic Data #1 – Number of Blades	0 Inferred	Read
1991	Turbine Diagnostic Data #2–Update Seconds(1-60)	0 Inferred	Read
1992	Turbine Diagnostic Data #2 – Sensitive Factor	0 Inferred	Read
1993	Turbine Diagnostic Data #2 – Number of Blades	0 Inferred	Read
1994	Turbine Diagnostic Data #3–Update Seconds(1-60)	0 Inferred	Read
1995	Turbine Diagnostic Data #3 – Sensitive Factor	0 Inferred	Read
1996	Turbine Diagnostic Data #3 – Number of Blades	0 Inferred	Read
1997	Turbine Diagnostic #1 Mode (1=Diagnostic,0=No)	0 Inferred	Read
1998	Turbine Diagnostic #2 Mode (1=Diagnostic,0=No)	0 Inferred	Read
1999	Turbine Diagnostic #3 Mode (1=Diagnostic,0=No)	0 Inferred	Read
2108	Frequency #1	0 Inferred	Read
2109	Frequency #2	0 Inferred	Read
2110	Frequency #3	0 Inferred	Read

Modbus Address Table – 16 Bits Integer

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
(The following 2 registers only available for version 6.01.6 or above)			
2368	IEEE Floating Point Modbus 0=one 32 bit data ,1=two 16 bit data		
2369	IEEE Floating Point Modbus 0=HI,LO,1=LO,HI Byte	0 Inferred	Read/Write
2534	Flow Copmputer Display Delay	0 Inferred	Read/Write
2535	DFM Display Screen#1 Assignment #1	0 Inferred	Read/Write
2536	DFM Display Screen#1 Assignment #2	0 Inferred	Read/Write
2537	DFM Display Screen#2 Assignment #1	0 Inferred	Read/Write
2538	DFM Display Screen#2 Assignment #2	0 Inferred	Read/Write
2539	DFM Display Screen#3 Assignment #1	0 Inferred	Read/Write
2540	DFM Display Screen#3 Assignment #2	0 Inferred	Read/Write
2541	DFM Display Screen#4 Assignment #1	0 Inferred	Read/Write
2542	DFM Display Screen#4 Assignment #2	0 Inferred	Read/Write
2543	DFM Display Screen#5 Assignment #1	0 Inferred	Read/Write
2544	DFM Display Screen#5 Assignment #2	0 Inferred	Read/Write
2545	DFM Display Screen#6 Assignment #1	0 Inferred	Read/Write
2546	DFM Display Screen#6 Assignment #2	0 Inferred	Read/Write
2547	DFM Display Screen#7 Assignment #1	0 Inferred	Read/Write
2548	DFM Display Screen#7 Assignment #2	0 Inferred	Read/Write
2549	DFM Display Screen#8 Assignment #1	0 Inferred	Read/Write
2550	DFM Display Screen#8 Assignment #2	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/CM2,2=KPA	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	Use Station Total	0 Inferred	Read/Write
2576	Spare #1 Assignment	0 Inferred	Read/Write
2577	Spare #2 Assignment	0 Inferred	Read/Write
2578	Spare #3 Assignment	0 Inferred	Read/Write
2579	Spare #4 Assignment	0 Inferred	Read/Write
2580	DP Unit (0=m.Bar, 1=KPA)	0 Inferred	Read/Write
2581	Flow Rate Display 0=Hour,1=Day,2=Minute	0 Inferred	Read/Write
2582	Flowrate Averaged Seconds (1-5)	0 Inferred	Read/Write

Modbus Address Table – 16 Bits

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
2583	Day Start Hour (0-23)	0 Inferred	Read/Write
2584	Disable Alarms ? (0=No, 1=Yes)	0 Inferred	Read/Write
2585	Spare		
2586	Spare		
2587	Pulse Width	0 Inferred	Read/Write
2588-2590	Spare		
2591	Spare #5 Assignment	0 Inferred	Read/Write
2592	Spare #6 Assignment	0 Inferred	Read/Write
2593	Spare #7 Assignment	0 Inferred	Read/Write
2594	Spare #8 Assignment	0 Inferred	Read/Write
2595	Spare #9 Assignment	0 Inferred	Read/Write
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	Analog Input #5 Fail Code	0 Inferred	Read/Write
2605	Analog Input #6 Fail Code	0 Inferred	Read/Write
2606	Analog Input #7 Fail Code	0 Inferred	Read/Write
2607	Analog Input #8 Fail Code	0 Inferred	Read/Write
2608	Analog Input #9 Fail Code	0 Inferred	Read/Write
2609	Enable Battery Alarm (1=Yes)	0 Inferred	Read/Write
2610	Common BS&W	0 Inferred	Read/Write
2611-2620	Company Name	20 Chars	Read/Write
2621-2630	Meter Location	20 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
2669-2671	Spare		
2672	Meter#1 Frequency I/O Position	0 Inferred	Read/Write
2673	Meter#1 Composition Set Number	0 Inferred	Read/Write
2674	Meter#1 BS&W Assignment	0 Inferred	Read/Write
2675	Spare		
2676	Meter #2 Use Stack DP	0 Inferred	Read/Write

Modbus Address Table – 16 Bits

ADDRESS	DESCRIPTION	DECIMAL	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
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
2689-2691	Spare		
2692	Meter#2 Frequency I/O Position	0 Inferred	Read/Write
2693	Meter#2 Composition Set Number	0 Inferred	Read/Write
2694	Meter#2 BS&W Assignment	0 Inferred	Read/Write
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
2709-2711	Spare		
2712	Meter #3 Frequency I/O Position	0 Inferred	Read/Write
2713	Meter #3 Composition Set Number	0 Inferred	Read/Write
2714	Meter #3 BS&W Assignment	0 Inferred	Read/Write
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
2729-2731	Spare		
2732	Meter #4 Frequency I/O Position	0 Inferred	Read/Write
2733	Meter #4 Composition Set Number	0 Inferred	Read/Write
2734	Meter #4 BS&W Assignment	0 Inferred	Read/Write
2735	Spare		

Modbus Address Table – 16 Bits

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
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	Meter #1 0=Gas, 1=Liquid Application	0 Inferred	Read/Write
2748	Meter #2 0=Gas, 1=Liquid Application	0 Inferred	Read/Write
2749	Meter #3 0=Gas, 1=Liquid Application	0 Inferred	Read/Write
2750	Meter #4 0=Gas, 1=Liquid Application	0 Inferred	Read/Write
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
2755-2860	Reserved		
2861-2864	Analog Input #5 Tag Name	8 Chars	Read/Write
2865-2868	Analog Input #6 Tag Name	8 Chars	Read/Write
2869-2872	Analog Input #7 Tag Name	8 Chars	Read/Write
2873-2876	Analog Input #8 Tag Name	8 Chars	Read/Write
2877-2880	Analog Input #9 Tag Name	8 Chars	Read/Write
2881-2883	Reserved		
2884-2890	Reserved		
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
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 DP Tag	8 Chars.	Read/Write
2935-2938	Multi.Var.Pressure Tag	8 Chars.	Read/Write
2939-2942	Multi.Var 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

Modbus Address Table – 16 Bits

ADDRESS	DESCRIPTION	DECIMAL	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	Meter#1 PID Pressure Base	0 Inferred	Read/Write
2980	Meter#2 PID Pressure Base	0 Inferred	Read/Write
2981	Meter#3 PID Pressure Base	0 Inferred	Read/Write
2982	Meter#4 PID Pressure Base	0 Inferred	Read/Write
2983-2984	Spare		
2985	Analog Output#1 –Remote Control (0-100)	0 Inferred	Read
2986	Analog Output#2 –Remote Control (0-100)	0 Inferred	Read
2987	Analog Output#3 –Remote Control (0-100)	0 Inferred	Read
2988	Analog Output#4 –Remote Control (0-100)	0 Inferred	Read
2989	Reset PID	0 Inferred	Read/Write
2990	Slave #1 DP Fail Code	0 Inferred	Read/Write
2991	Slave #1 Pressure Fail Code	0 Inferred	Read/Write
2992	Slave #1 Temperature Fail Code	0 Inferred	Read/Write
2993	Slave #2 DP Fail Code	0 Inferred	Read/Write
2994	Slave #2 Pressure Fail Code	0 Inferred	Read/Write
2995	Slave #2 Temperature Fail Code	0 Inferred	Read/Write
2996	Slave #3 DP Fail Code	0 Inferred	Read/Write
2997	Slave #3 Pressure Fail Code	0 Inferred	Read/Write
2998	Slave #3 Temperature Fail Code	0 Inferred	Read/Write
2999	Spare		

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	Report Format (0=Standard, 1=Prog.Variable)	0 Inferred	Read/Write
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/Write
3020	Spare	0 Inferred	Read/Write
3021	Test Request (0=No,1=On Demand,2=Date/Time)	0 Inferred	Read/Write
3022	Calibrate Meter	0 Inferred	Read
3023	Application Tag	0 Inferred	Read
3024	Enable Calibration Mode (1=Yes)	0 Inferred	Read
3025	Calibration – Set Time (1-9 Hours)	0 Inferred	Read
3026	Last Test Report Request (1-5)	0 Inferred	Write
3027	Reserved		
3028	Meter Number for Previous Historical Data Packet	0 Inferred	Read/Write
3029	Last Month Report Request	0 Inferred	Write
3030	Last Alarm Report Request	0 Inferred	Write
3031	Last Audit Report Request	0 Inferred	Write
3032	Time Clock – Month		Read
3033	Time Clock – Day		Read
3034	Time Clock – Year (2 Digits)		Read
3035	Time Clock – Hour		Read
3036	Time Clock – Minute		Read
3037	Time Clock – Second		Read
3038	Meter#1 Accelabar Size	0 Inferred	Read/Write
3039	Meter#1 Body Material	0 Inferred	Read/Write
3040	Meter#2 Accelabar Size	0 Inferred	Read/Write
3041	Meter#2 Body Material	0 Inferred	Read/Write
3042	Meter#3 Accelabar Size	0 Inferred	Read/Write
3043	Meter#3 Body Material	0 Inferred	Read/Write
3044	Meter#4 Accelabar Size	0 Inferred	Read/Write
3045	Meter#4 Body Material	0 Inferred	Read/Write
3046-3050	Reserved		
3051	Gas Meter Gross Flow Units	0 Inferred	Read/Write
3052	Gas Meter Mass Flow Units	0 Inferred	Read/Write
3053	Oil and Water Meter Gross Flow Units	0 Inferred	Read/Write
3054	Oil Meter Mass Flow Units	0 Inferred	Read/Write
3055-3121	Spare		
3122	Data Verification Number	0 Inferred	Read/Write
3123-3128	Spare		
3129	Last Calib./Verification Rpt Req.(1=Latest,20=Oldest**)**	0 Inferred	Write

Modbus 16-bit Address Table Ends

Modbus Address Table – 2x16 Bits Integer

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
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	0 Inferred	Read
3149	Meter #1 Monthly Net Total	0 Inferred	Read
3151	Meter #1 Monthly Mass Total	0 Inferred	Read
3153	Meter #1 Monthly Energy Total	0 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	0 Inferred	Read
3189	Meter #2 Monthly Net Total	0 Inferred	Read
3191	Meter #2 Monthly Mass Total	0 Inferred	Read
3193	Meter #2 Monthly Energy Total	0 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 – 2x16 Bits Integer

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	0 Inferred	Read
3229	Meter #3 Monthly Net Total	0 Inferred	Read
3231	Meter #3 Monthly Mass Total	0 Inferred	Read
3233	Meter #3 Monthly Energy Total	0 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	0 Inferred	Read
3269	Meter #4 Monthly Net Total	0 Inferred	Read
3271	Meter #4 Monthly Mass Total	0 Inferred	Read
3273	Meter #4 Monthly Energy Total	0 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		
3291-3323	Spare		
3325	Report by Exception Alarms	0 Inferred	Read

```
00000001 Slave#3 Multi.Var DP Alarm
00000002 Slave#3 Multi.Var PF Alarm
00000004 Slave#3 Multi.Var TF Alarm
00000008 Spare Auxiliary#9 Alarm
00000010 Spare Auxiliary#10 Alarm
00000020 Spare Auxiliary#11 Alarm
00000040 Spare Auxiliary#12 Alarm
```

3327	Reserved	0 Inferred	Read

Modbus Address Table – 2x16 Bits Integer

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
3329	Report by Exception Alarms	0 Inferred	Read

```
00000001 Analog Input #1 Alarm
00000002 Analog Input #2 Alarm
00000004 Analog Input #3 Alarm
00000008 Analog Input #4 Alarm
00000010 Analog Input #5 Alarm
00000020 Analog Input #6 Alarm
00000040 Analog Input #7 Alarm
00000080 Analog Input #8 Alarm

00000100 Analog Input #9 Alarm
00000200 Multi.Var DP Alarm
00000400 Multi.Var Pressure Alarm
00000800 Multi.Var Temperature Alarm
00001000 Battery Alarm
00002000 Slave Comm. Failed
00004000
00008000

00010000 Slave#1 Multi.Var DP Alarm
00020000 Slave#1 Multi.Var Pressure Alarm
00040000 Slave#1 Multi.Var Temperature Alarm
00080000 Spare Auxiliary#1 Alarm
00100000 Spare Auxiliary#2 Alarm
00200000 Spare Auxiliary#3 Alarm
00400000 Spare Auxiliary#4 Alarm

01000000 Slave#2 Multi.Var DP Alarm
02000000 Slave#2 Multi.Var Pressure Alarm
04000000 Slave#2 Multi.Var Temperature Alarm
08000000 Spare Auxiliary#5 Alarm
10000000 Spare Auxiliary#6 Alarm
20000000 Spare Auxiliary#7 Alarm
40000000 Spare Auxiliary#8 Alarm
```

3331	Reserved	0 Inferred	Read
3333	Reserved	0 Inferred	Read
3335	Reserved	0 Inferred	Read
3337	Reserved	0 Inferred	Read
3339	Reserved	0 Inferred	Read

Modbus Address Table – 2x16 Bits Integer

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
3341	Analog Input #5 mA Value	3 Inferred	Read
3343	Analog Input #6 mA Value	3 Inferred	Read
3345	Analog Input #7 mA Value	3 Inferred	Read
3347	Analog Input #8 mA Value	3 Inferred	Read
3349	Analog Input #9 mA Value	3 Inferred	Read
3351	Reserved		
3353	Analog Input #1 mA Value	3 Inferred	Read
3355	Analog Input #2 mA Value	3 Inferred	Read
3357	Analog Input #3 mA Value	3 Inferred	Read
3359	Analog Input #4 mA Value	3 Inferred	Read
3361	RTD Input Ohm Value	3 Inferred	Read
3363	Analog Output #1 mA Value	3 Inferred	Read
3365	Analog Output #2 mA Value	3 Inferred	Read
3367	Analog Output #3 mA Value	3 Inferred	Read
3369	Analog Output #4 mA Value	3 Inferred	Read
3371	Display Contrast	0 Inferred	Read
3373	Display Sensitive Factor	0 Inferred	Read
3375-3381	Spare		
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
3393-3421	Spare		
3423	Meter#1 Yesterday's FWA Temperature	2 Inferred	Read
3425	Meter#1 Yesterday's FWA Pressure	2 Inferred	Read
3427	Meter#1 Yesterday's Gross Total	1 Inferred	Read
3429	Meter#1 Yesterday's Net Total	1 Inferred	Read
3431	Meter#2 Yesterday's FWA Temperature	2 Inferred	Read
3433	Meter#2 Yesterday's FWA Pressure	2 Inferred	Read
3435	Meter#2 Yesterday's Gross Total	1 Inferred	Read
3437	Meter#2 Yesterday's Net Total	1 Inferred	Read
3439	Meter#3 Yesterday's FWA Temperature	2 Inferred	Read
3441	Meter#3 Yesterday's FWA Pressure	2 Inferred	Read
3443	Meter#3 Yesterday's Gross Total	1 Inferred	Read
3445	Meter#3 Yesterday's Net Total	1 Inferred	Read
3447	Meter#4 Yesterday's FWA Temperature	2 Inferred	Read
3449	Meter#4 Yesterday's FWA Pressure	2 Inferred	Read
3451	Meter#4 Yesterday's Gross Total	1 Inferred	Read
3453	Meter#4 Yesterday's Net Total	1 Inferred	Read
3455-3467	Spare		

Modbus Address Table – 2x16 Bits Integer

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
Snapshot Test Data Area			
3469	Test Data – Meter #1 24 Hours Gross Total	1 Inferred	Read
3471	Test Data – Meter #1 24 Hours Net Total	1 Inferred	Read
3473	Test Data – Meter #2 24 Hours Gross Total	1 Inferred	Read
3475	Test Data – Meter #2 24 Hours Net Total	1 Inferred	Read
3477	Test Data – Meter #3 24 Hours Gross Total	1 Inferred	Read
3479	Test Data – Meter #3 24 Hours Net Total	1 Inferred	Read
3481	Test Data – Meter #4 24 Hours Gross Total	1 Inferred	Read
3483	Test Data – Meter #4 24 Hours Net Total	1 Inferred	Read
3485	Test Data – Meter#1 Gross Total	1 Inferred	Read
3487	Test Data – Meter#1 Net Total	1 Inferred	Read
3489	Test Data – Meter#2 Gross Total	1 Inferred	Read
3491	Test Data – Meter#2 Net Total	1 Inferred	Read
3493	Test Data – Meter#3 Gross Total	1 Inferred	Read
3495	Test Data – Meter#3 Net Total	1 Inferred	Read
3497	Test Data – Meter#4 Gross Total	1 Inferred	Read
3499	Test Data – Meter#4 Net Total	1 Inferred	Read
3501-3507	Spare		

Previous Test Data

Set Last Test Report Request (3026, 16bits, Write only) to 1=Latest, 5=Oldest)

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
3509	Test Data – Meter#1 Gross Total	1 Inferred	Read
3511	Test Data – Meter#1 Net Total	1 Inferred	Read
3513	Test Data – Meter#2 Gross Total	1 Inferred	Read
3515	Test Data – Meter#2 Net Total	1 Inferred	Read
3517	Test Data – Meter#3 Gross Total	1 Inferred	Read
3519	Test Data – Meter#3 Net Total	1 Inferred	Read
3521	Test Data – Meter#4 Gross Total	1 Inferred	Read
3523	Test Data – Meter#4 Net Total	1 Inferred	Read
3525	Test Data – Meter #1 24 Hours Gross Total	1 Inferred	Read
3527	Test Data – Meter #1 24 Hours Net Total	1 Inferred	Read
3529	Test Data – Meter #2 24 Hours Gross Total	1 Inferred	Read
3531	Test Data – Meter #2 24 Hours Net Total	1 Inferred	Read
3533	Test Data – Meter #3 24 Hours Gross Total	1 Inferred	Read
3535	Test Data – Meter #3 24 Hours Net Total	1 Inferred	Read
3537	Test Data – Meter #4 24 Hours Gross Total	1 Inferred	Read
3539	Test Data – Meter #4 24 Hours Net Total	1 Inferred	Read
3541-3583	Spare		

Modbus Address Table – 2x16 Bits Integer

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
3585	Spare#1 Data	1 Inferred	Read
3587	Spare#2 Data	1 Inferred	Read
3589	Spare#3 Data	1 Inferred	Read
3591	Spare#4 Data	1 Inferred	Read
3593	Spare#5 Data	1 Inferred	Read
3595	Spare#6 Data	1 Inferred	Read
3597	Spare#7 Data	1 Inferred	Read
3599	Spare#8 Data	1 Inferred	Read
3601	Spare#9 Data	1 Inferred	Read
3603-3649	Reserved		
3651	Slave#1 Spare Auxiliary I/O #1 mA Value	3 Inferred	Read
3653	Slave#1 Spare Auxiliary I/O #2 mA Value	3 Inferred	Read
3655	Slave#1 Spare Auxiliary I/O #3 mA Value	3 Inferred	Read
3657	Slave#1 Spare Auxiliary I/O #4 mA Value	3 Inferred	Read
3659	Slave#1 DP	4 Inferred	Read
3661	Slave#1 Pressure	2 Inferred	Read
3663	Slave#1 Temperature	2 Inferred	Read
3665	Slave#1 Multi.Var.Unit Flag	0 Inferred	Read
3667	Slave#2 Spare Auxiliary I/O #1 mA Value	3 Inferred	Read
3669	Slave#2 Spare Auxiliary I/O #2 mA Value	3 Inferred	Read
3671	Slave#2 Spare Auxiliary I/O #3 mA Value	3 Inferred	Read
3673	Slave#2 Spare Auxiliary I/O #4 mA Value	3 Inferred	Read
3675	Slave#2 DP	4 Inferred	Read
3677	Slave#2 Pressure	2 Inferred	Read
3679	Slave#2 Temperature	2 Inferred	Read
3681	Slave#2 Multi.Var.Unit Flag	0 Inferred	Read
3683	Slave#3 Spare Auxiliary I/O #1 mA Value	3 Inferred	Read
3685	Slave#3 Spare Auxiliary I/O #2 mA Value	3 Inferred	Read
3687	Slave#3 Spare Auxiliary I/O #3 mA Value	3 Inferred	Read
3689	Slave#3 Spare Auxiliary I/O #4 mA Value	3 Inferred	Read
3691	Slave#3 DP	4 Inferred	Read
3693	Slave#3 Pressure	2 Inferred	Read
3695	Slave#3 Temperature	2 Inferred	Read
3697	Slave#3 Multi.Var.Unit Flag	0 Inferred	Read
3699	Foxboro Connection	0 Inferred	Read
3701	Turbine Diagnostic – Profile Alarm	0 Inferred	Read

Modbus Address Table – 2x16 Bits Integer

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
3703	Profile#1 Zone #1 Average Revolution Error %	2 Inferred	Read
3705	Profile#1 Zone #1 Average Blade Error %	2 Inferred	Read
3707	Profile#1 Zone #1 Average Profile Error %	2 Inferred	Read
3709	Profile#1 Zone #2 Average Revolution Error %	2 Inferred	Read
3711	Profile#1 Zone #2 Average Blade Error %	2 Inferred	Read
3713	Profile#1 Zone #2 Average Profile Error %	2 Inferred	Read
3715	Profile#1 Zone #3 Average Revolution Error %	2 Inferred	Read
3717	Profile#1 Zone #3 Average Blade Error %	2 Inferred	Read
3719	Profile#1 Zone #3 Average Profile Error %	2 Inferred	Read
3721	Profile#2 Zone #1 Average Revolution Error %	2 Inferred	Read
3723	Profile#2 Zone #1 Average Blade Error %	2 Inferred	Read
3725	Profile#2 Zone #1 Average Profile Error %	2 Inferred	Read
3727	Profile#2 Zone #2 Average Revolution Error %	2 Inferred	Read
3729	Profile#2 Zone #2 Average Blade Error %	2 Inferred	Read
3731	Profile#2 Zone #2 Average Profile Error %	2 Inferred	Read
3733	Profile#2 Zone #3 Average Revolution Error %	2 Inferred	Read
3735	Profile#2 Zone #3 Average Blade Error %	2 Inferred	Read
3737	Profile#2 Zone #3 Average Profile Error %	2 Inferred	Read
3739	Profile#3 Zone #1 Average Revolution Error %	2 Inferred	Read
3741	Profile#3 Zone #1 Average Blade Error %	2 Inferred	Read
3743	Profile#3 Zone #1 Average Profile Error %	2 Inferred	Read
3745	Profile#3 Zone #2 Average Revolution Error %	2 Inferred	Read
3747	Profile#3 Zone #2 Average Blade Error %	2 Inferred	Read
3749	Profile#3 Zone #2 Average Profile Error %	2 Inferred	Read
3751	Profile#3 Zone #3 Average Revolution Error %	2 Inferred	Read
3753	Profile#3 Zone #3 Average Blade Error %	2 Inferred	Read
3755	Profile#3 Zone #3 Average Profile Error %	2 Inferred	Read
3757	Current Turbine Diagnostic #1 Revolution Error %	2 Inferred	Read
3759	Current Turbine Diagnostic #1 Blade Error %	2 Inferred	Read
3761	Current Turbine Diagnostic #1 Profile Error %	2 Inferred	Read
3763	Current Turbine Diagnostic #2 Revolution Error %	2 Inferred	Read
3765	Current Turbine Diagnostic #2 Blade Error %	2 Inferred	Read
3767	Current Turbine Diagnostic #2 Profile Error %	2 Inferred	Read
3769	Current Turbine Diagnostic #3 Revolution Error %	2 Inferred	Read
3771	Current Turbine Diagnostic #3 Blade Error %	2 Inferred	Read
3773	Current Turbine Diagnostic #3 Profile Error %	2 Inferred	Read
3775-3819	Spare		
3821-3999	Reserved		
4001-4089	Reserved		
4091-4109	Spare		

Modbus Address Table – 2x16 Bits Integer

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
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		

Modbus Address Table – 2x16 Bits Integer

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
4201	Date (MMDDYY)	0 Inferred	Read/Write
4203	Time (HHMMSS)	0 Inferred	Read/Write
AGA 8 GROSS METHOD 1			
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		
AGA 8 GROSS METHOD 2			
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
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 – 2x16 Bits Integer

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

Modbus Address Table – 2x16 Bits Integer

ADDRESS	DESCRIPTION	DECIMAL	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
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 – 2x16 Bits Integer

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/Venturi Discharge Coeff.C	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/Venturi Discharge Coeff.C	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/Venturi Discharge Coeff.C	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
4477	Meter #3 ISO5167 down-stream Tapping	2 Inferred	Read/Write

Modbus Address Table – 2x16 Bits Integer

ADDRESS	DESCRIPTION	DECIMAL	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/Venturi Discharge Coeff.C	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	Spare		
4575	Analog Output #1 Percentage	2 Inferred	Read/Write
4577	Analog Output #2 Percentage	2 Inferred	Read/Write
4579	Analog Output #3 Percentage	2 Inferred	Read/Write
4581	Analog Output #4 Percentage	2 Inferred	Read/Write
4583	Meter #1 BS&W Value Override	2 Inferred	Read/Write
4585	Meter #2 BS&W Value Override	2 Inferred	Read/Write

Modbus Address Table – 2x16 Bits Integer

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
4587	Meter #3 BS&W Value Override	2 Inferred	Read/Write
4589	Meter #4 BS&W Value Override	2 Inferred	Read/Write
4591-4655	Spare		
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	6 Inferred	Read/Write
4667	Meter #2 FPV Override	6 Inferred	Read/Write
4669	Meter #3 FPV Override	6 Inferred	Read/Write
4671	Meter #4 FPV Override	6 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	Meter #1 Venturi C Override	4 Inferred	Read/Write
4691	Meter #2 Venturi C Override	4 Inferred	Read/Write
4693	Meter #3 Venturi C Override	4 Inferred	Read/Write
4695	Meter #4 Venturi C Override	4 Inferred	Read/Write
4697-4699	Spare		
4701-4703	Spare Auxiliary I/O #1 TAG	8 Chars	Read/Write
4705-4707	Spare Auxiliary I/O #2 TAG	8 Chars	Read/Write
4709-4711	Spare Auxiliary I/O #3 TAG	8 Chars	Read/Write
4713-4715	Spare Auxiliary I/O #4 TAG	8 Chars	Read/Write
4717-4719	Spare Auxiliary I/O #5 TAG	8 Chars	Read/Write
4721-4723	Spare Auxiliary I/O #6 TAG	8 Chars	Read/Write
4725-4727	Spare Auxiliary I/O #7 TAG	8 Chars	Read/Write
4729-4731	Spare Auxiliary I/O #8 TAG	8 Chars	Read/Write
4733-4735	Spare Auxiliary I/O #9 TAG	8 Chars	Read/Write
4737-4739	Spare Auxiliary I/O #10 TAG	8 Chars	Read/Write
4741-4743	Spare Auxiliary I/O #11 TAG	8 Chars	Read/Write
4745-4747	Spare Auxiliary I/O #12 TAG	8 Chars	Read/Write
4749-4759	Spare		
4761-4763	Slave #1 DP Tag	8 Chars	Read/Write
4765-4767	Slave #1 Pressure Tag	8 Chars	Read/Write
4769-4771	Slave #1 Temperature Tag	8 Chars	Read/Write
4773-4775	Slave #2 DP Tag	8 Chars	Read/Write
4777-4779	Slave #2 Pressure Tag	8 Chars	Read/Write
4781-4783	Slave #2 Temperature Tag	8 Chars	Read/Write
4785-4787	Slave #3 DP Tag	8 Chars	Read/Write
4789-4791	Slave #3 Pressure Tag	8 Chars	Read/Write
4793-4795	Slave #3 Temperature Tag	8 Chars	Read/Write

Modbus Address Table – 2x16 Bits Integer

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
4797	Gravity Factor	6 Inferred	Read/Write
4799	Meter#1 Base Density Factor	6 Inferred	Read/Write
4801	Meter#2 Base Density Factor	6 Inferred	Read/Write
4803	Meter#3 Base Density Factor	6 Inferred	Read/Write
4805	Meter#4 Base Density Factor	6 Inferred	Read/Write
4807-4811	Spare		
4813-4825	Spare		
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 Pressure Controller Gain	2 Inferred	Read/Write
4847	Meter #1 PID Pressure 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 Pressure Controller Gain	2 Inferred	Read/Write
4869	Meter #2 PID Pressure 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 Pressure Controller Gain	2 Inferred	Read/Write
4891	Meter #3 PID Pressure Controller Reset	2 Inferred	Read/Write
4893	Meter #3 PID Mininum Output %	2 Inferred	Read/Write
4895	Meter #3 PID Maxinum Output %	2 Inferred	Read/Write

Modbus Address Table – 2x16 Bits Integer

ADDRESS	DESCRIPTION	DECIMAL	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 Pressure Controller Gain	2 Inferred	Read/Write
4913	Meter #4 PID Pressure 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	Turbine Diagnostic#1 – Maximum Flow Threshold	2 Inferred	Read/Write
4921	Turbine Diagnostic#1 – Minimum Flow Threshold	2 Inferred	Read/Write
4923	Turbine Diagnostic#1 – Revolution Error %	2 Inferred	Read/Write
4925	Turbine Diagnostic#1 – Blade Error %	2 Inferred	Read/Write
4927	Turbine Diagnostic#1 – Profile Error %	2 Inferred	Read/Write
4929	Turbine Diagnostic#2 – Maximum Flow Threshold	2 Inferred	Read/Write
4931	Turbine Diagnostic#2 – Minimum Flow Threshold	2 Inferred	Read/Write
4933	Turbine Diagnostic#2 – Revolution Error %	2 Inferred	Read/Write
4935	Turbine Diagnostic#2 – Blade Error %	2 Inferred	Read/Write
4937	Turbine Diagnostic#2 – Profile Error %	2 Inferred	Read/Write
4939	Turbine Diagnostic#2 – Maximum Flow Threshold	2 Inferred	Read/Write
4941	Turbine Diagnostic#2 – Minimum Flow Threshold	2 Inferred	Read/Write
4943	Turbine Diagnostic#2 – Revolution Error %	2 Inferred	Read/Write
4945	Turbine Diagnostic#2 – Blade Error %	2 Inferred	Read/Write
4947	Turbine Diagnostic#2 – Profile Error %	2 Inferred	Read/Write
4949-5029	Resserved		

Modbus Address Table – 2x16 Bits Integer

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
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

Modbus Address Table – 2x16 Bits Integer

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
9097	Meter #1 Temperature	2 Inferred	Read
9099	Meter #1 Pressure	2 Inferred	Read
9101	Meter #1 Density	5 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	Meter #1 CTL	5 Inferred	Read
9117	Meter #1 CPL	5 Inferred	Read
9119	Meter #1 CTPL	5 Inferred	Read
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
9197-9199	Meter #2 Meter ID	8 Chars.	Read

Modbus Address Table – 2x16 Bits Integer

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
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	5 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	Meter #2 CTL	5 Inferred	Read
9237	Meter #2 CPL	5 Inferred	Read
9239	Meter #2 CTPL	5 Inferred	Read
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
9301	Meter #3 Helium	4 Inferred	Read

Modbus Address Table – 2x16 Bits Integer

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
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	5 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	Meter #3 CTL	5 Inferred	Read
9357	Meter #3 CPL	5 Inferred	Read
9359	Meter #3 CTPL	5 Inferred	Read
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

Modbus Address Table – 2x16 Bits Integer

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
9407	Meter #4 I-Pentane	4 Inferred	Read
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	5 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
9475	Meter #4 CTL	5 Inferred	Read
9477	Meter #4 CPL	5 Inferred	Read
9479	Meter #4 CTPL	5 Inferred	Read
9481	Meter #1 FA	6 Inferred	Read
9483	Meter #2 FA	6 Inferred	Read
9485	Meter #3 FA	6 Inferred	Read
9487	Meter #4 FA	6 Inferred	Read
9489-9493	Reserved		
9495	Meter #1 BS&W	2 Inferred	Read
9497	Meter #2 BS&W	2 Inferred	Read
9499	Meter #3 BS&W	2 Inferred	Read
9501	Meter #4 BS&W	2 Inferred	Read

Modbus Address Table – Float Point

ADDRESS	DESCRIPTION	READ/WRITE
7001	Sarasota Constant D0	Read/Write
7002	Sarasota Constant T0	Read/Write
7003	Sarasota Constant K	Read/Write
7004	Sarasota Constant Temperature Coeff.	Read/Write
7005	Sarasota Constant Temperature Cal.	Read/Write
7006	Sarasota Constant Pressure Coeff.	Read/Write
7007	Sarasota Constant Pressure Cal.	Read/Write
7008	UGC Constant K0	Read/Write
7009	UGC Constant K1	Read/Write
7010	UGC Constant K2	Read/Write
7011	UGC Constant KT	Read/Write
7012	UGC Constant Temperature Cal	Read/Write
7013	UGC Constant K	Read/Write
7014	UGC Constant P0	Read/Write
7015	Solartron Constant K0	Read/Write
7016	Solartron Constant K1	Read/Write
7017	Solartron Constant K2	Read/Write
7018	Solartron Constant K18	Read/Write
7019	Solartron Constant K19	Read/Write
7020	Solartron Constant K3	Read/Write
7021	Solartron Constant K4	Read/Write
7022	Calibration Data Entry	Read/Write
7023	Spare	Read/Write
7024	Verification Data Entry	Read/Write
7025	Spare	Read/Write
7026	Meter#1 Orifice ID	Read/Write
7027	Meter#1 Pipe ID	Read/Write
7028	Meter#1 K Factor	Read/Write
7029	Meter#1 Low Limit	Read/Write
7030	Meter#1 High Limit	Read/Write
7031	Meter#2 Orifice ID	Read/Write
7032	Meter#2 Pipe ID	Read/Write
7033	Meter#2 K Factor	Read/Write
7034	Meter#2 Low Limit	Read/Write
7035	Meter#2 High Limit	Read/Write
7036	Meter#3 Orifice ID	Read/Write
7037	Meter#3 Pipe ID	Read/Write
7038	Meter#3 K Factor	Read/Write
7039	Meter#3 Low Limit	Read/Write
7040	Meter#3 High Limit	Read/Write
7041	Meter#4 Orifice ID	Read/Write
7042	Meter#4 Pipe ID	Read/Write
7043	Meter#4 K Factor	Read/Write
7044	Meter#4 Low Limit	Read/Write
7045	Meter#4 High Limit	Read/Write
7046	Base Temperature	Read/Write
7047	Base Pressure	Read/Write
7048	Atmospheric Pressure	Read/Write
7049	Densitometer Low Limit	Read/Write
7050	Densitometer High Limit	Read/Write
7051	Densitometer Maintenance	Read/Write

Modbus Address Table – Float Point

ADDRESS	DESCRIPTION	READ/WRITE
7052	Meter #1 Flowing Density Override	Read/Write
7053	Meter #2 Flowing Density Override	Read/Write
7054	Meter #3 Flowing Density Override	Read/Write
7055	Meter #4 Flowing Density Override	Read/Write
7056-7060	Spare	
7061-7070	Reserved	
7071-7085	Reserved	
7086-7100	Spare	
7101	Meter#1 Gross Flow Rate	Read
7102	Meter#1 Net Flow Rate	Read
7103	Meter#1 Mass Flow Rate	Read
7104	Meter#1 Energy Flow Rate	Read
7105	Meter#1 Daily Gross Total	Read
7106	Meter#1 Daily Net Total	Read
7107	Meter#1 Daily Mass Total	Read
7108	Meter#1 Daily Energy Total	Read
7109	Meter#1 Cumulative Gross Total	Read
7110	Meter#1 Cumulative Net Total	Read
7111	Meter#1 Cumulative Mass Total	Read
7112	Meter#1 Cumulative Energy Total	Read
7113	Meter #1 DP	Read
7114	Meter #1 Temperature	Read
7115	Meter #1 Pressure	Read
7116	Meter #1 Density	Read
7117	Meter #1 Heating Value	Read
7118	Meter #1 Density.b	Read
7119	Meter #1 SG	Read
7120	Meter #1 Y	Read
7121	Meter #1 K/CD/LMF	Read
7122	Meter #1 FPV	Read
7123	Meter #1 FA	Read
7124	Meter #1 N2	Read
7125	Meter #1 Co2	Read
7126	Meter #1 Methane	Read
7127	Meter #1 Ethane	Read
7128	Meter #1 Propane	Read
7129	Meter #1 Water	Read
7130	Meter #1 H2S	Read
7131	Meter #1 H2	Read
7132	Meter #1 CO	Read
7133	Meter #1 Oxygen	Read
7134	Meter #1 I-Butane	Read
7135	Meter #1 n-Butane	Read
7136	Meter #1 I-Pentane	Read
7137	Meter #1 n-Pentane	Read
7138	Meter #1 n-Hexane	Read
7139	Meter #1 n-Heptane	Read
7140	Meter #1 n-Octane	Read
7141	Meter #1 n-Nonane	Read
7142	Meter #1 n-Decane	Read
7143	Meter #1 Helium	Read
7144	Meter #1 Argon	Read
7145	Meter #1 Day Flow Time in Minutes	Read
7146	Meter #1 Hour Flow Time in Minutes	Read

Modbus Address Table – Float Point

ADDRESS	DESCRIPTION	READ/WRITE
7147	Meter #1 Month Flow Time in Hours	Read
7148	Meter #2 Month Flow Time in Hours	Read
7149	Meter #3 Month Flow Time in Hours	Read
7150	Meter #4 Month Flow Time in Hours	Read
7151	Date	Read
7152	Time	Read
7153	Meter #3 Day Flow Time in Minutes	Read
7154	Meter #3 Hour Flow Time in Minutes	Read
7155	Meter#3 Gross Flow Rate	Read
7156	Meter#3 Net Flow Rate	Read
7157	Meter#3 Mass Flow Rate	Read
7158	Meter#3 Energy Flow Rate	Read
7159	Meter#3 Daily Gross Total	Read
7160	Meter#3 Daily Net Total	Read
7161	Meter#3 Daily Mass Total	Read
7162	Meter#3 Daily Energy Total	Read
7163	Meter#3 Cumulative Gross Total	Read
7164	Meter#3 Cumulative Net Total	Read
7165	Meter#3 Cumulative Mass Total	Read
7166	Meter#3 Cumulative Energy Total	Read
7167	Meter #3 DP	Read
7168	Meter #3 Temperature	Read
7169	Meter #3 Pressure	Read
7170	Meter #3 Density	Read
7171	Meter #3 Heating Value	Read
7172	Meter #3 Density.b	Read
7173	Meter #3 SG	Read
7174	Meter #3 Y	Read
7175	Meter #3 K/CD/LMF	Read
7176	Meter #3 FPV	Read
7177	Meter #3 FA	Read
7178	Meter #3 N2	Read
7179	Meter #3 Co2	Read
7180	Meter #3 Methane	Read
7181	Meter #3 Ethane	Read
7182	Meter #3 Propane	Read
7183	Meter #3 Water	Read
7184	Meter #3 H2S	Read
7185	Meter #3 H2	Read
7186	Meter #3 CO	Read
7187	Meter #3 Oxygen	Read
7188	Meter #3 I-Butane	Read
7189	Meter #3 n-Butane	Read
7190	Meter #3 I-Pentane	Read
7191	Meter #3 n-Pentane	Read
7192	Meter #3 n-Hexane	Read
7193	Meter #3 n-Heptane	Read
7194	Meter #3 n-Octane	Read
7195	Meter #3 n-Nonane	Read
7196	Meter #3 n-Decane	Read
7197	Meter #3 Helium	Read
7198	Meter #3 Argon	Read

Modbus Address Table – Float Point

ADDRESS	DESCRIPTION	READ/WRITE
7203	Meter #3 Last Month Flow Time	Read
7204	Meter #3 Last Month Gross Total	Read
7205	Meter #3 Last Month Net Total	Read
7206	Meter #3 Last Month Mass Total	Read
7207	Meter #3 Last Month Energy Total	Read
7208	Meter #4 Last Month Flow Time	Read
7209	Meter #4 Last Month Gross Total	Read
7210	Meter #4 Last Month Net Total	Read
7211	Meter #4 Last Month Mass Total	Read
7212	Meter #4 Last Month Energy Total	Read
7213	Meter #3 Yesterday Flowing Time	Read
7214	Meter #3 Average DP	Read
7215	Meter #3 Average Temperature	Read
7216	Meter #3 Average Pressure	Read
7217	Meter #3 Average DP_EXT	Read
7218	Meter #3 Yesterday Gross	Read
7219	Meter #3 Yesterday Net	Read
7220	Meter #3 Yesterday Mass	Read
7221	Meter #3 Yesterday Energy	Read
7222	Meter #4 Yesterday Flowing Time	Read
7223	Meter #4 Average DP	Read
7224	Meter #4 Average Temperature	Read
7225	Meter #4 Average Pressure	Read
7226	Meter #4 DP_EXT	Read
7227	Meter #4 Yesterday Gross	Read
7228	Meter #4 Yesterday Net	Read
7229	Meter #4 Yesterday Mass	Read
7230	Meter #4 Yesterday Energy	Read
7231	Spare #1 Data	Read
7232	Spare #2 Data	Read
7233	Spare #3 Data	Read
7234	Spare #4 Data	Read
7235	Spare #5 Data	Read
7236	Spare #6 Data	Read
7237	Spare #7 Data	Read
7238	Spare #8 Data	Read
7239	Spare #9 Data	Read
7240	Battery Voltage	Read
7241	Meter #1 Last Hour Flow Time	Read
7242	Meter #1 Last Hour Net Total	Read
7243	Meter #1 Last Hour Energy Total	Read
7244	Meter #1 Last Hour Average Temperature	Read
7245	Meter #1 Last Hour Average Pressure	Read
7246	Meter #1 Last Hour Average DP	Read
7247	Meter #1 Last Hour Average DP/EXT	Read
7248	Meter #2 Last Hour Flow Time	Read
7249	Meter #2 Last Hour Net Total	Read
7250	Meter #2 Last Hour Energy Total	Read
7251	Meter #2 Last Hour Average Temperature	Read
7252	Meter #2 Last Hour Average Pressure	Read
7253	Meter #2 Last Hour Average DP	Read
7254	Meter #2 Last Hour Average DP/EXT	Read

Modbus Address Table – Float Point

ADDRESS	DESCRIPTION	READ/WRITE
7255-7256	Spare	
7257	Meter #1 Last Month Flow Time in Hours	Read
7258	Meter #1 Last Month Gross Total	Read
7259	Meter #1 Last Month Net Total	Read
7260	Meter #1 Last Month Mass Total	Read
7261	Meter #1 Last Month Energy Total	Read
7262	Last Hour Program Variable #1	Read
7263	Last Hour Program Variable #2	Read
7264	Last Hour Program Variable #3	Read
7265	Last Hour Program Variable #4	Read
7266	Last Hour Program Variable #5	Read
7267-7270	Reserved	
7271	Meter #1 Yesterday Flow Time	Read
7272	Meter #1 Yesterday Average DP	Read
7273	Meter #1 Yesterday Average Temperature	Read
7274	Meter #1 Yesterday Average Pressure	Read
7275	Meter #1 Yesterday Average DP/EXT	Read
7276	Meter #1 Yesterday Gross Total	Read
7277	Meter #1 Yesterday Net Total	Read
7278	Meter #1 Yesterday Mass Total	Read
7279	Meter #1 Yesterday Energy Total	Read
7280	Spare	
7281	Spare	

Modbus Address Table – Float Point

ADDRESS	DESCRIPTION	READ/WRITE
7301	Meter#2 Gross Flow Rate	Read
7302	Meter#2 Net Flow Rate	Read
7303	Meter#2 Mass Flow Rate	Read
7304	Meter#2 Energy Flow Rate	Read
7305	Meter#2 Daily Gross Total	Read
7306	Meter#2 Daily Net Total	Read
7307	Meter#2 Daily Mass Total	Read
7308	Meter#2 Daily Energy Total	Read
7309	Meter#2 Cumulative Gross Total	Read
7310	Meter#2 Cumulative Net Total	Read
7311	Meter#2 Cumulative Mass Total	Read
7312	Meter#2 Cumulative Energy Total	Read
7313	Meter #2 DP	Read
7314	Meter #2 Temperature	Read
7315	Meter #2 Pressure	Read
7316	Meter #2 Density	Read
7317	Meter #2 Heating Value	Read
7318	Meter #2 Density.b	Read
7319	Meter #2 SG	Read
7320	Meter #2 Y	Read
7321	Meter #2 K/CD/LMF	Read
7322	Meter #2 FPV	Read
7323	Meter #2 FA	Read
7324	Meter #2 N2	Read
7325	Meter #2 Co2	Read
7326	Meter #2 Methane	Read
7327	Meter #2 Ethane	Read
7328	Meter #2 Propane	Read
7329	Meter #2 Water	Read
7330	Meter #2 H2S	Read
7331	Meter #2 H2	Read
7332	Meter #2 CO	Read
7333	Meter #2 Oxygen	Read
7334	Meter #2 I-Butane	Read
7335	Meter #2 n-Butane	Read
7336	Meter #2 I-Pentane	Read
7337	Meter #2 n-Pentane	Read
7338	Meter #2 n-Hexane	Read
7339	Meter #2 n-Heptane	Read
7340	Meter #2 n-Octane	Read
7341	Meter #2 n-Nonane	Read
7342	Meter #2 n-Decane	Read
7343	Meter #2 Helium	Read
7344	Meter #2 Argon	Read
7345	Meter #2 Day Flow Time	Read
7346	Meter #2 Hour Flow Time	Read
7347-7348	Spare	
7349	Spare	
7350	Spare	
7351	Spare	
7352	Day Star Hour	Read

Modbus Address Table – Float Point

ADDRESS	DESCRIPTION	READ/WRITE
7353	Meter #4 Day Flow Time	Read
7354	Meter #4 Hour Flow Time	Read
7355	Meter#4 Gross Flow Rate	Read
7356	Meter#4 Net Flow Rate	Read
7357	Meter#4 Mass Flow Rate	Read
7358	Meter#4 Energy Flow Rate	Read
7359	Meter#4 Daily Gross Total	Read
7360	Meter#4 Daily Net Total	Read
7361	Meter#4 Daily Mass Total	Read
7362	Meter#4 Daily Energy Total	Read
7363	Meter#4 Cumulative Gross Total	Read
7364	Meter#4 Cumulative Net Total	Read
7365	Meter#4 Cumulative Mass Total	Read
7366	Meter#4 Cumulative Energy Total	Read
7367	Meter #4 DP	Read
7368	Meter #4 Temperature	Read
7369	Meter #4 Pressure	Read
7370	Meter #4 Density	Read
7371	Meter #4 Heating Value	Read
7372	Meter #4 Density.b	Read
7373	Meter #4 SG	Read
7374	Meter #4 Y	Read
7375	Meter #4 K/CD/LMF	Read
7376	Meter #4 FPV	Read
7377	Meter #4 FA	Read
7378	Meter #4 N2	Read
7379	Meter #4 Co2	Read
7380	Meter #4 Methane	Read
7381	Meter #4 Ethane	Read
7382	Meter #4 Propane	Read
7383	Meter #4 Water	Read
7384	Meter #4 H2S	Read
7385	Meter #4 H2	Read
7386	Meter #4 CO	Read
7387	Meter #4 Oxygen	Read
7388	Meter #4 I-Butane	Read
7389	Meter #4 n-Butane	Read
7390	Meter #4 I-Pentane	Read
7391	Meter #4 n-Pentane	Read
7392	Meter #4 n-Hexane	Read
7393	Meter #4 n-Heptane	Read
7394	Meter #4 n-Octane	Read
7395	Meter #4 n-Nonane	Read
7396	Meter #4 n-Decane	Read
7397	Meter #4 Helium	Read
7398	Meter #4 Argon	Read
7401	Multi.Var DP	Read
7402	Multi.Var Pressure	Read
7403	Multi.Var Temperature	Read
7404	Analog Input #1 mA Value	Read
7405	Analog Input #2 mA Value	Read
7406	Analog Input #3 mA Value	Read

Modbus Address Table – Float Point

ADDRESS	DESCRIPTION	READ/WRITE
7407	Analog Input #4 mA Value	Read
7408	Multi.Var. Flag	Read
7409	Slave#1 DP	Read
7410	Slave#1 Pressure	Read
7411	Slave#1 Temperature	Read
7412	Slave#1 Spare Auxiliary I/O #1	Read
7413	Slave#1 Spare Auxiliary I/O #2	Read
7414	Slave#1 Spare Auxiliary I/O #3	Read
7415	Slave#1 Spare Auxiliary I/O #4	Read
7416	Slave#1 Multi.Var.Flag	Read
7417-7425	Reserved	
7426-7433	Spare	
7434	Yesterday Program Variable #1	Read
7435	Yesterday Program Variable #2	Read
7436	Yesterday Program Variable #3	Read
7437	Yesterday Program Variable #4	Read
7438	Yesterday Program Variable #5	Read
7439	Reserved	
7440	Reserved	
7441	Meter #3 Last Hour Flow Time	Read
7442	Meter #3 Last Hour Net Total	Read
7443	Meter #3 Last Hour Energy Total	Read
7444	Meter #3 Last Hour Average Temperature	Read
7445	Meter #3 Last Hour Average Pressure	Read
7446	Meter #3 Last Hour Average DP	Read
7447	Meter #3 Last Hour Average DP/EXT	Read
7448	Meter #4 Last Hour Flow Time	Read
7449	Meter #4 Last Hour Net Total	Read
7450	Meter #4 Last Hour Energy Total	Read
7451	Meter #4 Last Hour Average Temperature	Read
7452	Meter #4 Last Hour Average Pressure	Read
7453	Meter #4 Last Hour Average DP	Read
7454	Meter #4 Last Hour Average DP/EXT	Read
7455	Spare	
7456	Spare	
7457	Meter#2 Last Month Flow Time	Read
7458	Meter#2 Last Month Gross Total	Read
7459	Meter#2 Last Month Net Total	Read
7460	Meter#2 Last Month Mass Total	Read
7461	Meter#2 Last Month Energy Total	Read
7462	Meter#1 Yesterday's Averaged BS&W	Read
7463	Meter#2 Yesterday's Averaged BS&W	Read
7464	Meter#3 Yesterday's Averaged BS&W	Read
7465	Meter#4 Yesterday's Averaged BS&W	Read
7466	Last Month Program Variable #1	Read
7467	Last Month Program Variable #2	Read
7468	Last Month Program Variable #3	Read
7469	Last Month Program Variable #4	Read
7470	Last Month Program Variable #5	Read

Modbus Address Table – Float Point

ADDRESS	DESCRIPTION	READ/WRITE
7471	Meter #2 Yesterday Flow Time	Read
7472	Meter #2 Yesterday Average DP	Read
7473	Meter #2 Yesterday Average Temperature	Read
7474	Meter #2 Yesterday Average Pressure	Read
7475	Meter #2 Yesterday Average DP/EXT	Read
7476	Meter #2 Yesterday Gross Total	Read
7477	Meter #2 Yesterday Net Total	Read
7478	Meter #2 Yesterday Mass Total	Read
7479	Meter #2 Yesterday Energy Total	Read

Modbus Address Table – Float Point

ADDRESS	DESCRIPTION	READ/WRITE
7601	Analog Input #5 @4mA	Read/Write
7602	Analog Input #5 @20mA	Read/Write
7603	Analog Input #5 Low Limit	Read/Write
7604	Analog Input #5 High Limit	Read/Write
7605	Analog Input #5 Maintenance	Read/Write
7606	Analog Input #6 @4mA	Read/Write
7607	Analog Input #6 @20mA	Read/Write
7608	Analog Input #6 Low Limit	Read/Write
7609	Analog Input #6 High Limit	Read/Write
7610	Analog Input #6 Maintenance	Read/Write
7611	Analog Input #7 @4mA	Read/Write
7612	Analog Input #7 @20mA	Read/Write
7613	Analog Input #7 Low Limit	Read/Write
7614	Analog Input #7 High Limit	Read/Write
7615	Analog Input #7 Maintenance	Read/Write
7616	Analog Input #8 @4mA	Read/Write
7617	Analog Input #8 @20mA	Read/Write
7618	Analog Input #8 Low Limit	Read/Write
7619	Analog Input #8 High Limit	Read/Write
7620	Analog Input #8 Maintenance	Read/Write
7621	Analog Input #9 @4mA	Read/Write
7622	Analog Input #9 @20mA	Read/Write
7623	Analog Input #9 Low Limit	Read/Write
7624	Analog Input #9 High Limit	Read/Write
7625	Analog Input #9 Maintenance	Read/Write
7626	Analog Input #5 Override	Read/Write
7627	Analog Input #6 Override	Read/Write
7628	Analog Input #7 Override	Read/Write
7629	Analog Input #8 Override	Read/Write
7630	Analog Input #9 Override	Read/Write
7631	Spare Auxiliary I/O #1 @4mA	Read/Write
7632	Spare Auxiliary I/O #1 @20mA	Read/Write
7633	Spare Auxiliary I/O #1 Low Limit	Read/Write
7634	Spare Auxiliary I/O #1 High Limit	Read/Write
7635	Spare Auxiliary I/O #2 @4mA	Read/Write
7636	Spare Auxiliary I/O #2 @20mA	Read/Write
7637	Spare Auxiliary I/O #2 Low Limit	Read/Write
7638	Spare Auxiliary I/O #2 High Limit	Read/Write
7639	Spare Auxiliary I/O #3 @4mA	Read/Write
7640	Spare Auxiliary I/O #3 @20mA	Read/Write
7641	Spare Auxiliary I/O #3 Low Limit	Read/Write
7642	Spare Auxiliary I/O #3 High Limit	Read/Write
7643	Spare Auxiliary I/O #4 @4mA	Read/Write
7644	Spare Auxiliary I/O #4 @20mA	Read/Write
7645	Spare Auxiliary I/O #4 Low Limit	Read/Write
7646	Spare Auxiliary I/O #4 High Limit	Read/Write
7647	Spare Auxiliary I/O #5 @4mA	Read/Write

Modbus Address Table – Float Point

ADDRESS	DESCRIPTION	READ/WRITE
7648	Spare Auxiliary I/O #5 @20mA	Read/Write
7649	Spare Auxiliary I/O #5 Low Limit	Read/Write
7650	Spare Auxiliary I/O #5 High Limit	Read/Write
7651	Spare Auxiliary I/O #6 @4mA	Read/Write
7652	Spare Auxiliary I/O #6 @20mA	Read/Write
7653	Spare Auxiliary I/O #6 Low Limit	Read/Write
7654	Spare Auxiliary I/O #6 High Limit	Read/Write
7655	Spare Auxiliary I/O #7 @4mA	Read/Write
7656	Spare Auxiliary I/O #7 @20mA	Read/Write
7657	Spare Auxiliary I/O #7 Low Limit	Read/Write
7658	Spare Auxiliary I/O #7 High Limit	Read/Write
7659	Spare Auxiliary I/O #8 @4mA	Read/Write
7660	Spare Auxiliary I/O #8 @20mA	Read/Write
7661	Spare Auxiliary I/O #8 Low Limit	Read/Write
7662	Spare Auxiliary I/O #8 High Limit	Read/Write
7663	Spare Auxiliary I/O #9 @4mA	Read/Write
7664	Spare Auxiliary I/O #9 @20mA	Read/Write
7665	Spare Auxiliary I/O #9 Low Limit	Read/Write
7666	Spare Auxiliary I/O #9 High Limit	Read/Write
7667	Spare Auxiliary I/O #10 @4mA	Read/Write
7668	Spare Auxiliary I/O #10 @20mA	Read/Write
7669	Spare Auxiliary I/O #10 Low Limit	Read/Write
7670	Spare Auxiliary I/O #10 High Limit	Read/Write
7671	Spare Auxiliary I/O #11 @4mA	Read/Write
7672	Spare Auxiliary I/O #11 @20mA	Read/Write
7673	Spare Auxiliary I/O #11 Low Limit	Read/Write
7674	Spare Auxiliary I/O #11 High Limit	Read/Write
7675	Spare Auxiliary I/O #12 @4mA	Read/Write
7676	Spare Auxiliary I/O #12 @20mA	Read/Write
7677	Spare Auxiliary I/O #12 Low Limit	Read/Write
7678	Spare Auxiliary I/O #12 High Limit	Read/Write
7679	Well Test Number	Read/Write
7680	Test Start Date (mmddyy)	Read/Write
7681	Test Start Hour (0-23)	Read/Write
7682	Test Duration in Minutes	Read/Write
7683	Meter#1 Mol. Percentage of CO2	Read/Write
7684	Meter#1 Mol Percentage of N2	Read/Write
7685	Meter#1 Relative Density (SG)	Read/Write
7686	Meter#1 BTU Override	Read/Write
7687	Meter#2 Mol. Percentage of CO2	Read/Write
7688	Meter#2 Mol Percentage of N2	Read/Write
7689	Meter#2 Relative Density (SG)	Read/Write
7690	Meter#2 BTU Override	Read/Write
7691	Slave#1 DP Override	Read/Write
7692	Slave#1 Pressure Override	Read/Write
7693	Slave#1 Temperature Override	Read/Write
7694	Slave#2 DP Override	Read/Write
7695	Slave#2 Pressure Override	Read/Write
7696	Slave#2 Temperature Override	Read/Write
7697	Slave#3 DP Override	Read/Write
7698	Slave#3 Pressure Override	Read/Write
7699	Slave#3 Temperature Override	Read/Write
7700	Spare	

Modbus Address Table – Float Point

ADDRESS	DESCRIPTION	READ/WRITE
7701	Slave #1 DP Low Limit	Read/Write
7702	Slave #1 DP High Limit	Read/Write
7703	Slave #1 DP Maintenance	Read/Write
7704	Slave #1 Pressure Low Limit	Read/Write
7705	Slave #1 Pressure High Limit	Read/Write
7706	Slave #1 Pressure Maintenance	Read/Write
7707	Slave #1 Temperature Low Limit	Read/Write
7708	Slave #1 Temperature High Limit	Read/Write
7709	Slave #1 Temperature Maintenance	Read/Write
7710	Slave #2 DP Low Limit	Read/Write
7711	Slave #2 DP High Limit	Read/Write
7712	Slave #2 DP Maintenance	Read/Write
7713	Slave #2 Pressure Low Limit	Read/Write
7714	Slave #2 Pressure High Limit	Read/Write
7715	Slave #2 Pressure Maintenance	Read/Write
7716	Slave #2 Temperature Low Limit	Read/Write
7717	Slave #2 Temperature High Limit	Read/Write
7718	Slave #2 Temperature Maintenance	Read/Write
7719	Slave #3 DP Low Limit	Read/Write
7720	Slave #3 DP High Limit	Read/Write
7721	Slave #3 DP Maintenance	Read/Write
7722	Slave #3 Pressure Low Limit	Read/Write
7723	Slave #3 Pressure High Limit	Read/Write
7724	Slave #3 Pressure Maintenance	Read/Write
7725	Slave #3 Temperature Low Limit	Read/Write
7726	Slave #3 Temperature High Limit	Read/Write
7727	Slave #3 Temperature Maintenance	Read/Write

Modbus Address Table – Float Point

ADDRESS	DESCRIPTION	READ/WRITE
Test Snapshot Data Area		
7728	Well Test Number	Read
7729	Test Start Date (mm/dd/yy)	Read
7730	Test Start Time (hh/mm/ss)	Read
7731	Status (1= In Progress)	Read
7732	Test Remaining Time (hh/mm/ss)	Read
7733	Test Duration Time (in Minutes)	Read
7734	Test End Date (mm/dd/yy)	Read
7735	Test End Time (hh/mm/ss)	Read
7736	Test Data – Meter#1 Gross Total	Read
7737	Test Data – Meter#1 Net Total	Read
7738	Test Data – Meter#2 Gross Total	Read
7739	Test Data – Meter#2 Net Total	Read
7740	Test Data – Meter#3 Gross Total	Read
7741	Test Data – Meter#3 Net Total	Read
7742	Test Data – Meter#4 Gross Total	Read
7743	Test Data – Meter#4 Net Total	Read
7744	Test Data – Meter#1 24 Hours Gross Total	Read
7745	Test Data – Meter#1 24 Hours Net Total	Read
7746	Test Data – Meter#2 24 Hours Gross Total	Read
7747	Test Data – Meter#2 24 Hours Net Total	Read
7748	Test Data – Meter#3 24 Hours Gross Total	Read
7749	Test Data – Meter#3 24 Hours Net Total	Read
7750	Test Data – Meter#4 24 Hours Gross Total	Read
7751	Test Data – Meter#4 24 Hours Net Total	Read
7752-7759	Spare	
History Test Data Area		
7760	Well Test Number	Read
7761	Test Start Date (mm/dd/yy)	Read
7762	Test Start Time (hh/mm/ss)	Read
7763	Status	Read
7764	Test Remaining Time (hh/mm/ss)	Read
7765	Test Duration Time (in Minutes)	Read
7766	Test End Date (mm/dd/yy)	Read
7767	Test End Time (hh/mm/ss)	Read
7768	Test Data – Meter#1 Gross Total	Read
7769	Test Data – Meter#1 Net Total	Read
7770	Test Data – Meter#2 Gross Total	Read
7771	Test Data – Meter#2 Net Total	Read
7772	Test Data – Meter#3 Gross Total	Read
7773	Test Data – Meter#3 Net Total	Read
7774	Test Data – Meter#4 Gross Total	Read
7775	Test Data – Meter#4 Net Total	Read
7776	Test Data – Meter#1 24 Hours Gross Total	Read
7777	Test Data – Meter#1 24 Hours Net Total	Read
7778	Test Data – Meter#2 24 Hours Gross Total	Read
7779	Test Data – Meter#2 24 Hours Net Total	Read
7780	Test Data – Meter#3 24 Hours Gross Total	Read
7781	Test Data – Meter#3 24 Hours Net Total	Read
7782	Test Data – Meter#4 24 Hours Gross Total	Read
7783	Test Data – Meter#4 24 Hours Net Total	Read
7784-7789	Spare	

Modbus Address Table – Float Point

ADDRESS	DESCRIPTION	READ/WRITE
7901	Analog Input #1 @4mA	Read/Write
7902	Analog Input #1 @20mA	Read/Write
7903	Analog Input #1 Low Limit	Read/Write
7904	Analog Input #1 High Limit	Read/Write
7905	Analog Input #1 Maintenance	Read/Write
7906	Analog Input #2 @4mA	Read/Write
7907	Analog Input #2 @20mA	Read/Write
7908	Analog Input #2 Low Limit	Read/Write
7909	Analog Input #2 High Limit	Read/Write
7910	Analog Input #2 Maintenance	Read/Write
7911	Analog Input #3 @4mA	Read/Write
7912	Analog Input #3 @20mA	Read/Write
7913	Analog Input #3 Low Limit	Read/Write
7914	Analog Input #3 High Limit	Read/Write
7915	Analog Input #3 Maintenance	Read/Write
7916	Analog Input #4 @4mA	Read/Write
7917	Analog Input #4 @20mA	Read/Write
7918	Analog Input #4 Low Limit	Read/Write
7919	Analog Input #4 High Limit	Read/Write
7920	Analog Input #4 Maintenance	Read/Write
7921	Spare	
7922	Spare	

Modbus Address Table – Float Point

ADDRESS	DESCRIPTION	READ/WRITE
7923	RTD Input Low Limit	Read/Write
7924	RTD Input High Limit	Read/Write
7925	RTD Input Maintenance	Read/Write
7926	Analog Input #1 Override	Read/Write
7927	Analog Input #2 Override	Read/Write
7928	Analog Input #3 Override	Read/Write
7929	Analog Input #4 Override	Read/Write
7930	RTD Input Override	Read/Write
7931	Analog Output #1 @4mA	Read/Write
7932	Analog Output #1 @20mA	Read/Write
7933	Analog Output #2 @4mA	Read/Write
7934	Analog Output #2 @20mA	Read/Write
7935	Analog Output #3 @4mA	Read/Write
7936	Analog Output #3 @20mA	Read/Write
7937	Analog Output #4 @4mA	
7938	Analog Output #4 @20mA	Read/Write
7939	Meter #1 Density.b Override	Read/Write
7940	Meter #2 Density.b Override	Read/Write
7941	Meter #3 Density.b Override	Read/Write
7942	Meter #4 Density.b Override	Read/Write
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	
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
7966	Analog Input #5 Live Value (checking alarms only)	Read
7967	Analog Input #6 Live Value (checking alarms only)	Read
7968	Analog Input #7 Live Value (checking alarms only)	Read
7969	Analog Input #8 Live Value (checking alarms only)	Read
7970	Analog Input #9 Live Value (checking alarms only)	Read
7971	Analog Input #5 Value (used in the calculation	Read
7972	Analog Input #6 Value (used in the calculation)	Read
7973	Analog Input #7 Value (used in the calculation)	Read
7974	Analog Input #8 Value (used in the calculation)	Read

Modbus Address Table – Float Point

ADDRESS	DESCRIPTION	READ/WRITE
7975	Analog Input #9 Value (used in the calculation)	Read
7976	Spare #1 Data	Read
7977	Spare #2 Data	Read
7978	Spare #3 Data	Read
7979	Spare #4 Data	Read
7980	Spare #5 Data	Read
7981	Spare #6 Data	Read
7982	Spare #7 Data	Read
7983	Spare #8 Data	Read
7984	Spare #9 Data	Read
7985	Spare Auxiliary I/O #1 Data	Read
7986	Spare Auxiliary I/O #2 Data	Read
7987	Spare Auxiliary I/O #3 Data	Read
7988	Spare Auxiliary I/O #4 Data	Read
7989	Spare Auxiliary I/O #5 Data	Read
7990	Spare Auxiliary I/O #6 Data	Read
7991	Spare Auxiliary I/O #7 Data	Read
7992	Spare Auxiliary I/O #8 Data	Read
7993	Spare Auxiliary I/O #9 Data	Read
7994	Spare Auxiliary I/O #10 Data	Read
7995	Spare Auxiliary I/O #11 Data	Read
7996	Spare Auxiliary I/O #12 Data	Read

Alarms, Audit Trail, and Calibration Data

Previous Data Alarm Area

Set last alarm status request (3030) to 1. (3030,16 bits Integer, Write only)

4001-4005(2x16 bits Integers, Read Only)
4001 last alarm date mmddyy
4003 last alarm time hhmmss
4005 **last alarm flag -** IDx1000000 + CODE x10000 +ACODEx100 +STATUS

Last Alarm Flag

ID	CODE	Not used	STATUS

ID

0	Analog Input #1	41	Analog Input #5
1	Analog Input #2	42	Analog Input #6
2	Analog Input #3	43	Analog Input #7
3	Analog Input #4	44	Analog Input #8
4	RTD Input	45	Analog Input #9
5	Analog Output #1		
6	Analog Output #2	51	Spare Auxiliary I/O #1
7	Analog Output #3	52	Spare Auxiliary I/O #2
8	Analog Output #4	53	Spare Auxiliary I/O #3
9	Density	54	Spare Auxiliary I/O #4
10	Density	55	Spare Auxiliary I/O #5
11	Meter #1	56	Spare Auxiliary I/O #6
12	Meter #2	57	Spare Auxiliary I/O #7
13	Meter #3	58	Spare Auxiliary I/O #8
14	Meter #4	59	Spare Auxiliary I/O #9
17	Event Status	60	Spare Auxiliary I/O #10
18	Calibration Mode	61	Spare Auxiliary I/O #11
		62	Spare Auxiliary I/O #12
20	Multi.Var. DP	71	Slave#1 DP
21	Multi.Var. Pressure	72	Slave#2 DP
22	Multi.Var. Temperature	73	Slave#3 DP
		74	Slave#1 Pressure
30	MPU1200 Alarm	75	Slave#2 Pressure
31	GC Communication	76	Slave#3 Pressure
32	Slave#1 Communication	77	Slave#1 Temperature
33	Slave#2 Communication	78	Slave#2 Temperature
34	Slave#3 Communication	79	Slave#3 Temperature
		80	Battery Alarm
36	Turbine#1		
37	Turbine#2		
38	Turbine#3		

CODE (Only For ID=Meter#1,2,3,4)

1	Flow Rate		
2	Dens. Calc. Out of Range	7	Down
3	Dens. Calc. Out of Range	8	Start

CODE For Diagnostic Data

11	Revolution	12	Blade
13	Profile		

STATUS

0	ID = 10:	FAILED OK
	ID = 5 –8:	OVERRANGE OK
	ID=17,18	OFF
	ID=Others	OK
Others	Not Used	

1	ID=17,18,30	ON
	ID=Others	HI
	ID=31,32,33,34	FAIL
	ID=36,37,38	ERROR
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. (3031,16 bits Integer, Write only)

8101-8109 (2x16 bits Integer, Read only)
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 (config code, 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
Value 0 : this field is not used.

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

21	Analog Input #1
22	Analog Input #2
23	Analog Input #3
24	Analog Input #4
25	RTD

211	Multi.Var.DP
212	Multi.Var.Pressure
213	Multi.Var.Temperature
191	Analog Input #5
192	Analog Input #6
193	Analog Input #7
194	Analog Input #8
195	Analog Input #9
221	Auxiliary Meter #1
222	Auxiliary Meter #2
223	Auxiliary Meter #3
224	Auxiliary Meter #4
225	Auxiliary Meter #5
226	Auxiliary Meter #6
227	Auxiliary Meter #7
228	Auxiliary Meter #8
229	Auxiliary Meter #9
230	Auxiliary Meter #10
231	Auxiliary Meter #11
232	Auxiliary Meter #12
236	Slave #1 DP
237	Slave #1 Pressure
238	Slave #1 Temperature
239	Slave #2 DP
240	Slave #2 Pressure
241	Slave #2 Temperature
242	Slave #3 DP
243	Slave #3 Pressure
244	Slave #3 Temperature

Audit Codes

1	DP Cut Off
2	Stack DP High Switch Percentage
5	Base Density Override
6	Pipe ID
7	Orifice ID
8	Temperature Override
9	Pressure Override
10	Density of Dry Air
11	Base SG (Relative Density)
12	Ratio of Heat
13	Viscosity/Discharge Coeff.C
14	Pipe Thermal
15	Orifice Thermal
16	Pipe Reference Temperature
17	Orifice Reference Temperature
18	MOL% of Methane (aga8d) CO2 (AGA8 Gross Method 1) Nitrogen(AGA8 Gross Method 2)
19	Hydrogen(AGA8 GrossMethod1) CO2 (AGA8 Gross Method 2) Nitrogen(AGA8 Detail Method)
20	CO (AGA8 Gross Method 1) Hydrogen(AGA8 Gross Method 2) CO2 (AGA8 Detail Method)
21	CO (AGA8 Gross Method 2) Ethane (AGA8 Detail Method)
22	Propane (AGA8 Detail Method)
23	Water (AGA8 Detail Method)
24	H2S (AGA8 Detail Method)
25	Hydrogen (AGA8 Detail Method)
26	CO (AGA8 Detail Method)
27	Oxygen (AGA8 Detail Method)
28	i-Butane (AGA8 Detail Method)
29	n-Butane (AGA8 Detail Method)
58	Density Correction Factor
59	
60	Base Temperature
61	Base Pressure
62	Atmospheric Pressure
63	Pulse Output Volume #1
64	Pulse Output Volume #2
65	Mol % of I-Pentane
66	Mol % of n-Pentane
65	Mol % of n-Hexane
66	Mol % of n-Heptane
67	Mol % of n-Octane
68	Mol % of n-Nonane
69	Mol % of n-Decane
70	Mol % of Helium
71	Mol % of Argon
72	

132	Analog Input @4mA
133	Analog Input @20mA
134	Analog Input Maintenance
135	Analog Input Override
137	Multi-Variable Maintenance
138	Multi-Variable Override
142	Flow Rate Threshold #1
143	Flow Rate Threshold #2
144	Flow Rate Threshold #3
145	Flow Rate Threshold #4
146	Linear Factor #1
147	Linear Factor #2
148	Linear Factor #3
149	Linear Factor #4
150	Common Temperature
151	Common Pressure
154	Flow Equation Type
155	Y Factor Selection
156	BS&W Override
157	Use Stack DP
158	Density Type
159	Density Unit
160	BTU Override
161	Day Start Hour
162	Disable Alarm
163	Number of Meters
164	Density Calculation Type
165	DP Low Assignment
166	Temperature Assignment
167	Pressure Assignment
168	Density Assignment
169	Densitometer Temperature Assignment
170	DP High Assignment
171	Pressure Unit
172	Flow Unit
173	
174	
175	
176	Common Density
177	Common BS&W
178	
179	
180	See Notes
181	Flow Cut Off

***Example*: **Meter#2 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 8109)**
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 8109)**
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

Previous Audit Data Area Ends

Previous Calibration/Verification Data Area

3129 Last Calib./Verification Rpt Req.(1=Latest,20=Oldest)
(3129,16 bits Integer, Write only)

8101-8109 (2x16bits Integers, Read only)
8101 Last Calibration/Verification Date mmddyy
8103 Last Calibration/Verification Time hhmmss
8105 As Found / Verification Point (Decimal Inferred in the 4th byte of 8109)
8107 As Left (Decimal Inferred in the 4th byte of 8109)
8109 Code Flag-Given in four hexadecimal bytes (ID,Code,Decimal Inferreed)

Code Flag

	ID	Code	Value Decimal Inferred

Calibration ID

	Master	Slave #1	Slave#2	Slave#3
DP	1	21	31	41
Pressure	2	22	32	42
Temperature	3	23	33	43
Analog Input#1	4	24	34	44
Analog Input#2	5	25	35	45
Analog Input#3	6	26	36	46
Analog Input#4	7	27	37	47
Analog Input#5	8			
Analog Input#6	9			
Analog Input#7	10			
Analog Input#8	11			
Analog Input#9	12			
RTD	13			

Code

0	Calibration
1	Verification

Decimal Inferred

4	4 Decimal Inferred
3	3 Decimal Inferred
2	2 Decimal Inferred

Current Alarm Status

4 Bytes in Hex - 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	Dens. Calc. Out of Range
04	00	00	00	Net Flow Rate High
08	00	00	00	Net Flow Rate Low

Diagnostic Data Alarms – 3701

1st byte	2nd byte	3rd byte	4th byte	
01	00	00	00	Turbine #1 Revolution Error
02	00	00	00	Turbine #1 Blade Error
04	00	00	00	Turbine #1 Profile Error
00	01	00	00	Turbine #2 Revolution Error
00	02	00	00	Turbine #2 Blade Error
00	04	00	00	Turbine #2 Profile Error
00	00	01	00	Turbine #3 Revolution Error
00	00	02	00	Turbine #3 Blade Error
00	00	04	00	Turbine #3 Profile Error

Other Alarms (Modbus Address 9517)
4 Bytes in Hex - FF

01	00	00	00	Slave#1 DP High
02	00	00	00	Slave#1 DP Low
04	00	00	00	Slave#1 Pressure High
08	00	00	00	Slave#1 Pressure Low
10	00	00	00	Slave#1 Temperature High
20	00	00	00	Slave#1 Temperature Low
00	01	00	00	Slave#2 DP High
00	02	00	00	Slave#2 DP Low
00	04	00	00	Slave#2 Pressure High
00	08	00	00	Slave#2 Pressure Low
00	10	00	00	Slave#2 Temperature High
00	20	00	00	Slave#2 Temperature Low
00	00	01	00	Slave#3 DP High
00	00	02	00	Slave#3 DP Low
00	00	04	00	Slave#3 Pressure High
00	00	08	00	Slave#3 Pressure Low
00	00	10	00	Slave#3 Temperature High
00	00	20	00	Slave#3 Temperature Low

Other Alarms (Modbus Address 9527)
4 Bytes in Hex - FF

01	00	00	00	Spare Auxiliary I/O#1 High
02	00	00	00	Spare Auxiliary I/O#1 Low
04	00	00	00	Spare Auxiliary I/O#2 High
08	00	00	00	Spare Auxiliary I/O#2 Low
10	00	00	00	Spare Auxiliary I/O#3 High
20	00	00	00	Spare Auxiliary I/O#3 Low
40	00	00	00	Spare Auxiliary I/O#4 High
80	00	00	00	Spare Auxiliary I/O#4 Low
00	01	00	00	Spare Auxiliary I/O#5 High
00	02	00	00	Spare Auxiliary I/O#5 Low
00	04	00	00	Spare Auxiliary I/O#6 High
00	08	00	00	Spare Auxiliary I/O#6 Low
00	10	00	00	Spare Auxiliary I/O#7 High
00	20	00	00	Spare Auxiliary I/O#7 Low
00	40	00	00	Spare Auxiliary I/O#8 High
00	80	00	00	Spare Auxiliary I/O#8 Low
00	00	01	00	Spare Auxiliary I/O#9 High
00	00	02	00	Spare Auxiliary I/O#9 Low
00	00	04	00	Spare Auxiliary I/O#10 High
00	00	08	00	Spare Auxiliary I/O#10 Low
00	00	10	00	Spare Auxiliary I/O#11 High
00	00	20	00	Spare Auxiliary I/O#11 Low
00	00	40	00	Spare Auxiliary I/O#12 High
00	00	80	00	Spare Auxiliary I/O#12 Low
00	00	00	01	Analog Input #5 Failed
00	00	00	02	Analog Input #6 Failed
00	00	00	04	Analog Input #7 Failed
00	00	00	08	Analog Input #8 Failed
00	00	00	10	Analog Input #9 Failed

Other Alarms (Modbus Address 9529)
4 Bytes in Hex - FF

01	00	00	00	GC Communication Failed
02	00	00	00	Slave#1 Communication Failed
04	00	00	00	Slave#2 Communication Failed
08	00	00	00	Slave#3 Communication Failed
10	00	00	00	MPU –1200 Alarm
00	01	00	00	Analog Input#5 High
00	02	00	00	Analog Input#5 Low
00	04	00	00	Analog Input#6 High
00	08	00	00	Analog Input#6 Low
00	10	00	00	Analog Input#7 High
00	20	00	00	Analog Input#7 Low
00	40	00	00	Analog Input#8 High
00	80	00	00	Analog Input#8 Low
00	00	01	00	Analog Input#9 High
00	00	02	00	Analog Input#9 Low

Other Alarms (Modbus Address 9531)
4 Bytes in Hex - 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	Battery Voltage Low
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
21 – Analog Input #5
22 – Analog Input #6
23 – Analog Input #7
24 – Analog Input #8
25 – Analog Input #9

ADDRESS DESCRIPTION

Assignment	Meter#1	Meter#2	Meter#3	Meter#4
DP	2664	2684	2704	2724
Temperature	2665	2685	2705	2725
Pressure	2666	2686	2706	2726
Density	2667	2687	2707	2727
DP High	2668	2688	2708	2728

2861-2864	Analog Input #5 TAG ID	8 Chars.
2865-2868	Analog Input #6 TAG ID	8 Chars
2869-2872	Analog Input #7 TAG ID	8 Chars
2873-2876	Analog Input #8 TAG ID	8 Chars
2877-2880	Analog Input #9 TAG ID	8 Chars
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.
2931-2934	Multi.Var DP TAG	8 Chars.
2935-2938	Multi.Var Pressure TAG	8 Chars.
2939-2942	Multi.Var Temperature TAG	8 Chars.
4701-4703	Spare Auxiliary I/O #1	8 Chars.
4705-4707	Spare Auxiliary I/O #2	8 Chars.
4709-4711	Spare Auxiliary I/O #3	8 Chars.
4713-4715	Spare Auxiliary I/O #4	8 Chars.
4717-4719	Spare Auxiliary I/O #5	8 Chars.
4721-4723	Spare Auxiliary I/O #6	8 Chars.
4725-4727	Spare Auxiliary I/O #7	8 Chars.
4729-4731	Spare Auxiliary I/O #8	8 Chars.
4733-4735	Spare Auxiliary I/O #9	8 Chars.
4737-4739	Spare Auxiliary I/O #10	8 Chars.
4741-4743	Spare Auxiliary I/O #11	8 Chars.
4745-4747	Spare Auxiliary I/O #12	8 Chars.

Data Packet

Set Meter Number to 1, 2, 3, or 4 (Address 3028)

Previous Hourly Data Packet (101-184)

Hourly archive flow data 101, 102, .. 184 are fixed length arrays. The data field is used to address a 10 hours individual group record.(101=Latest, 184=Oldest)

RTU MODE –

ADDR	FUNC CODE	STARTING POINT		# OF POINTS		CRC CHECK	
		HI	LO	HI	LO		
01	03	00	65	00	01	94	15

Response

ADDR	FUNC CODE	BYTE COUNTS	DATA …(Repeat n Times)		CRC CHECK	
			HI	LO		
01	03	F0	00	01..		

Response Data Message – Standard

DESCRIPTION (Standard)	Decimal	HOUR
Date (3 bytes)/Hour (one byte)	0 Inferred	First Hour
Flowing Time (4 bytes)	2 Inferred	First Hour
Hourly Total (4 bytes) Net Total: (Gas Application) Gross Total (Liquid Application)	1 Inferred	First Hour
Energy Total (4 bytes)	1 Inferred	First Hour
Pressure (2 bytes)/ Temperature (2 bytes)	*Note	First Hour
DP EXT (2 bytes)/DP (2 bytes)	1 Inferred	First Hour
Date (3 bytes)/Hour (one byte)	0 Inferred	Second Hour
Flowing Time (4 bytes)	2 Inferred	Second Hour
Hourly Total (4 bytes) Net Total: (Gas Application) Gross Total (Liquid Application)	1 Inferred	Second Hour
Hourly Total (4 bytes) Energy Total: (Gas Application) Net Total (Liquid Application)	1 Inferred	Second Hour
Pressure (2 bytes)/ Temperature (2 bytes)	*Note	Second Hour
DP EXT (2 bytes)/DP (2 bytes)	1 Inferred	Second Hour
…	…	…
…	…	…
…	…	…
Date (3 bytes)/Hour (one byte)	0 Inferred	Ninth Hour
Flowing Time (4 bytes)	2 Inferred	Ninth Hour
Hourly Total (4 bytes) Net Total: (Gas Application) Gross Total (Liquid Application)	1 Inferred	Ninth Hour
Hourly Total (4 bytes) Energy Total: (Gas Application) Net Total (Liquid Application)	1 Inferred	Ninth Hour
Pressure (2 bytes)/ Temperature (2 bytes)	*Note	Ninth Hour
DP EXT (2 bytes)/DP (2 bytes)	1 Inferred	Ninth Hour
Date (3 bytes)/Hour (one byte)	0 Inferred	Tenth Hour
Flowing Time (4 bytes)	2 Inferred	Tenth Hour
Hourly Total (4 bytes) Net Total: (Gas Application) Gross Total (Liquid Application)	1 Inferred	Tenth Hour
Hourly Total (4 bytes) Energy Total: (Gas Application) Net Total (Liquid Application)	1 Inferred	Tenth Hour
Pressure (2 bytes)/ Temperature (2 bytes)	*Note	Tenth Hour
DP EXT (2 bytes)/DP (2 bytes)	1 Inferred	Tenth Hour

*Note

Description	Units	Decimal
Pressure	PSIG	1 Inferred
	BAR, KG/CM2	2 Inferred
	KPA	0 Inferred
Temperature	Degrees F, Degrees C	1 Inferred

Response Data Message – Program Variable

DESCRIPTION	DATA TYPE	HOUR
Date (3 bytes)/Hour (one byte)	Integer	First Hour
Variable #1	Float	First Hour
Variable #2	Float	First Hour
Variable #3	Float	First Hour
Variable #4	Float	First Hour
Variable #5	Float	First Hour
Date (3 bytes)/Hour (one byte)	Float	Second Hour
Variable #1	Float	Second Hour
Variable #2	Float	Second Hour
Variable #3	Float	Second Hour
Variable #4	Float	Second Hour
Variable #5	Float	Second Hour
…	…	…
…	…	…
…	…	…
Date (3 bytes)/Hour (one byte)	Float	Ninth Hour
Variable #1	Float	Ninth Hour
Variable #2	Float	Ninth Hour
Variable #3	Float	Ninth Hour
Variable #4	Float	Ninth Hour
Variable #5	Float	Ninth Hour
Date (3 bytes)/Hour (one byte)	Float	Tenth Hour
Variable #1	Float	Tenth Hour
Variable #2	Float	Tenth Hour
Variable #3	Float	Tenth Hour
Variable #4	Float	Tenth Hour
Variable #5	Float	Tenth Hour

DESCRIPTION	MODBUS ADDR.	DATA TYPE	Day
BS&W	8001	Float	First Day
BS&W	8003	Float	Second Day
BS&W	8005	Float	Third Day
BS&W	8007	Float	Forth Day
BS&W	8009	Float	Fifth Day
BS&W	8011	Float	Sixth Day
BS&W	8013	Float	Seventh Day
BS&W	8015	Float	Eighth Day
BS&W	8017	Float	Ninth Day
BS&W	8019	Float	Tenth Day

Previous Hourly Data Packet

NO.	Hour
101	1-10
102	11-20
103	21-30
104	31-40
105	41-50
106	51-60
107	61-70
108	71-80
109	81-90
110	91-100
111	101-110
112	111-120
113	121-130
114	131-140
115	141-150
116	151-160
117	161-170
118	171-180
119	181-190
120	191-200
121	201-210
122	211-220
123	221-230
124	231-240
125	241-250
126	251-260
127	261-270
128	271-280
129	281-290
130	291-300
131	301-310
132	311-320
133	321-330
134	331-340
135	341-350
136	351-360
137	361-370
138	371-380
139	381-390
140	391-400
141	401-410
142	411-420
143	421-430
144	431-440
145	441-450
146	451-460
147	461-470
148	471-480
149	481-490
150	491-500

NO.	Hour
151	501-510
152	511-520
153	521-530
154	531-540
155	541-550
156	551-560
157	561-570
158	571-580
159	581-590
160	591-600
161	601-610
162	611-620
163	621-630
164	631-640
165	641-650
166	651-660
167	661-670
168	671-680
169	681-690
170	691-700
171	701-710
172	711-720
173	721-730
174	731-740
175	741-750
176	751-760
177	761-770
178	771-780
179	781-790
180	791-800
181	801-810
182	811-820
183	821-830
184	831-840

Previous Daily Data Packet – 35 Days

Daily archive flow data 431,432, 433 (240 bytes),434 (120 bytes) are fixed length arrays. The data field is used to address a 10 days individual group record.431=Latest, 434=Oldest)

Set Meter Number to 1, 2, 3, or 4 (Address 3028)

RTU MODE –

ADDR	FUNC CODE	STARTING POINT		# OF POINTS		CRC CHECK	
		HI	LO	HI	LO		
01	03	01	AF	00	01		

Response

ADDR	FUNC CODE	BYTE COUNTS	DATA …(Repeat n Times)		CRC CHECK	
			HI	LO		
01	03	F0	00	01..		

Response Data Message – Standard

DESCRIPTION	DECIMAL	DAY
Day Start Hour (1 byte) /Date (3 byte)	0 Inferred	First Day
Flowing Time (4 bytes)	2 Inferred	First Day
Daily Total (4 bytes) Net Total: (Gas Application) Gross Total (Liquid Application)	1 Inferred	First Day
Daily Total (4 bytes) Energy Total: (Gas Application) Net Total (Liquid Application)	1 Inferred	First Day
Pressure (2 bytes)/Temperature (2 bytes)	*Note	First Day
DP EXT (2 bytes)/DP (2 bytes)	1 Inferred	First Day
…	…	…
…	…	…
…	…	…
Day Start Hour (1 byte) /Date (3 byte)	0 Inferred	Ninth Day
Flowing Time	2 Inferred	Ninth Day
Daily Total – Net Total: (Gas Application) Gross Total (Liquid Application)	1 Inferred	Ninth Day
Daily Total (4 bytes) Energy Total: (Gas Application) Net Total (Liquid Application)	1 Inferred	Ninth Day
Pressure (2 bytes)/ Temperature (2 bytes)	*Note	Ninth Day
DP EXT (2 bytes)/DP (2 bytes)	2 Inferred	Ninth Day
Day Start Hour (1 byte) /Date (3 byte)	0 Inferred	Tenth Day
Flowing Time	2 Inferred	Tenth Day
Daily Total (4 bytes) Net Total: (Gas Application) Gross Total (Liquid Application)	1 Inferred	Tenth Day
Daily Total (4 bytes) Energy Total: (Gas Application) Net Total (Liquid Application)	1 Inferred	Tenth Day
Pressure (2 bytes)/Temperature (2 bytes)	*Note	Tenth Day
DP EXT (2 bytes)/DP (2 bytes)	1 Inferred	Tenth Day

Previous Daily Data Packet - 35 days

Number	Day
431	**1-10**
432	**11-20**
433	**21-30**
434	**31-35**

*Note

Description	Units	Decimal
Pressure	PSIG	1 Inferred
	BAR, KG/CM2	2 Inferred
	KPA	0 Inferred
Temperature	Degrees F, Degrees C	1 Inferred

Response Data Message – Program Variable

DESCRIPTION	DATA TYPE	DAY
Day Start Hour (1 byte) /Date (3 byte)	Integer	First Day
Variable #1	Float	First Day
Variable #2	Float	First Day
Variable #3	Float	First Day
Variable #4	Float	First Day
Variable #5	Float	First Day
…	…	…
…	…	…
…	…	…
Day Start Hour (1 byte) /Date (3 byte)	Integer	Ninth Day
Variable #1	Float	Ninth Day
Variable #2	Float	Ninth Day
Variable #3	Float	Ninth Day
Variable #4	Float	Ninth Day
Variable #5	Float	Ninth Day
Day Start Hour (1 byte) /Date (3 byte)	Integer	Tenth Day
Variable #1	Float	Tenth Day
Variable #2	Float	Tenth Day
Variable #3	Float	Tenth Day
Variable #4	Float	Tenth Day
Variable #5	Float	Tenth Day

Previous Daily Data Packet - 35 Days

Number	Day
431	**1-10**
432	**11-20**
433	**21-30**
434	**31-35**

Previous Month Data Packet

Set Meter Number to 1, 2, 3, or 4 (Address 3028)

Last Month Data Packet – 1 Month

Data Packet Number	Month
411	1

Monthly archive flow data 411 (72 bytes) is a fixed length array. The data field is used to address month configuration and month totals record.

RTU MODE -

ADDR	FUNC CODE	STARTING POINT		# OF POINTS		CRC CHECK	
		HI	LO	HI	LO		
01	03	01	9b	00	01	F4	19

Response

ADDR	FUNC CODE	BYTE COUNTS	DATA …(Repeat n Times)		CRC CHECK	
			HI	LO		
01	03	48	00	01..		

Response Data Message - Standard

DESCRIPTION	DECIMAL	Bytes
Base Temperature	2 Inferred	4
Base Pressure	4 Inferred	4
Atmospheric Pressure	4 Inferred	4
Base SG	6 Inferred	4
Heating Value	3 Inferred	4
Pipe ID	5 Inferred	4
Orifice ID	5 Inferred	4
DP Cut Off	4 Inferred	4
Flowing Hour	2 Inferred	4
Month Total Net Total: (Gas Application) Gross Total (Liquid Application)	0 Inferred	4
Month Total Energy Total (Gas Application) Net Total (Liquid Application)	0 Inferred	4
Month Averaged Pressure (2 bytes)/ Month Averaged Temperature (2 bytes)	*Note	4
Month Averaged DP EXT (2 bytes)/ Month Averaged DP (2 bytes)	1 Inferred	4
Spare	0 Inferred	4
Total Day	0 Inferred	4
Month	0 Inferred	4
Year	0 Inferred	4
Spare	0 Inferred	4

*Note

Description	Units	Decimal
Pressure	PSIG	1 Inferred
	BAR, KG/CM2	2 Inferred
	KPA	0 Inferred
Temperature	Degrees F, Degrees C	1 Inferred

Response Data Message – Program Variable

DESCRIPTION	DECIMAL
Base Temperature	2 Inferred
Base Pressure	4 Inferred
Atmospheric Pressure	4 Inferred
Base SG	6 Inferred
Heating Value	3 Inferred
Pipe ID	5 Inferred
Orifice ID	5 Inferred
DP Cut Off	4 Inferred
Variable #1	Float
Variable #2	Float
Variable #3	Float
Variable #4	Float
Variable #5	Float
Spare	0 Inferred
Total Day	0 Inferred
Month	0 Inferred
Year	0 Inferred
Spare	0 Inferred

Previous Month Data Packet (412-414)

Monthly archive flow data 412-414 (240 bytes) are fixed length arrays. The data field is used to address an 10 days individual group record

RTU MODE -

ADDR	FUNC CODE	STARTING POINT		# OF POINTS		CRC CHECK	
		HI	LO	HI	LO		
01	03	01	9f	00	01		

Response

ADDR	FUNC CODE	BYTE COUNTS	DATA …(Repeat n Times)		CRC CHECK	
			HI	LO		
01	03	F0	00	01..		

Number	Day
412	**1-10**
413	**11-20**
414	**21-30**

DESCRIPTION	DECIMAL	Days
Day Start Hour (1 byte) /Date (3 byte)	0 Inferred	First Day
Flowing Time	2 Inferred	First Day
Daily Total – Net Total: (Gas Application) Gross Total (Liquid Application)	1 Inferred	First Day
Daily Total – Energy Total (Gas Application) Net Total (Liquid Application)	1 Inferred	First Day
Pressure (2 bytes) /Temperature (2 bytes)	*Note	First Day
DP EXT (2 bytes)/DP (2 bytes)	1 Inferred	First Day
…	…	…
…	…	…
Day Start Hour (1 byte) /Date (3 byte)	0 Inferred	10th Day
Flowing Time	2 Inferred	10th Day
Daily Total – Net Total: (Gas Application) Gross Total (Liquid Application)	1 Inferred	10th Day
Daily Total – Energy Total (Gas Application) Net Total (Liquid Application)	1 Inferred	10th Day
Pressure (2 bytes) /Temperature (2 bytes)	*Note	10th Day
DP EXT (2 bytes)/DP (2 bytes)	0 Inferred	10th Day

*Note

Description	Units	Decimal
Pressure	PSIG	1 Inferred
	BAR, KG/CM2	2 Inferred
	KPA	0 Inferred
Temperature	Degrees F, Degrees C	1 Inferred

Previous Month Data Packet (415)

Monthly archive flow data 415 (48 bytes) is a fixed length array. The data field is used to address a 2 days individual group record.

Number	Day
415	**31-32**

RTU MODE -

ADDR	FUNC CODE	STARTING POINT		# OF POINTS		CRC CHECK	
		HI	LO	HI	LO		
01	03	01	A0	00	01		

Response

ADDR	FUNC CODE	BYTE COUNTS	DATA …(Repeat n Times)		CRC CHECK	
			HI	LO		
01	03	30	00	01..		

Report by Exception:

When a new alarm is occurred, the MicroMS4 will send out an alarm message through RS232.

Unit ID	**Function Code**	**CRC**	
1	**99 (63 Hex)**	**XX**	**XX**

32 bits Integer - 3329

```
00000001 Analog Input #1 Alarm
00000002 Analog Input #2 Alarm
00000004 Analog Input #3 Alarm
00000008 Analog Input #4 Alarm
00000010 Analog Input #5 Alarm
00000020 Analog Input #6 Alarm
00000040 Analog Input #7 Alarm
00000080 Analog Input #8 Alarm

00000100 Analog Input #9 Alarm
00000200 Multi.Var DP Alarm
00000400 Multi.Var Pressure Alarm
00000800 Multi.Var Temperature Alarm
00001000 Battery Alarm
00002000 Slave Comm. Failed
00004000
00008000

00010000 Slave#1 Multi.Var DP Alarm
00020000 Slave#1 Multi.Var Pressure Alarm
00040000 Slave#1 Multi.Var Temperature Alarm
00080000 Spare Auxiliary#1 Alarm
00100000 Spare Auxiliary#2 Alarm
00200000 Spare Auxiliary#3 Alarm
00400000 Spare Auxiliary#4 Alarm

01000000 Slave#2 Multi.Var DP Alarm
02000000 Slave#2 Multi.Var Pressure Alarm
04000000 Slave#2 Multi.Var Temperature Alarm
08000000 Spare Auxiliary#5 Alarm
10000000 Spare Auxiliary#6 Alarm
20000000 Spare Auxiliary#7 Alarm
40000000 Spare Auxiliary#8 Alarm
```

32 bits Integer - 3325

```
00000001 Slave#3 Multi.Var DP Alarm
00000002 Slave#3 Multi.Var PF Alarm
00000004 Slave#3 Multi.Var TF Alarm
00000008 Spare Auxiliary#9 Alarm
00000010 Spare Auxiliary#10 Alarm
00000020 Spare Auxiliary#11 Alarm
00000040 Spare Auxiliary#12 Alarm
```

Number of active meters/Spare I/O 1-4 Assignments

Spare I/Os are built in master unit- modbus address 3331,3332

Spare I/O	**#2**	**#1**		**Active Aux.Spare**	**Active Spare**	**Active Meter**
Bits	8	8	4	4	4	4
Assignment				1-12	1-9	1-4

Spare I/O Assignments 3-6: modbus address 3333,3334

Spare I/O	**#6**	**#5**	**#4**	**#3**
Bits	8	8	8	8
Assignment				

Spare I/O Assignments 7,8: modbus address 3327,3328

Spare I/O	**#8**	**#7**
Bits	8	8
Assignment		

Spare Auxiliary I/O Assignments 1-4: modbus address 3335,3336

Spare Auxiliary I/O	**#4**	**#3**	**#2**	**#1**
Bits	8	8	8	8
Assignment				

Spare Auxiliary I/O Assignments 5-8: modbus address 3337,3338

Spare Auxiliary I/O	**#8**	**#7**	**#6**	**#5**
Bits	8	8	8	8
Assignment				

Spare Auxiliary I/O Assignments 9-12: modbus address 3339,3340

Spare Auxiliary I/O	**#12**	**#11**	**#10**	**#9**
Bits	8	8	8	8
Assignment				

Assignments: (2 digits – 1st digit: Meter Number, 2nd digit: Selection)

Selection

0. Not Used
1. Tubing Pressure
2. Casing Pressure
3. Oil Tank
4. Water Tank
5. Compressor – Suction
6. Compressor – Discharge
7. Compressor – Temperature

Others - Spare

Default Tag Number

11	TubingP1	**21**	TubingP2	**31**	TubingP3	**41**	TubingP4
12	CasingP1	**22**	CasingP2	**32**	CasingP3	**42**	CasingP4
13	OilTank1	**23**	OilTank2	**33**	OilTank3	**43**	OilTank4
14	WatTank1	**24**	WatTank2	**34**	WatTank3	**44**	WatTank4
15	Suction1	**25**	Suction2	**35**	Suction3	**45**	Suction4
16	Dischag1	**26**	Dischag2	**36**	Dischag3	**46**	Dischag4
17	CompreT1	**27**	CompreT2	**37**	CompreT3	**47**	CompreT4

Hourly Data (Last Day - 24 Hours)

Address 601:meter#1, 602:meter#2, 603:meter#3, 604:meter#4

ADDR	FUNC CODE	STARTING POINT		# OF POINTS		CRC CHECK	
		HI	LO	HI	LO		
01	03	02	59	00	01		

Response

ADDR	FUNC CODE	BYTE COUNTS		DATA		CRC CHECK	
		HI	LO	HI	LO		
01	03	00	F0	00	01		

Hourly Data (Last Day - 24 hours and 240 Bytes/Meter)

Variables	Bits	Hour	Range	Decimal
Flow Time (Hour)	8	1st	0-1.00	2 Decimals
Hourly Net Total	16	1st.	0-6553.4	1 Decimal
DP	12	1st.	0-409.5	1 Decimal
Temperature	12	1st.	0-409.5	1 Decimal
Pressure	12	1st.	0-4095	None
DP/EXT	20	1st.	0-10485.76	2 Decimals
	Total – 80 Bits (10 Bytes)			

Flow Time (Hour)	8	2nd.	0-1.00	2 Decimals
Hourly Net Total	16	2nd.	0-6553.4	1 Decimal
DP	12	2nd.	0-409.5	1 Decimal
Temperature	12	2nd.	0-409.5	1 Decimal
Pressure	12	2nd.	0-4095	None
DP/EXT	20	2nd.	0-10485.76	2 Decimals

…

Flow Time (Hour)	8	24th	0-1.00	2 Decimals
Hourly Net Total	16	24th	0-6553.4	1 Decimal
DP	12	24th	0-409.5	1 Decimal
Temperature	12	24th	0-409.5	1 Decimal
Pressure	12	24th	0-4095	None
DP/EXT	20	24th	0-10485.76	2 Decimals

Snapshot Report

Address 605: Spare Auxiliary I/O
Address 606: Spare I/O Data
Address 607: Meter#1
Address 608: Meter#2
Address 609: Meter#3
Address 610: Meter#4

ADDR	FUNC CODE	STARTING POINT		# OF POINTS		CRC CHECK	
		HI	LO	HI	LO		
01	03	02	5d	00	01		

Response

ADDR	FUNC CODE	BYTE COUNTS		DATA		CRC CHECK	
		HI	LO	HI	LO		
01	03	00	F0	00	01		

Snapshot Meter Data

Variables	Bits	Range	Decimal
Yesterday Net Volume	**24**	**0-167721.5**	**1 Decimal**
Month Net Volume	**24**	**0-1677215**	**None**
Daily Net Volume	**24**	**0-167721.5**	**1 Decimal**
Net Flow Rate	**20**	**0-65535**	**None**
Line Temperature	**12**	**0-409.5**	**1 Decimal**
Line Pressure	**12**	**0-4095**	**None**
Line DP	**12**	**0-409.5**	**1 Decimal**

Spare I/Os are built in master unit

Spare Data

Variables	Bits	Decimal
Spare #1 Data	**16**	***Note**
Spare #2 Data	**16**	***Note**
Spare #3 Data	**16**	***Note**
Spare #4 Data	**16**	***Note**
Spare #5 Data	**16**	***Note**
Spare #6 Data	**16**	***Note**
Spare #7 Data	**16**	***Note**
Spare #8 Data	**16**	***Note**
Spare #9 Data	**16**	***Note**

***Note:**

11	TubingP1	**21**	TubingP2	**31**	TubingP3	**41**	TubingP4
12	CasingP1	**22**	CasingP2	**32**	CasingP3	**42**	CasingP4
13	OilTank1	**23**	OilTank2	**33**	OilTank3	**43**	OilTank4
14	WatTank1	**24**	WatTank2	**34**	WatTank3	**44**	WatTank4
15	Suction1	**25**	Suction2	**35**	Suction3	**45**	Suction4
16	Dischag1	**26**	Dischag2	**36**	Dischag3	**46**	Dischag4
17	CompreT1	**27**	CompreT2	**37**	CompreT3	**47**	CompreT4

Spare auxiliary I/Os are utilized from the slave microms4 unit.

SPARE AUXILIARY DATA

Variables	Bits	Decimal
Spare Auxiliary#1 Data	**16**	***Note**
Spare Auxiliary #2 Data	**16**	***Note**
Spare Auxiliary #3 Data	**16**	***Note**
Spare Auxiliary #4 Data	**16**	***Note**
Spare Auxiliary #5 Data	**16**	***Note**
Spare Auxiliary #6 Data	**16**	***Note**
Spare Auxiliary #7 Data	**16**	***Note**
Spare Auxiliary #8 Data	**16**	***Note**
Spare Auxiliary #9 Data	**16**	***Note**
Spare Auxiliary #10 Data	**16**	***Note**
Spare Auxiliary #11 Data	**16**	***Note**
Spare Auxiliary #12 Data	**16**	***Note**

***Note:**

11	TubingP1	**21**	TubingP2	**31**	TubingP3	**41**	TubingP4
12	CasingP1	**22**	CasingP2	**32**	CasingP3	**42**	CasingP4
13	OilTank1	**23**	OilTank2	**33**	OilTank3	**43**	OilTank4
14	WatTank1	**24**	WatTank2	**34**	WatTank3	**44**	WatTank4
15	Suction1	**25**	Suction2	**35**	Suction3	**45**	Suction4
16	Dischag1	**26**	Dischag2	**36**	Dischag3	**46**	Dischag4
17	CompreT1	**27**	CompreT2	**37**	CompreT3	**47**	CompreT4

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 FINSH 125

-TOLERANCE-
.X = .1 [2.5]
.XX = .02 [0.5]
.XXX = .010 [0.25]
FRACTIONS = 1/32 ANGLES = 2°

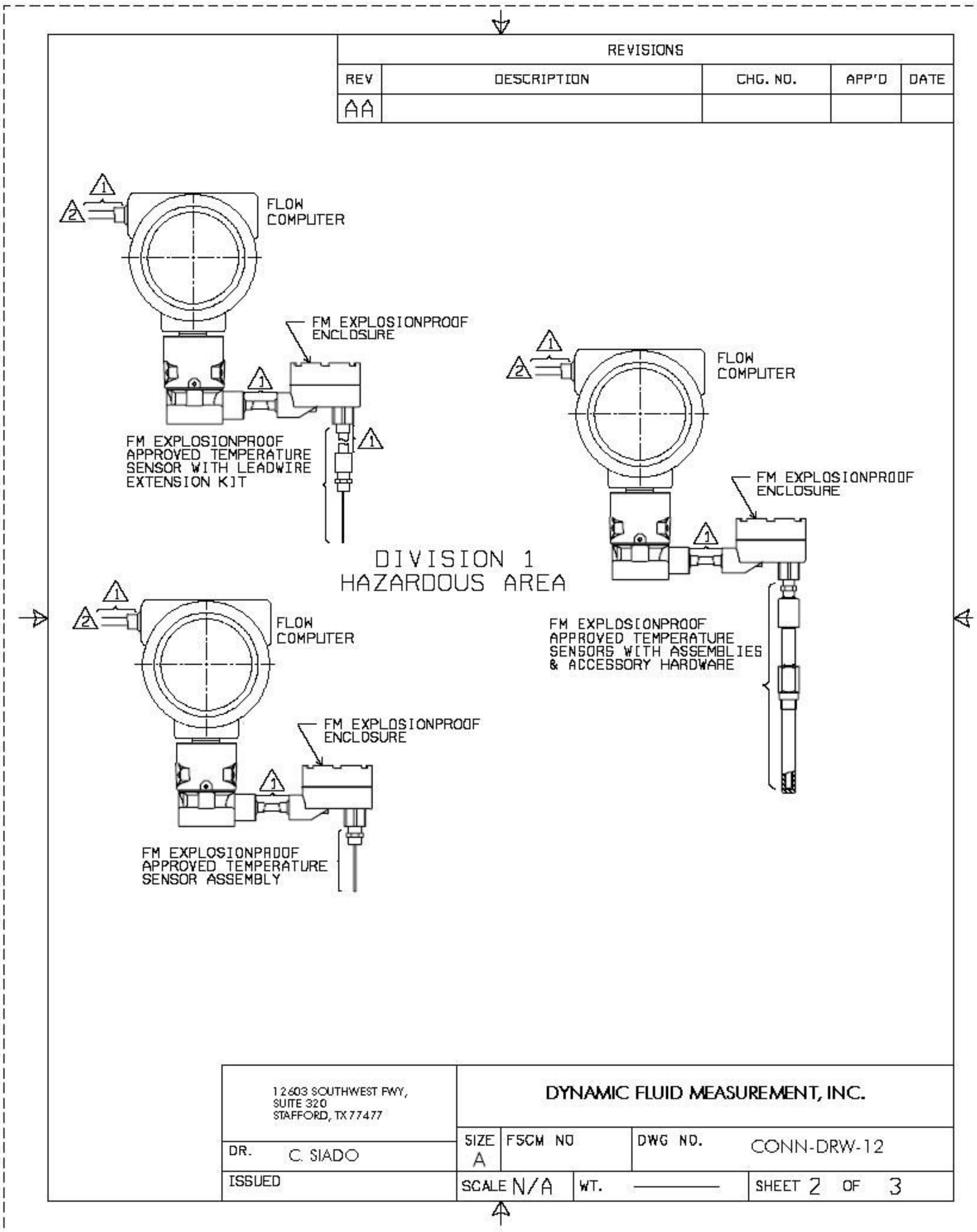
DO NOT SCALE PRINT

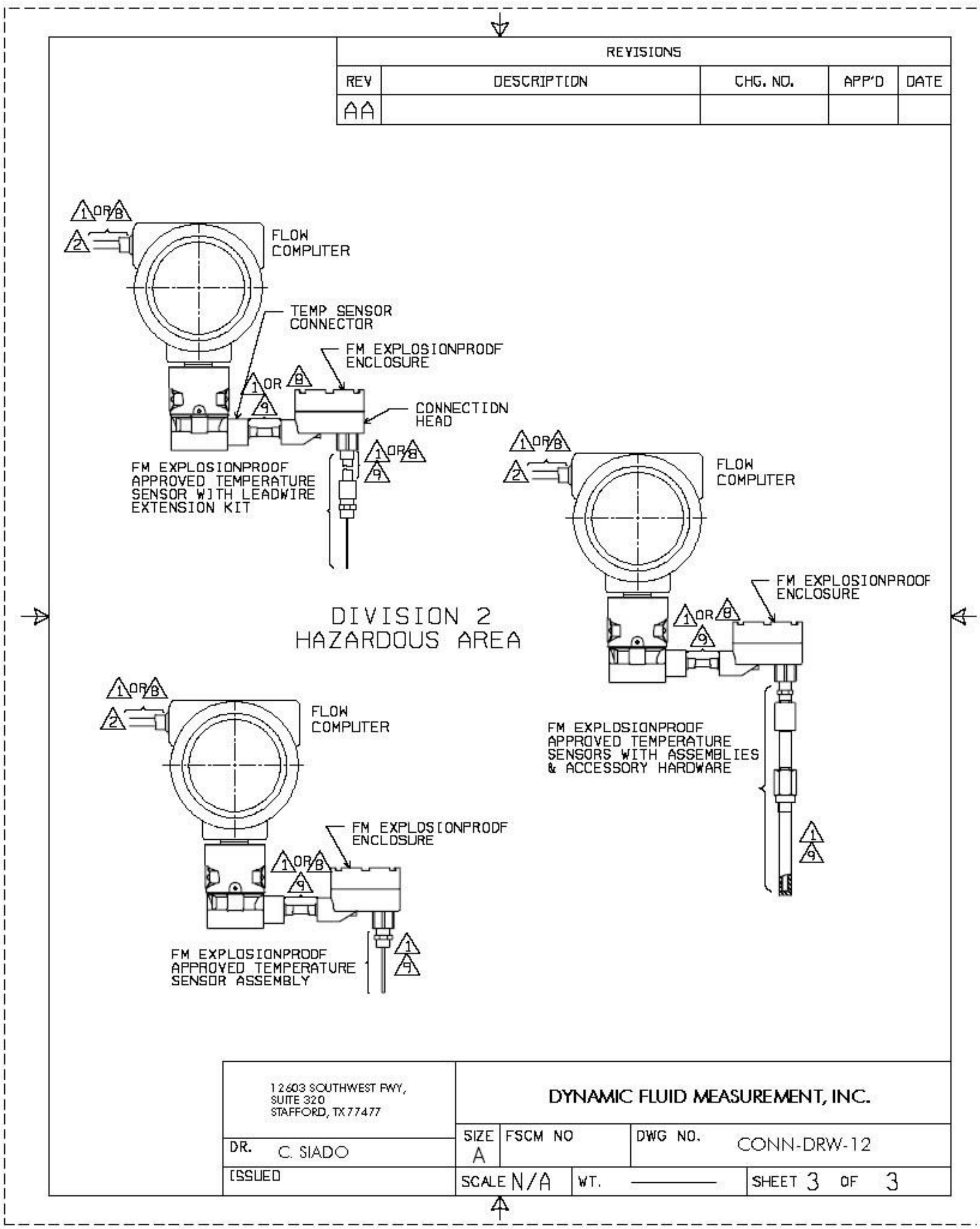
CONTRACT NO.
DR. C. SIADO
CHK'D
APP'D. S. HALILAH
APP'D. GOVT.

DYNAMIC FLUID MEASUREMENT, INC.
12603 SOUTHWEST FWY, SUITE 320 STAFFORD, TX 77477

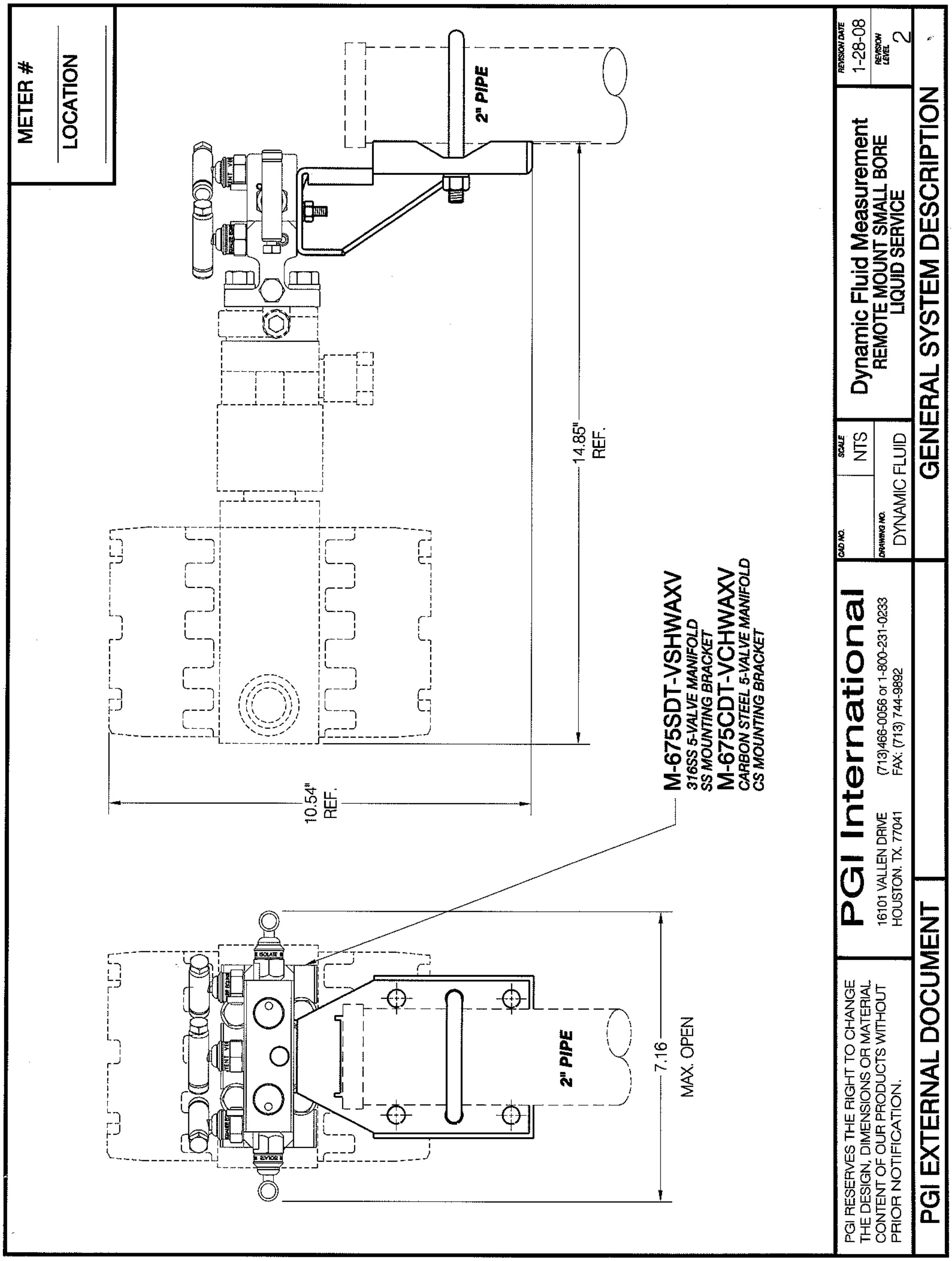
TITLE: MODEL MICROMV AND ECHART EXPLOSIONPROOF INSTALLATION DRAWING, FACTORY MUTUAL

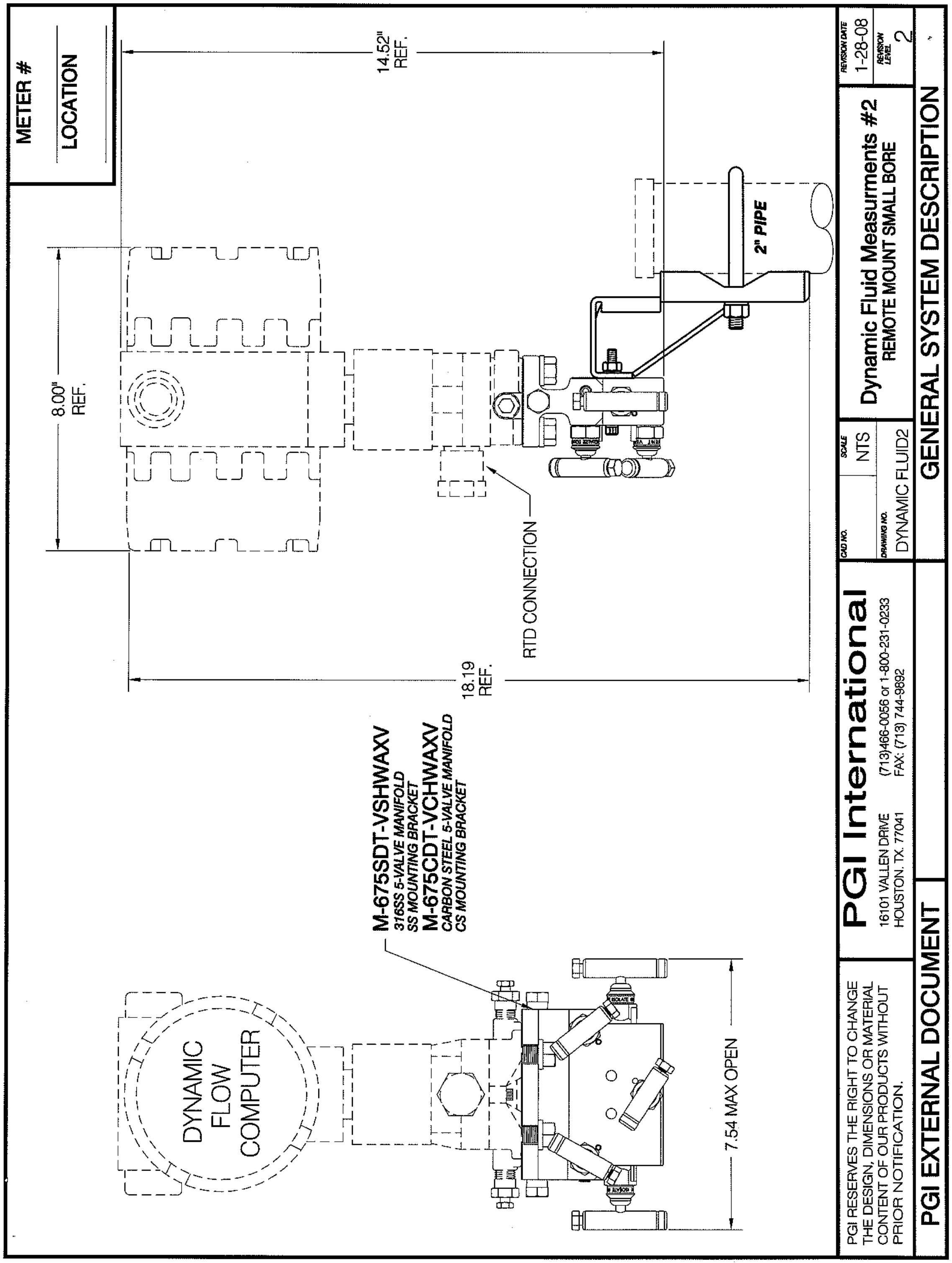
SIZE A | FSCM NO | DWG NO. CONN-DRW-12
SCALE | WT. | SHEET 1 OF 3

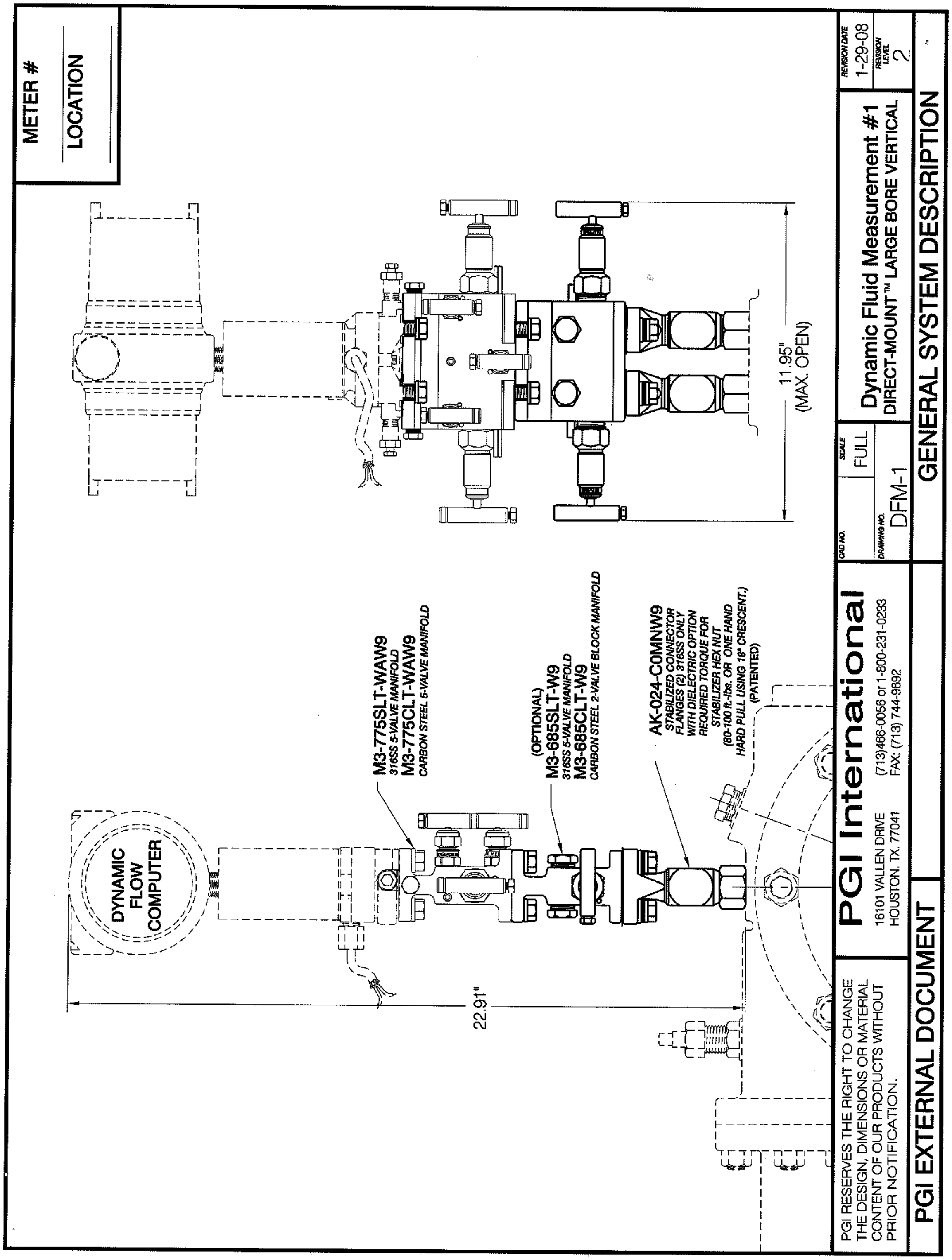

REVISIONS
REV
DESCRIPTION
CHG. NO.
APP'D
DATE
AA
FLOW COMPUTER
FM EXPLOSIONPROOF ENCLOSURE
FM EXPLOSIONPROOF APPROVED TEMPERATURE SENSOR WITH LEADWIRE EXTENSION KIT
DIVISION 1 HAZARDOUS AREA
FLOW COMPUTER
FM EXPLOSIONPROOF ENCLOSURE
FM EXPLOSIONPROOF APPROVED TEMPERATURE SENSORS WITH ASSEMBLIES & ACCESSORY 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

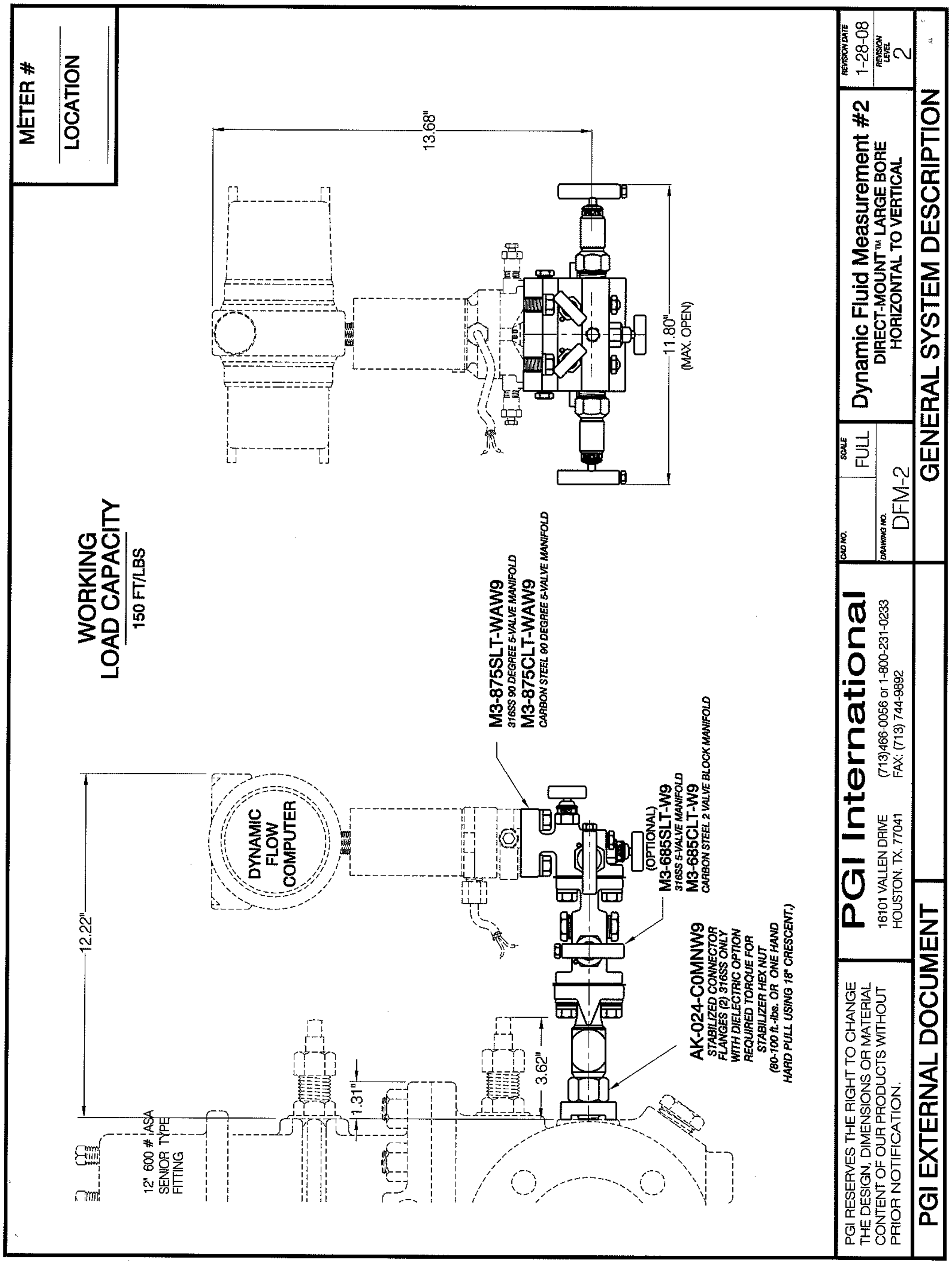

REVISIONS
REV
DESCRIPTION
CHG. NO.
APP'D
DATE
AA
FLOW COMPUTER
TEMP SENSOR CONNECTOR
FM EXPLOSIONPROOF ENCLOSURE
CONNECTION HEAD
FM EXPLOSIONPROOF APPROVED TEMPERATURE SENSOR WITH LEADWIRE EXTENSION KIT
DIVISION 2
HAZARDOUS AREA
FM EXPLOSIONPROOF APPROVED TEMPERATURE SENSORS WITH ASSEMBLIES & ACCESSORY 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)
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-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
WORKING
LOAD CAPACITY
150 FT/LBS
13.68"
11.80"
(MAX. OPEN)
12.22"
3.62"
1.31"
12" 600 # ASA
SENIOR TYPE
FITTING
DYNAMIC
FLOW
COMPUTER
M3-875SLT-WAW9
316SS 90 DEGREE 5-VALVE MANIFOLD
M3-875CLT-WAW9
CARBON STEEL 90 DEGREE 5-VALVE MANIFOLD
(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.)
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