MicroNOC/Micro100 Net Oil Computer
OPERATORS MANUAL

Flow Computer
Liquid Version

11104 W.Airport Blvd, Suite 108
Stafford, Texas 77477 USA
(281) 565-1118
Fax (281) 565-1119

Date: 1/19/2022

WARRANTY

Dynamic Flow Computers warrants to the owner of the 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: 1/19/2022

CHAPTER 1: QUICK START

Introduction:

The micro MV Net Oil Multi-Meter Flow Computer is a dual meter run allocation flow computer with well testing functionality. It combines several functionalities including allocation for oil and water by using a live density input or a BS&W water cut meter. Up to 20 wells can be preconfigured for on the fly testing with adjustable purge time and well test time. The focus has been to bring the different needs and requirements of these specialized industries into one hardware and firmware platform and therefore reducing the spare parts requirements, the training process, calibration, and overall cost of ownership. We believe the Micro MV Net Oil Flow Computer has delivered and met the design intentions.
The Micro MV Net Oil 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 Net Oil Flow Computer will be a simple pleasant experience, not intimidating in any way.

The Micro MV Net Oil Flow Computer handles up to two-meter runs for the measurement of liquid products. Using orifice plate, Venturi, turbine/PD meter, mass or wedge devices, it can meter a wide variety of products, such as crude, refined product, LPG/NGL products. Thirty-five days of previous daily data, eight previous batch data, and thirty-five days previous hourly data are stored in the short format type reports. The previous 80 audit-trail reports and 80 alarm reports are stored. User formatted reports and user formatted ticket reports are available. Eight different product files are user-configurable.
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 Net Oil Flow Computer via RS485 serial interface. Up to four meter runs can be stored and calculated in a single Micro MV Net Oil Flow computer. The 2nd RS485 is used as a slave or a master Modbus port for data acquisition and other serial functions.
The Micro MV Net Oil Flow Computer has a host of inputs and outputs beyond the built in Rosemount Multi Variable transmitter.
Three high-speed frequency inputs (Sine or Square wave), 70 mV peak to peak or sine wave 6 volts, or lighter on square wave
Four standard analog inputs, or two analog inputs and one three wire RTD inputs

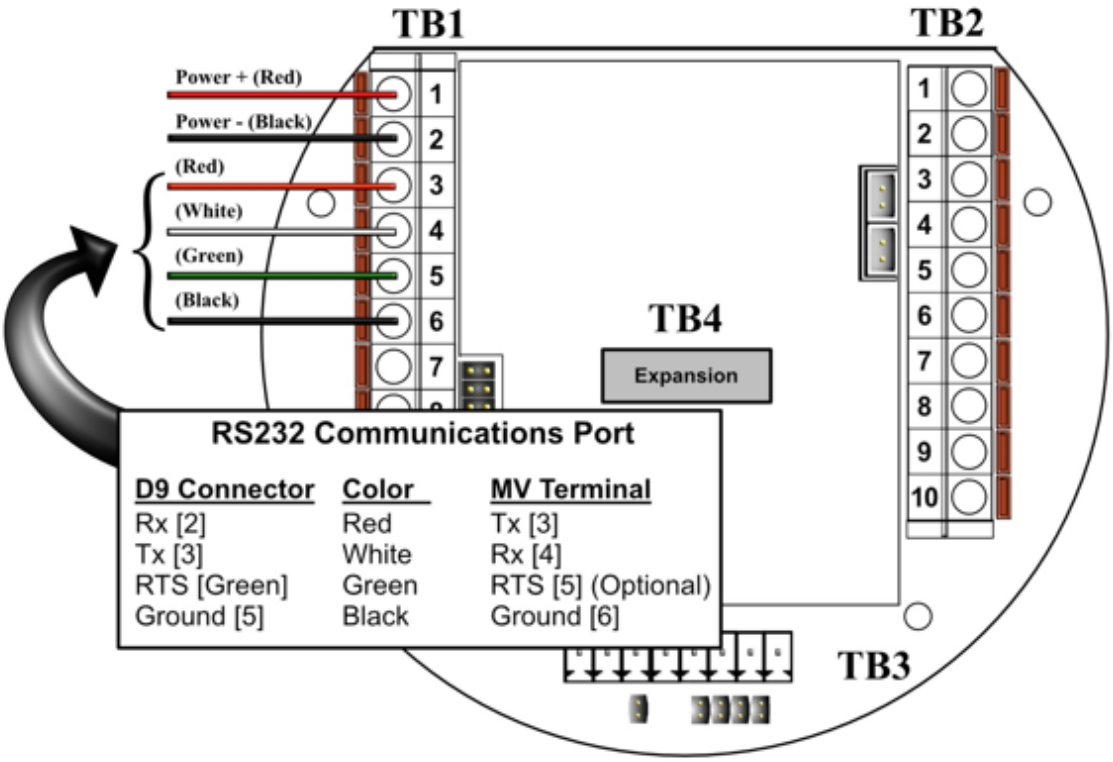
The Micro MV Net Oil Flow computer handles up to two-meter runs. It includes the following
Four additional analog inputs, or two analog inputs and one three wire RTD inputs
One analog output expandable to four, or five additional analog inputs, one RS232, two RS485 with Modbus protocol, and one additional serial printer output.
Four status inputs or digital outputs are user configurable. Each Micro MV Net Oil Flow Computer can store up to 35 days of hourly and daily data.

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

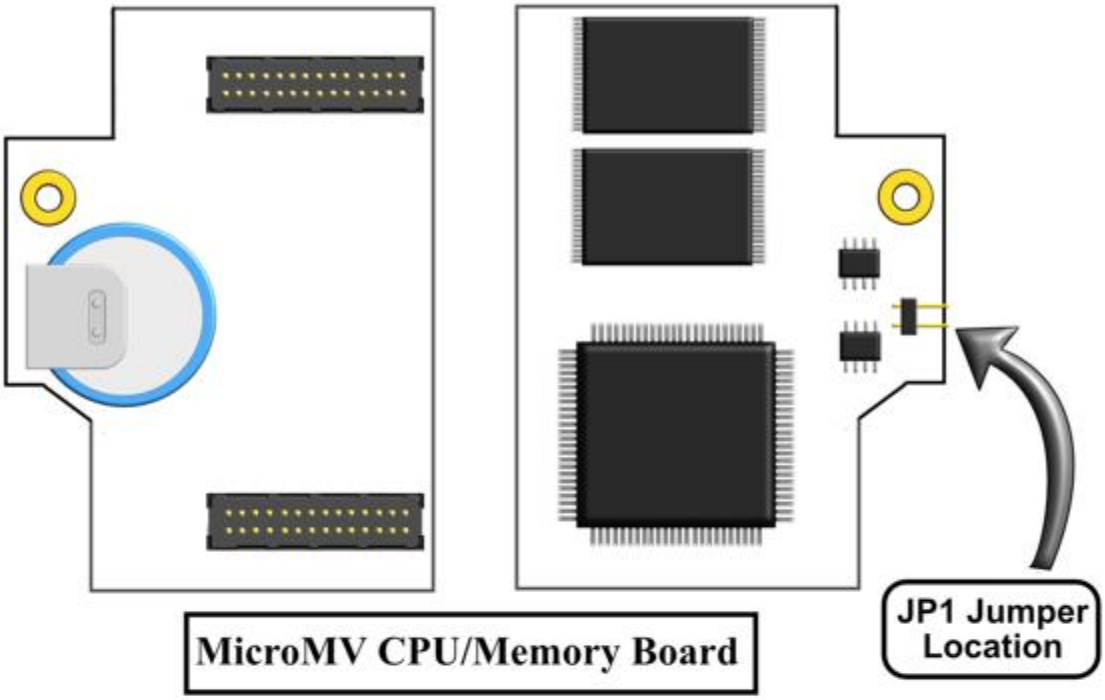


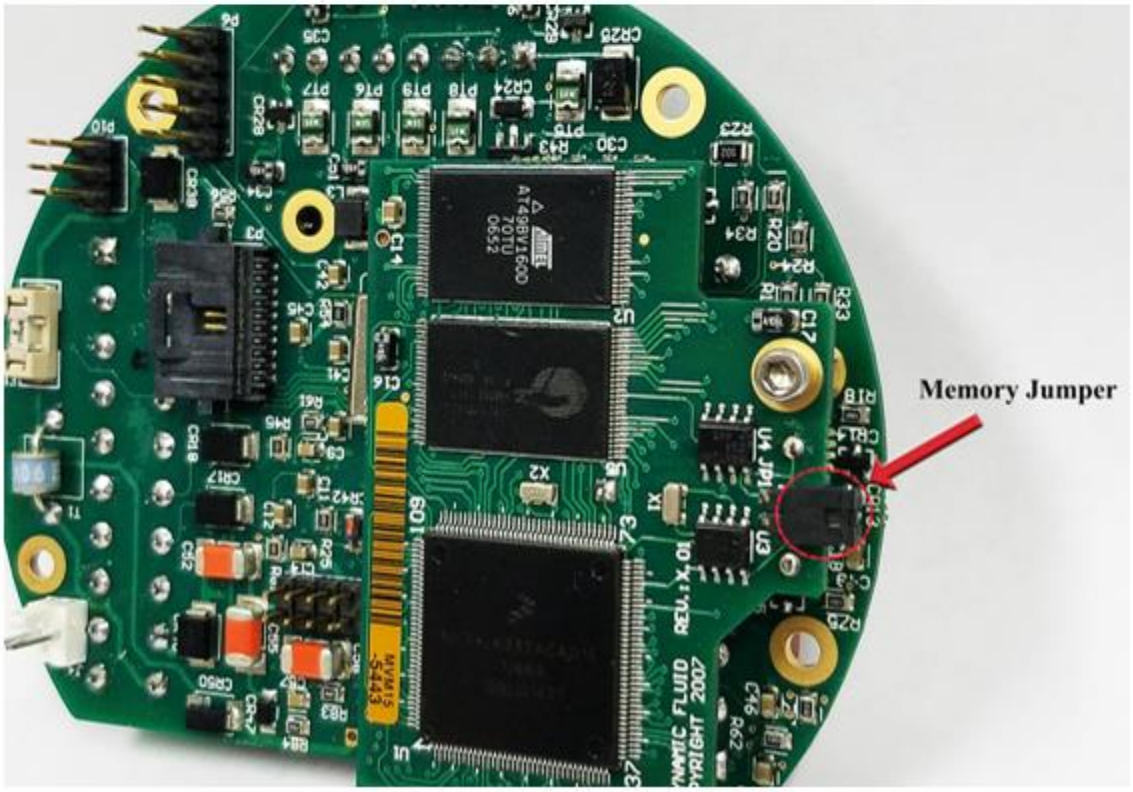
MV Step by Step Startup:

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**

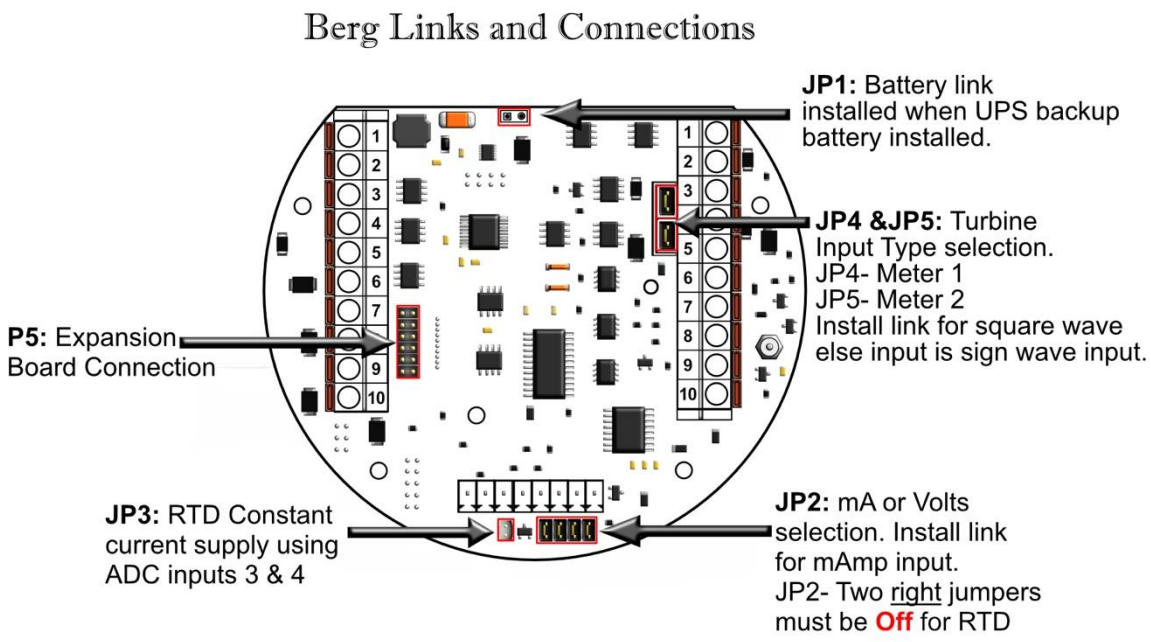
Version 2 - MicroMV Main/Memory Boards (Micro2009 and Later Model)

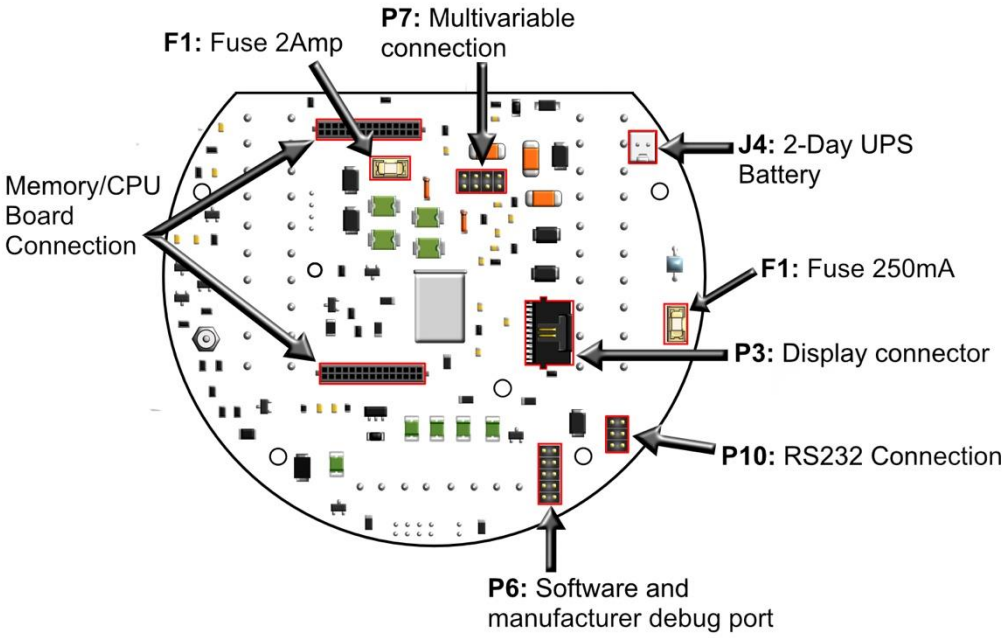
Memory/CPU Board



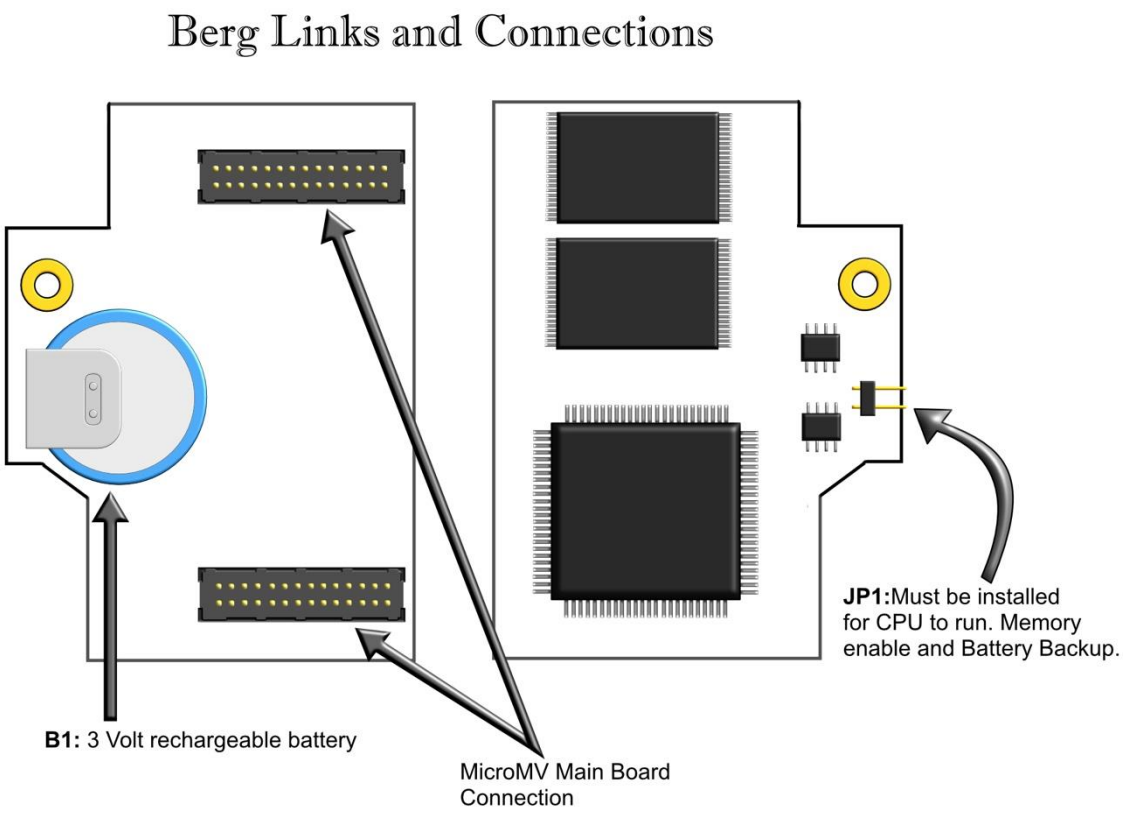


Version 2 - MicroMV Main Board (Micro2009 and Later Model)





Version 2 - MicroMV Memory/CPU Board



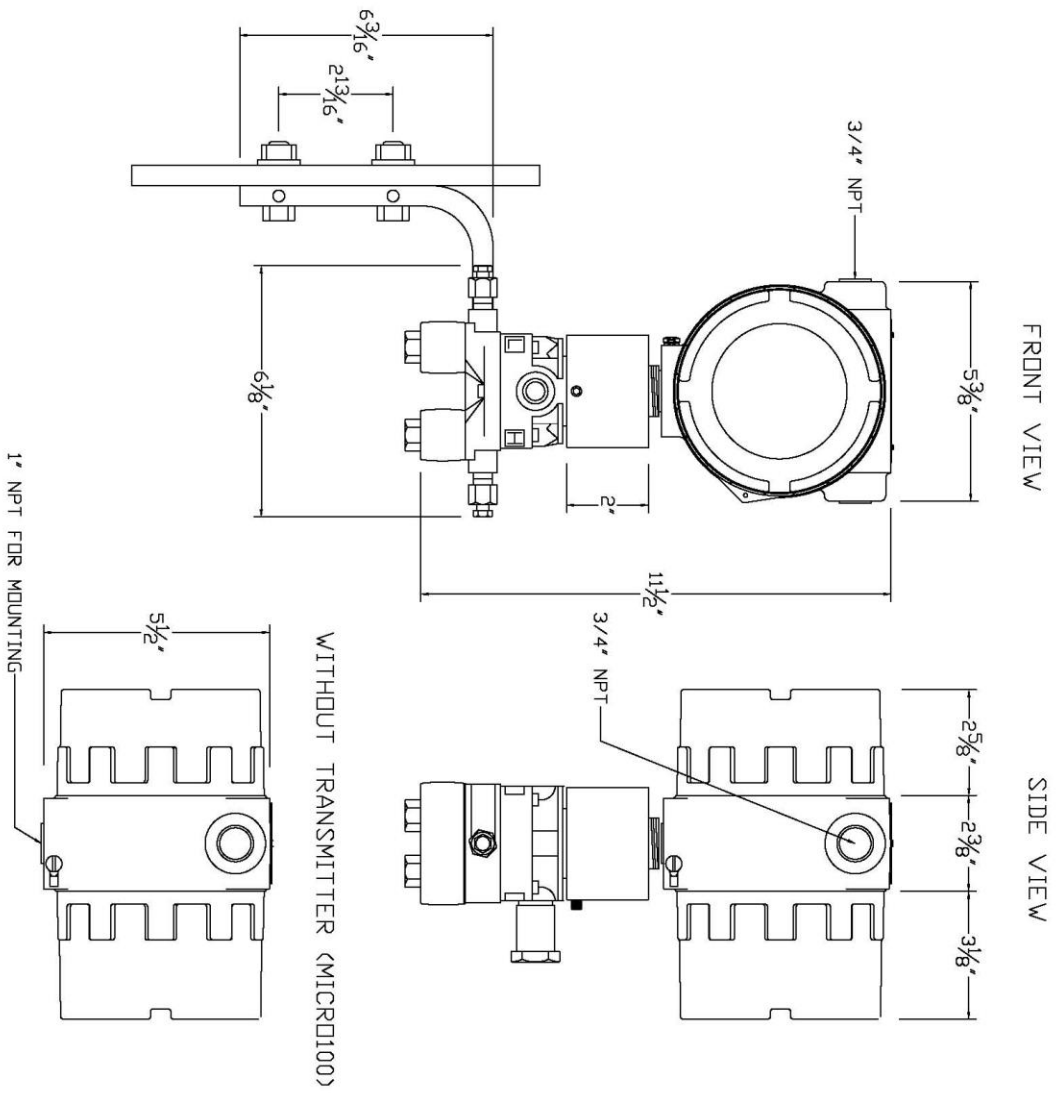
Technical Data

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

Micro MV Flow Computer: Dimensions



Window Software Minimum Requirements:

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

System Minimum Requirements

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

- Windows Operating System (Win95, Win98, Win98SE, win2000, WinNT, WinXP, Vista, Windows 7, Windows 8, and Windows 10)
- For a Windows NT machine: Service Pack 3 or
- For Windows NT, 2000, XP or Vista: Administrator level access to create an ODBC system DNS.
- Minimum disk space available: 16 MB.
- 1 Serial Communication Port

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

What is a configuration file?

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

Downloading a configuration file to the flow computer.

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

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

button on the vertical toolbar, or by pressing the **[F5]** key on the keyboard. Once you are connected the application it will show an ONLINE status on the lower 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

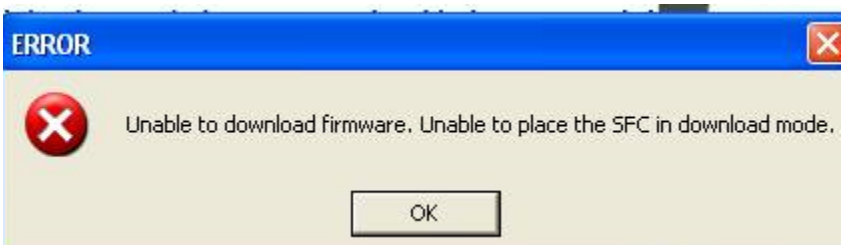
- Download an image file through **RS232 port** only.
- To Download an Image File to the Flow Computer select the **Tools | Download Program** option form the main menu or press the  button in the toolbar.
- A small dialog will appear asking for the file name of the image file (Image file have the extension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

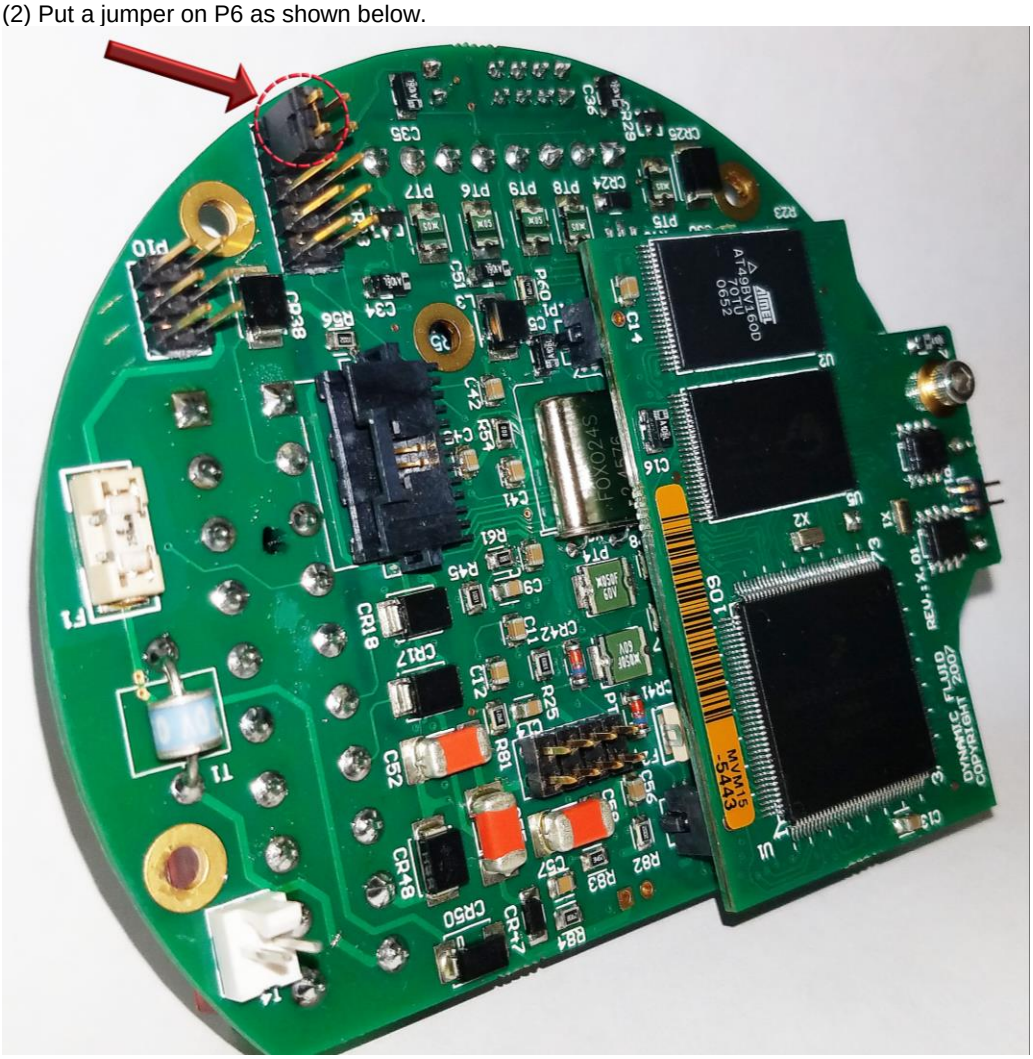
The download task will take about 7 minutes to be completed. Once the image file is in place, the flow computer is ready to be configured (enter calculation parameters and I/O assignments).

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**. MicroNOC Windows Software version 7 or higher is required. Contact technical support for old boards loaded with downloader v2
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.

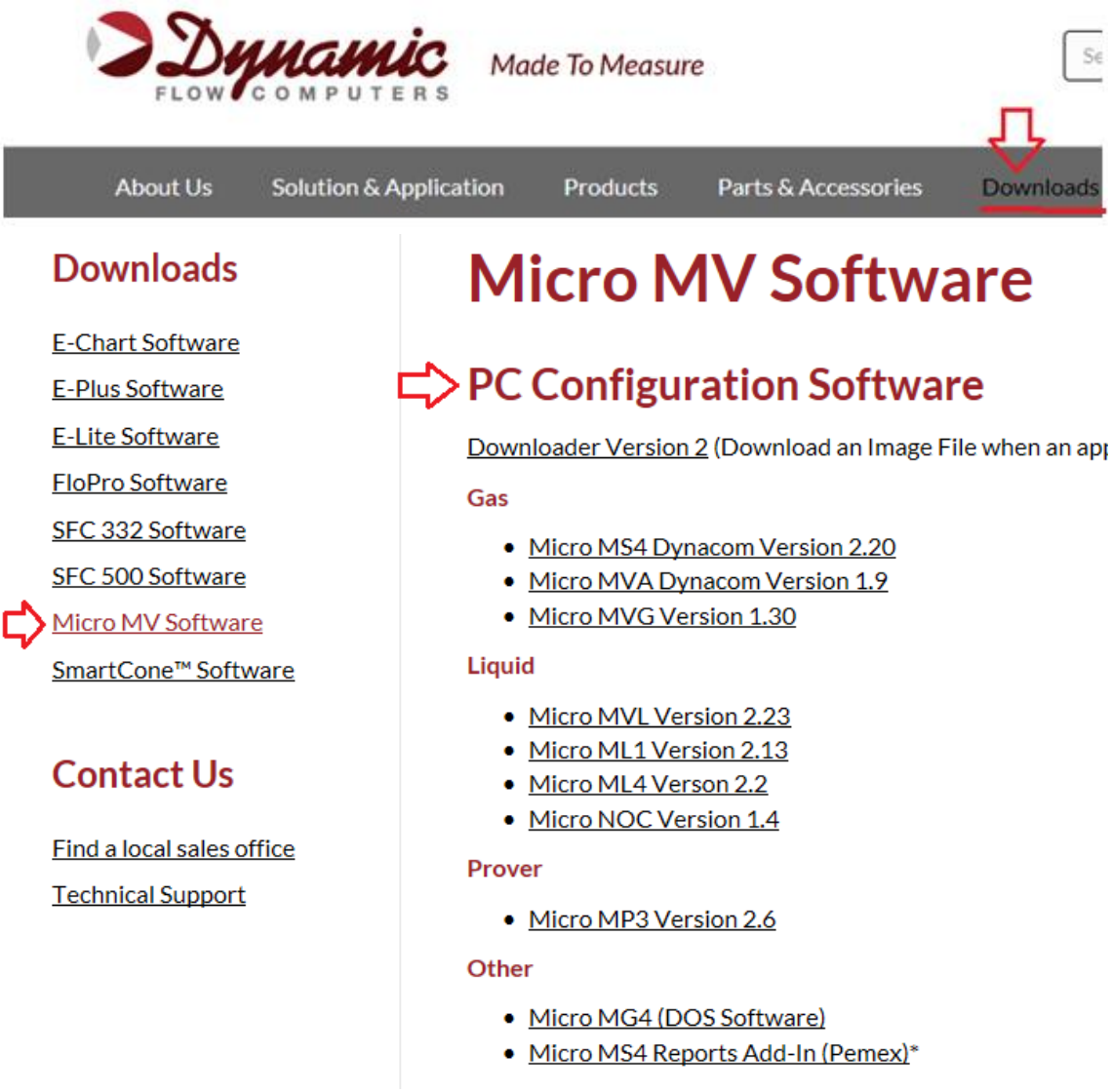


(3) Power up the board
(4) Board is in download mode
(5) Download image
(6) Remove power and jumper on P6 after a new image is loaded
(7) Board is ready

Website - DFC Configuration Software

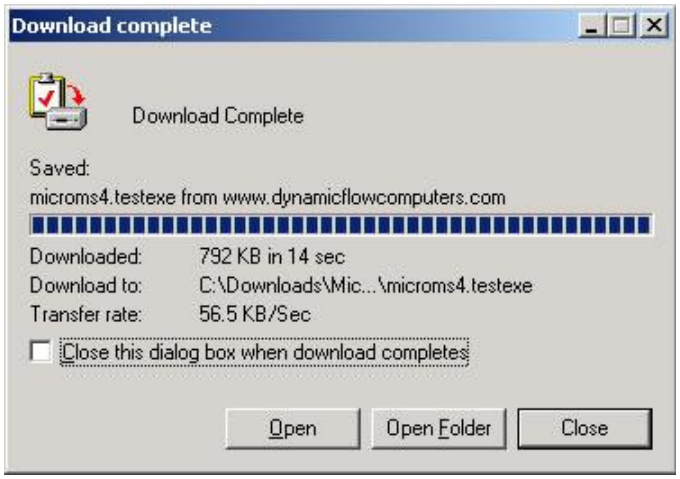
Step 1. Go to our website WWW.DYNAMICFLOWCOMPUTERS.COM

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



Step 3. Select application 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.

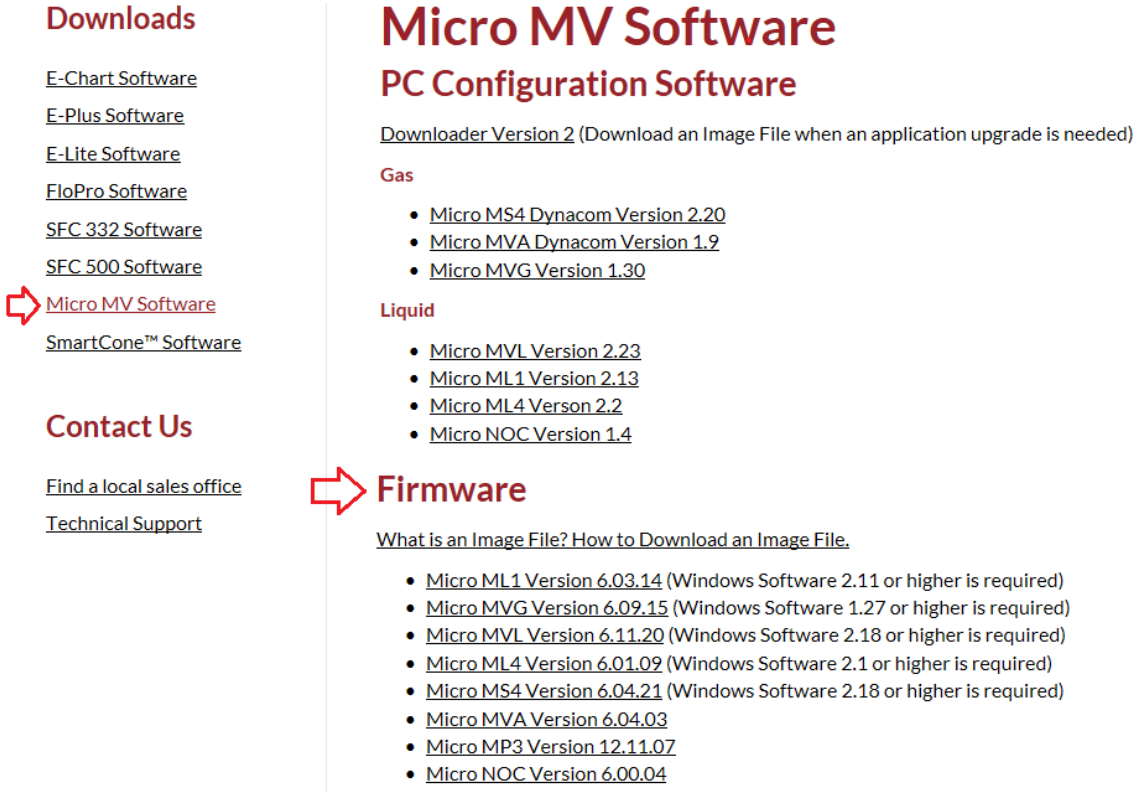
Website – Image File (Firmware)

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 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.

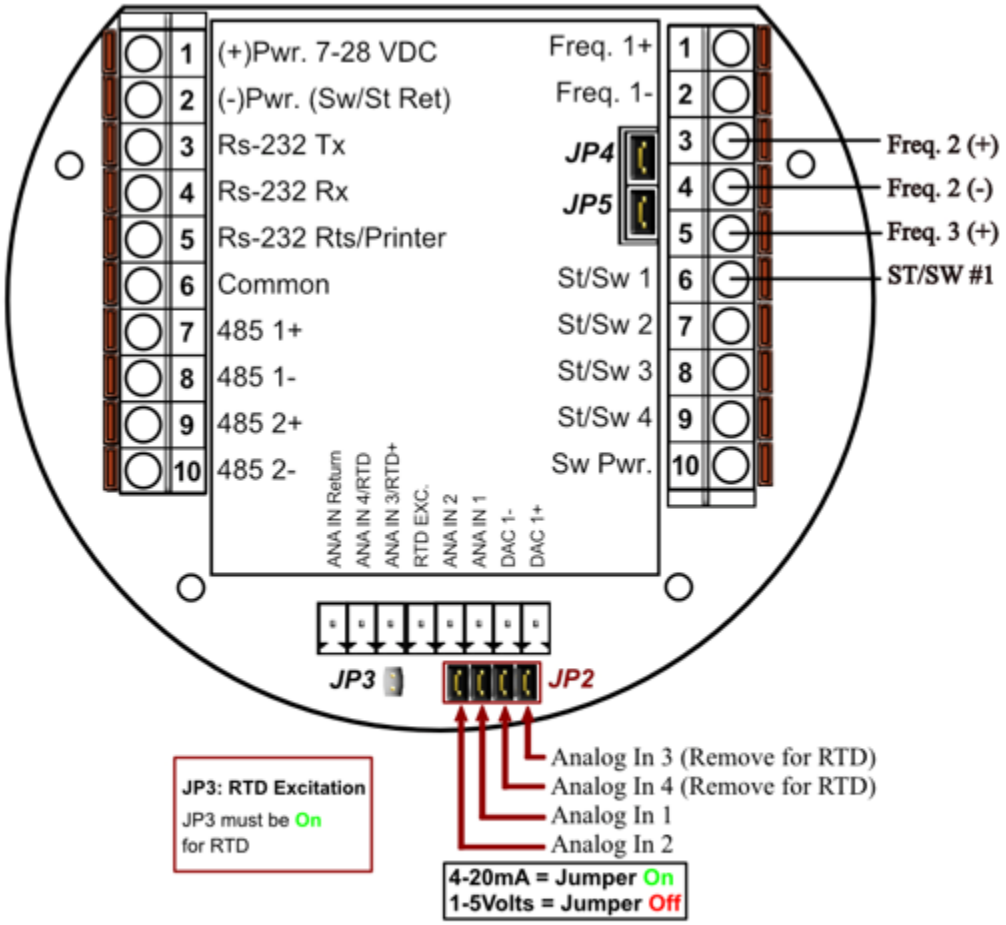
Step 5. After the download is finished, follow the steps in the image downloading setup.

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

INPUT/OUTPUT: Assigning and Ranging Inputs

Input/Output Assignment

We will now configure your MicroNOC/Micro100 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 "Meter Data | Input Position"

3 Enter assignments for DP, temperature, pressure, density and BS&W 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 (version 2 board)/1-2.5 volts input (version 1 board) 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 "Inputs/Outputs | Analog Inputs" 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 wate**r.
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.
3. **Set up the fail code: Maintenance** and **Failure Code** values tell the flow computer to use a default value in the event the transmitter fails. The default value is stored in **Maintenance**. There are three outcomes: the transmitter value is always used, no matter what (**Failure Code** = 0); the **Maintenance** value is always used, no matter what (**Failure Code** = 1); and the **Maintenance** value is used only when the transmitter's value indicates that the transmitter has temporarily failed (**Failure Code** = 2).

RTD inputs will skip 4-20 mA assignment because RTD is a raw signal of 50Ω (ohms) to 156Ω. Readings beyond that range require a 4-20 mA signal to the flow computer or using the built in Rosemount Multi Variable transmitter. The Rosemount Multivariable has a range of –40-1200 degrees Fahrenheit. Density coefficients for raw frequency inputs are programmed in this menu. The menu will only show parameters relevant to the live density selected (i.e., Solartron or UGC, etc.).

WIRING:

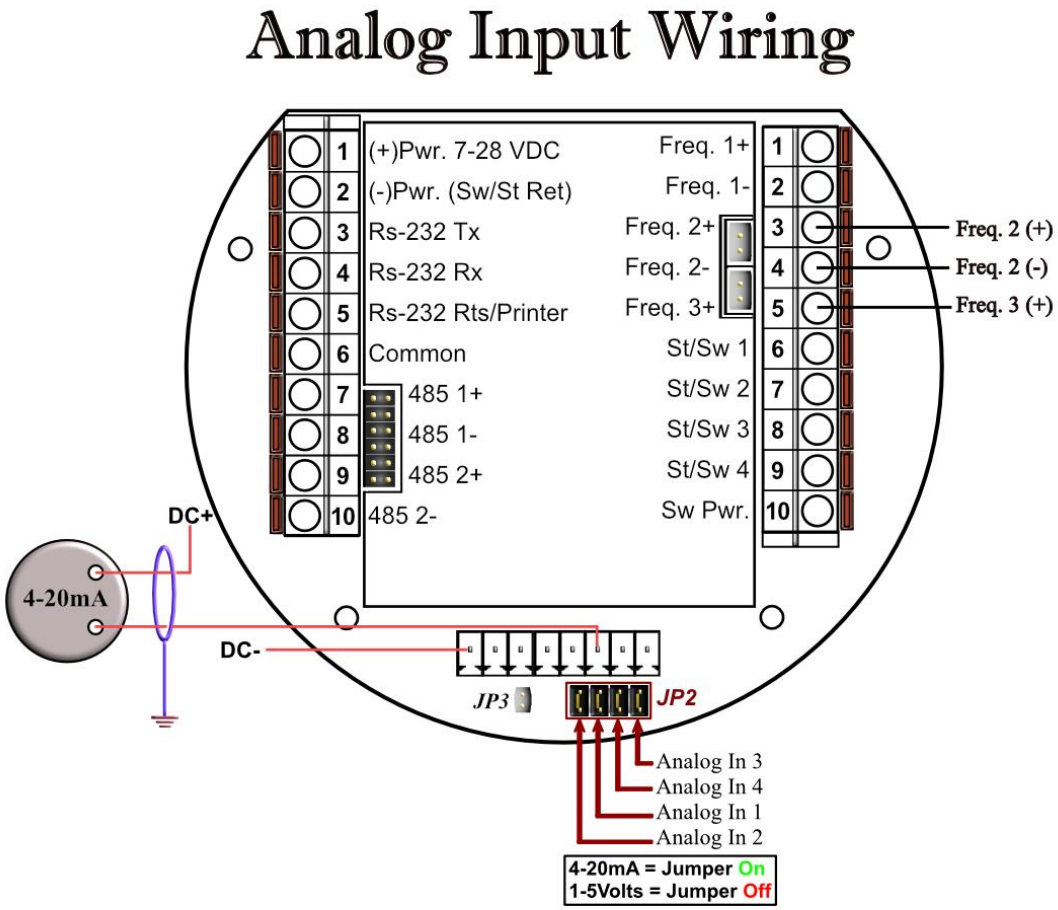
Wiring to the flow computer is very straightforward and simple. But still it is very important to get familiar with the wiring diagram.

Wiring 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.



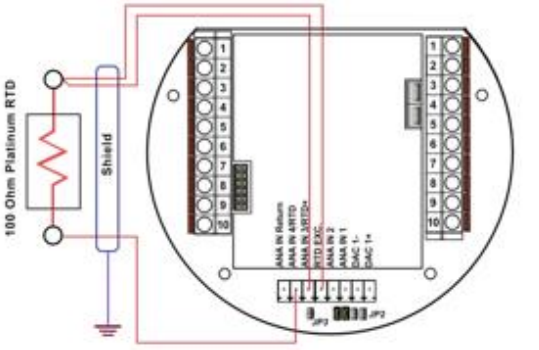
NOTE: The 4-20mA or 1-5 volt DOES NOT source power to the transmitters. You can use the DC power feeding the flow computer to power the 4-20mA loops IF that power supply is FILTERED.

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 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. For 4-wire RTD, the two return wires together and wire as 3-wire RTD

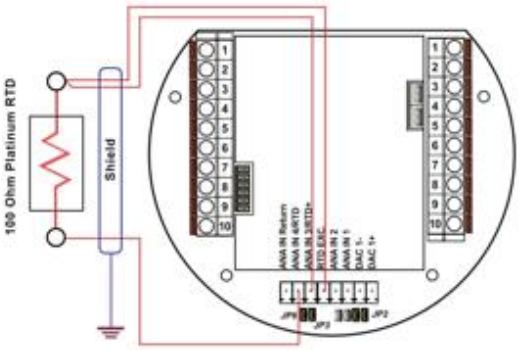
Wiring RTD Directly Into CPU Board

MicroMV 2009 & Later Model



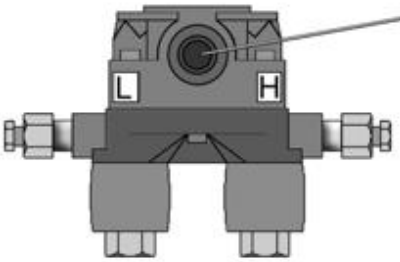
Jumper Settings:
JP3- Must be On
JP2- Two right jumpers must be Off
For 4-wire RTD, tie the two return wires together and wire as 3-wire RTD

Older MicroMV Models



Jumper Settings:
JP3- Must be On
JP2- Two left jumpers must be Off
For 4-wire RTD, tie the two return wires together and wire as 3-wire RTD

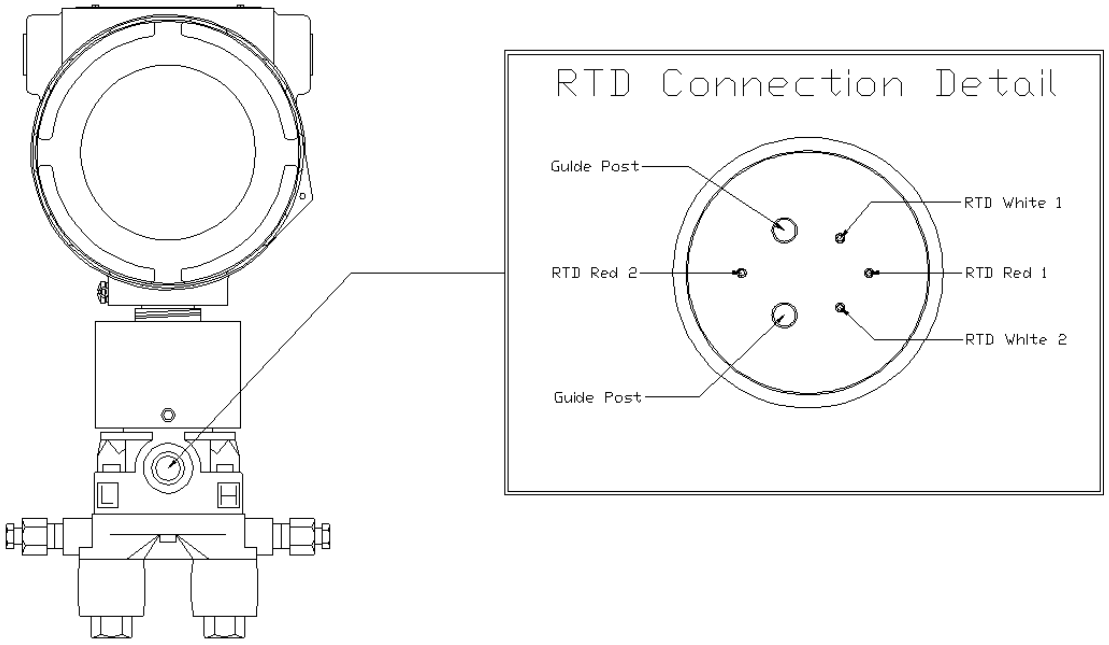
Wiring RTD Into Rosemount Multivariable



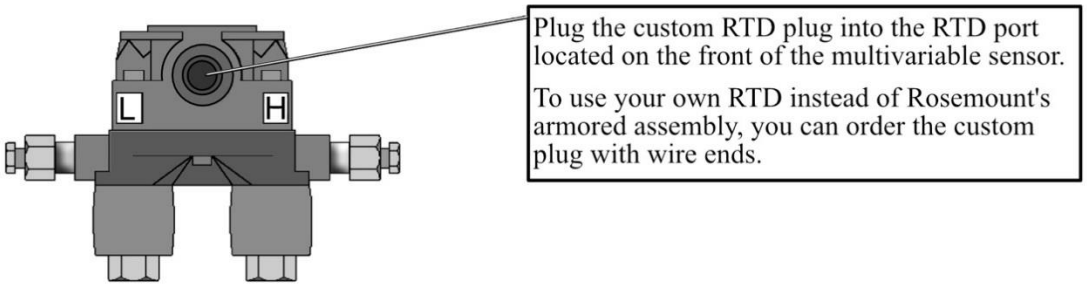
Plug the custom RTD plug into the RTD port located on the front of the multivariable sensor.

To use your own RTD instead of Rosemount's armored assembly, you can order the custom plug with wire ends.

Rosemount RTD Connection:

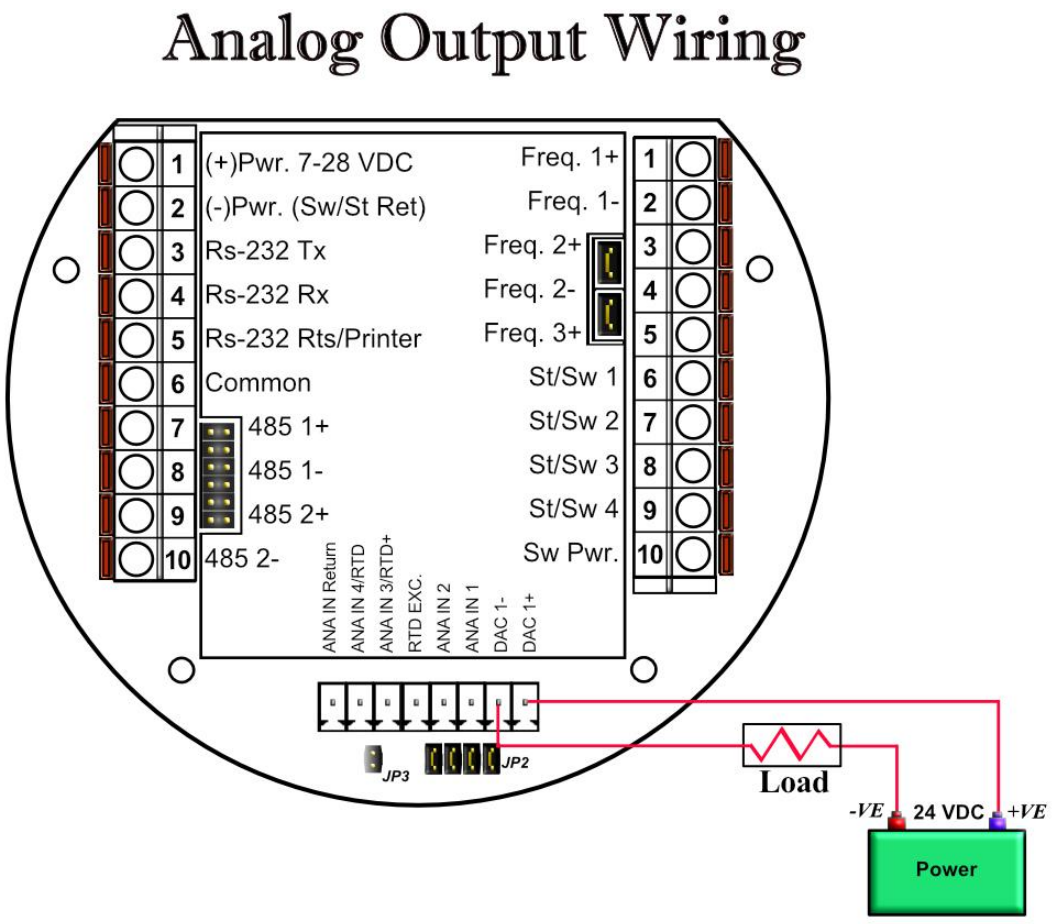


Wiring RTD Into Rosemount Multivariable



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**. Expansion board is required for addition three analog outputs.

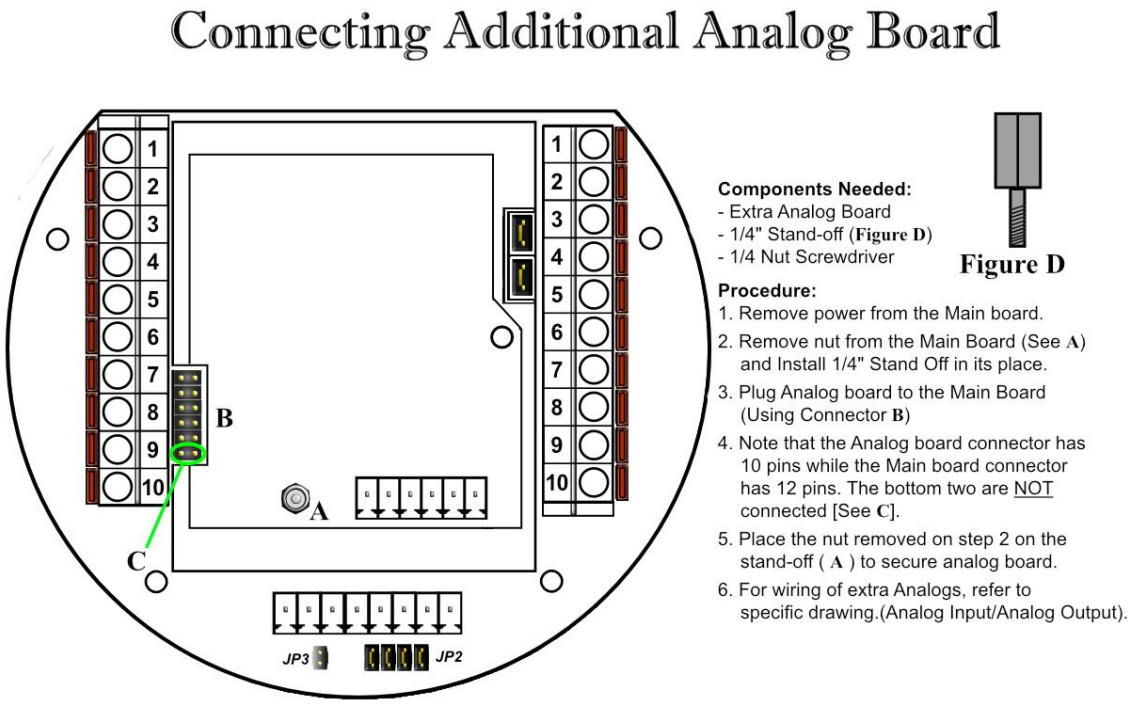


Assigning/Ranging the 4-20mA Analog Outputs:

Go to the **`configuration`** 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.

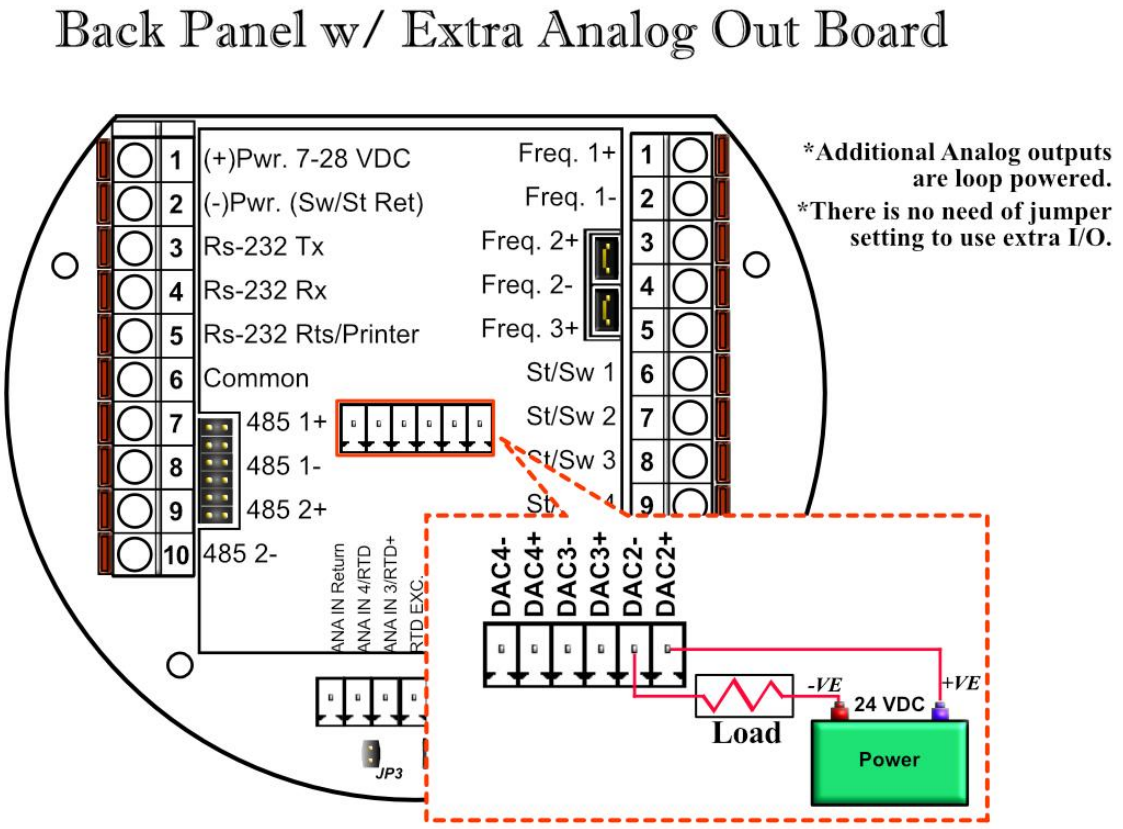
Additional Analog Inputs or Analog Outputs – Board Installation

Addition analog output board is required to have additional 3 analog outputs.



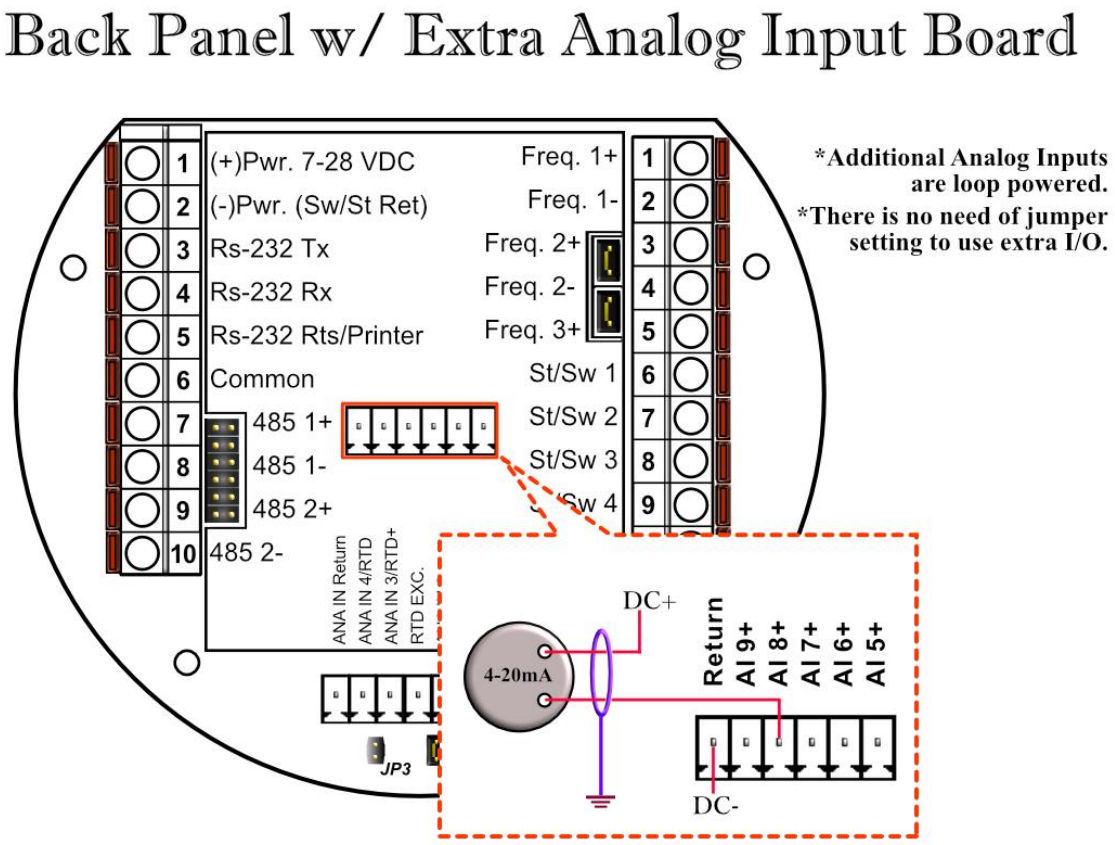
Back Panel - Additional Analog Outputs

Addition analog output board is required to have additional 3 analog inputs.



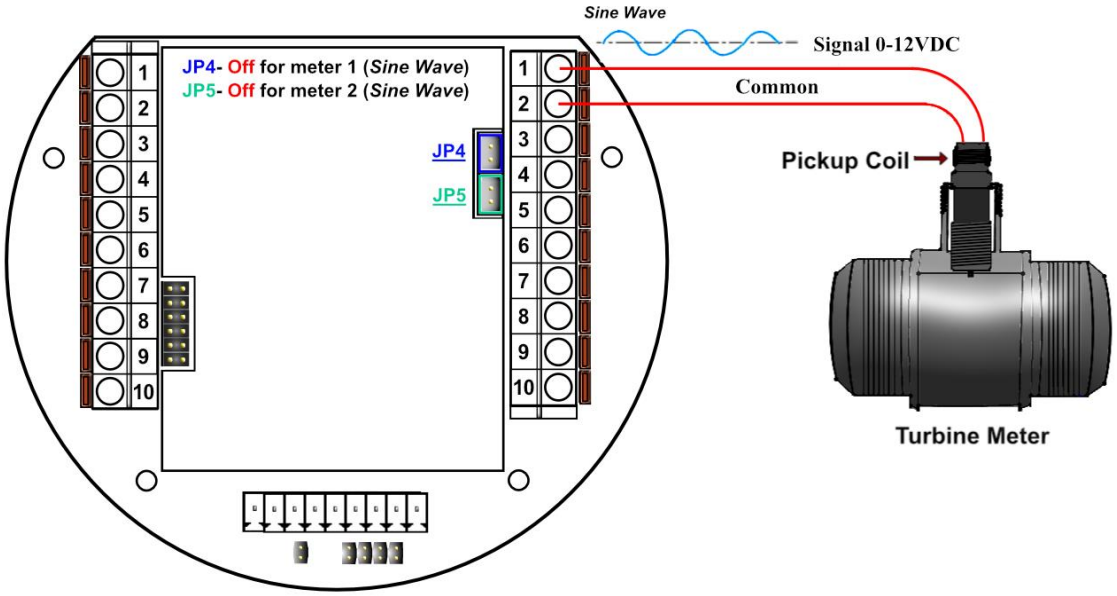
Back Panel - Additional Analog Intputs

Addition analog input board is required to have additional 5 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 dual pickups from the same turbine are connected, use the inputs for turbine 1 for pickup 1 and turbine 2 for the second pickup coil. When connecting sine wave directly from the pickup coil make sure the distance from the pickup coil to the flow computer is very short–less than 50 feet with shielded cable. In the event there is presence of noise, the distance must be shortened. When connecting sine wave signal, the JP4 jumper for meter 1 must not be installed and JP5 jumper for meter 2 must not be installed. (*JP4 and JP5 must be off when using sine wave*). On the other hand, when using square wave, the square wave signal can be sinusoidal but has to be above 5 volts peak to peak with less than 0.4 volts offset in order for the flow computer to read it. The JP4 jumper for meter 1 must be installed and JP5 jumper for meter 2 must be installed.



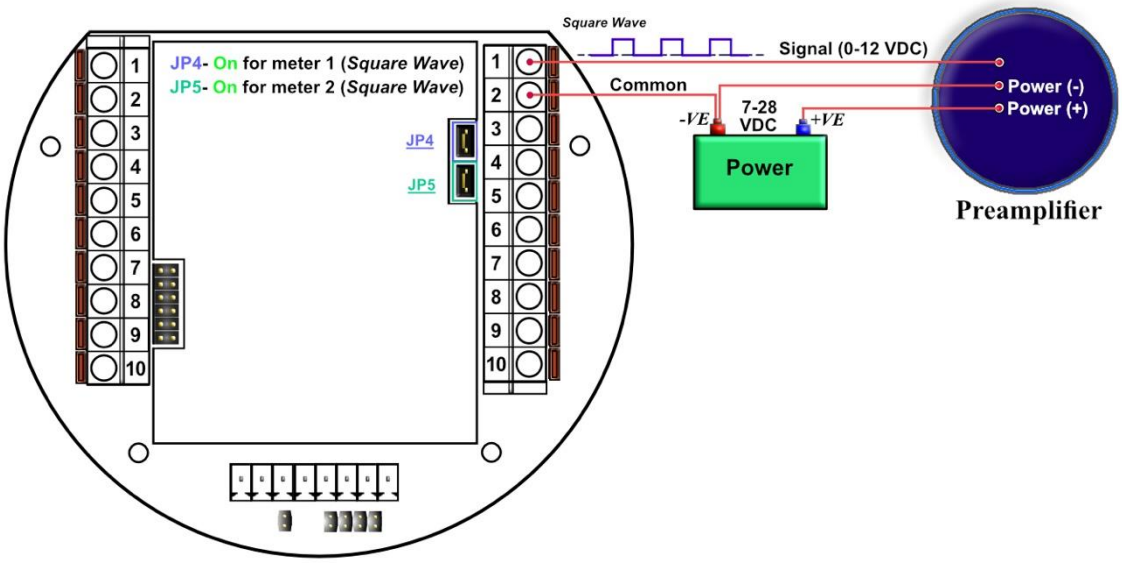
Note:	*When connecting square wave input, the JP4 and JP5 connect the turbine return to the flow computer power return. Therefore, signal polarity is very important. Reverse polarity could result in some **damage or power loss**. When sine wave is used the signal polarity is usually of no significance.*

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

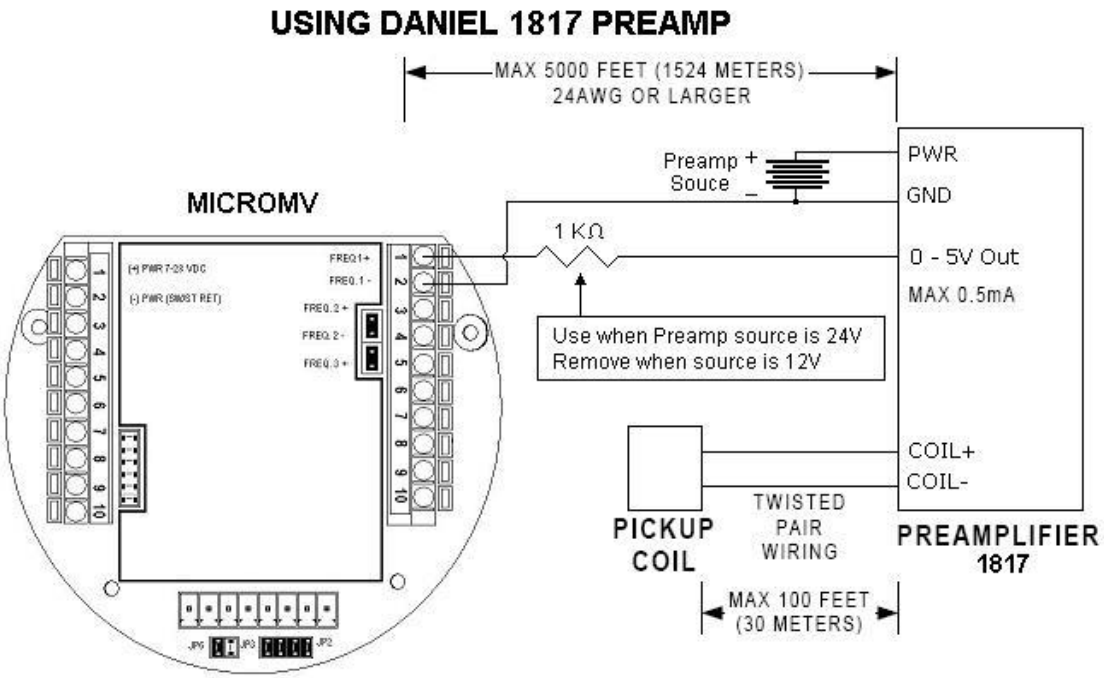
Turbine Input Wiring – Using Daniel 1818 Preamp

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



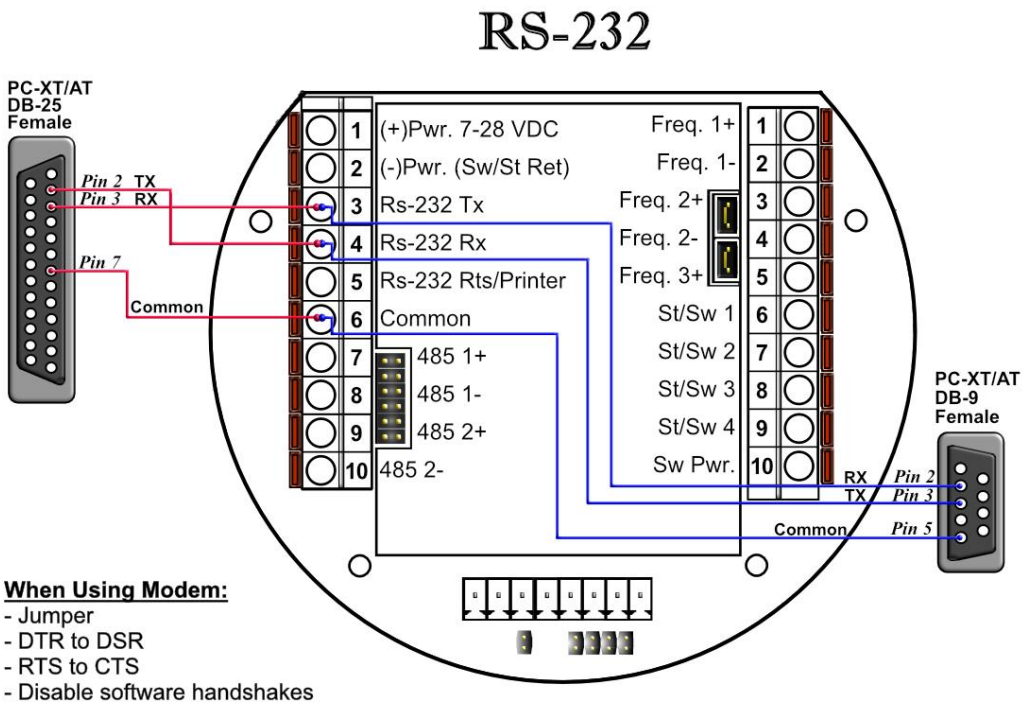
Turbine Input Wiring – Using Daniel 1817 Preamp



RS-232 Connection:

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

Note: Twisted shielded cable is required.



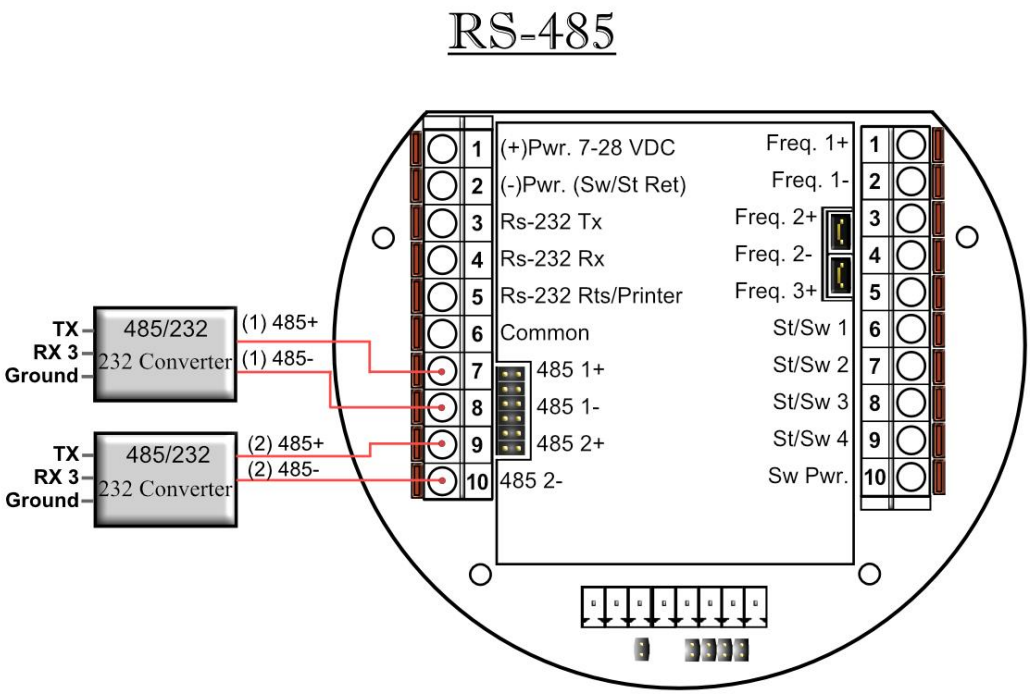
When Using Modem:
- Jumper
- DTR to DSR
- RTS to CTS
- Disable software handshakes

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.



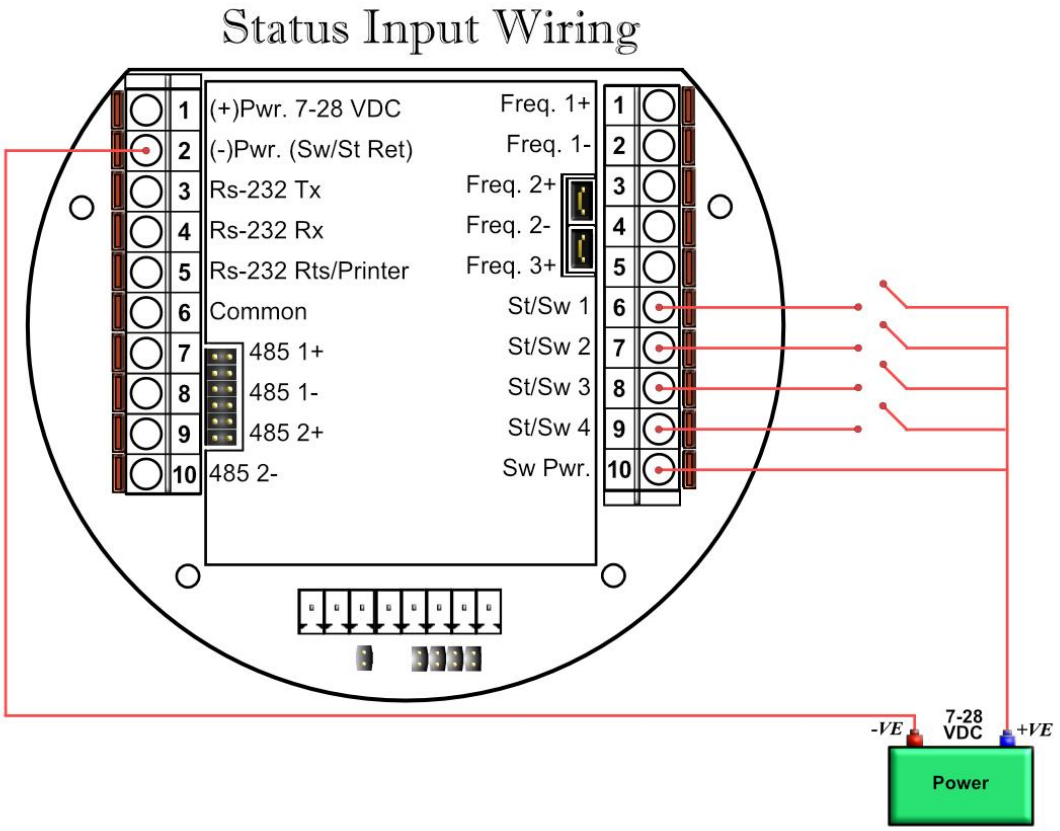
WARNING: When the RS-485 terminal is used, external transient protection and optical isolation is required, especially for long distance wiring.

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.

Wiring of Status Inputs:

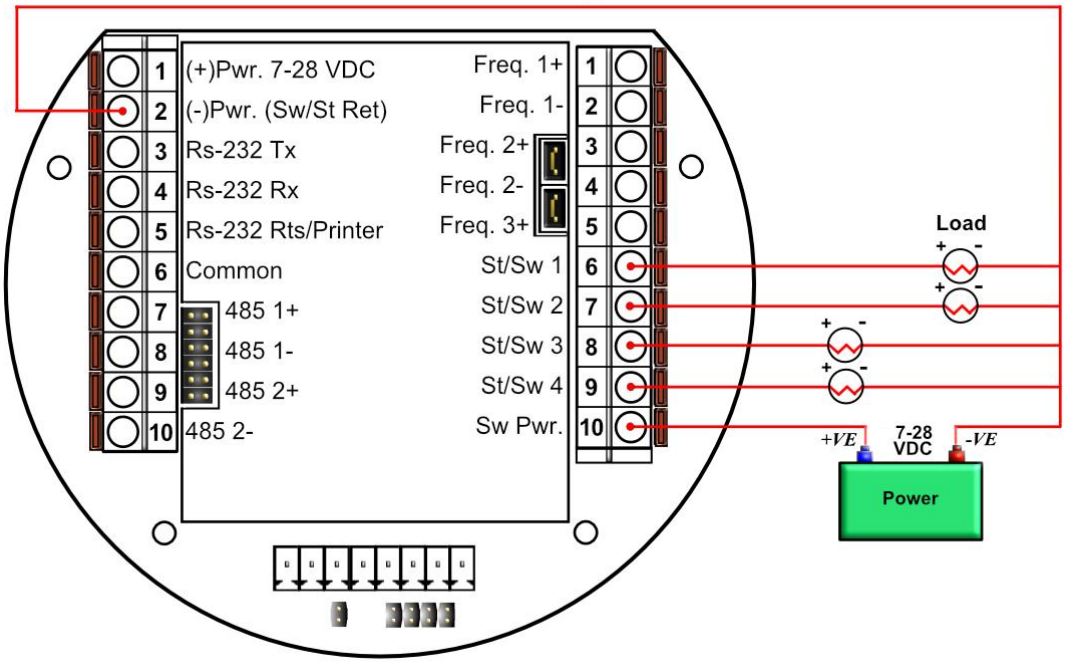
There are 4 digital inputs or outputs that are user configurable. The configuration software will configure the input to be a status input or a switch output.. The standard status input has 4 volts of noise hysteresis, with on trigger point of 5 volts and an off point of 1 Volt.



Wiring of Switch/Pulse Outputs:

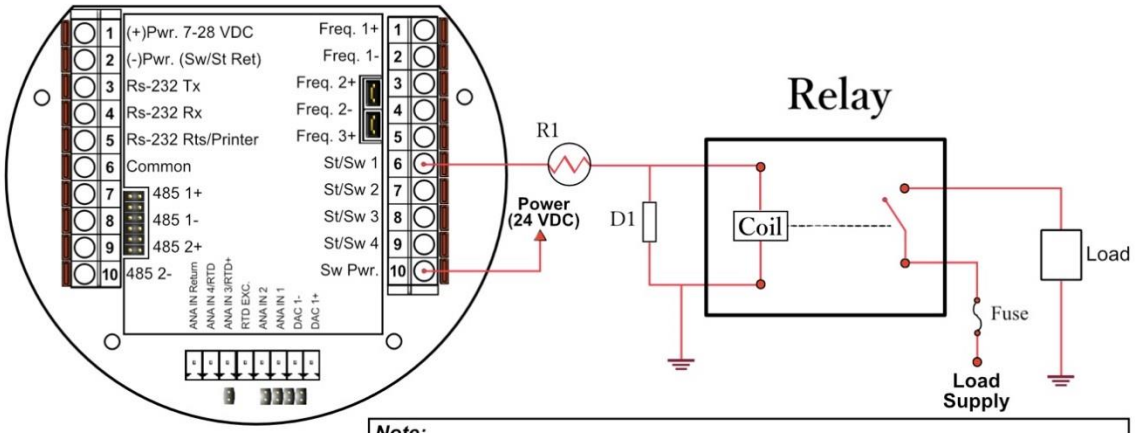
Switch one and two can be on /off or pulse type output up to 125 pulse per second. Notice that the switch outputs are transistor type outputs (open collector type with maximum DC rating of 350 mA continuous at 24 VDC) connections		
1	Status Input /switch output 1	Switch - Maximum rating: 350mA @24 volts Switch Output Range: 7-28 VDC Status Input Rating: 7-28 VDC
2	Status Input /switch output 2	
3	Status Input /switch output 3	
4	Status input /switch output 4	

Switch Output



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.



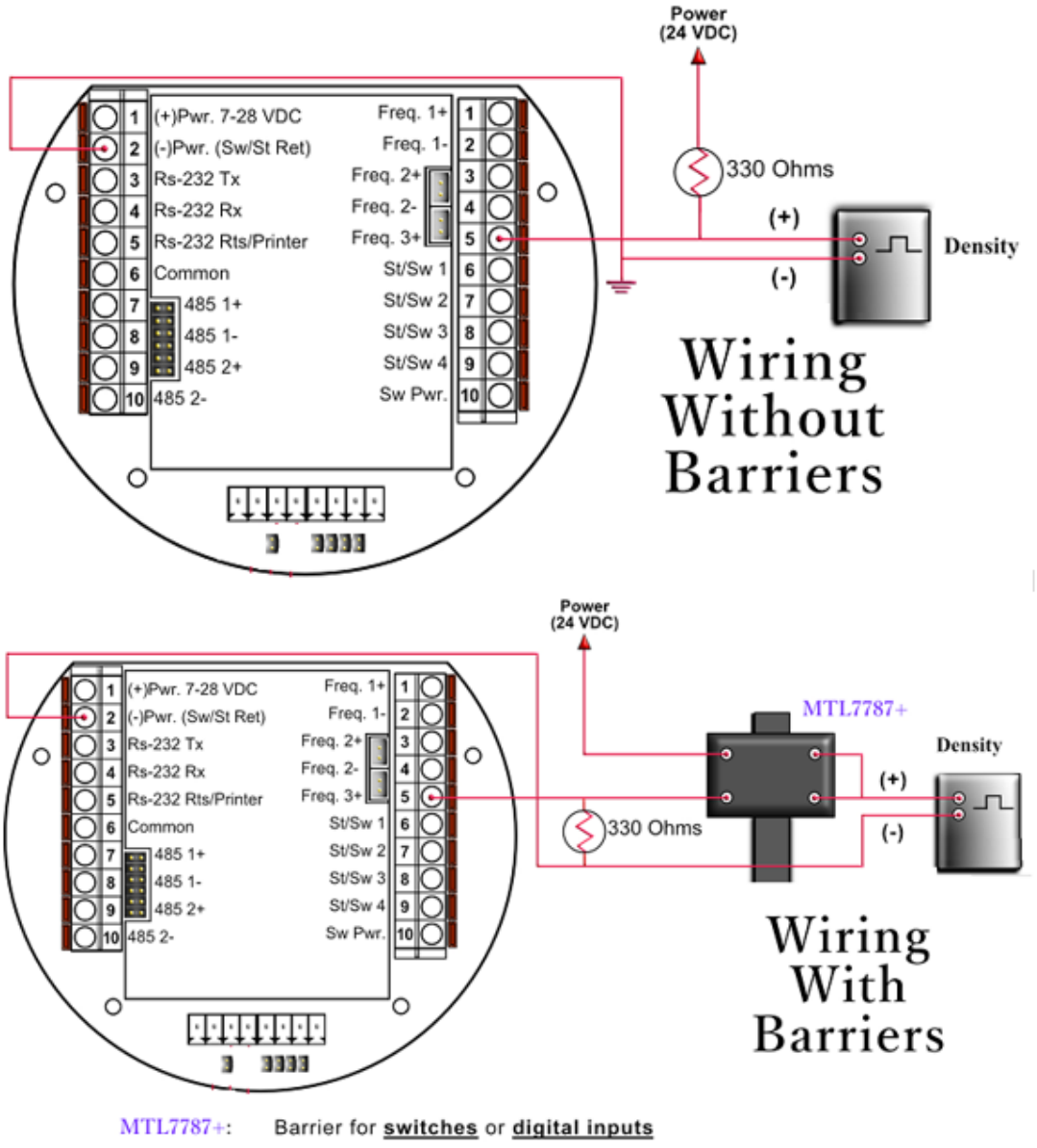
Note:

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 analog input and not the density frequency input.*

CALIBRATION

Analog Input 4-20mA or 1-5 Volt Signal

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

OFFSET CALIBRATION:

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

FULL CALIBRATION METHOD:

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

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

TO USE DEFAULT CALIBRATION

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

RTD Calibration:

RTD Calibration is a 2-step process. The first step is a 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 live value in Ohm, and click OK button.
3. Induce the High range signal (120 Ohm.) and wait 10 seconds, then enter 120 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 - 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 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**.

Data Verification

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

Verifying Digital Inputs and Outputs

Use the diagnostic menu. to verify all inputs and outputs. 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 **Wiring | 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 MicroNOC/Micro100 software is constructed around a menu-driven organization. Click on "MicroNOC" icon on the desktop to run the program. It opens with "Diagnostics Data" screen.

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...** (Left top corner of the screen) 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

Go to the **Configuration File** | **Open...** (Left top corner of the screen)
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

Go to the **Configuration File** | **New...** (Left top corner of the screen)
Create a new file to store all the programmed information for one Micro MV Net Oil 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

Go to the **Configuration File** | **Save As...** (Left top corner of the screen)
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

Go to the **Configuration File** | **Save ...** (Left top corner of the screen)
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

Go to the **Configuration File** | **Exit...** (Left top corner of the screen)
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.

Export Configuration File as Text

Go to the **Configuration File** | **Export as Text..** (Left top corner of the screen)
Use "Export as Text" to save configuration file in a text format. Provide a file name and location to save the configuration data report.

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. (the fourth icon from the left)

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

SERIAL COMMUNICATION PARAMETERS

Port - Communication Port Number

Enter the PC port used to communicate with the MicroNOC/Micro100 Flow Computer.

Baud Rate

> *Note: this parameter must be set the same for both the PC and the MicroNOC/Micro100 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 MicroNOC/Micro100 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 mode, 7 for ASCII mode. The MicroNOC/Micro100 uses 8 data bits in RTU mode and 7 data bits in ASCII mode.

Stop Bits

Options available: 1, 1.5,or28. Generally used: 1. The MicroNOC uses 1 stop bit.

Modbus Type

> *Note: this parameter must be set the same for both the PC and the MicroNOC 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 MicroNOC 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 MicroNOC Flow Computer. (Modbus type, parity, baud rate, etc.) or lack of power to the MicroNOC Flow Computer. To use this feature, the user must insure that only one MicroNOC Flow Computer is connected to the PC. More than one MicroNOC Flow Computer in the loop will cause data collisions and unintelligible responses.

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.

USE INTERNET PROTOCOL

Check the box if an Ethernet connection is configured instead of a serial connection. To be able to communicate with the flow computer, both IP Address and Port must be configured.

IP Address

Enter IP Address of the target flow computer.
The standard addressing format is xxx.xxx.xxx.xxx

Port

Enter the port number of Modbus/Ethernet Bridges. The default port number is 502.

Protocol

Select a Modbus TCP or TCP/IP Encapsulation protocol to be used through 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.

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 a general purpose Ethernet to Serial converters.

Meter Configuration

A - METER SETTINGS

Meter Set Up

Units System

Selection	Description	Temperature	Pressure	DP
0	US Unit	DEG.F	PSIG	Inches of Water
1	Metric Unit	DEG.C	BAR, KG/CM2, KPA	KPA, m.Bar

Pressure Units – Metric Only

Selection	Description
0	BAR
1	KG/CM2
2	KPA

Flow Units

Selection	Description **Gross and Net Flow**	Description **Mass Flow**
0	CF	MLB in US Unit
1	M3	TON in Metric Unit
2	Gallon	
3	Liter	
4	Barrel	

DP Units – Metric Only

Selection	Description
0	m.BAR
1	KPA

K Factor Units – Frequency Device Equation Only

Selection	Description
0	CF
1	Barrel
2	Gallon
3	M3
4	Liter

Well Test Mass Flow Units

Selection	Description
0	MLB
1	LB

General Settings

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.

GM/CC Conversion Factor

This factor is used to reference the density to density of water (i.e. 0.999016) to establish specific and API gravity.

$$Specific\ Gravity\ = \frac{Density\ GM/CC}{Density\ of\ Water(gm/cc\ conversion\ factor\ )}$$

$$API\ Gravity\ = \frac{141.5 * Density\ of\ Water(gm/cc\ conversion\ factor)}{Density\ GM/CC} - 131.5$$

Number of Meters

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

Select Flow Rate Display

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 Deg.F is used in US units, 15 or 20 Deg.C in Metric units.

Common Parameters

This feature allows the Micro MV Net Oil 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.

Battery Voltage Reading

Enable this feature to read battery voltage. The battery alarm low is activated, when the voltage is below 11.2 volts. Uncheck the box to disable battery low alarm.

Slave Units Configuration

The Micro MV can poll up to 3 other slaves and support function code 3.

Slave Type

Selection	Description
0	Others – Communication in Modbus Protocol
1	MicroMS4
2	Foxboro
3	E-Chart
4	MicroMV and E-Chart Combination

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#1 BS&W
1	Floating #2 (7062)	**11**	Integer #2(5073)	**21**	M#1 PF	**31**	M#2 BS&W
2	Floating #3 (7063)	**12**	Integer #3(5075)	**22**	M#1 DF		
3	Floating #4 (7064)	**13**	Integer #4(5077)	**23**	M#1 DB*		
4	Floating #5 (7065)	**14**	Integer #5(5079)	**24**	M#1 DP		
5	Floating #6 (7066)	**15**	Integer #6(5081)	**25**	M#2 TF		
6	Floating #7 (7067)	**16**	Integer #7(5083)	**26**	M#2 PF		
7	Floating #8 (7068)	**17**	Integer #8(5085)	**27**	M#2 DF		
8	Floating #9 (7069)	**18**	Integer #9(5087)	**28**	M#2 DB*		
9	Floating 10 (7070)	**19**	Integer 10(5089)	**29**	M#2 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 MicroNOC from the Micro Motion.
Four entries are required.

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– MicroNOC (up to 4 slaves)

Slave **ID**	**ID**	MicoMS4 Unit ID

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

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

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

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

B - METER DATA

Live Density Input Units in gm/cc (US Units), KG/M3(Metric Units)

Meter ID

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

Flow Equation Type (0-3)

0 = API 14.3 (NEW AGA3)
1 = Venturi
2 = Frequency Device
3 = Wedge

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 Flow Computer suspends flow rate calculations whenever the DP, in inches of water column (us unit), 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.

Thermal Expansion Coefficient of Orifice E-6

Thermal Expansion Coefficient of Pipe 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

Venturi

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

DP Cutoff

The Micro MV Flow Computer suspends flow rate calculations whenever the DP, in inches of water column (us unit), 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.

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 Of Orifice E-6

Thermal Expansion Coefficient Of Pipe 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

Discharge Coefficient C

This value is the discharge coefficient for Venturi flow equations. The default value is 0.9950.

Frequency Device

`Flow Equation Type = 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.

K Factor Units – Volume

Selection	Description
0	CF
1	Barrel
2	Gallon
3	M3
4	Liter

K Factor Units – Mass – LB (US Units), KG (Metric Units)

Meter Factor

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

Retroactive Meter Factor

If zero is selected, the meter factor will not apply to the entire batch. It will only apply from the time the new meter factor is entered. Retroactive meter factor, on the other hand, will apply to the entire batch and the entire batch is re-calculated, using the new meter factor.

Flow Cutoff Frequency

The Micro MV 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 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.

Wedge

Flow Equation Type = 3

DP Cutoff

The Micro MV 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 Coeff Kd2 and Expansion Factor FA

US unit

Flow Rate (Gallon/Minute) = (5.668 x FA x Kd2) x SQRT (DP / SG)

DP = different pressure, inches of water
SG = Liquid specific gravity at flow conditions
FA = Expansion Coefficient of Wedge
Kd2 = Discharge Coefficient of Wedge

Metric Unit

Flow Rate (Liter/Hour) = (1.287343 x Fa x Kd2) x SQRT (DP / SG)

DP = different pressure, m.Bar
SG = Liquid specific gravity at flow conditions
FA = Expansion Coefficient of Wedge
Kd2 = Discharge Coefficient of Wedge

Net 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.

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 – Temperature, Pressure, BS&W, DP

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

Use Stack DP

The Micro MV 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 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 Net Oil Flow Computer will begin using the high DP provided the high DP did not fail. When the high DP cell drops below 23.75, the Flow Computer will start using the Low DP for measurement.

Density Type

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

Density Type	Densitometer
Type 0	None
Type 1	**4–20 mA** Density Signal 4-20mA in gm/cc (US unit) or in KG/M3 (Metric unit)
Type 2	UGC
Type 3	Sarasota
Type 4	Solartron

C – BATCH

Batch Type

If daily batch selected, the batch will end at the day start hour. On demand type will end the batch, when the Micro MV Net Oil Flow Computer is requested to end the batch manually.

Batch Ticket Number

This number will increment by one at the end of batch.

Next Batch Product Number

Enter the product number for the next batch.

D - PRODUCTS

End the current batch is required to use the new product data settings.

Product Number

Up to 8 products.

Product Name

Up to 16 characters.

Table Selection

Sel.	Table	Description	Conditions
0	23A/24A Crude SG (API2004)	Crude oil, natural gasoline, drip gasoline Base Temperature@60°F	Live densitometer used
1	24A Crude SG (API2004)	Crude oil, natural gasoline, drip gasoline Base Temperature@60°F	Density is known, Parameter - Specific Gravity @ 60°F is required
2	23B/24B Refined SG (API2004)	Gasoline, naphthalene, jet fuel, aviation fuel, kerosene, diesel, heating oil, furnace oil. Base Temperature@60°F	Live densitometer used
3	24B Refined SG (API2004)	Gasoline, naphthalene, jet fuel, aviation fuel, kerosene, diesel, heating oil, furnace oil. Base Temperature@60°F	Density is known, Parameter - Specific Gravity @ 60°F is required
4	New 23/24	LPG	Live densitometer used
5	New 24	LPG	Density is known, Parameter - Specific Gravity@ 60°F is required
6	24C Special Prod (API 2004)	Benzene, toluene, styrene, *ortho*-xylene, *meta*-xylene, acetone Base Temperature@60°F	Density is known, Parameter - Specific Gravity @ 60°F is required, Alpha T, the number entered will be divided by 10^{-6}.
7	53A/54A Crude (API2004)	Crude oil, natural gasoline, drip gasoline Base Temperature@15°C	Live densitometer used
8	54A Crude (API2004)	Crude oil, natural gasoline, drip gasoline Base Temperature@15°C	Density is known, Parameter - Density@15°C is required
9	53B/54B Refined Prod (API2004)	Gasoline, naphthalene, jet fuel, aviation fuel, kerosene, diesel, heating oil, furnace oil. Base Temperature@15°C	Live densitometer used
10	54B Refined Prod (API2004)	Gasoline, naphthalene, jet fuel, aviation fuel, kerosene, diesel, heating oil, furnace oil. Base Temperature@15°C	Density is known, Parameter - Density@15°C is required
11	OLD 53/54	LPG	Live densitometer used
12	OLD 54	LPG	Density is known, Parameter - Density@15°C is required

13	54C Special Prod (API 2004)	Benzene, toluene, styrene, *ortho*-xylene, *meta*-xylene, acetone Base Temperature@15°C or @20°C	All conditions
14	59A/60A Crude (API2004)	Crude oil, natural gasoline, drip gasoline Base Temperature@20°C	Live densitometer used
15	60A Crude (API2004)	Crude oil, natural gasoline, drip gasoline Base Temperature@20°C	Density is known, Parameter - Density@20°C is required
16	59B/60B Refined Prod (API2004)	Gasoline, naphthalene, jet fuel, aviation fuel, kerosene, diesel, heating oil, furnace oil. Base Temperature@20°C	Live densitometer used
17	60B Refined Prod (API2004)	Gasoline, naphthalene, jet fuel, aviation fuel, kerosene, diesel, heating oil, furnace oil. Base Temperature@20°C	Density is known, Parameter - Density@20°C is required
18	59D/60D Lubricating Prod	Lub Oil Base Temperature@20°C	Live densitometer used
19	60D Lubricating Prod	Lub Oil Base Temperature@20°C	Density@20°C is known,

Table A is for Crude, the Table B is for refined products, the Table C is for special products - butadiene, toluene. OLD/NEW Tables are used for LPG and NGLs.

Crude/Refined/Lubricating Prod/Special Product: use API 2004, D1250-04.
(Refer to API Manual of Petroleum Measurement Standards:
Chapter11-Physical Properties Data/Section 1-Temperature and Pressure Volume Correction "Factors for Generalized Crude Oils, Refined Products, and Lubricating Oils/May2004, and Addendum 1/September 2007)

Temperature, Pressure and Density Limits for Crude Oil, Refined Products, Lubricating Oils

	Crude Oil	**Refined Products**	**Lubricating Oils**
Density, kg/m³@ 60°F	***610.6 to 1163.5***		***800.9 to 1163.5***
Relative Density @ 60°F	0.61120 to 1.16464		0.80168 to 1.1646
API Gravity @ 60°F	100.0 to -10.0		45.0 to -10.0
Kg/m³@ 15°C	611.16 to 1163.79	611.16 to 1163.86	801.25 to 1163.85
Kg/m³@20°C	606.12 to 1161.15	606.12 to 1160.62	798.11 to 1160.71
Temperature, °C	***-50.00 to 150.00***		
°F	-58.0 to 302.0		
Pressure, psig	***0 to 1,500***		
kPa (gauge)	0 to 1.034×10^4		
Bar (gauge)	0 to 103.4		
α_{60},per °F	***230.0×10^{-6} to 930.0×10^{-6}***		
per °C	414.0×10^{-6} to 1674.0×10^{-6}		

SG and Temperature limits for New Table 23/24

SG	.21 to .74
Temperature	-50 °F to 100 °F

SG@60 and Temperature Limits for New Table 24

SG@60	.35 to .688
Temperature	-50 °F to 100 °F

Density and Temperature limits for New Table 53/54

Density	425 to 1200
Temperature	-20 °C to 125 °C

Density@15 and Temperature Limits for New Table 54

Density@15	427 to 1200
Temperature	-20 °C to 125 °C

E – COMMUNICATION 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

Modbus Type

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

The Modbus Communication Specification is either Binary RTU or ASCII.

Parity

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

RTU - NONE
ASCII - EVEN or ODD

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

Baud Rate

> *Note: this parameter must be set the same for both the PC and the MicroNOC 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.

RTS Delay

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

RTU - NONE
ASCII - EVEN or ODD

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.

Printer Baud Rate (N/A)

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

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 MicroNOC 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.

W – WELL TEST CONFIGURATION

Well Name

Enter up to 16 characters. This function will serve as Well tag.

Location

Enter up to 16 characters for the location of Well.

Lease ID

Enter up to 16 characters for the lease ID of Well.

Oil Shrinkage Factor

Shrinkage factor is the amount of gas in trapped in the oil by volumes. **The shrinkage factor is not in percent.**

Water Salinity Factor

Water salinity factor is controlled by the amount of salt in water. Typical value would be around 1.2. The salinity value influences water correction factor for the net calculations.

Base Density gm/cc (Oil)

Enter Density at base for the oil in gm/cc.

Base Density gm/cc (Water)

Enter Density at base for the water in gm/cc.

Live Density or BS&W Input

Enter to use a live density input or use a live BS&W input to perform Well test.

Meter Correction Factor

Meter correction factor is a correction factor for this individual meter.

Purge Time in Minutes

Time required for the well flow to stabilize. The flow computer will wait purge time period after the test is requested before beginning the test.

Test Time Period in Hours

This is the duration for the test period. After purge time expires, the flow computer will start collecting data for the gas and liquid streams for the pre-set time. Enter -99 for the continuous operation.

INPUTS/OUTPUTS

F – ANALOG/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
12	CasingP1	**22**	CasingP2
13	OilTank1	**23**	OilTank2
14	WatTank1	**24**	WatTank2
15	Suction1	**25**	Suction2
16	Dischag1	**26**	Dischag2
17	CompreT1	**27**	CompreT2

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

Analog Input Type

Enter the type of analog inputs 1-4, 4-20mA or 1-5V

Type	**4-20 mA**	**1-5V**
Analog Input	Enter the value at 4mA	Enter the value at 1V
Analog Input	Enter the value at 20mA	Enter the value at 5V

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. Analog Input - 4-20mA is above 21.75 or below 3.25, RTD Input - OHMs is above 156 or below 50)

G - 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
Gross Flow Rate	111	211
Net Flow Rate (Oil)	112	212
Mass Flow Rate	113	213
DP	121	221
Temperature	122	222
Pressure	123	223
Density	124	224
Density Base	125	225
SG	126	226
SG Base	127	227
DP Low	128	228
DP High	129	229

Station Gross Flow Rate	511
Station Net Flow Rate (Oil)	512
Station Mass Flow Rate	513

	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**
			Densitometer Temp	**23**
			Densitometer Press	**24**

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.

H - DENSITOMETER SETTINGS

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
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

Densitometer Pressure IO Position

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

Densitometer Settings - Sarasota, UGC, or Solartron

Enter the densitometer constants accordingly with the type selection.

Density Correction Factor

Enter the correction factor for the densitometer

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 Maintenance

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

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.

I - 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
12	CasingP1	**22**	CasingP2
13	OilTank1	**23**	OilTank2
14	WatTank1	**24**	WatTank2
15	Suction1	**25**	Suction2
16	Dischag1	**26**	Dischag2
17	CompreT1	**27**	CompreT2

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)

J - 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

K - STATUS INPUT /SWITCH OUTPUT ASSIGNMENT

I/O | Status Input/Switch Output Assignment

	Assignment	Comments
1	End Batch	End batch and reset batch totalizer for all the meters
2	Product Bit 0	Before ending the batch, the user can use status input bit to select next product. These bits are read once when batch is ended.
3	Product Bit 1	
4	Product Bit 2	
5	Alarm Acknowledge	Reset the previous occurred alarms output bit
6	Calibration Mode	Calibration mode will set the flow computer to continue totalizing at same rate while all values are still showing live readings.

Switch Output Assignment

User can assign an output to each of the Micro MV Net Oil Flow Computer's output switches from this list. The Micro MV Net Oil 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
Gross	101	104
Net (Oil)	102	105
Mass	103	106

Station Gross	113
Station Net (Oil)	114
Station Mass	115

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 Net Oil 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 Net Oil Flow Computer can produce up to 50 pulses per second.

The Micro MV Net Oil Flow Computer's maximum pulse output is 125 pulses/sec. The Pulse Output in combination with the Pulse Output Width should be set so that this number is not exceeded.

Assignments - Contact Type Outputs

	Meter 1	Meter 2
Batch Ended	116	121
Temperature Out Range	117	122
Gravity Out of Range	118	123
Flow Rate High	119	124
Flow Rate Low	120	125
Meter Down	138	225

Day Ended	136
Month Ended	137
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

L - FLOW COMPUTER DISPLAY ASSIGNMENT

Display assignment selections are up to 16 assignments. Each screen has two selections. The Micro MV Net Oil Flow Computer will scroll through them at the assigned delay time.

Assignment

	Meter 1	Meter 2
Gross Flow Rate	101	201
Net Flow Rate (Oil)	102	202
Mass Flow Rate	103	203
Gross Batch Total	104	204
Net Batch Total (Oil)	105	205
Mass Batch Total	106	206
Gross Daily Total	107	207
Net Daily Total (Oil)	108	208
Mass Daily Total	109	209
Gross Month Total	110	210
Net Month Total (Oil)	111	211
Mass Month Total	112	212
Gross Cumulative Total	113	213
Net Cumulative Total (Oil)	114	214
Mass Cumulative Total	115	215
Previous Gross Batch Total	116	216
Previous Net Batch Total (Oil)	117	217
Previous Mass Batch Total	118	218
Previous Gross Daily Total	119	219
Previous Net Daily Total (Oil)	120	220
Previous Mass Daily Total	121	221

	Meter 1	Meter 2
Temperature	122	222
Pressure	123	223
Density	124	224
DP	125	225
DP Low	126	226
DP High	127	227
Alarms	128	228
Orifice ID	129	229
Pipe ID	130	230
PID – Flow	131	231
PID – Pressure	132	232
PID – Output	133	233
Density Base	134	234
SG	135	235
SG Base	136	236
FWA DP	137	237
FWA Temperature	138	238
FWA Pressure	139	239
FWA Density	140	240
FWA Density Base	141	241
FWA SG	142	242
FWA SG Base	143	243
Last Batch FWA Temperature	144	244
Last Batch FWA Pressure	145	245
Last Batch FWA Density	146	246
Densitometer Period	147	247
Un-Corrected Density	148	248
BS&W	149	249
FWA BS&W	150	250

	Meter 1	Meter 2
Well Test Gross Flow Rate	151	251
Well Test Gross Flow Rate (Water)	152	252
Well Test Gross Flow Rate (Oil)	153	253
Well Test Net Flow Rate (Water)	154	254
Well Test Net Flow Rate (Oil)	155	255
Well Test Combined Mass Flow Rate	156	256
Well Test Gross Total	157	257
Well Test Gross Total (Water)	158	258
Well Test Gross Total (Oil)	159	259
Well Test Net Total (Water)	160	260
Well Test Net Total (Oil)	161	261
Well Test Combined Mass Total	162	262
Last Well Test Gross Total	163	263
Last Well Test Gross Total (Water)	164	264
Last Well Test Gross Total (Oil)	165	265
Last Well Test Net Total (Water)	166	266
Last Well Test Net Total (Oil)	167	267
Last Well Test Combined Mass Total	168	268
API	169	269
FWA API	170	270
API Base	171	271
FWA API Base	172	272

Station Gross Flow Rate	501
Station Net Flow Rate (Oi)	502
Station Mass Flow Rate	503

Selection	Description
701	Date/Time
702	Battery Voltage/Spare Variabe#1
703	Spare Variable #2/#3
704	Spare Variable #4/#5
705	Spare Variable #6/#7
706	Spare Variable #8/#9
707	Spare Auxiliary Variable#1/#2
708	Spare Auxiliary Variable#3/#4

Selection	Description
709	Spare Auxiliary Var.#5/#6
710	Spare Auxiliary Var.#7/#8
711	Spare Auxiliary Var.#9 /#10
712	Spare Auxiliary Var.#11 /#12
713	Program Variable #1/#2
714	Program Variable #3/#4
715	Program Variable #5/#6
716	Program Variable #7/#8
717	Well Test Status

M - MODBUS SHIFT- 2 OR 4 BYTES

Reassigns Modbus address registers on the Micro MV Net Oil 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 Net Oil 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)

N - MODBUS SHIFT – FLOATING POINT

Use Modbus Shift to collect values in scattered Modbus floating point registers into a consecutive order. The Micro MV Net Oil 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.**

O - 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

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	Density Override in Use
0n15	BS&W Override in Use
0n17-0n20	Spare
0n21	Gravity Out of Range
0n22	Flow Rate High Alarm
0n23	Flow Rate Low Alarm
0n24	Table Temperature Out of Range
0n25	Alpha T Out of Range
0n26	
0n27	

0601 through 0800

0601	Analog Input #1 High
0602	Analog Input #1 Low
0603	Analog Input #2 High
0604	Analog Input #2 Low
0605	Analog Input #3 High
0606	Analog Input #3 Low
0607	Analog Input #4 High
0608	Analog Input #4 Low
0609	RTD Input High
0610	RTD Input Low
0611	Calibration Mode
0612	Battery Alarm
0613	Analog Output #1 Out of Range
0614	Analog Output #2 Out of Range
0615	Analog Output #3 Out of Range
0616	Analog Output #4 Out of Range

0617	Analog Input #1 Failed
0618	Analog Input #2 Failed
0619	Analog Input #3 Failed
0620	Analog Input #4 Failed
0621	RTD Input Failed
0622	Densitometer Failed
0623	Densitometer High Alarm
0624	Densitometer Low Alarm
0625	Multi-Variable DP High
0626	Multi-Variable DP Low
0627	Multi-Variable Pressure High
0628	Multi-Variable Pressure Low
0629	Multi-Variable Temperature High
0630	Multi-Variable Temperature Low
0631	Spare
0632	Spare
0633	Analog Input#1 Override in Use
0634	Analog Input#2 Override in Use
0635	Analog Input#3 Override in Use
0636	Analog Input#4 Override in Use
0637	RTD Input Override in Use
0638	Density Override in Use
0639	Densitometer Temperature Override in Use
0640	Densitometer Pressure Override in Use
0641	Multi-Variable DP Override in Use
0642	Multi-Variable Pressure Override in Use
0643	Multi-Variable Temperature Override in Use
0644	Spare
0645	Spare#1 Input Override in Use
0646	Spare#2 Input Override in Use
0647	Spare#3 Input Override in Use
0648	Spare#4 Input Override in Use
0649	Reserved
0650	Slave ID #1 Communication Failed
0651	Slave ID #2 Communication Failed
0652	Slave ID #3 Communication Failed
0653	Reserved
0654	Spare
0655	Spare
0656	Spare

0657	Analog Input #5 High
0658	Analog Input #5 Low
0659	Analog Input #6 High
0660	Analog Input #6 Low
0661	Analog Input #7 High
0662	Analog Input #7 Low
0663	Analog Input #8 High
0664	Analog Input #8 Low
0665	Analog Input #9 High
0666	Analog Input #9 Low
0667	Spare
0668	Spare Input #5 Override in Use
0669	Spare Input #6 Override in Use
0670	Spare Input #7 Override in Use
0671	Spare Input #8 Override in Use
0672	Spare Input #9 Override in Use
0673	Analog Input #5 Override in Use
0674	Analog Input #6 Override in Use
0675	Analog Input #7 Override in Use
0676	Analog Input #8 Override in Use
0677	Analog Input #9 Override in Use
0678	Spare
0679	Spare
0680	Spare
0681	Auxiliary Variable #1 High
0682	Auxiliary Variable #1 Low
0683	Auxiliary Variable #2 High
0684	Auxiliary Variable #2 Low
0685	Auxiliary Variable #3 High
0686	Auxiliary Variable #3 Low
0687	Auxiliary Variable #4 High
0688	Auxiliary Variable #4 Low
0689	Auxiliary Variable #5 High
0690	Auxiliary Variable #5 Low
0691	Auxiliary Variable #6 High
0692	Auxiliary Variable #6 Low
0693	Auxiliary Variable #7 High
0694	Auxiliary Variable #7 Low
0695	Auxiliary Variable #8 High
0696	Auxiliary Variable #8 Low
0697	Auxiliary Variable #9 High
0698	Auxiliary Variable #9 Low
0699	Auxiliary Variable #10 High
0700	Auxiliary Variable #10 Low
0701	Auxiliary Variable #11 High
0702	Auxiliary Variable #11 Low
0703	Auxiliary Variable #12 High
0704	Auxiliary Variable #12 Low

0705	Day Ended Flag (Last 5 Seconds)
0706	Month Ended Flag (Last 5 Seconds)
0707	Spare
0708	Spare
0709	Spare
0710	Spare
0711	Run Switch
0712	Spare
0713	Slave#1 DP High Alarm
0714	Slave#1 DP Low Alarm
0715	Slave#1 Pressure High Alarm
0716	Slave#1 Pressure Low Alarm
0717	Slave#1 Temperature High Alarm
0718	Slave#1 Temperature Low Alarm
0719	Spare
0720	Spare
0721	Slave#2 DP High Alarm
0722	Slave#2 DP Low Alarm
0723	Slave#2 Pressure High Alarm
0724	Slave#2 Pressure Low Alarm
0725	Slave#2 Temperature High Alarm
0726	Slave#2 Temperature Low Alarm
0727	Spare
0728	Spare
0729	Slave#3 DP High Alarm
0730	Slave#3 DP Low Alarm
0731	Slave#3 Pressure High Alarm
0732	Slave#3 Pressure Low Alarm
0733	Slave#3 Temperature High Alarm
0734	Slave#3 Temperature Low Alarm
0735	Spare
0736	Spare
0737	Slave#1 DP Override in Use
0738	Slave#1 Pressure Override in Use
0739	Slave#1 Temperature Override in Use
0740	Slave#2 DP Override in Use
0741	Slave#2 Pressure Override in Use
0742	Slave#2 Temperature Override in Use
0743	Slave#3 DP Override in Use
0744	Slave#3 Pressure Override in Use
0745	Slave#3 Temperature Override in Use

0801 through 0899 Command Boolean Points

0801	Alarm Acknowledge

P - 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)

Q – Variable Statement Tags

These tags are provided to add a meaningful description for the program variables.

R - Spare Assignment

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

S - PID Control

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 5 security areas to prevent users from entering data into certain areas. The 5 areas are:

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

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.

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.

Settings

Each report has its own default template. The user can edit, modify and save as a new personal report. Specify the new location if you want to use the formatted report.

PID OPERATING

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

Flow Loop Set Point

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

Flow Loop In Service OR Out of Service

The device can perform either flow control or pressure control, or both flow and pressure control. Check if the flow loop is in service or not.

Pressure Loop Set Point

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

Pressure Loop In Service OR Out of Service

The device can perform either flow control or pressure control, or both flow and pressure control. Check if the flow loop is in service or not.

Set Output Percentage

If PID output mode is in automatic mode, then enter the output percentage to control PID loop.

Auto/Manual Mode

PID mode can be configured as manual or automatic mode.

Reset PID

Reset PID data if PID configuration parameters are changed.

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 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

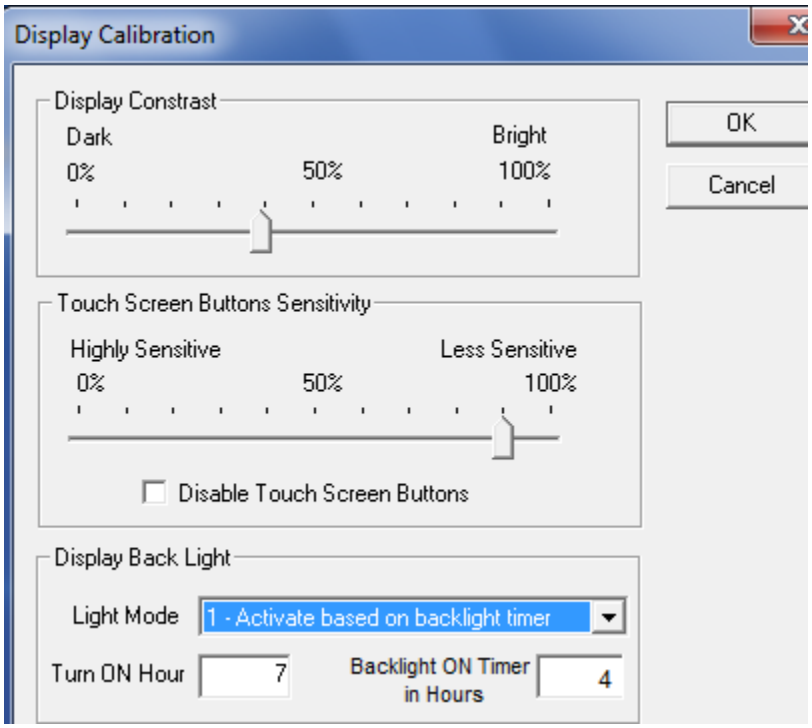
See details in chapter 1.

.

Calibration - Slave Unit

This feature is only available if master and slave units are configured. (Slave type = 1) See detailed information in the "Slave Units Configuration" section.

Calibration - Display



Display backlight mode

Display Backlight Mode	Description
0	60 seconds ON after a touch screen sensor is activated
1	Activate based on backlight timer - Turn ON Hour and Backlight ON Timer in Hours
2	Backlight always OFF

Data Verification

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

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 MicroNOC Flow Computer.

Venturi C Override

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

Wedge Kd2 Override

The value is the discharge coefficient for Wedge flow equations.

BS&W Override

BS&W override can be used when no live BS&W input is connected to the MicroNOC Flow Computer.

Equilibrium Pressure Override

Enter equilibrium pressure override to the current batch.

Alpha T E-6 Override

Enter Alpha T Override to the batch. It will not affect the Alpha T value in the product file. Alpha T is the thermal expansion coefficient for the selected product. The flow computer divides by 1000000.

Example: 0.000355 = 355 / 1000000 (value entered is *335* for an Alpha T of 0.000355)

Orifice ID Override

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

Pipe ID Override

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

SG/Density Override

Enter Gravity Override to replace current gravity. The gravity override is a non-retroactive gravity and will not override the product file gravity. It only applies to the current running batch.
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.

END BATCH ON ALL METERS

The batch will end if requested through this menu. The current batch totalizer and flow weighted data will reset to zero. Non-resettable totalizers are not affected by the batch resetting.

RESET CUMULATIVE TOTALIZER

Enter reset code to reset cumulative totalizer.

Non-resettable accumulated volume will roll over at 999999999.

CLEAR SYSTEM

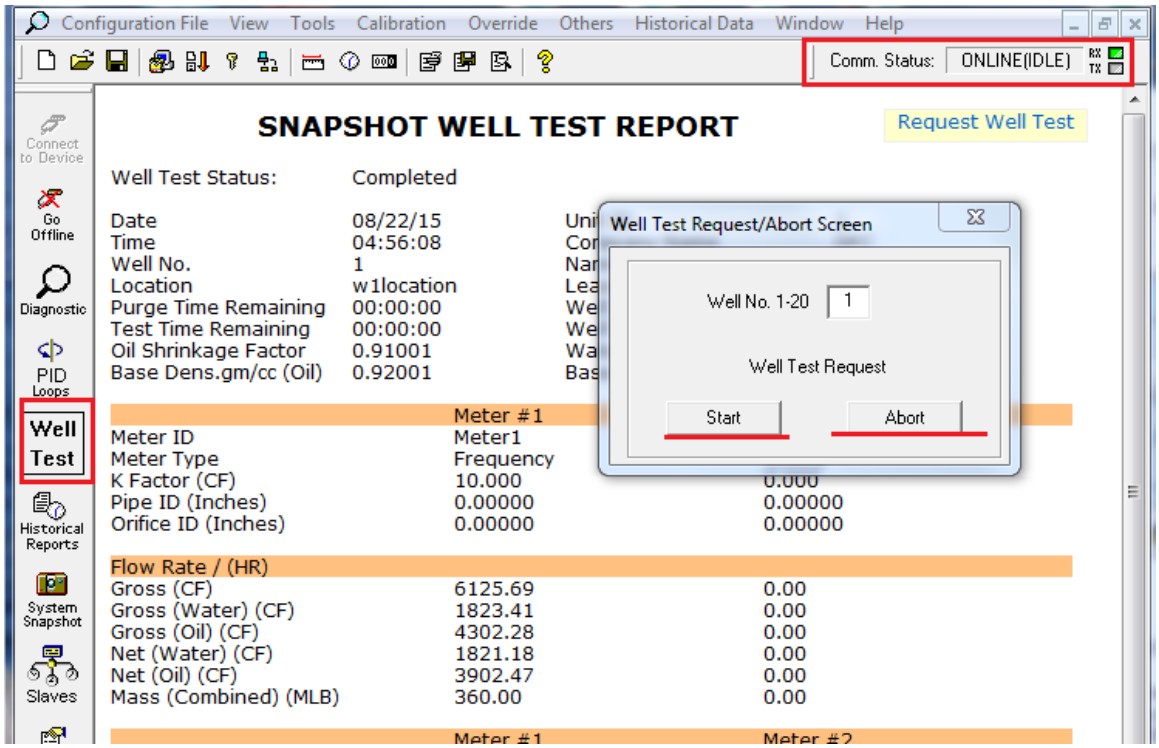
Enter reset system code to reset all data.

NOTE: Contact our offices for a reset code.

Well Test

Start/Abort

Click on “Start” or “Abort” button to start or abort a Well Test.



HISTORICAL DATA

CAPTURE REPORT

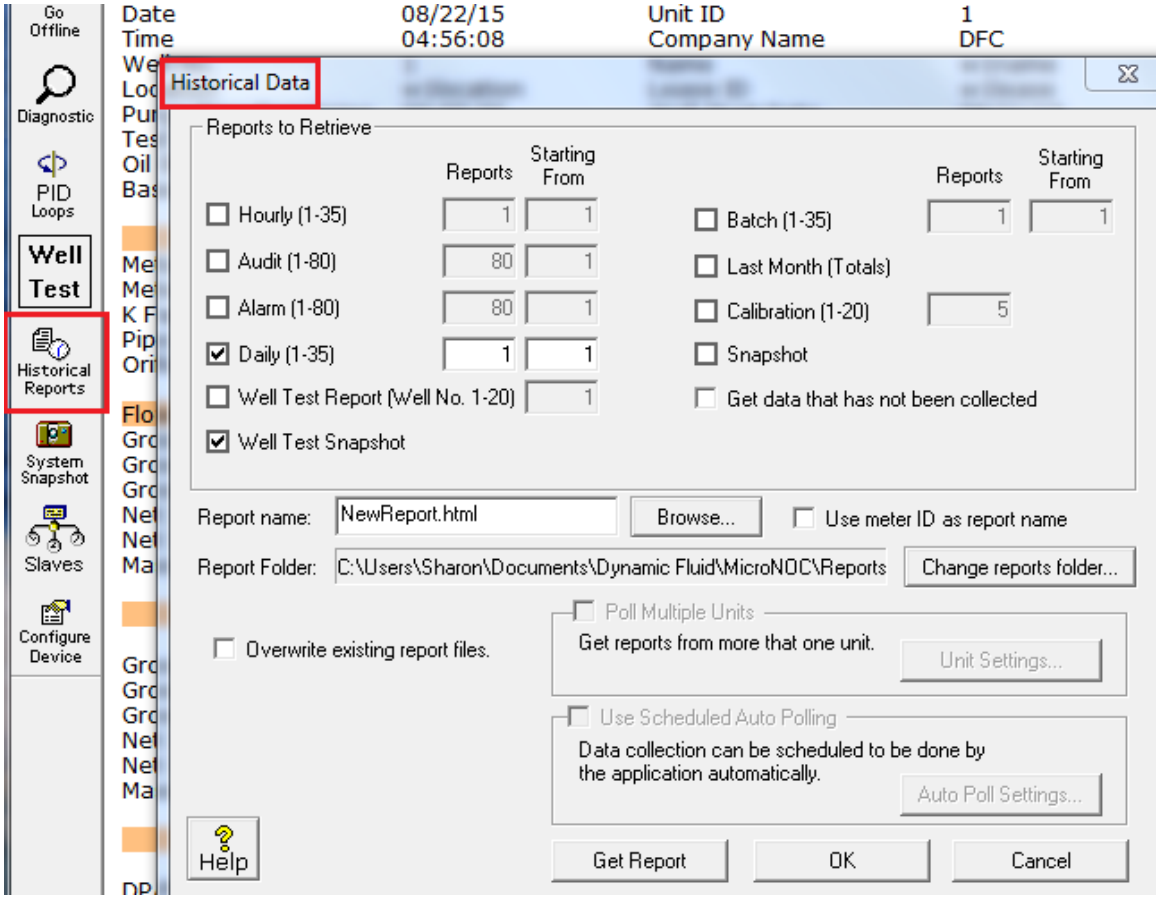
To retrieve historical data, go to **Historical Data** menu. It retrieves the information, shows it on the screen and stores in one report. Use the different names to save new reports. The data will be overwritten by the same file name. Select reports, enter the file name, click 

button to save all data in one report.

Templates are created for each report. The user can edit, modify the report template, and save as a new formatted report. Go to **"Tools | Settings…",** then click 

button to specify the location or directory for the new report, and the location of the reports to be saved. Check "DFM File" box to generate the additional binary format of reports.

The available types of reports are:



PREVIOUS HOURLY DATA

Up to 35 previous hourly data are stored in the Flow Computer. Enter starting (1=Latest, 35=Oldest) report and the Flow Computer will go backward from that selected report. Current hour cannot be retrieved.

HISTORICAL HOURLY REPORT

Company Name	DFC		Unit ID	1
Meter Location	Houston			
Start Time	03/31/16	15:00:00	Product Name	
End Time	03/31/16	16:00:00	Product Table	24A (Crude SG API2004)
Oil Shrinkage Factor	0.91001		Water Salanity Factor	0.91501
Base Dens. gm/cc (Oil)	0.92001		Base Dens. gm/cc (Water)	1.19502

	Meter 1	Meter 2
Meter ID	Meter1	Meter2
Hourly Totals		
Hourly Gross (BBL)	3600.0	3600.0
Hourly Net Oil (BBL)	2555.0	2555.0
Hourly Net Water (BBL)	812.1	812.1
Hourly Mass (MLB)	1164.0	1164.0
Cumulative Totals		
Cumulative Gross (BBL)	81923	81923
Cumulative Net Oil (BBL)	58132	58132
Cumulative Net Water (BBL)	18470	18470
Cumulative Mass (MLB)	26482	26482
Hourly FWA Values		
DP (H2O)	0.0000	0.0000
Temperature (°F)	49.94	49.94
Pressure (PSIG)	249.69	249.69
Density gm/cc	0.92251	0.92251
Density Base gm/cc	0.98197	0.98197
API	21.7	21.7
API Base	12.5	12.5
K/CD/LMF	1.000000	1.000000
CTLW	1.00098	1.00098
CTPL	1.00680	1.00680
DP Ext	0.0000	0.0000
BS&W	22.53	22.53
	Meter 1	**Meter 2**
Pipe ID (Inches)	0.00000	0.00000
Orifice ID (Inches)	0.00000	0.00000
Dens.Corr.Factor	1.00000	1.00000
K Factor	1000.000	1000.000

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.

AUDIT REPORT

Company Name: DFC **Unit ID:** 1
Meter Location: Houston
Meter 1 ID: Meter1
Meter 2 ID: Meter2

Date	Time	Description	Old Value	New Value
03/06/16	01:19:38	(Analog Input 3) Fail Code	0	2
03/06/16	01:19:38	Pres (Analog Input 2) Fail Code	0	2
03/06/16	01:19:38	(Analog Input 1) Fail Code	0	2
03/06/16	01:19:38	Meter1 (Meter 1) Venturi C Factor Override	0.000000	0.662900
03/06/16	01:19:38	Meter1 (Meter 1) FA Override	0.000000	1.000000
03/06/16	01:19:38	Meter1 (Meter 1) Kd2 Override	0.000000	0.999500
03/06/16	01:19:34	Product 1 Table Selection	0	1
03/06/16	01:19:34	(Analog Input 3) Maintenance	0.0000	22.4400
03/06/16	01:19:34	Pres (Analog Input 2) Maintenance	0.00	100.00
03/06/16	01:19:34	(Analog Input 1) Maintenance	0.0000	70.0000
03/06/16	01:19:34	(Analog Input 3) @20mA	0.0000	50.0000
03/06/16	01:19:34	Pres (Analog Input 2) @20mA	0.00	500.00
03/06/16	01:19:34	(Analog Input 1) @20mA	0.00	100.00
03/06/16	01:19:34	Meter1 (Meter 1) Linearization Factor 1	0.000000	1.000000
03/06/16	01:19:34	Meter1 (Meter 1) Meter Factor	0.000000	1.000000
03/06/16	01:19:34	Meter1 (Meter 1) DP Cut Off	0.0000	0.5000
03/06/16	01:19:34	Meter1 (Meter 1) Ref. Temperature of Orifice	0.00	68.00
03/06/16	01:19:34	Meter1 (Meter 1) Ref. Temperature of Pipe	0.00	68.00

ALARM REPORT

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

ALARMS REPORT

Company Name: DFC **Unit ID:** 1
Meter Location: Houston
Meter 1 ID: Meter1
Meter 2 ID: Meter2

Date	Time	Description
03/06/16	01:20:00	(Analog Input 3) OK
03/06/16	01:19:46	Pres (Analog Input 2) OK
03/06/16	01:19:46	Pres (Analog Input 2) FAIL OK
03/06/16	01:19:46	(Analog Input 1) FAIL OK
03/06/16	01:19:36	(Analog Input 3) LOW
03/06/16	01:19:36	Pres (Analog Input 2) LOW
03/06/16	01:19:36	Pres (Analog Input 2) FAIL
03/06/16	01:19:36	(Analog Input 1) LOW
03/06/16	01:19:36	(Analog Input 1) FAIL

PREVIOUS DAILY DATA

Up to 35 previous daily reports can be retrieved.

HISTORICAL DAILY REPORT

Company Name	DFC			Unit ID	1
Meter Location	Houston				
Day Start Time	03/30/16	00:00:00		Product Name	
Day End Time	03/31/16	00:00:00		Product Table	24A (Crude SG API2004)
Oil Shrinkage Factor	0.91001			Water Salanity Factor	0.91501
Base Dens. gm/cc (Oil)	0.92001			Base Dens. gm/cc (Water)	1.19502

	Meter 1	Meter 2
Meter ID	Meter1	Meter2
Daily Totals		
Daily Gross (BBL)	405.0	405.0
Daily Net Oil (BBL)	289.2	289.2
Daily Net Water (BBL)	89.5	89.5
Daily Mass (MLB)	130.8	130.8
Cumulative Totals		
Cumulative Gross (BBL)	24323	24323
Cumulative Net Oil (BBL)	17305	17305
Cumulative Net Water (BBL)	5418	5418
Cumulative Mass (MLB)	7850	7850
Day FWA Values		
DP (H2O)	0.0000	0.0000
Temperature (°F)	49.94	49.94
Pressure (PSIG)	249.69	249.69
Density gm/cc	0.92087	0.92087
Density Base gm/cc	0.98070	0.98070
API	22.0	22.0
API Base	12.6	12.6
K/CD/LMF	1.000000	1.000000
CTLW	1.00098	1.00098
CTPL	1.00680	1.00680
DP Ext	0.0000	0.0000
BS&W	22.07	22.07
	Meter 1	**Meter 2**
Pipe ID (Inches)	0.00000	0.00000
Orifice ID (Inches)	0.00000	0.00000
Dens.Corr.Factor	1.00000	1.00000
K Factor	1000.000	1000.000

PREVIOUS BATCH DATA

Up to 35 previous batch reports can be retrieved.

HISTORICAL BATCH REPORT

Company Name	DFC		Unit ID	1
Meter Location	Houston			
Batch Start Time	03/06/16	01:19:47	Product Name	
Batch End Time	03/31/16	18:01:48	Product Table	24A (Crude SG API2004)
Batch Number		14		
Oil Shrinkage Factor	0.91001	Water Salanity Factor	0.91501	
Base Dens. gm/cc (Oil)	0.92001	Base Dens. gm/cc (Water)	1.19502	

	Meter 1	Meter 2
Meter ID	Meter1	Meter2
Batch Opening		
Cum Gross (BBL)	15	15
Cum Net Oil (BBL)	0	0
Cum Net Water (BBL)	0	0
Cum Mass (MLB)	0	0
Batch Totals		
Batch Gross (BBL)	85695.0	85695.0
Batch Net Oil (BBL)	60820.9	60820.9
Batch Net Water (BBL)	19323.3	19323.3
Batch Mass (MLB)	27706.7	27706.7
Cumulative Totals		
Cumulative Gross (BBL)	85710	85710
Cumulative Net Oil (BBL)	60820	60820
Cumulative Net Water (BBL)	19323	19323
Cumulative Mass (MLB)	27706	27706
Batch FWA Values		
DP (H2O)	0.0000	0.0000
Temperature (°F)	49.94	49.94
Pressure (PSIG)	249.69	249.69
Density gm/cc	0.92243	0.92243
Density Base gm/cc	0.98196	0.98196
API	21.7	21.7
API Base	12.5	12.5
K/CD/LMF	1.000000	1.000000
CTLW	1.00098	1.00098
CTPL	1.00680	1.00680
DP Ext	0.0000	0.0000
BS&W	22.53	22.53
	Meter 1	**Meter 2**
Pipe ID (Inches)	0.00000	0.00000
Orifice ID (Inches)	0.00000	0.00000
Dens.Corr.Factor	1.00000	1.00000
K Factor	1000.000	1000.000

LAST MONTH DATA

One month of data is stored in the Flow Computer.

HISTORICAL MONTHLY REPORT

Company Name	DFC		Unit ID	1
Meter Location	Houston			
Month Start Time	03/01/16	00:00:00	Product Name	Crude
Month End Time	04/01/16	00:00:00	Product Table	24A (Crude SG API2004)
Oil Shrinkage Factor	0.91001		Water Salanity Factor	0.91501
Base Dens. gm/cc (Oil)	0.92001		Base Dens. gm/cc (Water)	1.19502

	Meter 1	Meter 2
Meter ID	Meter1	Meter2
Monthly Totals		
Monthly Gross (BBL)	86785.0	86785.0
Monthly Net Oil (BBL)	61583.0	61583.0
Monthly Net Water (BBL)	19566.0	19566.0
Monthly Mass (MLB)	28054.0	28054.0
Cumulative Totals		
Cumulative Gross (BBL)	86785	86785
Cumulative Net Oil (BBL)	61583	61583
Cumulative Net Water (BBL)	19566	19566
Cumulative Mass (MLB)	28054	28054
Monthly FWA Values		
DP (H2O)	0.0000	0.0000
Temperature (°F)	49.94	49.94
Pressure (PSIG)	249.69	249.69
Density gm/cc	0.92315	0.92315
Density Base gm/cc	0.98247	0.98247
API	21.6	21.6
API Base	12.4	12.4
K/CD/LMF	1.000000	1.000000
CTLW	1.00098	1.00098
CTPL	1.00680	1.00680
DP Ext	0.0000	0.0000
BS&W	22.71	22.71
	Meter 1	**Meter 2**
Pipe ID (Inches)	0.00000	0.00000
Orifice ID (Inches)	0.00000	0.00000
Dens.Corr.Factor	1.00000	1.00000
K Factor	1000.000	1000.000

WELL TEST REPORT

One well test data is stored in the Flow Computer for each Well. Select Well number to display, print, or capture.

HISTORICAL WELL TEST REPORT

Company Name	DFC	Unit ID	1
Well End Date	03/31/16	Well Start Date	03/31/16
Well End Time	16:55:33	Well Start Time	15:55:33
Well No.	1	Name	w1name
Location	w1location	Lease ID	w1lease
Oil Shrinkage Factor	0.91001	Water Salinity Factor	0.91501
Base Dens. gm/cc (Oil)	0.92001	Base Dens.gm/cc (Water)	1.19502

	Meter #1	Meter #2
Meter ID	Meter1	Meter2
Meter Type	Frequency	Frequency
K Factor (BLL)	1000.000	1000.000
Pipe ID (Inches)	0.00000	0.00000
Orifice ID (Inches)	0.00000	0.00000

	Meter #1		Meter #2	
	Test Totals	Projected Daily	Test Totals	Projected Daily
Gross (BBL)	3600.0	86400.0	3600.0	86400.0
Gross (Water) (BBL)	810.6	19455.6	810.6	19455.6
Gross (Oil) (BBL)	2789.4	66944.4	2789.4	66944.4
Net (Water) (BBL)	811.4	19474.6	811.4	19474.6
Net (Oil) (BBL)	2555.6	61334.4	2555.6	61334.4
Mass Combined (MLB)	1164.0	27935.7	1164.0	27935.7

Averaged Value	Meter #1	Meter #2
DP Ext. (H2O)	0.0000	0.0000
Temperature (°F)	49.94	49.94
Pressure (PSIG)	249.69	249.69
Combined Flowing Dens. gm/cc	0.92246	0.92246
Combined Base Dens.gm/cc	0.98194	0.98194
K/CD/LMF	1.000000	1.000000
BS&W	22.52	22.52
CTLW	1.00098	1.00098
CTPL (OIL)	1.00680	1.00680
Combined API	21.7	21.7
Combined Base API	12.5	12.5
Y Factor	0.000000	0.000000

SNAPSHOT REPORT

SNAPSHOT REPORT

Current Time	03/31/16	20:00:04		Unit ID	1
Product Name	Crude		Batch Start Time	03/31/16	18:06:07
Batch Number	15		Table Selection	24A (Crude SG API2004)	
Oil Shrinkage Factor	0.91001		Water Salanity Factor	0.91501	
Base Dens. gm/cc (Oil)	0.92001		Base Dens. gm/cc (Water)	1.19502	

Current Values	Meter 1	Meter 2
Meter ID	Meter1	Meter2
DP (H2O) /Freq	1000.0000	1000.0000
Temperature (°F)	49.94	49.94
Pressure (PSIG)	249.69	249.69
Density gm/cc	0.92544	0.92544
Density Base gm/cc	0.98425	0.98425
API	21.2	21.2
API Base	12.1	12.1
K/CD/LMF	1.000000	1.000000
CTLW	1.00098	1.00098
CTPL	1.00680	1.00680
BS&W	23.36	23.36
Y Factor	0.000000	0.000000
Densitom. Temperature	0.00	0.00
Densitom. Pressure	0.00	0.00
Pipe ID (Inches)	0.00000	0.00000
Orifice ID (Inches)	0.00000	0.00000
Dens. Correction Factor	1.00000	1.00000
K Factor	1000.000	1000.000
Gross Flow Rate (BBL/HR)	3600.00	3600.00
Net Flow Rate Oil (BBL/HR)	2527.83	2527.83
Net Flow Rate Water (BBL/HR)	764.67	764.67
Mass Flow Rate (MLB/HR)	1167.74	1167.74

Totals		Meter 1	Meter 2
Daily	Gross (BBL)	61823.0	61823.0
	Net Oil (BBL)	43825.5	43825.5
	Net Water (BBL)	14002.3	14002.3
	Mass (MLB)	19997.5	19997.5
Cumulative	Gross (BBL)	86146	86146
	Net Oil (BBL)	61130	61130
	Net Water (BBL)	19421	19421
	Mass (MLB)	27847	27847
Batch Total	Gross(BBL)	177.0	177.0
	Net Oil (BBL)	125.4	125.4
	Net Water (BBL)	39.9	39.9
	Mass(MLB)	57.2	57.2

Batch Average (FWA)	Meter 1	Meter 2
DP (H2O)	0.0000	0.0000
Temperature (°F)	49.94	49.94
Pressure (PSIG)	249.69	249.69
Density gm/cc	0.92327	0.92327
Density Base gm/cc	0.98256	0.98256
API	21.6	21.6
API Base	12.4	12.4
K/CD/LMF	1.000000	1.000000
CTLW	1.00098	1.00098
CTPL	1.00680	1.00680
BS&W	22.75	22.75

Viewing previously captured reports

Once a report is saved using the **Historical Data | Open Saved Report** option to view the report.
When the option is selected, a dialog will appear asking for the name and location of the report you want to see. The browse button can be used to specify the location or directory of the reports.

Printing Reports

Go to **Configuration File | Print Report** or click  button to print reports.

- 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.

CHAPTER 3: Data Entry

Through Front Panel Display

The Data entry is a menu driven type construction.

Four Keys – **ESC/Mode, Enter/Select, Down Arrow/Right Arrow key**
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.

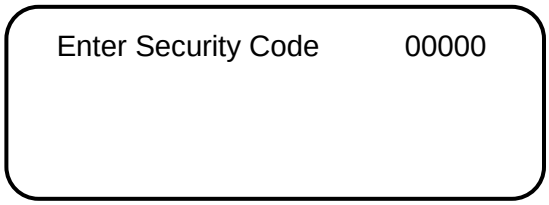
Down Arrow Key, Right Arrow Key

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

MAIN MENU

It consists primarily of series of topics. Your valid choices are the two Arrow Keys (**Down**, **Right**) 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.

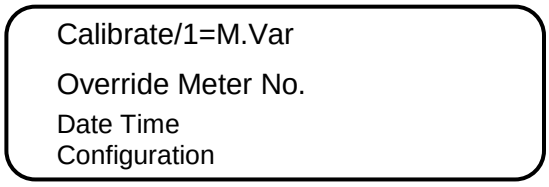
Security Code



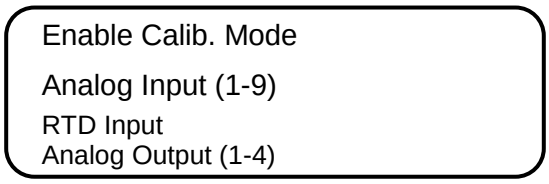
Enter the right security code to be able to change data.

Calibrate /1=M.Var

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



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.

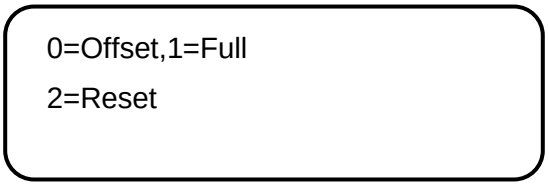


Enable Calibrate Mode

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.

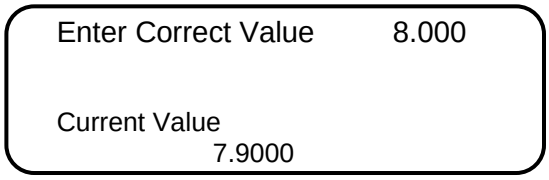
Calibrate Analog Input, RTD

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.



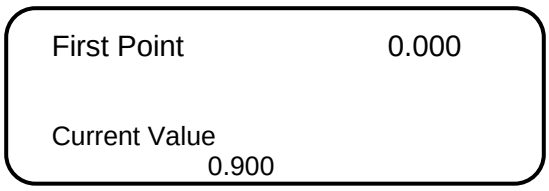
OFFSET (SINGLE POINT)

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

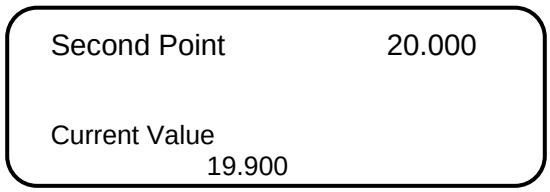


FULL (ZERO AND SPAN CALIBRATION)

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.



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.

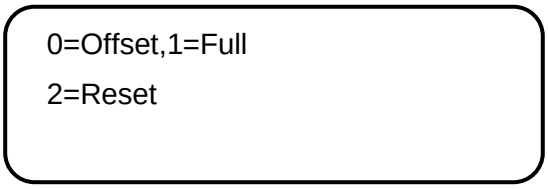


RESET (USE DEFAULT)

Enter '2' to use manufacture default.

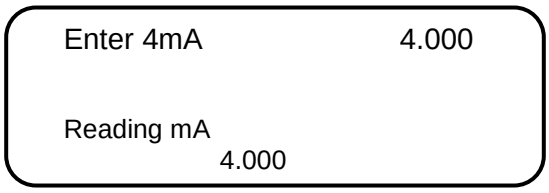
Calibrate Analog Output

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.

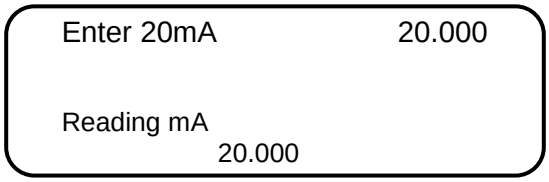


FULL (ZERO AND SPAN CALIBRATION)

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



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

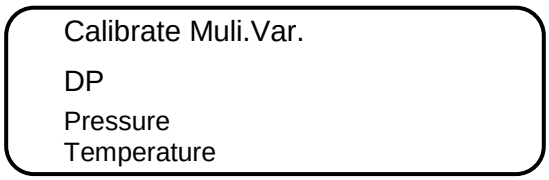


RESET (USE DEFAULT)

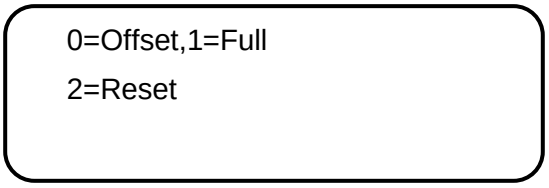
Enter ‘2’ to use manufacture default.

Calibrate Multivariable

Select DP, Pressure, or Temperature to be calibrated.

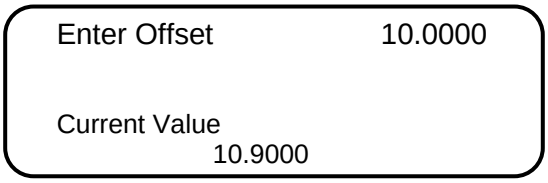


Enter the calibrate method (0=Offset, 1=Full, 2=Reset).



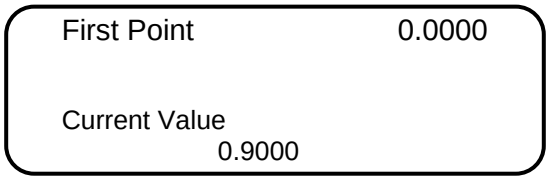
OFFSET (SINGLE POINT)

Induce the live value, and then enter the offset.

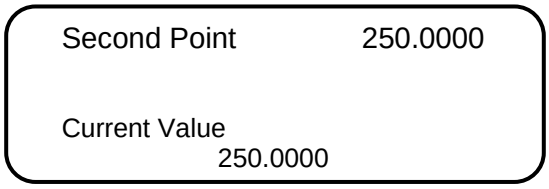


FULL (ZERO AND SPAN CALIBRATION)

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



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



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

BS&W/Venturi C/Equilibrium/Alpha T

SG/Density/DCF

Orifice/Pipe ID

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 (Frequency Device Method)

BS&W/Venturi C/Equilibrium Pressure/Alpha T

BS&W Override: used to enter a value to override the BS&W factor.
Venturi C Override: used to enter a value to override the flow coefficient C factor.
Equilibrium Pressure Override: used to enter a value to override the equilibrium pressure.
Alpha T Override: used to enter a value to override the Alpha T value.

SG /DCF/Density

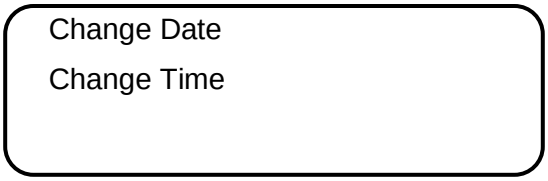
SG Override is used to override the specific gravity.
DCF- Density Correction Factor
Density Override is used to override the density.

Orifice/Pipe ID

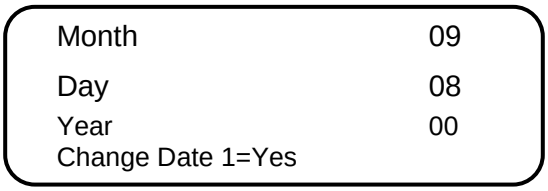
Orifice ID in inches is the measured inside pipe diameter to 5 decimals at reference conditions

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

Date/Time

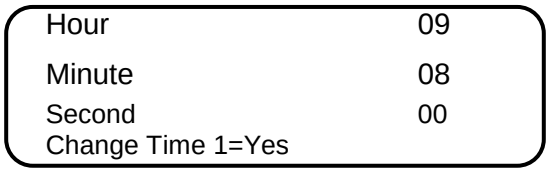


CHANGE DATE



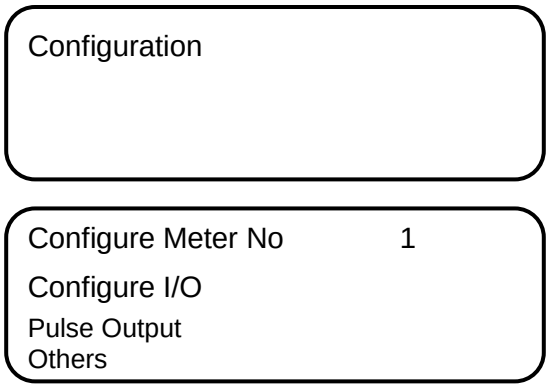
Enter Month (1-12), Day (1-31), Year (0-99) and then enter '1' to change date.

CHANGE TIME

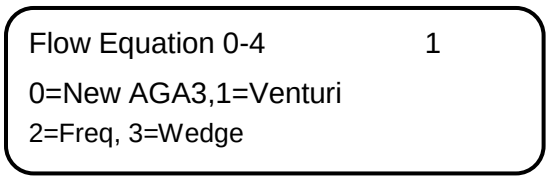


Enter Hour (0-23), Minute (0-59), Second (0-59) and then enter '1' to change time.

Configuration



Configue Meter



Flow Equation Type

0 = API 14.3 (NEW AGA3, 1992 Orifice Equations)
1 = Venturi
2 = Frequency Device
3 = Wedge

NEW AGA3

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

Pipe I.D.

Orifice ID

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

DP Cutoff

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

Viscosity in Centipoise

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

VENTURI

Orifice ID	10.00000
Throat ID	5.00000
DP Cut Off	1.0000
C Coefficient	.024500

Pipe I.D.

Throat ID

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

DP Cutoff

The Micro MV Net Oil 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.

Discharge Coefficient C

This value is the discharge coefficient for Venturi flow equations. The default value is 0.9950.

FREQUENCY DEVICE

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/unit. 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 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 (Oil)	112	212	312	412
Mass Flow Rate	113	213	313	413
DP	121	221	321	421
Temperature	122	222	322	422
Pressure	123	223	323	423
Density	124	224	324	424
Base Density	125	225	325	425
SG	126	226	326	426
Base SG	127	227	327	427
DP Low	128	228	328	428
DP High	129	229	329	429

Station Gross Flow Rate	511
Station Net Flow Rate (Oil)	512
Station Mass Flow Rate	513

	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**
			Densitometer Temp	**23**
			Densitometer Press	**24**

Meter I/O

Temperature

Pressure

DP
Densitometer

ASSIGNMENTS

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

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

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

4MA

Enter the 4mA value for the transducer.

20MA

Enter the 20mA value for the transducer.

Status Input Assignment

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

	Assignment	Comments
1	End Batch	End batch and reset batch totalizer for all the meters
2	Product Bit 0	Before ending the batch, the user can use status input bit to select next product. These bits are read once when batch is ended.
3	Product Bit 1	
4	Product Bit 2	
5	Alarm Acknowledge	Reset the previous occurred alarms output bit
6	Calibration Mode	Calibration mode will set the flow computer to continue totalizing at same rate while all values are still showing live readings.

Switch Output Assignment

User can assign an output to each of the Micro MV Net Oil Flow Computer's output switches from this list. The Micro MV Net Oil 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
Gross	101	104
Net (Oil)	102	105
Mass	103	106

Station Gross	113
Station Net (Oil)	114
Station Mass	115

ASSIGNMENTS - CONTACT TYPE OUTPUTS

	Meter 1	Meter 2
Batch Ended	116	121
Temperature Out Range	117	122
Gravity Out of Range	118	123
Flow Rate High	119	124
Flow Rate Low	120	125
Meter Down	138	225

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 Net Oil Flow Computer will scroll through them at the assigned delay time.

Assignment

	Meter 1	Meter 2
Gross Flow Rate	101	201
Net Flow Rate (Oil)	102	202
Mass Flow Rate	103	203
Gross Batch Total	104	204
Net Batch Total (Oil)	105	205
Mass Batch Total	106	206
Gross Daily Total	107	207
Net Daily Total (Oil)	108	208
Mass Daily Total	109	209
Gross Month Total	110	210
Net Month Total (Oil)	111	211
Mass Month Total	112	212
Gross Cumulative Total	113	213
Net Cumulative Total (Oil)	114	214
Mass Cumulative Total	115	215
Previous Gross Batch Total	116	216
Previous Net Batch Total (Oil)	117	217
Previous Mass Batch Total	118	218
Previous Gross Daily Total	119	219
Previous Net Daily Total (Oil)	120	220
Previous Mass Daily Total	121	221

Station Gross Flow Rate	501
Station Net Flow Rate (Oil)	502
Station Mass Flow Rate	503

	Meter 1	Meter 2
Temperature	122	222
Pressure	123	223
Density	124	224
DP	125	225
DP Low	126	226
DP High	127	227
Alarms	128	228
Orifice ID	129	229
Pipe ID	130	230
PID – Flow	131	231
PID – Pressure	132	232
PID – Output	133	233
Base Density	134	234
SG	135	235
Base SG	136	236
FWA DP	137	237
FWA Temperature	138	238
FWA Pressure	139	239
FWA Density	140	240
FWA Base Density	141	241
FWA SG	142	242

FWA Base SG	143	243
Last Batch FWA Temperature	144	244
Last Batch FWA Pressure	145	245
Last Batch FWA Density	146	246
Density Period	147	247
Un-Corrected Density	148	248
BS&W	149	249
FWA BS&W	150	250

	Meter 1	Meter 2
Well Test Gross Flow Rate	151	251
Well Test Gross Flow Rate (Water)	152	252
Well Test Gross Flow Rate (Oil)	153	253
Well Test Net Flow Rate (Water)	154	254
Well Test Net Flow Rate (Oil)	155	255
Well Test Combined Mass Flow Rate	156	256
Well Test Gross Total	157	257
Well Test Gross Total (Water)	158	258
Well Test Gross Total (Oil)	159	259
Well Test Net Total (Water)	160	260
Well Test Net Total (Oil)	161	261
Well Test Combined Mass Total	162	262
Last Well Test Gross Total	163	263
Last Well Test Gross Total (Water)	164	264
Last Well Test Gross Total (Oil)	165	265
Last Well Test Net Total (Water)	166	266
Last Well Test Net Total (Oil)	167	267
Last Well Test Combined Mass Total	168	268
API	169	269
FWA API	170	270
API Base	171	271
FWA API Base	172	272

Selection	Description
701	Date/Time
702	Battery Voltage/Spare Variable #1
703	Spare Variable #2/#3
704	Spare Variable #4/#5
705	Spare Variable #6/#7
706	Spare Variable #8/#9
707	Spare Auxiliary Variable#1/#2
708	Spare Auxiliary Variable#3/#4

Selection	Description
709	Spare Auxiliary Var.#5/#6
710	Spare Auxiliary Var.#7/#8
711	Spare Auxiliary Var.#9/#10
712	Spare Auxiliary Var.#11/#12
713	Program Variable #1/#2
714	Program Variable #3/#4
715	Program Variable #5/#6
716	Program Variable #7/#8
717	Well Test Status

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 Net Oil 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 Net Oil Flow Computer can produce up to 50 pulses per second.

The Micro MV Net Oil 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
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 $= \frac{\pi}{4} \times N_c \times C_d \times E_v \times d^2 \times Y \times \sqrt{2DP \times Density} \times .001$

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	*gm/cc*	*gm/cc*
Gross Flow Rate/HR	MCF	KM3
Net Flow Rate/HR	MSCF	KSM3
Mass Flow Rate/HR	MLB	TON

Net Flow Rate (Oil) =

$$\frac{Mass\ Flow \times (1 - BS\&W\%) \times MeterCorrectionFactor \times UnitsConversionFactor}{DensityBiseOil}$$

Net Flow Rate (Water) =

$$\frac{Mass\ Flow \times BS\&W\% \times MeterCorrectionFactor \times UnitsConversionFactor}{DensityBiseWater}$$

Gross Flow Rate (Oil) =

$$\frac{Mass\ Flow \times (1 - BS\&W\%) \times MeterCorrectionFactor \times UnitsConversionFactor}{DensityBiseOil \times CTPL \times OilShrinkageFactor}$$

Gross Flow Rate (Water) =

$$\frac{Mass\ Flow \times BS\&W\% \times MeterCorrectionFactor \times UnitsConversionFactor}{DensityBiseWater \times CTLW}$$

Gross Flow Rate $= Gross\ Flow\ (Water) + Gross\ Flow\ (Oil)$

Where:

CTLP: **Crude/Refined/Lubricating Prod/Special Product**: use API 2004, D1250-04.
(Refer to API Manual of Petroleum Measurement Standards:
Chapter11-Physical Properties Data/Section 1-Temperature and Pressure Volume Correction "Factors for Generalized Crude Oils, Refined Products, and Lubricating Oils/May2004, and Addendum 1/September 2007)

CTLW*: Water Salinity Factor/Temperature Correction Factor,* $\Delta T = Temperature - BaseTemperature$

$$CTLW = 1 - (1.0312e^{-4} + 7.1568e^{-6} \times WaterSainityFactor) \times \Delta T - (1.2701e^{-6} - 4.4641e^{-8} \times WaterSaintyFactor) \times (\Delta T)^2 + (1.2333e^{-9} - 2.2436e^{-11} \times WaterSaintyFactor \times (\Delta T)^3$$

Oil Shrinkage Factor (Data Entry : the amount of gas in trapped in the oil by volumes

Venturi

$$\boldsymbol{Mass\ Flow\ Rate} = \frac{\boldsymbol{N \times 3.6 \times C \times Y \times Fa \times d^2\sqrt{Density \times DP}}}{\boldsymbol{\sqrt{1 - Beta^4}}}$$

Where

DP = Differential Pressure
C = Discharge Coefficient C (Manual Entry)
Y = Expansion Factor
Fa = Manual Entry
d = Venturi Bore Diameter at Reference

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

Net Flow Rate (Oil) =

$$\frac{Mass\ Flow \times (1 - BS\&W\%) \times MeterCorrectionFactor \times UnitsConversionFactor}{DensityBiseOil}$$

Net Flow Rate (Water) =

$$\frac{Mass\ Flow \times BS\&W\% \times MeterCorrectionFactor \times UnitsConversionFactor}{DensityBiseWater}$$

Gross Flow Rate (Oil) =

$$\frac{Mass\ Flow \times (1 - BS\&W\%) \times MeterCorrectionFactor \times UnitsConversionFactor}{DensityBiseOil \times CTPL \times OilShrinkageFactor}$$

Gross Flow Rate (Water) =

$$\frac{Mass\ Flow \times BS\&W\% \times MeterCorrectionFactor \times UnitsConversionFactor}{DensityBiseWater \times CTLW}$$

Gross Flow Rate = $Gross\ Flow\ (Water) + Gross\ Flow\ (Oil)$

Where:

CTLP: **Crude/Refined/Lubricating Prod/Special Product**: use API 2004, D1250-04.
(Refer to API Manual of Petroleum Measurement Standards:
Chapter11-Physical Properties Data/Section 1-Temperature and Pressure Volume Correction "Factors for Generalized Crude Oils, Refined Products, and Lubricating Oils/May2004, and Addendum 1/September 2007)

CTLW*: Water Salinity Factor/Temperature Correction Factor,* $\Delta T = Temperature - BaseTemperature$

$$CTLW = 1 - (1.0312e^{-4} + 7.1568e^{-6} \times WaterSainityFactor) \times \Delta T - (1.2701e^{-6} - 4.4641e^{-8} \times WaterSaintyFactor) \times (\Delta T)^2 + (1.2333e^{-9} - 2.2436e^{-11} \times WaterSaintyFactor \times (\Delta T)^3$$

Oil Shrinkage Factor (Data Entry): the amount of gas in trapped in the oil by volumes

Frequency Device - Volume

Water Cut Input (BS&W)

Combined Flowing Density =

$$DensityBaseOil \times CTPL \times (1 - BS\&W\%) \times OilShrinkageFactor + DensityBaseWater \times CTLW \times BS\&W\%$$

Live Density Input

Combined Flowing Density = Live Density

$$\boldsymbol{BS\%W} = \frac{Flowing\ Density - DensityBaseOil \times CTPL \times OilShrinkageFactor}{DensityBaseWater \times CTLW - DensityBaseOil \times CTPL \times OilShrinkageFactor}$$

Combined Density Base =

$$DensityBaseOil \times (1 - BS\&W\%) + DensityBaseWater \times BS\&W\%$$

$$\boldsymbol{Gross\ Flow}\ Per\ Hour = \frac{Pulse}{K\ Factor} \times 3600$$

$$\boldsymbol{Gross\ Flow}\ (\boldsymbol{Water}) = Gross\ Flow \times BSW\%$$

$$\boldsymbol{Gross\ Flow}\ (\boldsymbol{Oil}) = Gross\ Flow\ \times (1 - BSW\%)$$

$$\boldsymbol{Net\ Flow}\ (\boldsymbol{Water}) = Gross\ Flow\ (Water) \times LMF \times MeterCorrectionFactor \times CTLw$$

$$\boldsymbol{Net\ Flow}\ (\boldsymbol{Oil}) = Gross\ Flow\ (Oil) \times LMF \times CTPL \times MeterCorrectionFactor \times OilShrinkageFactor$$

$$\boldsymbol{Mass\ Flow} =$$
$$(Net\ Oil\ Flow\ \times DensityBaseOil + Net\ Water\ Flow \times DensityBaseWater)\ \times UnitsConversionFactor$$

Where:

CTLP: **Crude/Refined/Lubricating Prod/Special Product**: use API 2004, D1250-04.
(Refer to API Manual of Petroleum Measurement Standards:
Chapter11-Physical Properties Data/Section 1-Temperature and Pressure Volume Correction "Factors for Generalized Crude Oils, Refined Products, and Lubricating Oils/May2004, and Addendum 1/September 2007)

CTLW*: Water Salinity Factor/Temperature Correction Factor,* $\Delta T = Temperature - BaseTemperature$

$$CTLW = 1 - (1.0312e^{-4} + 7.1568e^{-6} \times WaterSainityFactor) \times \Delta T - (1.2701e^{-6} - 4.4641e^{-8} \times WaterSaintyFactor) \times (\Delta T)^2 + (1.2333e^{-9} - 2.2436e^{-11} \times WaterSaintyFactor \times (\Delta T)^3$$

Oil Shrinkage Factor (Data Entry): the amount of gas in trapped in the oil by volumes

Frequency Device – Mass Pulse

Water Cut Input (BS&W)

Combined Flowing Density =

$$DensityBaseOil \times CTPL \times (1 - BS\&W\%) \times OilShrinkageFactor + DensityBaseWater \times CTLW \times BS\&W\%$$

Live Density Input

Combined Flowing Density = Live Density

$$\boldsymbol{BS\%W} = \frac{Flowing\ Density - DensityBaseOil \times CTPL \times OilShrinkageFactor}{DensityBaseWater \times CTLW - DensityBaseOil \times CTPL \times OilShrinkageFactor}$$

Combined Density Base =

$$DensityBaseOil \times (1 - BS\&W\%) + DensityBaseWater \times BS\&W\%$$

$$\boldsymbol{Mass\ Flow\ Per\ Hour} = \frac{Mass\ Pulse}{K\ Factor} \times 3600$$

$$\boldsymbol{Net}\ (\boldsymbol{Oil}) = \frac{Mass\ Flow \times (1 - BSW\%) \times LMF \times MeterCorrFactor \times UnitsConversionFactor}{BaseDensity(Oil)}$$

$$\boldsymbol{Net}\ (\boldsymbol{Water}) = \frac{Mass\ Flow \times BSW\% \times LMF \times UnitsConversionFactor}{BaseDensity(Water)}$$

$$\boldsymbol{Gross}\ (\boldsymbol{Oil}) = \frac{Mass\ Flow \times (1 - BS\&W\%) \times UnitsConversionFactor}{BaseDensity(Oil)\ \times CTLP \times OilShrinkageFactor}$$

$$\boldsymbol{Gross}\ (\boldsymbol{Water}) = \frac{Mass\ Flow \times (BS\&W\%) \times UnitsConversionFactor}{BaseDensity(Water) \times CTLW}$$

$$\boldsymbol{Gross} = Gross\ (Oil) + Gross\ (Water)$$

Where:

CTLP: **Crude/Refined/Lubricating Prod/Special Product**: use API 2004, D1250-04.
(Refer to API Manual of Petroleum Measurement Standards:
Chapter11-Physical Properties Data/Section 1-Temperature and Pressure Volume Correction "Factors for Generalized Crude Oils, Refined Products, and Lubricating Oils/May2004, and Addendum 1/September 2007)

CTLW*: Water Salinity Factor/Temperature Correction Factor,* $\Delta T = Temperature - BaseTemperature$

$$CTLW = 1 - (1.0312e^{-4} + 7.1568e^{-6} \times WaterSainityFactor) \times \Delta T - (1.2701e^{-6} - 4.4641e^{-8} \times WaterSaintyFactor) \times (\Delta T)^2 + (1.2333e^{-9} - 2.2436e^{-11} \times WaterSaintyFactor \times (\Delta T)^3$$

Oil Shrinkage Factor (Data Entry): the amount of gas in trapped in the oil by volumes

Wedge

US unit

Flow Rate (Gallon/Minute) $=5.668 \times Fa \times Kd^2 \times \sqrt{\frac{DP}{SG}}$

Where:

DP = different pressure, inches of water
SG = Liquid specific gravity at flow conditions
Fa = Expansion Coefficient of Wedge
Kd2 = Discharge Coefficient of Wedge

Metric Unit

Flow Rate (Liter/Hour) $= 1.287343 \times Fa \times Kd^2 \times \sqrt{\frac{DP}{SG}}$

Where:

DP = different pressure
SG = Liquid specific gravity at flow conditions
Fa = Expansion Coefficient of Wedge
Kd2 = Discharge Coefficient of Wedge

$$\boldsymbol{Gross\ Flow\ (Water)} = Gross\ Flow \times BSW\% \times UnitsConversionFactor$$

$$\boldsymbol{Gross\ Flow\ (Oil)} = Gross\ Flow\ \times (1 - BSW\%) \times UnitsConversionFactor$$

$$\boldsymbol{Net\ Flow\ (Water)} = Gross\ Flow\ (Water) \times MeterCorrectionFactor \times CTLw$$

$$\boldsymbol{Net\ Flow\ (Oil)} = Gross\ Flow\ (Oil) \times CTPL \times MeterCorrectionFactor \times OilShrinkageFactor$$

$$\boldsymbol{Mass\ Flow} =$$
$$(Net\ Oil\ Flow\ \times DensityBaseOil + Net\ Water\ Flow \times DensityBaseWater)\ \times UnitsConversionFactor$$

Where:

Oil Shrinkage Factor (Data Entry : the amount of gas in trapped in the oil by volumes

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.

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

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 (USUnit) or °C (MetricUnit)*

P = *Flowing pressure in PSIG (USUnit), BAR, or KG/CM (MetricUnit)*

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

P_{cal} = *Calibration pressure in PSIG (USUnit), BAR, or KG/CM (MetricUnit)*

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 (USUnit), or °C (MetricUnit)*

Solartron Density (GM/CC-US 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 68^{O}F and 0 PSIG

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

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

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

Temperature Corrected Density

$$DT = D[1 + K_{18}(T\text{-}68)] + K_{19}(T\text{-}68)$$

$$\text{Where } T = \text{Temperature in } °F$$

Temperature and Pressure Corrected Density

$$DP = DL(1 + K_{20}P) + K_{21}P$$

Where :

$$P = \text{Pressure in PSIG}$$

$$K_{20} = K_{20A} + K_{20B}P$$

$$K_{21} = K_{21A} + K_{21B}P$$

$$K_{20A}, K_{20B}, K_{21A}, K_{21B} = \text{Calibration Constants Supplied by Solarton}$$

Additional Equation for Velocity of Sound Effects

The following equation can provide more accurate measurement for LPG products in the density range of $0.300 \le D \le 0.550$ (D is in gm/cc). ***Contact Solarton to get information about KR and KJ constants.***

$$D_{vos} = DP + K_r (DP - K_j)^3$$

$$\text{Let } K_r = 0.0 \text{ outside this range.}$$

Solartron Density (KG/M3-Metric Unit)

Density at 20°C and 0 KPA

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

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

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

Temperature Corrected Density

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

$$Where\ T = Temperature\ in\ °C$$

Temperature and Pressure Corrected Density

$$DP = DL(1 + K_{20}P) + K_{21}P$$

Where :

$$P = Pressure\ in\ KPA$$

$$K_{20} = K_{20A} + K_{20B}P$$

$$K_{21} = K_{21A} + K_{21B}P$$

$$K_{20A}, K_{20B}, K_{21A}, K_{21B} = Calibration\ Constants\ Supplied\ by\ Solarton$$

Additional Equation for Velocity of Sound Effects

The following equation can provide more accurate measurement for LPG products in the density range of $0.300 \le D \le 0.550$ (D is in kg/m3).

$$D_{vos} = DP + K_r (DP - K_j)^3$$

$$Let\ K_r = 0.0\ outside\ this\ range.$$

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 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 3001

ADDR	FUNC CODE	STARTING POINT		# OF POINTS		CRC CHECK	
		HI	LO	HI	LO		
01	03	0B	B9	00	01	57	CB

Response - Data - 02 63 (Hex), 611 (Decimal)

ADDR	FUNC CODE	BYTE COUNTS	**DATA**		CRC CHECK	
			HI	**LO**		
01	03	02	**02**	**63**	F9	0D

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
One register with 4 data bytes (high word and low word)

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

Sample Floating Point Value

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
1801-1848	Spare		
1850	Reserved		
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

Modbus Address Table – 16 Bits Integer

ADDRESS	DESCRIPTION	DECIMAL	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	Slave#1 Type	0 Inferred	Read/Write
1901	Slave#2 Type	0 Inferred	Read/Write
1902	Slave#3 Type	0 Inferred	Read/Write
1903	Reserved		
1904-1920	Spare		
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
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

Modbus Address Table – 16 Bits Integer

ADDRESS	DESCRIPTION	DECIMAL	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
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
1988-1999	Spare		

Modbus Address Table – 16 Bits Integer

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
2001-2141	Reserved		
2142	Display Sensitive Factor	0 Inferred	Read/Write
2143	Spare		
2144	Diagnostic Mode	0 Inferred	Read/Write
2145	Modbus Shift Update	0 Inferred	Read/Write
2146-2289	Reserved		
2290	Well#1 Test Period in Hours	0 Inferred	Read/Write
2291	Well#2 Test Period in Hours	0 Inferred	Read/Write
2292	Well#3 Test Period in Hours	0 Inferred	Read/Write
2293	Well#4 Test Period in Hours	0 Inferred	Read/Write
2294	Well#5 Test Period in Hours	0 Inferred	Read/Write
2295	Well#6 Test Period in Hours	0 Inferred	Read/Write
2296	Well#7 Test Period in Hours	0 Inferred	Read/Write
2297	Well#8 Test Period in Hours	0 Inferred	Read/Write
2298	Well#9 Test Period in Hours	0 Inferred	Read/Write
2299	Well#10 Test Period in Hours	0 Inferred	Read/Write
2300	Well#11 Test Period in Hours	0 Inferred	Read/Write
2301	Well#12 Test Period in Hours	0 Inferred	Read/Write
2302	Well#13 Test Period in Hours	0 Inferred	Read/Write
2303	Well#14 Test Period in Hours	0 Inferred	Read/Write
2304	Well#15 Test Period in Hours	0 Inferred	Read/Write
2305	Well#16 Test Period in Hours	0 Inferred	Read/Write
2306	Well#17 Test Period in Hours	0 Inferred	Read/Write
2307	Well#18 Test Period in Hours	0 Inferred	Read/Write
2308	Well#19 Test Period in Hours	0 Inferred	Read/Write
2309	Well#20 Test Period in Hours	0 Inferred	Read/Write
2310	Well#1 Test Purge Time in Minutes	0 Inferred	Read/Write
2311	Well#2 Test Purge Time in Minutes	0 Inferred	Read/Write
2312	Well#3 Test Purge Time in Minutes	0 Inferred	Read/Write
2313	Well#4 Test Purge Time in Minutes	0 Inferred	Read/Write
2314	Well#5 Test Purge Time in Minutes	0 Inferred	Read/Write
2315	Well#6 Test Purge Time in Minutes	0 Inferred	Read/Write
2316	Well#7 Test Purge Time in Minutes	0 Inferred	Read/Write
2317	Well#8 Test Purge Time in Minutes	0 Inferred	Read/Write
2318	Well#9 Test Purge Time in Minutes	0 Inferred	Read/Write
2319	Well#10 Test Purge Time in Minutes	0 Inferred	Read/Write
2320	Well#11 Test Purge Time in Minutes	0 Inferred	Read/Write
2321	Well#12 Test Purge Time in Minutes	0 Inferred	Read/Write
2322	Well#13 Test Purge Time in Minutes	0 Inferred	Read/Write
2323	Well#14 Test Purge Time in Minutes	0 Inferred	Read/Write
2324	Well#15 Test Purge Time in Minutes	0 Inferred	Read/Write
2325	Well#16 Test Purge Time in Minutes	0 Inferred	Read/Write
2326	Well#17 Test Purge Time in Minutes	0 Inferred	Read/Write
2327	Well#18 Test Purge Time in Minutes	0 Inferred	Read/Write
2328	Well#19 Test Purge Time in Minutes	0 Inferred	Read/Write
2329	Well#20 Test Purge Time in Minutes	0 Inferred	Read/Write

Modbus Address Table – 16 Bits Integer

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
2330	Well#1 Select 0:BS&W, 1:Live Density	0 Inferred	Read/Write
2331	Well#2 Select 0:BS&W, 1:Live Density	0 Inferred	Read/Write
2332	Well#3 Select 0:BS&W, 1:Live Density	0 Inferred	Read/Write
2333	Well#4 Select 0:BS&W, 1:Live Density	0 Inferred	Read/Write
2334	Well#5 Select 0:BS&W, 1:Live Density	0 Inferred	Read/Write
2335	Well#6 Select 0:BS&W, 1:Live Density	0 Inferred	Read/Write
2336	Well#7 Select 0:BS&W, 1:Live Density	0 Inferred	Read/Write
2337	Well#8 Select 0:BS&W, 1:Live Density	0 Inferred	Read/Write
2338	Well#9 Select 0:BS&W, 1:Live Density	0 Inferred	Read/Write
2339	Well#10 Select 0:BS&W, 1:Live Density	0 Inferred	Read/Write
2340	Well#11 Select 0:BS&W, 1:Live Density	0 Inferred	Read/Write
2341	Well#12 Select 0:BS&W, 1:Live Density	0 Inferred	Read/Write
2342	Well#13 Select 0:BS&W, 1:Live Density	0 Inferred	Read/Write
2343	Well#14 Select 0:BS&W, 1:Live Density	0 Inferred	Read/Write
2344	Well#15 Select 0:BS&W, 1:Live Density	0 Inferred	Read/Write
2345	Well#16 Select 0:BS&W, 1:Live Density	0 Inferred	Read/Write
2346	Well#17 Select 0:BS&W, 1:Live Density	0 Inferred	Read/Write
2347	Well#18 Select 0:BS&W, 1:Live Density	0 Inferred	Read/Write
2348	Well#19 Select 0:BS&W, 1:Live Density	0 Inferred	Read/Write
2349	Well#20 Select 0:BS&W, 1:Live Density	0 Inferred	Read/Write
2350	Reserved		
2351	Port 3 (2nd 485) Modbus Type (0=RTU,1=ASCII)	0 Inferred	Read/Write
2352	Port 3 (2nd 485) Parity(0=None,1=Odd,2=Even)	0 Inferred	Read/Write
2353	Port 3 (2nd 485) Baud Rate(0=1200,1=2400,3=4800,4=9600)		
2354	reserved		
2355	Port 3 (2nd 485) RTS Delay in Milliseconds	0 Inferred	Read/Write
2356-2367	Reserved		
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
2370	Reserved		
2399	Program Variable Statement Update	0 Inferred	Read/Write
2400	Boolean Statement Update	0 Inferred	Read/Write
2401-2530	Reserved		
2531	Floating Variable Modbus Shift Update	0 Inferred	Read/Write
2532-2533	Spare		
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

Modbus Address Table – 16 Bits Integer

ADDRESS	DESCRIPTION	DECIMAL	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 (1st 485) Modbus Type (0=RTU,1=ASCII)	0 Inferred	Read/Write
2554	Port 1 (1st 485) Parity(0=None,1=Odd,2=Even)	0 Inferred	Read/Write
2555	Port 1 (1st 485) Baud Rate(0=1200,1=2400,3=4800,4=9600)		
2556	reserved		
2557	Port 1 (1st 485) RTS Delay in Milliseconds	0 Inferred	Read/Write
2558-2559	reserved		
2560	Port 2 (RS232) Select 0=RTS,1=Printer	0 Inferred	Read/Write
2561	Port 2 (RS232) Modbus Type (0=RTU,1=ASCII)	0 Inferred	Read/Write
2562	Port 2 (RS232) Parity(0=None,1=Odd,2=Even)	0 Inferred	Read/Write
2563	Port 2 (RS232) Baud Rate(0=1200,1=2400,3=4800,4=9600)		
2564	Reserved		
2565	Port 2 (RS232) 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=CF,1=M3,2=Gallon,3=Liter,4=BBL	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) – Metric Unit	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
2583	Day Start Hour (0-23)	0 Inferred	Read/Write
2584	Disable Alarms ? (0=No, 1=Yes)	0 Inferred	Read/Write
2585	New Alarm Delay Timer	0 Inferred	Read/Write
2586	Disable Cry-Out Alarm Message	0 Inferred	Read/Write
2587	Pulse Width	0 Inferred	Read/Write
2588	Cry-Out Alarm Delay Timer	0 Inferred	Read/Write
2589	Reserved		
2590	Analog Output Expnasion	0 Inferred	Read/Write
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

Modbus Address Table – 16 Bits Integer

ADDRESS	DESCRIPTION	DECIMAL	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	Freq KF.Unit 0=CF,1=BBL,2=Gal.,3=Liter,4=BBL	0 Inferred	Read/Write
2610	Enable Battery Alarm (1=Yes)	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	Well Test Mass Flow Units(1=LB(US), KG(Metric)	0 Inferred	Read/Write
2648-2655	Reserved		
2656	Meter #1 Use Stack DP (1=Yes)	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 BS&W Assignment	0 Inferred	Read/Write
2663	Meter #1 Retroactive Meter Factor (1=Yes)	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	Meter #1 Mass Pulse	0 Inferred	Read/Write
2670-2671	Spare		
2672	Meter #1 Frequency Input Position		
2673-2675	Spare		
2676	Meter #2 Use Stack DP (1=Yes)	0 Inferred	Read/Write
2677	Meter #2 Density Type	0 Inferred	Read/Write
2678	Meter #2 Density Unit	0 Inferred	Read/Write
2679	Meter #2 Flow Cut Off	0 Inferred	Read/Write
2680	Meter #2 Flow Equation	0 Inferred	Read/Write
2681	Meter #2 Y Factor Select	0 Inferred	Read/Write
2682	Meter #2 BS&W Assignment	0 Inferred	Read/Write
2683	Meter #2 Retroactive Meter Factor (1=Yes)	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	Meter #1 Mass Pulse	0 Inferred	Read/Write
2690-2691	Spare		
2692	Meter #2 Frequency Input Position		
2693-2735	Reserved		

Modbus Address Table – 16 Bits Integer

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	Activiate Backlight Start Hour (0-23)	0 Inferred	Read/Write
2748	Backlight On Timer in Hours	0 Inferred	Read/Write
2749	Backlignt Mode	0 Inferred	Read/Write
2750	Spare		
2751	Status Input/Switch Output #1 (0=OFF,1=ON)	0 Inferred	Read/Write
2752	Status Input/Switch Output #2 (0=OFF,1=ON)	0 Inferred	Read/Write
2753	Status Input/Switch Output #3 (0=OFF,1=ON)	0 Inferred	Read/Write
2754	Status Input/Switch Output #4 (0=OFF,1=ON)	0 Inferred	Read/Write
2755-2756	Spare		
2757	Analog Input#1 Mode 0=mA, 1=Voltage	0 Inferred	Read/Write
2758	Analog Input#2 Mode 0=mA, 1=Voltage	0 Inferred	Read/Write
2759	Analog Input#3 Mode 0=mA, 1=Voltage	0 Inferred	Read/Write
2760	Analog Input#4 Mode 0=mA, 1=Voltage	0 Inferred	Read/Write
2761-2860	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	Multivar.DP Calibration Index	0 Inferred	Read/Write
2882	Multivar.Pressure Calibration Index	0 Inferred	Read/Write
2883	Multivar.Temperature Calibration Index	0 Inferred	Read/Write
2884-2887	Spare		
2888	Reserved		
2889-2990	Spare		
2891-2894	Analog Input #1 Tag Name	8 Chars	Read/Write
2895-2898	Analog Input #2 Tag Name	8 Chars	Read/Write
2899-2902	Analog Input #3 Tag Name	8 Chars	Read/Write
2903-2906	Analog Input #4 Tag Name	8 Chars	Read/Write
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

Modbus Address Table – 16 Bits Integer

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
2947	Meter#1 PID Pressure Direct/Reverse Act	0 Inferred	Read/Write
2948	Meter#1 PID Flow Loop in Service	0 Inferred	Read/Write
2949	Meter#1 PID Pressure Loop in Service	0 Inferred	Read/Write
2950	Meter#1 PID 0=Low,1=High Signal	0 Inferred	Read/Write
2951	Meter#1 PID Flow Base 0=Gross,1=Net,2=Mass	0 Inferred	Read/Write
2952	Meter#2 PID Auto/Manual	0 Inferred	Read/Write
2953	Meter#2 PID Flow Loop Used (1=Yes)	0 Inferred	Read/Write
2954	Meter#2 PID Flow Direct/Reverse Act	0 Inferred	Read/Write
2955	Meter#2 PID Pressure Loop Used (1=Yes)	0 Inferred	Read/Write
2956	Meter#2 PID Pressure Direct/Reverse Act	0 Inferred	Read/Write
2957	Meter#2 PID Flow Loop in Service	0 Inferred	Read/Write
2958	Meter#2 PID Pressure Loop in Service	0 Inferred	Read/Write
2959	Meter#2 PID 0=Low,1=High Signal	0 Inferred	Read/Write
2960	Meter#2 PID Flow Base 0=Gross,1=Net,2=Mass	0 Inferred	Read/Write
2961-2978	Spare	0 Inferred	Read/Write
2979	Meter#1 PID Pressure Base	0 Inferred	Read/Write
2980	Meter#2 PID Pressure Base	0 Inferred	Read/Write
2981-2984	Spare		
2985	Analog Output#1 –Remote Control (0-100)	0 Inferred	Read/Write
2986	Analog Output#2 –Remote Control (0-100)	0 Inferred	Read/Write
2987	Analog Output#3 –Remote Control (0-100)	0 Inferred	Read/Write
2988	Analog Output#4 –Remote Control (0-100)	0 Inferred	Read/Write
2989	Reset PID		
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
3001	Version Number	2 Inferred	Read
3002-3009	Reserved		
3010	Spare		
3007	Product Used	0 Inferred	Read
3011	Batch Type	0 Inferred	Read/Write
3012	Report Format (0=Standard, 1=Prog.Variable)	0 Inferred	Read/Write
3013	End Batch	0 Inferred	Read/Write
3014-3017	Reserved		
3018	Flow Computer Unit Number	0 Inferred	Read
3019	Disable Alarms (1=Yes)	0 Inferred	Read/Write
3020	Spare	0 Inferred	Read/Write
3021	Spare	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	Spare		
3027	Last Batch Report Request (1-35)	0 Inferred	Write
3028	Reserved		

Modbus Address Table – 16 Bits Integer

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
3029	Last Hourly Report Request (1-35 Report)	0 Inferred	Write
3030	Last Alarm Report Request (1-80)	0 Inferred	Write
3031	Last Audit Report Request (1-80)	0 Inferred	Write
3032	Last Daily Report Request (1-35 Report)	0 Inferred	Write
3033	Last Month Report Request	0 Inferred	Write
3034	Last Well Number Test Data Report (1-20)	0 Inferred	Write
3035-3040	Spare		
3041	Product #1 Table Selection	0 Inferred	Read/Write
3042	Product #2 Table Selection	0 Inferred	Read/Write
3043	Product #3 Table Selection	0 Inferred	Read/Write
3044	Product #4 Table Selection	0 Inferred	Read/Write
3045	Product #5 Table Selection	0 Inferred	Read/Write
3046	Product #6 Table Selection	0 Inferred	Read/Write
3047	Product #7 Table Selection	0 Inferred	Read/Write
3048	Product #8 Table Selection	0 Inferred	Read/Write
3049	Next Batch Product Number	0 Inferred	Read/Write
3050	Spring Forward Month	0 Inferred	Read/Write
3051	Spring Forward Day	0 Inferred	Read/Write
3052	Fall Back Month	0 Inferred	Read/Write
3053	Fall Back Day	0 Inferred	Read/Write
3054	Enable Daylight Time Saving	0 Inferred	Read/Write
3055-3078	Reserved		
3079	Well Test Well Number (1-20)	0 Inferred	Read/Write
3080	Start Well Test Now	0 Inferred	Write
3081	Stop Well Test Now	0 Inferred	Write
3082-3121	Reserved		
3122	Data Verification Number	0 Inferred	Read/Write
3123-3128	Reserved		
3129	Last Calib./Verification Rpt Req.(1=Latest,20=Oldest)	0 Inferred	**Write**

Modbus 16-bit Address Table End

Modbus Address Table – 2x16 Bits Integer

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
***Non-resettable accumulated volume will roll over at 999999999.**			
3131	Meter #1 Daily Gross Total	1 inferred	Read
3133	Meter #1 Daily Net Oil Total	1 inferred	Read
3135	Meter #1 Daily Mass Total	1 inferred	Read
3137	Meter #1 Hourly Gross Total	1 Inferred	Read
3139	Meter #1 Hourly Net Oil Total	1 Inferred	Read
3141	Meter #1 Hourly Mass Total	1 Inferred	Read
3143	Meter #1 Batch Gross Total	1 Inferred	Read
3145	Meter #1 Batch Net Oil Total	1 Inferred	Read
3147	Meter #1 Batch Mass Total	1 Inferred	Read
3149	Meter #1 Monthly Gross Total	0 Inferred	Read
3151	Meter #1 Monthly Net Oil Total	0 Inferred	Read
3153	Meter #1 Monthly Mass Total	0 Inferred	Read
3155	Meter #1 Cumulative Gross Total*	0 Inferred	Read
3157	Meter #1 Cumulative Ne Oil t Total*	0 Inferred	Read
3159	Meter #1 Cumulative Mass Total*	0 Inferred	Read
3161	Spare		
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 Oil Total	1 inferred	Read
3175	Meter #2 Daily Mass Total	1 inferred	Read
3177	Meter #2 Hourly Gross Total	1 Inferred	Read
3179	Meter #2 Hourly Net Oil Total	1 Inferred	Read
3181	Meter #2 Hourly Mass Total	1 Inferred	Read
3183	Meter #2 Batch Gross Total	1 inferred	Read
3185	Meter #2 Batch Net Oil Total	1 Inferred	Read
3187	Meter #2 Batch Mass Total	0 Inferred	Read
3189	Meter #2 Monthly Gross Total	0 Inferred	Read
3191	Meter #2 Monthly Net Oil Total	0 Inferred	Read
3193	Meter #2 Monthly Mass Total	0 Inferred	Read
3195	Meter #2 Cumulative Gross Total*	0 Inferred	Read
3197	Meter #2 Cumulative Net Oil Total*	0 Inferred	Read
3199	Meter #2 Cumulative Mass Total*	0 Inferred	Read
3201	Spare	0 Inferred	Read
3203	Meter #2 Meter Factor	6 Inferred	Read
3205	Meter #2 Linear Factor	6 Inferred	Read
3207-3209	Spare		
3211	Meter #1 Daily Net Water Total	1 inferred	Read
3213	Meter #1 Hourly Net Water Total	1 inferred	Read
3215	Meter #1 Batch Net Water Total	1 inferred	Read
3217	Meter #1 Monthly Net Water Total	0 inferred	Read
3219	Meter #1 Cumulative Net Water Total*	0 Inferred	Read
3221	Meter #2 Daily Net Water Total	1 inferred	Read
3223	Meter #2 Hourly Net Water Total	1 inferred	Read
3225	Meter #2 Batch Net Water Total	1 inferred	Read
3227	Meter #2 Monthly Net Water Total	0 inferred	Read
3229	Meter #2 Cumulative Net Water Total*	0 Inferred	Read
3231-3285	Spare		
3287	Battery Voltage	2 Inferred	Read

3289-3299	Spare		
3301-3303	Reserved		
3305-3323	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		
3331-3339	Reserved		
	0 Inferred	Read	
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	Spare		
3353	Analog Input #1 mA/Voltage Value	3 Inferred	Read
3355	Analog Input #2 mA/Voltage Value	3 Inferred	Read
3357	Analog Input #3 mA/Voltage Value	3 Inferred	Read
3359	Analog Input #4 mA/Voltage 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		

Modbus Address Table – 2x16 Bits Integer

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
3383	Analog Output #1 Output %	2 Inferred	Read
3385	Analog Output #2 Output %	2 Inferred	Read
3387	Analog Output #3 Output %	2 Inferred	Read
3389	Analog Output #4 Output %	2 Inferred	Read
3391	Uncorrected Density gmcc	6 Inferred	Read
3393-3421	Reserved		
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 Oil Total	1 Inferred	Read
3431	Meter#1 Yesterday's Mass Total	1 Inferred	Read
3433	Meter#2 Yesterday's FWA Temperature	2 Inferred	Read
3435	Meter#2 Yesterday's FWA Pressure	2 Inferred	Read
3437	Meter#2 Yesterday's Gross Total	1 Inferred	Read
3439	Meter#2 Yesterday's Net Oil Total	1 Inferred	Read
3441	Meter#2 Yesterday's Mass Total	1 Inferred	Read
3443	Meter#2 Yesterday's Net Water Total	1 Inferred	Read
3445	Meter#1 Yesterday's Net Water Total	1 Inferred	Read
3451-3461	Spare		
3463	Meter#1 Last Hour Flowing Time	2 Inferred	Read
3465	Meter#1 Last Hour Gross Total	1 Inferred	Read
3467	Meter#1 Last Hour Net Oil Total	1 Inferred	Read
3469	Meter#1 Last Hour Mass Total	1 Inferred	Read
3471	Meter#1 Last Hour FWA Temperature	2 Inferred	Read
3473	Meter#1 Last Hour FWA Pressure	2 Inferred	Read
3475	Meter#1 Last Hour FWA DP	4 Inferred	Read
3477	Meter#1 Last Hour FWA DP/EXT	4 Inferred	Read
3479	Meter#2 Last Hour Flowing Time	2 Inferred	Read
3481	Meter#2 Last Hour Gross Total	1 Inferred	Read
3483	Meter#2 Last Hour Net Oil Total	1 Inferred	Read
3485	Meter#2 Last Hour Mass Total	1 Inferred	Read
3487	Meter#2 Last Hour FWA Temperature	2 Inferred	Read
3489	Meter#2 Last Hour FWA Pressure	2 Inferred	Read
3491	Meter#2 Last Hour FWA DP	4 Inferred	Read
3493	Meter#2 Last Hour FWA DP/EXT	4 Inferred	Read
3495	Meter#2 Last Hour Net Water Total	1 Inferred	Read
3497	Meter#1 Last Hour Net Water Total	1 Inferred	Read
3499-3525	Spare		
3527	Meter #1 Last Batch Gross Total	1 Inferred	Read
3529	Meter #1 Last Batch Net Total (Oil)	1 Inferred	Read
3531	Meter #1 Last Batch Mass Total	1 Inferred	Read
3533	Meter #1 Last Batch FWA Temperature	2 Inferred	Read
3535	Meter #1 Last Batch FWA Pressure	2 Inferred	Read
3537	Meter #1 Last Batch FWA DP	4 Inferred	Read
3539	Meter #1 Last Batch FWA Combined Density gm/cc	5 Inferred	Read
3541	Meter #2 Last Batch Gross Total	1 Inferred	Read
3543	Meter #2 Last Batch Net Total (Oil)	1 Inferred	Read
3545	Meter #2 Last Batch Mass Total	1 Inferred	Read
3547	Meter #2 Last Batch FWA Temperature	2 Inferred	Read
3549	Meter #2 Last Batch FWA Pressure	2 Inferred	Read
3551	Meter #2 Last Batch FWA DP	4 Inferred	Read

Modbus Address Table – 2x16 Bits Integer

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
3553	Meter #2 Last Batch FWA Combined Density gm/cc	5 Inferred	Read
3555	Meter #2 Last Batch Net Water Total	1 Inferred	Read
3557	Meter #1 Last Batch Net Water Total	1 Inferred	Read
3559-3583	Spare		
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	Reserved	0 Inferred	Read
3701-3729	Spare		
3731-3797	Reserved		
3799-3817	Spare		
3819-3999	Modbus Shift Data Area – 4 bytes		
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
4131-4149	Spare		
4151	Densitometer Period	3 Inferred	Read
4153	Spare		
4155-4177	Reserved		
4179-4199	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
4205-4211	Product #1 Name	16 Chars.	Read/Write
4213-4219	Product #2 Name	16 Chars.	Read/Write
4221-4227	Product #3 Name	16 Chars.	Read/Write
4229-4235	Product #4 Name	16 Chars.	Read/Write
4237-4243	Product #5 Name	16 Chars.	Read/Write
4245-4251	Product #6 Name	16 Chars.	Read/Write
4253-4259	Product #7 Name	16 Chars.	Read/Write
4261-4267	Product #8 Name	16 Chars.	Read/Write
4269	Product #1 SG Override	4 Inferred	Read/Write
4271	Product #1 Density Override *	1,4 Inferred	Read/Write
4273	Product #1 Alpha-T Override	3 Inferred	Read/Write
4275	Product #2 SG Override	4 Inferred	Read/Write
4277	Product #2 Density Override*	1,4 Inferred	Read/Write
4279	Product #2 Alpha-T Override	3 Inferred	Read/Write
4281	Product #3 SG Override	4 Inferred	Read/Write
4283	Product #3 Density Override*	1,4 Inferred	Read/Write
4285	Product #3 Alpha-T Override	3 Inferred	Read/Write
4287	Product #4 SG Override	4 Inferred	Read/Write
4289	Product #4 Density Override*	1,4 Inferred	Read/Write
4291	Product #4 Alpha-T Override	3 Inferred	Read/Write
4293	Product #5 SG Override	4 Inferred	Read/Write
4295	Product #5 Density Override*	1,4 Inferred	Read/Write
4297	Product #5 Alpha-T Override	3 Inferred	Read/Write
4299	Product #6 SG Override	4 Inferred	Read/Write
4301	Product #6 Density Override*	1,4 Inferred	Read/Write
4303	Product #6 Alpha-T Override	3 Inferred	Read/Write
4305	Product #7 SG Override	4 Inferred	Read/Write
4307	Product #7 Density Override*	1,4 Inferred	Read/Write
4309	Product #7 Alpha-T Override	3 Inferred	Read/Write
4311	Product #8 SG Override	4 Inferred	Read/Write
4313	Product #8 Density Override*	1,4 Inferred	Read/Write
4315	Product #8 Alpha-T Override	3 Inferred	Read/Write
4317	Batch or Ticket Number	0 Inferred	Read/Write
4319-4377	Spare		

*Note: Density in gmcc (US Units), KG/M3 (Metric Units)

Modbus Address Table – 2x16 Bits Integer

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
4379	Meter #1 Ratio of Heat	4 Inferred	Read/Wirte
4381	Meter #1 Viscosity	6 Inferred	Read/Write
4383	Meter #1 Pipe Thermal E-6	2 Inferred	Read/Write
4385	Meter #1 Orifice Thermal E-6	2 Inferred	Read/Write
4387	Meter #1 Reference Temperature of Pipe	2 Inferred	Read/Write
4389	Meter #1 Reference Temperature of Orifice	2 Inferred	Read/Write
4391	Meter #1 Spare	2 Inferred	Read/Write
4393	Meter #1 Spare	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	Spare		
4419	Spare		
4421	Meter #2 Ratio of Heat	4 Inferred	Read/Wirte
4423	Meter #2 Viscosity	6 Inferred	Read/Write
4425	Meter #2 Pipe Thermal E-6	2 Inferred	Read/Write
4427	Meter #2 Orifice Thermal E-6	2 Inferred	Read/Write
4429	Meter #2 Reference Temperature of Pipe	2 Inferred	Read/Write
4431	Meter #2 Reference Temperature of Orifice	2 Inferred	Read/Write
4433	Spare		
4435	Spare		
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
4459-4541	Reserved		
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

Modbus Address Table – 2x16 Bits Integer

ADDRESS	DESCRIPTION	DECIMAL	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
4567-4571	Reserved		
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
4583-4615	Spare		
4617	Muti.Var DP Calibration Data Entry	4 Inferred	Read/Write
4619	Muti.Var Pressure Calibration Data Entry	2 Inferred	Read/Write
4621	Muti.Var Temperature Calibration Data Entry	2 Inferred	Read/Write
4623-4627	Spare		
4629	Meter #1 Equilibrium Pressure Override	3 Inferred	Read/Write
4631	Meter #2 Equilibrium Pressure Override	3 Inferred	Read/Write
4633	Reserved		
4635	Reserved		
4637-4655	Reserved		
4657	Meter #1 Wedge Fa Override	6 Inferred	Read/Write
4659	Meter #2 Wedge Fa Override	6 Inferred	Read/Write
4661	Reserved		
4663	Reserved		
4665	Meter #1 BS&W Override	3 Inferred	Read/Write
4667	Meter #2 BS&W Override	3 Inferred	Read/Write
4669	Reserved		
4671	Reserved		
4673	Meter #1 Temperature Override	2 Inferred	Read/Write
4675	Meter #2 Temperature Override	2 Inferred	Read/Write
4677	Reserved		
4679	Reserved		
4681	Meter #1 Pressure Override	2 Inferred	Read/Write
4683	Meter #2 Pressure Override	2 Inferred	Read/Write
4685	Reserved		
4687	Reserved		
4689	Meter #1 Venturi C Override/Wedge Kd2	6 Inferred	Read/Write
4691	Meter #2 Venturi C Override/Wedge Kd2	6 Inferred	Read/Write
4693	Reserved		
4695	Reserved		
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

Modbus Address Table – 2x16 Bits Integer

ADDRESS	DESCRIPTION	DECIMAL	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
4797-4799	Reserved		
4801-4813	Spare		
4815-4825	Reserved	Spare	
4827	Pulse Output Volume #1 Pulses/Unit	3 Inferred	Read/Write
4829	Pulse Output Volume #2 Pulses/Unit	3 Inferred	Read/Write

Modbus Address Table – 2x16 Bits Integer

ADDRESS	DESCRIPTION	DECIMAL	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 Flow Controller Gain	2 Inferred	Read/Write
4869	Meter #2 PID Flow Controller Reset	2 Inferred	Read/Write
4871	Meter #2 PID Mininum Output %	2 Inferred	Read/Write
4873	Meter #2 PID Maxinum Output %	2 Inferred	Read/Write
4875-4917	Reserved		
4919-4975	Spare		
4977-5093	Resserved		

Modbus Address Table – 2x16 Bits Integer

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
Well Test Data Configuration			
5201-5207	Well#1 Name	16 Chars.	Read/Write
5209-5215	Well#1 Location	16 Chars.	Read/Write
5217-5223	Well#1 Lease ID	16 Chars.	Read/Write
5225	Well#1 Oil Shrikage Factor	5 Inferred	Read/Write
5227	Well#1 Water Salinity Factor	5 Inferred	Read/Write
5229	Well#1 Base Density gm/cc (Oil)	5 Inferred	Read/Write
5231	Well#1 Base Density gm/cc (Water)	5 Inferred	Read/Write
5233-5239	Well#2 Name	16 Chars.	Read/Write
5241-5247	Well#2 Location	16 Chars.	Read/Write
5249-5255	Well#2 Lease ID	16 Chars.	Read/Write
5257	Well#2 Oil Shrikage Factor	5 Inferred	Read/Write
5259	Well#2 Water Salinity Factor	5 Inferred	Read/Write
5261	Well#2 Base Density gm/cc (Oil)	5 Inferred	Read/Write
5263	Well#2 Base Density gm/cc (Water)	5 Inferred	Read/Write
5265-5271	Well#3 Name	16 Chars.	Read/Write
5273-5279	Well#3 Location	16 Chars.	Read/Write
5281-5287	Well#3 Lease ID	16 Chars.	Read/Write
5289	Well#3 Oil Shrikage Factor	5 Inferred	Read/Write
5291	Well#3 Water Salinity Factor	5 Inferred	Read/Write
5293	Well#3 Base Density gm/cc (Oil)	5 Inferred	Read/Write
5295	Well#3 Base Density gm/cc (Water)	5 Inferred	Read/Write
5297-5303	Well#4 Name	16 Chars.	Read/Write
5305-5311	Well#4 Location	16 Chars.	Read/Write
5313-5319	Well#4 Lease ID	16 Chars.	Read/Write
5321	Well#4 Oil Shrikage Factor	5 Inferred	Read/Write
5323	Well#4 Water Salinity Factor	5 Inferred	Read/Write
5325	Well#4 Base Density gm/cc (Oil)	5 Inferred	Read/Write
5327	Well#4 Base Density gm/cc (Water)	5 Inferred	Read/Write
5329-5335	Well#5 Name	16 Chars.	Read/Write
5337-5343	Well#5 Location	16 Chars.	Read/Write
5345-5351	Well#5 Lease ID	16 Chars.	Read/Write
5353	Well#5 Oil Shrikage Factor	5 Inferred	Read/Write
5355	Well#5 Water Salinity Factor	5 Inferred	Read/Write
5357	Well#5 Base Density gm/cc (Oil)	5 Inferred	Read/Write
5359	Well#5 Base Density gm/cc (Water)	5 Inferred	Read/Write
5361-5367	Well#6 Name	16 Chars.	Read/Write
5369-5375	Well#6 Location	16 Chars.	Read/Write
5377-5383	Well#6 Lease ID	16 Chars.	Read/Write
5385	Well#6 Oil Shrikage Factor	5 Inferred	Read/Write
5387	Well#6 Water Salinity Factor	5 Inferred	Read/Write
5389	Well#6 Base Density gm/cc (Oil)	5 Inferred	Read/Write
5391	Well#6 Base Density gm/cc (Water)	5 Inferred	Read/Write

Modbus Address Table – 2x16 Bits Integer

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
5393-5399	Well#7 Name	16 Chars.	Read/Write
5401-5407	Well#7 Location	16 Chars.	Read/Write
5409-5415	Well#7 Lease ID	16 Chars.	Read/Write
5417	Well#7 Oil Shrikage Factor	5 Inferred	Read/Write
5419	Well#7 Water Salinity Factor	5 Inferred	Read/Write
5421	Well#7 Base Density gm/cc (Oil)	5 Inferred	Read/Write
5423	Well#7 Base Density gm/cc (Water)	5 Inferred	Read/Write
5425-5431	Well#8 Name	16 Chars.	Read/Write
5433-5439	Well#8 Location	16 Chars.	Read/Write
5441-5447	Well#8 Lease ID	16 Chars.	Read/Write
5449	Well#8 Oil Shrikage Factor	5 Inferred	Read/Write
5451	Well#8 Water Salinity Factor	5 Inferred	Read/Write
5453	Well#8 Base Density gm/cc (Oil)	5 Inferred	Read/Write
5455	Well#8 Base Density gm/cc (Water)	5 Inferred	Read/Write
5457-5463	Well#9 Name	16 Chars.	Read/Write
5465-5471	Well#9 Location	16 Chars.	Read/Write
5473-5479	Well#9 Lease ID	16 Chars.	Read/Write
5481	Well#9 Oil Shrikage Factor	5 Inferred	Read/Write
5483	Well#9 Water Salinity Factor	5 Inferred	Read/Write
5485	Well#9 Base Density gm/cc (Oil)	5 Inferred	Read/Write
5487	Well#9 Base Density gm/cc (Water)	5 Inferred	Read/Write
5489-5495	Well#10 Name	16 Chars.	Read/Write
5497-5503	Well#10 Location	16 Chars.	Read/Write
5505-5511	Well#10 Lease ID	16 Chars.	Read/Write
5513	Well#10 Oil Shrikage Factor	5 Inferred	Read/Write
5515	Well#10 Water Salinity Factor	5 Inferred	Read/Write
5517	Well#10 Base Density gm/cc (Oil)	5 Inferred	Read/Write
5519	Well#10 Base Density gm/cc (Water)	5 Inferred	Read/Write
5521-5527	Well#11 Name	16 Chars.	Read/Write
5529-5535	Well#11 Location	16 Chars.	Read/Write
5537-5543	Well#11 Lease ID	16 Chars.	Read/Write
5545	Well#11 Oil Shrikage Factor	5 Inferred	Read/Write
5547	Well#11 Water Salinity Factor	5 Inferred	Read/Write
5549	Well#11 Base Density gm/cc (Oil)	5 Inferred	Read/Write
5551	Well#11 Base Density gm/cc (Water)	5 Inferred	Read/Write
5553-5559	Well#12 Name	16 Chars.	Read/Write
5561-5567	Well#12 Location	16 Chars.	Read/Write
5569-5575	Well#12 Lease ID	16 Chars.	Read/Write
5577	Well#12 Oil Shrikage Factor	5 Inferred	Read/Write
5579	Well#12 Water Salinity Factor	5 Inferred	Read/Write
5581	Well#12 Base Density gm/cc (Oil)	5 Inferred	Read/Write
5583	Well#12 Base Density gm/cc (Water)	5 Inferred	Read/Write

Modbus Address Table – 2x16 Bits Integer

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
5585-5591	Well#13 Name	16 Chars.	Read/Write
5593-5599	Well#13 Location	16 Chars.	Read/Write
5601-5607	Well#13 Lease ID	16 Chars.	Read/Write
5609	Well#13 Oil Shrikage Factor	5 Inferred	Read/Write
5611	Well#13 Water Salinity Factor	5 Inferred	Read/Write
5613	Well#13 Base Density gm/cc (Oil)	5 Inferred	Read/Write
5615	Well#13 Base Density gm/cc (Water)	5 Inferred	Read/Write
5617-5623	Well#14 Name	16 Chars.	Read/Write
5625-5631	Well#14 Location	16 Chars.	Read/Write
5633-5639	Well#14 Lease ID	16 Chars.	Read/Write
5641	Well#14 Oil Shrikage Factor	5 Inferred	Read/Write
5643	Well#14 Water Salinity Factor	5 Inferred	Read/Write
5645	Well#14 Base Density gm/cc (Oil)	5 Inferred	Read/Write
5647	Well#14 Base Density gm/cc (Water)	5 Inferred	Read/Write
5645-5655	Well#15 Name	16 Chars.	Read/Write
5657-5663	Well#15 Location	16 Chars.	Read/Write
5665-5671	Well#15 Lease ID	16 Chars.	Read/Write
5673	Well#15 Oil Shrikage Factor	5 Inferred	Read/Write
5675	Well#15 Water Salinity Factor	5 Inferred	Read/Write
5677	Well#15 Base Density gm/cc (Oil)	5 Inferred	Read/Write
5679	Well#15 Base Density gm/cc (Water)	5 Inferred	Read/Write
5681-5687	Well#16 Name	16 Chars.	Read/Write
5689-5695	Well#16 Location	16 Chars.	Read/Write
5697-5703	Well#16 Lease ID	16 Chars.	Read/Write
5705	Well#16 Oil Shrikage Factor	5 Inferred	Read/Write
5707	Well#16 Water Salinity Factor	5 Inferred	Read/Write
5709	Well#16 Base Density gm/cc (Oil)	5 Inferred	Read/Write
5711	Well#16 Base Density gm/cc (Water)	5 Inferred	Read/Write
5713-5719	Well#17 Name	16 Chars.	Read/Write
5721-5727	Well#17 Location	16 Chars.	Read/Write
5729-5735	Well#17 Lease ID	16 Chars.	Read/Write
5737	Well#17 Oil Shrikage Factor	5 Inferred	Read/Write
5739	Well#17 Water Salinity Factor	5 Inferred	Read/Write
5741	Well#17 Base Density gm/cc (Oil)	5 Inferred	Read/Write
5743	Well#17 Base Density gm/cc (Water)	5 Inferred	Read/Write
5745-5751	Well#18 Name	16 Chars.	Read/Write
5753-5759	Well#18 Location	16 Chars.	Read/Write
5761-5767	Well#18 Lease ID	16 Chars.	Read/Write
5769	Well#18 Oil Shrikage Factor	5 Inferred	Read/Write
5771	Well#18 Water Salinity Factor	5 Inferred	Read/Write
5773	Well#18 Base Density gm/cc (Oil)	5 Inferred	Read/Write
5775	Well#18 Base Density gm/cc (Water)	5 Inferred	Read/Write
5777-5783	Well#19 Name	16 Chars.	Read/Write
5785-5791	Well#19 Location	16 Chars.	Read/Write
5793-5799	Well#19 Lease ID	16 Chars.	Read/Write
5801	Well#19 Oil Shrikage Factor	5 Inferred	Read/Write

Modbus Address Table – 2x16 Bits Integer

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
5803	Well#19 Water Salinity Factor	5 Inferred	Read/Write
5805	Well#19 Base Density gm/cc (Oil)	5 Inferred	Read/Write
5807	Well#19 Base Density gm/cc (Water)	5 Inferred	Read/Write
5809-5815	Well#20 Name	16 Chars.	Read/Write
5817-5823	Well#20 Location	16 Chars.	Read/Write
5825-5831	Well#20 Lease ID	16 Chars.	Read/Write
5833	Well#20 Oil Shrikage Factor	5 Inferred	Read/Write
5835	Well#20 Water Salinity Factor	5 Inferred	Read/Write
5837	Well#20 Base Density gm/cc (Oil)	5 Inferred	Read/Write
5839	Well#20 Base Density gm/cc (Water)	5 Inferred	Read/Write
5841	Well#1 Meter Correction Factor	5 Inferred	Read/Write
5843	Well#2 Meter Correction Factor	5 Inferred	Read/Write
5845	Well#3 Meter Correction Factor	5 Inferred	Read/Write
5847	Well#4 Meter Correction Factor	5 Inferred	Read/Write
5849	Well#5 Meter Correction Factor	5 Inferred	Read/Write
5851	Well#6 Meter Correction Factor	5 Inferred	Read/Write
5853	Well#7 Meter Correction Factor	5 Inferred	Read/Write
5855	Well#8 Meter Correction Factor	5 Inferred	Read/Write
5857	Well#9 Meter Correction Factor	5 Inferred	Read/Write
5859	Well#10 Meter Correction Factor	5 Inferred	Read/Write
5861	Well#11 Meter Correction Factor	5 Inferred	Read/Write
5863	Well#12 Meter Correction Factor	5 Inferred	Read/Write
5865	Well#13 Meter Correction Factor	5 Inferred	Read/Write
5867	Well#14 Meter Correction Factor	5 Inferred	Read/Write
5869	Well#15 Meter Correction Factor	5 Inferred	Read/Write
5871	Well#16 Meter Correction Factor	5 Inferred	Read/Write
5873	Well#17 Meter Correction Factor	5 Inferred	Read/Write
5875	Well#18 Meter Correction Factor	5 Inferred	Read/Write
5877	Well#19 Meter Correction Factor	5 Inferred	Read/Write
5879	Well#20 Meter Correction Factor	5 Inferred	Read/Write

End of Well Test Data Configuration

Modbus Address Table – 2x16 Bits Integer

ADDRESS DESCRIPTION DECIMAL READ/WRITE

Last Batch/Hourly/Daily/Month DATA AREA

Last Batch Report

3027 (16 bits Ingeter, Wirte only) =Last Batch Request
Set last batch report request to 1=Latest, 35=Oldest

Last Hourly Report

3029 (16 bits Ingeter, Wirte only) = Last Hour Request
Set last hour report request to 1=Latest, 35=Oldest

Last Daily Report

3032 (16 bits Ingeter, Wirte only) = Last Daily Request
Set last daily report request to 1=Latest, 35=Oldest

Last Month Report

3033 (16 bits Ingeter, Wirte only) = Last Month Request
Set last month report request to 1

6161	Meter#1 CTPL (Oil)	5 Inferred	Read
6163	Meter#1 Batch/Hourly/Daily/Month FWA CTPL(Oil)	5 Inferred	Read
6165	Meter#1 Combined Density gm/cc	5 Inferred	Read
6167	M1Batch/Hourly/Daily/Month FWA Combined Dens.	5 Inferred	Read
6169	Meter#2 CTPL	5 Inferred	Read
6171	Meter#2 Batch/Hourly/Daily/Month FWA CTPL	5 Inferred	Read
6173	Meter#2 Combined Density gm/cc	3 Inferred	Read
6175	M2 Batch/Hourly/Daily/Month FWA Combined Dens	5 Inferred	Read
6177	M2 Batch/Hour/Daiy/Month FWA DensityBase gmcc	5 Inferred	Read
6179	M1 Batch/Hour/Daiy/Month FWA DensityBase gmcc	5 Inferred	Read
6181-6191	Reserved		
6193-6203	Reserved		

6205	Product/Table/Number	0 Inferred	Read
6207	Batch Number	0 inferred	Read
6209	Batch Start Date	0 inferred	Read
6211	Batch Start Time	0 inferred	Read
6213	Date(mmddyy)	0 Inferred	Read
6215	Time (hhmmss)	0 Inferred	Read
6217-6223	Product Name	16 Chars.	Read
6225-6229	Spare		

6231-6233	Meter#1 ID	8 Chars.	Read
6235	Meter #1 Alarm Status	0 Inferred	Read
6237	Meter #1 Daily Gross Total	1 Inferred	Read
6239	Meter #1 Daily Net Oil Total	1 Inferred	Read
6241	Meter #1 Daily Mass Total	1 Inferred	Read
6243	Meter #1 Cumulative Gross Total	0 Inferred	Read
6245	Meter #1 Cumulative Net Oil Total	0 Inferred	Read
6247	Meter #1 Cumulative Mass Total	0 Inferred	Read
6249	Meter #1 Batch/Hourly/Daily/Monthly Gross Total	1 Inferred	Read

Modbus Address Table – 2x16 Bits Integer

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
6251	M#1 Batch/Hourly/Daily/Monthly Net Oil Total	1 Inferred	Read
6253	Meter #1 Batch/Hourly/Daily/Monthly Mass Total	1 Inferred	Read
6255	Meter #1 Gross Flowrate	2 Inferred	Read
6257	Meter #1 Net Oil Flowrate	2 Inferred	Read
6259	Meter #1 Mass Flowrate	2 Inferred	Read
6261	M#1 Batch/Hourly/Daily/Monthly FW Average DP	4 Inferred	Read
6263	M#1 Batch/Hourly/Daily/Monthly FWA Temperature	2 Inferred	Read
6265	M#1 Batch/Hourly/Daily/Monthly FWA Pressure	2 Inferred	Read
6267	M1Batch/Hourly/Daily/Monthly FWA Density	5 Inferred	Read
6269	M1 Batch/Hour/Day/Month FWA CombinedDfBase	5 Inferred	Read
6271	M#1 Batch/Hourly/Daily/Monthly FWA API	1 Inferred	Read
6273	M1 Batch/Hourly/Daily/Monthly FWA API Base	1 Inferred	Read
6275	M#1 Batch/Hourly/Daily/Monthly FWA. K/CD/LMF	6 Inferred	Read
6277	M#1 Batch/Hourly/Daily/Monthly FWA. CTLW	5 Inferred	Read
6279	Reserved		
6281	M#1 Batch/Hourly/Daily/Monthly FWA. DP EXT	4 Inferred	Read
6283	M#1 Batch/Hourly/Daily/Monthly FWA. BS&W	2 Inferred	Read
6285	Meter#1 DP	4 Inferred	Read
6287	Meter#1 Temperature	2 Inferred	Read
6289	Meter#1 Pressure	2 Inferred	Read
6291	Meter#1 Density	5 Inferred	Read
6293	Meter#1 Combined Density Base gm/cc	5 Inferred	Read
6295	Meter#1 API	1 Inferred	Read
6297	Meter#1 API Base	1 Inferred	Read
6299	Meter#1 K/CD/LMF	6 Inferred	Read
6301	Meter#1 CTLW	5 Inferred	Read
6303	Reserved		
6305	Meter#1 DP EXT	4 Inferred	Read
6307	Meter#1 BS&W	2 Inferred	Read
6309	Meter #1 Y Factor	6 Inferred	Read
6311	Meter#1 Densitometer Temperature	2 Inferred	Read
6313	Meter#1 Densitometer Pressure	2 Inferred	Read
6315	Meter#1 Equilibrium Pressure	3 Inferred	Read
6317	Meter #1 Pipe ID	5 Inferred	Read
6319	Meter #1 Orifice ID	5 Inferred	Read
6321	Meter #1 Density Correction Factor	5 Inferred	Read
6323	Meter #1 K Factor	3 Inferred	Read
6325	Meter #1 Batch Opening Cum. Gross	0 Inferred	Read
6327	Meter #1 Batch Opening Cum. Net Oil	0 Inferred	Read
6329	Meter #1 Batch Opening Cum. Mass	0 Inferred	Read
6331-6333	Meter#2 ID	8 Chars.	Read
6335	Meter #2 Alarm Status	0 Inferred	Read
6337	Meter #2 Daily Gross Total	1 Inferred	Read
6339	Meter #2 Daily Net Oil Total	1 Inferred	Read
6341	Meter #2 Daily Mass Total	1 Inferred	Read
6343	Meter #2 Cumulative Gross Total	0 Inferred	Read
6345	Meter #2 Cumulative Net OilTotal	0 Inferred	Read

Modbus Address Table – 2x16 Bits Integer

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
6347	Meter #2 Cumulative Mass Total	0 Inferred	Read
6349	Meter #2 Batch/Hourly/Daily/Monthly Gross Total	1 Inferred	Read
6351	Meter #2 Batch/Hourly/Daily/Monthly Net Oil Total	1 Inferred	Read
6353	Meter #2 Batch/Hourly/Daily/Monthly Mass Total	1 Inferred	Read
6355	Meter #2 Gross Flowrate	2 Inferred	Read
6357	Meter #2 Net Oil Flowrate	2 Inferred	Read
6359	Meter #2 Mass Flowrate	2 Inferred	Read
6361	M#2 Batch/Hourly/Daily/Monthly F.W. Average DP	4 Inferred	Read
6363	M#2 Batch/Hourly/Daily/Monthly FWA Temperature	2 Inferred	Read
6365	M#2 Batch/Hourly/Daily/Monthly FWA Pressure	2 Inferred	Read
6367	M2 Batch/Hourly/Daily/Monthly FWA Density gm/cc	3 Inferred	Read
6369	M2 Batch/Hour/Day/Monthly FWA Comb.gmcc.Base	3 Inferred	Read
6371	M#2 Batch/Hourly/Daily/Monthly FW. Average SG	4 Inferred	Read
6373	M2 Batch/Hourly/Daily/Monthly FWA Base SG	4 Inferred	Read
6375	M#2 Batch/Hourly/Daily/Monthly FWA K/CD/LMF	6 Inferred	Read
6377	M#2 Batch/Hourly/Daily/Monthly FWA CTLW	5 Inferred	Read
6379	Reserved		
6381	M#2 Batch/Hourly/Daily/Monthly FWA DP EXT	4 Inferred	Read
6383	M#2 Batch/Hourly/Daily/Monthly FWA BS&W	2 Inferred	Read
6385	Meter#2 DP	4 Inferred	Read
6387	Meter#2 Temperature	2 Inferred	Read
6389	Meter#2 Pressure	2 Inferred	Read
6391	Meter#2 Density gm/cc	3 Inferred	Read
6393	Meter#2 Combined Density Base gm/cc	3 Inferred	Read
6395	Meter#2 API	1 Inferred	Read
6397	Meter#2 API Base	1 Inferred	Read
6399	Meter#2 K/CD/LMF	6 Inferred	Read
6401	Meter#2 CTLW	5 Inferred	Read
6403	Reserved		
6405	Meter#2 DP EXT	4 Inferred	Read
6407	Meter#2 BS&W	2 Inferred	Read
6409	Meter #2 Y Factor	6 Inferred	Read
6411	Meter#2 Densitometer Temperature	2 Inferred	Read
6413	Meter#2 Densitometer Pressure	2 Inferred	Read
6415	Meter#2 Equilibrium Pressure	3 Inferred	Read
6417	Meter #2 Pipe ID	5 Inferred	Read
6419	Meter #2 Orifice ID	5 Inferred	Read
6421	Meter #2 Density Correction Factor	5 Inferred	Read
6423	Meter #2 K Factor	3 Inferred	Read
6425	Meter #2 Batch Opening Cum. Gross	0 Inferred	Read
6427	Meter #2 Batch Opening Cum. Net Oil	0 Inferred	Read
6429	Meter #2 Batch Opening Cum. Mass	0 Inferred	Read
6431-6441	Reserved		
6443	M#1 Batch/Hourly/Daily/Monthly Cum. Net Water	0 Inferred	Read
6445	M#2 Batch/Hourly/Daily/Monthly Cum. Net Water	0 Inferred	Read
6447	Reserved		
6449	M#1 Batch/Hourly/Daily/Monthly Net Water	0 Inferred	Read
6451	M#2 Batch/Hourly/Daily/Monthly Net Water	0 Inferred	Read
6453-6629	Reserved		

Modbus Address Table – 2x16 Bits Integer

ADDRESS DESCRIPTION DECIMAL READ/WRITE

Well Test Current Data

8295	Well Test Status	0 Inferred	Read

1: Well Test Requested
2: Well Test Completed
3: Well Test in Progress
4: Well Test Aborted
5: Purge Time Period

8297	Well Test Purge Time Left mm:ss	0 Inferred	Read
8299	Well Test Time Left hh:mm:ss	0 Inferred	Read
8301	Well Test Start Date mm/dd/yy	0 Inferred	Read
8303	Well Test Start Time hh:mm:ss	0 Inferred	Read
8305	Well Test Current Date mm/dd/yy	0 Inferred	Read
8307	Well Test Current Time hh:mm:ss	0 Inferred	Read
8309	Well Test Well Number	0 Inferred	Read
8311-8317	Well Test Name	16 Chars.	Read
8319-8325	Well Test Location	16 Chars.	Read
8327-8333	Well Test Lease ID	16 Chars.	Read
8335	Well Test Oil Shrikage Factor	5 Inferred	Read
8337	Well Test Water Salinity Factor	5 Inferred	Read
8339	Well Test Base Density gm/cc (Oil)	5 Inferred	Read
8341	Well Test Base Density gm/cc (Water)	5 Inferred	Read
8343	Well Test Units	0 Inferred	Read

1st Byte	2nd Byte	3rd Byte	4th Byte
Gross/Net Flow Units	**Mass Flow Units**	**Frequency K FactorUnits**	N/A
0:CF	0:LB	0:CF	
1:M3	1:KLB	1:BBL	
2:GAL	2:KG	2:GAL	
3:LITR	3:TON	3:M3	
4:BBL		4:LITR	

8345-8347	Well Test Meter#1 ID	8 Chars.	Read
8349	WellTest Meter#1 Type	0 Inferred	Read

1st Byte	2nd Byte	3rd Byte	4th Byte
Meter Type	**n/a**	**Input Status**	
0:Orifice		B0: DP: 0-Live, 1-Maintenance	
1:Venturi		B1: Temperature: 0-Live, 1-Maintenance	
2:Frequency		B2: Pressure: 0-Live, 1-Maintenance	
3:Wedge		B3: BS&W: 0-Live, 1-Maintenance	
4:Foxbora		B4 Density: 0-Live, 1-Maintenance	

8351	Well Test Meter#1 K Factor	3 Inferred	Read
8353	Well Test Meter#1 Pipe ID	5 Inferred	Read
8355	Well Test Meter#1 Orifice ID	5 Inferred	Read

Modbus Address Table – 2x16 Bits Integer

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
8357	Well Test Meter#1 Gross Flow Rate	2 Inferred	Read
8359	Well Test Meter#1 Gross Flow Rate (Water)	2 Inferred	Read
8361	Well Test Meter#1 Gross Flow Rate (Oil)	2 Inferred	Read
8363	Well Test Meter#1 Net Flow Rate (Water)	2 Inferred	Read
8365	Well Test Meter#1 Gross Flow Rate (Oil)	2 Inferred	Read
8367	Well Test Meter#1 Combine Mass Flow Rate	2 Inferred	Read
8369	Well Test Meter#1 Gross Total	1 Inferred	Read
8371	Well Test Meter#1 Gross Total (Water)	1 Inferred	Read
8373	Well Test Meter#1 Gross Total (Oil)	1 Inferred	Read
8375	Well Test Meter#1 Net Total (Water)	1 Inferred	Read
8377	Well Test Meter#1 Net Total (Oil)	1 Inferred	Read
8379	Well Test Meter#1 Combined Mass Total	1 Inferred	Read
8381	Well Test Meter#1 Estimated Daily Gross Total	1 Inferred	Read
8383	Well Test M#1 Estimated Daily Gross Total (Water)	1 Inferred	Read
8385	Well Test M#1 Estimated Daily Gross Total (Oil)	1 Inferred	Read
8387	Well Test M#1 Estimated Daily Net Total (Water)	1 Inferred	Read
8389	Well Test Meter#1 Estimated Daily Net Total (Oil)	1 Inferred	Read
8391	Well Test Meter#1 Estimated Daily Mass Total	1 Inferred	Read
8393	Well Test Meter#1 DP	4 Inferred	Read
8395	Well Test Meter#1 Temperature	2 Inferred	Read
8397	Well Test Meter#1 Pressure	2 Inferred	Read
8399	Well Test Meter#1 Combined Density gm/cc	5 Inferred	Read
8401	Well Test Meter#1 Combined Base Density gm/cc	5 Inferred	Read
8403	Well Test Meter#1 CD/LMF	5 Inferred	Read
8405	Well Test Meter#1 BS&W	2 Inferred	Read
8407	Well Test Meter#1 CTLW	5 Inferred	Read
8409	Well Test Meter#1 CTPL	5 Inferred	Read
8411	Well Test Meter#1 Combined API	1 Inferred	Read
8413	Well Test Meter#1 Combine API at Base	1 Inferred	Read
8415	Well Test Meter#1 Y Factor	6 Inferred	Read
8417	Well Test Meter#1 Density	5 Inferred	Read
8419	Well Test Meter#1 Density Base	5 Inferred	Read
8421	Well Test Meter#1 Averaged DP	4 Inferred	Read
8423	Well Test Meter#1 Averaged Temperature	2 Inferred	Read
8425	Well Test Meter#1 Averaged Pressure	2 Inferred	Read
8427	Well Test Meter#1 Averaged Combined gm/cc	5 Inferred	Read
8429	Well Test Meter#1 Averaged Combined Base gm/cc	5 Inferred	Read
8431	Well Test Meter#1 Averaged CD/LMF	5 Inferred	Read
8433	Well Test Meter#1 Averaged BS&W	2 Inferred	Read
8435	Well Test Meter#1 Averaged CTLW	5 Inferred	Read
8437	Well Test Meter#1 Averaged CTPL	5 Inferred	Read
8439	Well Test Meter#1 Averaged API	1 Inferred	Read
8441	Well Test Meter#1 Averaged API.b	1 Inferred	Read
8443	Well Test Meter#1 Averaged Y Factor	6 Inferred	Read
8445	Well Test Meter#1 Averaged Density gm/cc	5 Inferred	Read
8447	Well Test Meter#1 Averaged Density Base gm/cc	5 Inferred	Read
8449	Reserved		

Modbus Address Table – 2x16 Bits Integer

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
8451-8453	Well Test Meter#2 ID	8 Chars.	Read
8455	WellTest Meter#2 Type	0 Inferred	Read

1st Byte	2nd Byte	3rd Byte	4th Byte
Meter Type 0:Orifice 1:Venturi 2:Frequency 3:Wedge 4:Foxbora	**n/a**	**Input Status** B0: DP: 0-Live, 1-Maintenance B1: Temperature: 0-Live, 1-Maintenance B2: Pressure: 0-Live, 1-Maintenance B3: BS&W: 0-Live, 1-Maintenance B4 Density: 0-Live, 1-Maintenance	

8457	Well Test Meter#2 K Factor	3 Inferred	Read
8459	Well Test Meter#2 Pipe ID	5 Inferred	Read
8461	Well Test Meter#2 Orifice ID	5 Inferred	Read
8463	Well Test Meter#2 Gross Flow Rate	2 Inferred	Read
8465	Well Test Meter#2 Gross Flow Rate (Water)	2 Inferred	Read
8467	Well Test Meter#2 Gross Flow Rate (Oil)	2 Inferred	Read
8469	Well Test Meter#2 Net Flow Rate (Water)	2 Inferred	Read
8471	Well Test Meter#2 Gross Flow Rate (Oil)	2 Inferred	Read
8473	Well Test Meter#2 Combined Mass Flow Rate	2 Inferred	Read
8475	Well Test Meter#2 Gross Total	1 Inferred	Read
8477	Well Test Meter#2 Gross Total (Water)	1 Inferred	Read
8479	Well Test Meter#2 Gross Total (Oil)	1 Inferred	Read
8481	Well Test Meter#2 Net Total (Water)	1 Inferred	Read
8483	Well Test Meter#2 Net Total (Oil)	1 Inferred	Read
8485	Well Test Meter#2 Combined Mass Total	1 Inferred	Read
8487	Well Test Meter#2 Estimated Daily Gross Total	1 Inferred	Read
8489	Well Test M#2 Estimated Daily Gross Total (Water)	1 Inferred	Read
8491	Well Test M#2 Estimated Daily Gross Total (Oil)	1 Inferred	Read
8493	Well Test M#2 Estimated Daily Net Total (Water)	1 Inferred	Read
8495	Well Test Meter#2 Estimated Daily Net Total (Oil)	1 Inferred	Read
8497	Well Test Meter#2 Estimated Daily Mass Total	1 Inferred	Read
8499	Well Test Meter#2 DP	4 Inferred	Read
8501	Well Test Meter#2 Temperature	2 Inferred	Read
8503	Well Test Meter#2 Pressure	2 Inferred	Read
8505	Well Test Meter#2 Combined Density gm/cc	5 Inferred	Read
8507	Well Test Meter#2 Combined Base Density gm/cc	5 Inferred	Read
8509	Well Test Meter#2 CD/LMF	5 Inferred	Read
8511	Well Test Meter#2 BS&W	2 Inferred	Read
8513	Well Test Meter#2 CTLW	5 Inferred	Read
8515	Well Test Meter#2 CTPL	5 Inferred	Read
8517	Well Test Meter#2 Combined API	1 Inferred	Read
8519	Well Test Meter#2 Combined API at Base	1 Inferred	Read
8521	Well Test Meter#2 Y Factor	6 Inferred	Read

Modbus Address Table – 2x16 Bits Integer

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
8523	Well Test Meter#2 Density	5 Inferred	Read
8525	Well Test Meter#2 Density Base	5 Inferred	Read
8527	Well Test Meter#2 Averaged DP	4 Inferred	Read
8529	Well Test Meter#2 Averaged Temperature	2 Inferred	Read
8531	Well Test Meter#2 Averaged Pressure	2 Inferred	Read
8533	Well Test Meter#2 Averaged Combined gm/cc	5 Inferred	Read
8535	Well Test Meter#2 Averaged Combined Base gm/cc	5 Inferred	Read
8537	Well Test Meter#2 Averaged CD/LMF	5 Inferred	Read
8539	Well Test Meter#2 Averaged BS&W	2 Inferred	Read
8541	Well Test Meter#2 Averaged CTLW	5 Inferred	Read
8543	Well Test Meter#2 Averaged CTPL	5 Inferred	Read
8545	Well Test Meter#2 Averaged Combined API	1 Inferred	Read
8547	Well Test Meter#2 Averaged Combined API at Base	1 Inferred	Read
8549	Well Test Meter#2 Averaged Y Factor	6 Inferred	Read
8551	Well Test Meter#2 Averaged Density gm/cc	5 Inferred	Read
8553	Well Test Meter#2 Averaged Density Base gm/cc	5 Inferred	Read
8555	Well Test Meter#2 DPEXT	5 Inferred	Read
8557	Well Test Meter#1 DPEXT	5 Inferred	Read
8559	Reserved		

Modbus Address Table – 2x16 Bits Integer

ADDRESS DESCRIPTION DECIMAL READ/WRITE

Last Well Test DATA AREA

Last Well Test Data Request

3034 (16 bits Ingeter, Wirte only)
Set request to 1=Well Number 1, 20=Well Number 20

8601	Well Test Start Date mm/dd/yy	0 Inferred	Read
8603	Well Test Start Time hh:mm:ss	0 Inferred	Read
8605	Well Test End Date mm/dd/yy	0 Inferred	Read
8607	Well Test End Time hh:mm:ss	0 Inferred	Read
8609	Well Test Well Number	0 Inferred	Read
8611-8617	Well Test Name	16 Chars.	Read
8619-8625	Well Test Location	16 Chars.	Read
8627-8633	Well Test Lease ID	16 Chars.	Read
8635	Well Test Oil Shrikage Factor	5 Inferred	Read
8637	Well Test Water Salinity Factor	5 Inferred	Read
8639	Well Test Base Density gm/cc (Oil)	5 Inferred	Read
8641	Well Test Base Density gm/cc (Water)	5 Inferred	Read
8643	Well Test Units	0 Inferred	Read

1st Byte	2nd Byte	3rd Byte	4th Byte
Gross/Net Flow Units 0:CF 1:M3 2:GAL 3:LITR 4:BBL	**Mass Flow Units** 0:LB 1:KLB 2:KG 3:TON	**Frequency K FactorUnits** 0:CF 1:BBL 2:GAL 3:M3 4:LITR	N/A

8645-8647	Well Test Meter#1 ID	8 Chars.	Read
8649	WellTest Meter#1 Type	0 Inferred	Read

1st Byte	2nd Byte	3rd Byte	4th Byte
Meter Type 0:Orifice 1:Venturi 2:Frequency 3:Wedge 4:Foxbora	**n/a**	**Input Status** B0: DP: 0-Live, 1-Maintenance B1: Temperature: 0-Live, 1-Maintenance B2: Pressure: 0-Live, 1-Maintenance B3: BS&W: 0-Live, 1-Maintenance B4 Density: 0-Live, 1-Maintenance	

8651	Well Test Meter#1 K Factor	3 Inferred	Read
8653	Well Test Meter#1 Pipe ID	5 Inferred	Read
8655	Well Test Meter#1 Orifice ID	5 Inferred	Read
8657	Well Test Meter#1 Gross Total	1 Inferred	Read
8659	Well Test Meter#1 Gross Total (Water)	1 Inferred	Read
8661	Well Test Meter#1 Gross Total (Oil)	1 Inferred	Read
8663	Well Test Meter#1 Net Total (Water)	1 Inferred	Read

Modbus Address Table – 2x16 Bits Integer

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
8665	Well Test Meter#1 Net Total (Oil)	1 Inferred	Read
8667	Well Test Meter#1 Mass Total	1 Inferred	Read
8669	Well Test Meter#1 Estimated Daily Gross Total	1 Inferred	Read
8671	Well Test M#1 Estimated Daily Gross Total (Water)	1 Inferred	Read
8673	Well Test M#1 Estimated Daily Gross Total (Oil)	1 Inferred	Read
8675	Well Test M#1 Estimated Daily Net Total (Water)	1 Inferred	Read
8677	Well Test Meter#1 Estimated Daily Net Total (Oil)	1 Inferred	Read
8679	Well Test Meter#1 Estimated Daily Mass Total	1 Inferred	Read
8681	Well Test Meter#1 DPEXT	4 Inferred	Read
8683	Well Test Meter#1 Averaged Temperature	2 Inferred	Read
8685	Well Test Meter#1 Averaged Pressure	2 Inferred	Read
8687	Well Test Meter#1 Averaged Combined gm/cc	5 Inferred	Read
8689	Well Test Meter#1 Averaged Combined Base gm/cc	5 Inferred	Read
8691	Well Test Meter#1 Averaged CD/LMF	5 Inferred	Read
8693	Well Test Meter#1 Averaged BS&W	2 Inferred	Read
8695	Well Test Meter#1 Averaged CTLW	5 Inferred	Read
8697	Well Test Meter#1 Averaged CTPL	5 Inferred	Read
8699	Well Test Meter#1 Averaged Combined API	1 Inferred	Read
8701	Well Test Meter#1 Averaged Combined API at Base	1 Inferred	Read
8703	Well Test Meter#1 Averaged Y Factor	6 Inferred	Read
8705	Well Test Meter#1 Averaged Density gmcc	5 Inferred	Read
8707	Well Test Meter#1 Averaged Density Base gmcc	5 Inferred	Read
8709-8739	Reserved		
8741-8743	Well Test Meter#2 ID	8 Chars.	Read
8745	WellTest Meter#2 Type	0 Inferred	Read

1st Byte	2nd Byte	3rd Byte	4th Byte
Meter Type 0:Orifice 1:Venturi 2:Frequency 3:Wedge 4:Foxbora	**n/a**	**Input Status** B0: DP: 0-Live, 1-Maintenance B1: Temperature: 0-Live, 1-Maintenance B2: Pressure: 0-Live, 1-Maintenance B3: BS&W: 0-Live, 1-Maintenance B4 Density: 0-Live, 1-Maintenance	

8747	Well Test Meter#2 K Factor	3 Inferred	Read
8749	Well Test Meter#2 Pipe ID	5 Inferred	Read
8751	Well Test Meter#2 Orifice ID	5 Inferred	Read
8753	Well Test Meter#2 Gross Total	1 Inferred	Read
8755	Well Test Meter#2 Gross Total (Water)	1 Inferred	Read
8757	Well Test Meter#2 Gross Total (Oil)	1 Inferred	Read
8759	Well Test Meter#2 Net Total (Water)	1 Inferred	Read
8761	Well Test Meter#2 Net Total (Oil)	1 Inferred	Read
8763	Well Test Meter#2 Combined Mass Total	1 Inferred	Read
8765	Well Test Meter#2 Estimated Daily Gross Total	1 Inferred	Read
8767	Well Test M#2 Estimated Daily Gross Total (Water)	1 Inferred	Read
8769	Well Test M#2 Estimated Daily Gross Total (Oil)	1 Inferred	Read
8771	Well Test M#2 Estimated Daily Net Total (Water)	1 Inferred	Read
8773	Well Test Meter#2 Estimated Daily Net Total (Oil)	1 Inferred	Read

Modbus Address Table – 2x16 Bits Integer

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
8775	Well Test Meter#2 Estimated Daily Mass Total	1 Inferred	Read
8777	Well Test Meter#2 Averaged DP	4 Inferred	Read
8779	Well Test Meter#2 Averaged Temperature	2 Inferred	Read
8781	Well Test Meter#2 Averaged Pressure	2 Inferred	Read
8783	Well Test Meter#2 Averaged Combined gm/cc	5 Inferred	Read
8785	Well Test Meter#2 Averaged Combined Base gm/cc	5 Inferred	Read
8787	Well Test Meter#2 Averaged CD/LMF	5 Inferred	Read
8789	Well Test Meter#2 Averaged BS&W	2 Inferred	Read
8791	Well Test Meter#2 Averaged CTLW	5 Inferred	Read
8793	Well Test Meter#2 Averaged CTPL	5 Inferred	Read
8795	Well Test Meter#2 Averaged Combined API	1 Inferred	Read
8797	Well Test Meter#2 Averaged Combined API at Base	1 Inferred	Read
8799	Well Test Meter#2 Averaged Y Factor	6 Inferred	Read
8801	Well Test Meter#2 Averaged Density gmcc	5 Inferred	Read
8803	Well Test Meter#2 Averaged Density Base gmcc	5 Inferred	Read
8805-8833	Reserved		
8835	Well Test Meter#2 DPEXT	4 Inferred	Read
8837	Well Test Meter#1 DPEXT	4 Inferred	Read

Modbus Address Table – 2x16 Bits Integer

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE

Non-resettable accumulated volume will roll over at 999999999.

Current Data Area

9001	Spare	0 Inferred	Read
9003	Spare	0 Inferred	Read
9005	Product/Table/Number	0 Inferred	Read
9007	Batch Number	0 inferred	Read
9009	Batch Start Date	0 inferred	Read
9011	Batch Start Time	0 inferred	Read
9013	Date(mmddyy)	0 Inferred	Read
9015	Time (hhmmss)	0 Inferred	Read
9017-9023	Product Name	16 Chars.	Read
9025-9029	Spare		
9031-9033	Meter#1 ID	8 Chars.	Read
9035	Meter #1 Alarm Status	0 Inferred	Read
9037	Meter #1 Daily Gross Total	1 Inferred	Read
9039	Meter #1 Daily Net Oil Total	1 Inferred	Read
9041	Meter #1 Daily Mass Total	1 Inferred	Read
9043	Meter #1 Cumulative Gross Total*	0 Inferred	Read
9045	Meter #1 Cumulative Net OilTotal*	0 Inferred	Read
9047	Meter #1 Cumulative Mass Total*	0 Inferred	Read
9049	Meter #1 Batch Gross Total	1 Inferred	Read
9051	Meter #1 Batch Net Oil Total	1 Inferred	Read
9053	Meter #1 Batch Mass Total	1 Inferred	Read
9055	Meter #1 Gross Flow Rate	2 Inferred	Read
9057	Meter #1 Net Oil Flow Rate	2 Inferred	Read
9059	Meter #1 Mass Flow Rate	2 Inferred	Read
9061	Meter#1 Batch Flow Weighted Average- DP	4 Inferred	Read
9063	Meter#1 Batch F.W. Average- Temperature	2 Inferred	Read
9065	Meter#1 Batch F.W. Average- Pressure	2 Inferred	Read
9067	Meter#1 Batch F.W. Average- Density gm/cc	5 Inferred	Read
9069	Meter#1 Batch FWA Combined Density Base gmcc	5 Inferred	Read
9071	Meter#1 Batch F.W. Average- - Combined API	1 Inferred	Read
9073	Meter#1 Batch F.W. Average- Combined API Base	1 Inferred	Read
9075	Meter#1 Batch F.W. Average- K/CD/LMF	6 Inferred	Read
9077	Meter#1 Batch F.W. Average- CTLW	5 Inferred	Read
9079	Reserved		
9083	Meter#1 Batch F.W. Average- BS&W	2 Inferred	Read
9085	Meter#1 DP	4 Inferred	Read
9087	Meter#1 Temperature	2 Inferred	Read
9089	Meter#1 Pressure	2 Inferred	Read
9091	Meter#1 Density gm/cc	5 Inferred	Read
9093	Meter#1 Combined Density Base gm/cc	5 Inferred	Read
9095	Meter#1 Combined API	1 Inferred	Read
9097	Meter#1 Combined API Base	1 Inferred	Read
9099	Meter#1 K/CD/LMF	6 Inferred	Read
9101	Meter#1 CTLW	5 Inferred	Read
9103	Reserved		
9105	Reserved		

Modbus Address Table – 2x16 Bits Integer

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
9107	Meter#1 BS&W	2 Inferred	Read
9109	Meter #1 Y Factor	6 Inferred	Read
9111	Meter#1 Densitometer Temperature	2 Inferred	Read
9113	Meter#1 Densitometer Pressure	2 Inferred	Read
9115	Meter#1 Equilibrium Pressure	3 Inferred	Read
9117	Meter #1 Pipe ID	5 Inferred	Read
9119	Meter #1 Orifice ID	5 Inferred	Read
9121	Meter #1 Density Correction Factor	5 Inferred	Read
9123	Meter #1 K Factor	3 Inferred	Read
9125	Meter #1 Batch Opening Cum. Gross	0 Inferred	Read
9127	Meter #1 Batch Opening Cum. Net Oil	0 Inferred	Read
9129	Meter #1 Batch Opening Cum. Mass	0 Inferred	Read
9131-9133	Meter#2 ID	8 Chars.	Read
9135	Meter #2 Alarm Status	0 Inferred	Read
9137	Meter #2 Daily Gross Total	1 Inferred	Read
9139	Meter #2 Daily Net Oil Total	1 Inferred	Read
9141	Meter #2 Daily MassTotal	1 Inferred	Read
9143	Meter #2 Cumulative Gross Total*	0 Inferred	Read
9145	Meter #2 Cumulative Net Oil Total*	0 Inferred	Read
9147	Meter #2 Cumulative Mass Total*	0 Inferred	Read
9149	Meter #2 Batch Gross Total	1 Inferred	Read
9151	Meter #2 Batch Net Oil Total	1 Inferred	Read
9153	Meter #2 Batch Mass Total	1 Inferred	Read
9155	Meter #2 Gross Flow Rate	2 Inferred	Read
9157	Meter #2 Net Oil Flow Rate	2 Inferred	Read
9159	Meter #2 Mass Flow Rate	2 Inferred	Read
9161	Meter#2 Batch Flow Weighted Average- DP	4 Inferred	Read
9163	Meter#2 Batch F.W. Average- Temperature	2 Inferred	Read
9165	Meter#2 Batch F.W. Average- Pressure	2 Inferred	Read
9167	Meter#2 Batch F.W. Average- Density	5 Inferred	Read
9169	Meter#2 Batch FWA Combined Density Base gmcc	5 Inferred	Read
9171	Meter#2 Batch F.W. Average- Combined API	1 Inferred	Read
9173	Meter#2 Batch F.W. Average- Combined API Base	1 Inferred	Read
9175	Meter#2 Batch F.W. Average- K/CD/LMF	6 Inferred	Read
9177	Meter#2 Batch F.W. Average- CTLW	5 Inferred	Read
9179	Reserved		
9181	Reserved		
9183	Meter#2 Batch F.W. Average- BS&W	2 Inferred	Read
9185	Meter#2 DP	4 Inferred	Read
9187	Meter#2 Temperature	2 Inferred	Read
9189	Meter#2 Pressure	2 Inferred	Read
9191	Meter#2 Density gm/cc	5 Inferred	Read
9193	Meter#2 Combined Density Base gm/cc	5 Inferred	Read
9195	Meter#2 Combined API	1 Inferred	Read
9197	Meter#2 Combined API Base	1 Inferred	Read
9199	Meter#2 K/CD/LMF	6 Inferred	Read
9201	Meter#2 CTLW	5 Inferred	Read

Modbus Address Table – 2x16 Bits Integer

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
9203	Reserved		
9205	Reserved		
9207	Meter#2 BS&W	2 Inferred	Read
9209	Meter #2 Y Factor	6 Inferred	Read
9211	Meter#2 Densitometer Temperature	2 Inferred	Read
9213	Meter#2 Densitometer Pressure	2 Inferred	Read
9215	Meter#2 Equilibrium Pressure	3 Inferred	Read
9217	Meter #2 Pipe ID	5 Inferred	Read
9219	Meter #2 Orifice ID	5 Inferred	Read
9221	Meter #2 Density Correction Factor	5 Inferred	Read
9223	Meter #2 K Factor	3 Inferred	Read
9225	Meter #2 Batch Opening Cum. Gross	0 Inferred	Read
9227	Meter #2 Batch Opening Cum. Net Oil	0 Inferred	Read
9229	Meter #2 Batch Opening Cum. Mass	0 Inferred	Read
9231-9451	Reserved		
9255	Meter #1 Net Water Flow Rate	2 Inferred	Read
9257	Meter #2 Net Water Flow Rate	2 Inferred	Read
9259-9451	Reserved		
9453	Meter#1 GM/CC (Live Densitometer)	4 Inferred	Read
9555	Reserved		
9457	Meter#2 GM/CC (Live Densitometer)	4 Inferred	Read
9559-9465	Reserved		
9469	Meter#1 CTPL	5 Inferred	Read
9471	Meter#1 Batch F.W. Average CTPL	5 Inferred	Read
9473	Meter#1 Combined Density gm/cc	5 Inferred	Read
9475	Meter#1 Batch F.W. Average Combined gm/cc	5 Inferred	Read
9477	Meter#2 CTPL	5 Inferred	Read
9479	Meter#2 Batch F.W. Average CTPL	5 Inferred	Read
9481	Meter#2 Combined Density gm/cc	3 Inferred	Read
9483	Meter#2 Batch F.W. Average Combined gm/cc	3 Inferred	Read
9481-9495	Reserved		

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	Reserved	
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	Calibration Data Entry	Read/Write
7053	Verification Data Entry	Read/Write
7054	GMCC Conversion Factor	Read/Write
7055-7060	Spare	
7061-7070	Reserved	
7071-7085	Reserved	
7086	Meter#1Density Override	Read/Write
7087	Meter#1 SG Override	Read/Write
7088	Meter#1 Alpha-T E-6 Override	Read/Write
7089	Meter#2 Density Override	Read/Write
7090	Meter#2 SG Override	Read/Write
7091	Meter#2 Alpha-T E-6 Override	Read/Write
7092-7097	Reserved	
7098-7102	Spare	
7103	Meter#1 FWA CTPL (Oil)	Read
7104	Meter#1 Daily Gross Total	Read
7105	Meter#1 Daily Net Oil Total	Read
7106	Meter#1 Daily Mass Total	Read
7107	Meter#1 CTPL (Oil)	Read
7108	Meter#1 Combined Density gm/cc	Read
7109	Meter#1 FWA Combined Density gm/cc	Read
7110	Meter#1 Batch Gross Total	Read
7111	Meter#1 Batch Net Oil Total	Read
7112	Meter#1 Batch Mass Total	Read
7113	Meter#1 Gross Flow Rate	Read
7114	Meter#1 Net Oil Flow Rate	Read
7115	Meter#1 Mass Flow Rate	Read
7116	Meter #1 FWA DP	Read
7117	Meter #1 FWA Temperature	Read
7118	Meter #1 FWA Pressure	Read
7119	Meter #1 FWA Density gm/cc	Read
7120	Meter #1 FWA Combined Density Base gm/cc	Read
7121	Meter #1 FWA Combined SG	Read
7122	Meter #1 FWA Combined SG Base	Read
7123	Meter #1 FWA K/CD/LMF	Read
7124	Meter #1 FWA CTLW	Read
7125	Reserved	
7126	Reserved	
7127	Meter #1 FWA BS&W	Read
7128	Meter #1 DP	Read
7129	Meter #1 Temperature	Read
7130	Meter #1 Pressure	Read
7131	Meter #1 Density gm/cc	Read
7132	Meter #1 Combined Density Base gm/cc	Read
7133	Meter #1 Combined SG	Read
7134	Meter #1 Combined SG Base	Read
7135	Meter #1 K/CD/LMF	Read
7136	Meter #1 CTLW	Read
7137	Reserved	Read

Modbus Address Table – Float Point

ADDRESS	DESCRIPTION	READ/WRITE
7138	Reserved	
7139	Meter #1 BS&W	Read
7140	Meter #1 Y	Read
7141	Meter #1 Densitometer Temperature	Read
7142	Meter #1 Densitometer Pressure	Read
7143	Meter #1 Equilibrium Pressure	Read
7144	Meter #1 Pipe ID	Read
7145	Meter #1 Orifice ID	Read
7146	Meter #1 Density Correction Factor	Read
7147	Meter #1 K Factor	Read
7148	Meter #1 Day Flow Time	Read
7149	Meter #1 Hour Flow Time	Read
7150	Meter#1 Daily Net Water Total	Read
7151	Meter#1 Batch Net Water Total	Read
7152	Meter #1 Fa Factor	Read
7153	Meter #2 Fa Factor	Read
7154	Meter#1 Net Water Flow Rate	Read
7155	Meter #1 Combined API	Read
7156	Meter #1 Combined API Base	Read
7157	Meter #1 FWA Combined API	Read
7158	Meter #1 FWA Combined API Base	Read
7159	Meter #1 FWA Density Base gm/cc	Read
7160	Meter #1 Density Base gm/cc	
7161-7199	Spare	

Modbus Address Table – Float Point

ADDRESS	DESCRIPTION	READ/WRITE
7201	Date – Floating	Read
7202	Time – Floating	Read
7203-7230	Spare	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 Gross Total	Read
7243	Meter #1 Last Hour Net Oil 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 DP/EXT	Read
7248	Meter #2 Last Hour Flow Time	Read
7249	Meter #2 Last Hour Gross Total	Read
7250	Meter #2 Last Hour Net Oil 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 DP/EXT	Read
7255	Meter #1 Last Hour Net Water Total	Read
7256	Meter #2 Last Hour Net Water Total	Read
7257	Meter #1 Last Month Flow Time	Read
7258	Meter #1 Last Month Gross Total	Read
7259	Meter #1 Last Month Net Oil Total	Read
7260	Meter #1 Last Month Mass Total	Read
7261	Spare	
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 DP/EXT	Read
7276	Meter #1 Yesterday Gross Total	Read
7277	Meter #1 Yesterday Net Oil Total	Read
7278	Meter #1 Yesterday Mass Total	Read
7279	Meter #1 Yesterday Net Water Total	Read

Modbus Address Table – Float Point

ADDRESS	DESCRIPTION	READ/WRITE
7301	Meter#2 Batch Net Water Total	Read
7302	Meter#2 Daily Net Water Total	Read
7303	Meter#2 FWA CTPL (Oil)	Read
7304	Meter#2 Daily Gross Total	Read
7305	Meter#2 Daily Net Oil Total	Read
7306	Meter#2 Daily Mass Total	Read
7307	Meter#2 CTPL (Oil)	Read
7308	Meter#2 Combined Density	Read
7309	Meter#2 FWA Combined Density	Read
7310	Meter#2 Batch Gross Total	Read
7311	Meter#2 Batch Net Oil Total	Read
7312	Meter#2 Batch Mass Total	Read
7313	Meter#2 Gross Flow Rate	Read
7314	Meter#2 Net Oil Flow Rate	Read
7315	Meter#2 Mass Flow Rate	Read
7316	Meter #2 FWA DP	Read
7317	Meter #2 FWA Temperature	Read
7318	Meter #2 FWA Pressure	Read
7319	Meter #2 FWA Density	Read
7320	Meter #2 FWA Combined Density Base	Read
7321	Meter #2 FWA Combined SG	Read
7322	Meter #2 FWA Combined SG Base	Read
7323	Meter #2 FWA K/CD/LMF	Read
7324	Meter #2 FWA CTLW	Read
7325	Reserved	
7326	Meter #2 DP_EXT	Read
7327	Meter #2 FWA BS&W	Read
7328	Meter #2 DP	Read
7329	Meter #2 Temperature	Read
7330	Meter #2 Pressure	Read
7331	Meter #2 Density gm/cc	Read
7332	Meter #2 Combined Density Base gm/cc	Read
7333	Meter #2 Combined SG	Read
7334	Meter #2 Combined SG Base	Read
7335	Meter #2 K/CD/LMF	Read
7336	Meter #2 CTLW	Read
7337	Reserved	
7338	Reserved	Read
7339	Meter #2 BS&W	Read
7340	Meter #2 Y	Read
7341	Meter #2 Densitometer Temperature	Read
7342	Meter #2 Densitometer Pressure	Read
7343	Meter #2 Equilibrium Pressure	Read
7344	Meter #2 Pipe ID	Read
7345	Meter #2 Orifice ID	Read
7346	Meter #2 Density Correction Factor	Read
7347	Meter #2 K Factor	Read
7348	Meter #2 Day Flow Time	Read
7349	Meter #2 Hour Flow Time	Read
7350	Meter #2 Flow Rate – Net Water	Read

Modbus Address Table – Float Point

ADDRESS	DESCRIPTION	READ/WRITE
7351	Meter #2 API	Read
7352	Meter #2 API Base	Read
7353	Meter #2 FWA API	Read
7354	Meter #2 FWA API Base	Read
7355	Meter #2 FWA Density Base gm/cc	Read
7356	Meter #2 Density Base gm/cc	Read
7357-7399	Spare	

Modbus Address Table – Float Point

ADDRESS	DESCRIPTION	READ/WRITE
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
7407	Analog Input #4 mA Value	Read
7408	Multi.Var. Flag (1=Connected)	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	
7441-7456	Spare	
7457	Meter#2 Last Month Flow Time	Read
7458	Meter#2 Last Month Gross Total	Read
7459	Meter#2 Last Month Net Oil Total	Read
7460	Meter#2 Last Month Mass Total	Read
7461	Meter#2 Last Month Net Water Total	Read
7462-7465	Spare	

Modbus Address Table – Float Point

ADDRESS	DESCRIPTION	READ/WRITE
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
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 Oil Total	Read
7478	Meter #2 Yesterday Mass Total	Read
7479	Meter #1 Last Batch Gross Total	Read
7480	Meter #1 Last Batch Net Oil Total	Read
7481	Meter #1 Last Batch Mass Total	Read
7482	Meter #2 Last Batch Gross Total	Read
7483	Meter #2 Last Batch Net Oil Total	Read
7484	Meter #2 Last Batch Mass Total	Read
7485	Meter #2 Last Batch Net Water Total	Read
7486	Meter #1 Last Batch Net WaterTotal	Read
7487	Meter #2 Yesterday Net Water Total	Read
7488	Spare	Read
7489	Spare	Read
7490	Spare	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
7679-7690	Spare	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
7901	Analog Input #1 @4mA	Read/Write
7902	Analog Input #2 @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	Read/Write
7922	Spare	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	Read/Write
7938	Analog Output #4 @20mA	Read/Write
7938-7951	Spare	

Modbus Address Table – Float Point

ADDRESS	DESCRIPTION	READ/WRITE
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
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

Alarm, Audit Trail, and Calibration Data

Previous Data Alarm Area

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

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
1	Analog Input #2
2	Analog Input #3
3	Analog Input #4
4	RTD Input
5	Analog Output #1
6	Analog Output #2
7	Analog Output #3
8	Analog Output #4
9	Density
10	Density
11	Meter #1
12	Meter #2
13	
14	
17	Event Status
18	Calibration Mode
20	Multi.Var. DP
21	Multi.Var. Pressurer
22	Multi.Var. Temperature
30	
31	
32	Slave#1 Communication
33	Slave#2 Communication
34	Slave#3 Communication

41	Analog Input #5
42	Analog Input #6
43	Analog Input #7
44	Analog Input #8
45	Analog Input #9
51	Spare Auxiliary I/O #1
52	Spare Auxiliary I/O #2
53	Spare Auxiliary I/O #3
54	Spare Auxiliary I/O #4
55	Spare Auxiliary I/O #5
56	Spare Auxiliary I/O #6
57	Spare Auxiliary I/O #7
58	Spare Auxiliary I/O #8
59	Spare Auxiliary I/O #9
60	Spare Auxiliary I/O #10
61	Spare Auxiliary I/O #11
62	Spare Auxiliary I/O #12
71	Slave#1 DP
72	Slave#2 DP
73	Slave#3 DP
74	Slave#1 Pressure
75	Slave#2 Pressure
76	Slave#3 Pressure
77	Slave#1 Temperature
78	Slave#2 Temperature
79	Slave#3 Temperature
80	Battery Alarm

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

1	Flow Rate
2	Table Gravity Out of Range
3	Table Temperature Out of Range
4	Table Alpha T Out of Range

7	Down
8	Start

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
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 (3031,16 bits Integer, Write only) to 1.
8101-8109 (2x16 bits Integers, 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 (no,audit code,dec)

Code Flag

	No.	Audit Code	Old/New Value Decimal Inferred

NO.

Value 0: this field is not used.

1	Meter #1 ID
2	Meter #2 ID
191	Analog Input #5 TAG
192	Analog Input #6 TAG
193	Analog Input #7 TAG
194	Analog Input #8 TAG
195	Analog Input #9 TAG
201	Analog Input #1 TAG
202	Analog Input #2 TAG
203	Analog Input #3 TAG
204	Analog Input #4 TAG
205	RTD TAG
211	Multi.Var.DP TAG
212	Multi.Var.Pressure TAG
213	Multi.Var.Temperature TAG

221	Spare Aux.I/O#1 TAG
222	Spare Aux.I/O#2 TAG
223	Spare Aux.I/O#3 TAG
224	Spare Aux.I/O#4 TAG
225	Spare Aux.I/O#5 TAG
226	Spare Aux.I/O#6 TAG
227	Spare Aux.I/O#7 TAG
228	Spare Aux.I/O#8 TAG
229	Spare Aux.I/O#9 TAG
230	Spare Aux.I/O#10 TAG
231	Spare Aux.I/O#11 TAG
232	Spare Aux.I/O#12 TAG
236	Slave#1 DP TAG
237	Slave#1 Pressure TAG
238	Slave#1 Temperature TAG
239	Slave#2 DP TAG
240	Slave#2 Pressure TAG
241	Slave#2 Temperature TAG
242	Slave#3 DP TAG
243	Slave#3 Pressure TAG
244	Slave#3 TemperatureTAG

Audit Codes

1	DP Cut Off
2	DP High Switch Percentage
3	DP Low Assignment
4	DP High Assignment
5	BS&W Assignment
6	Pipe ID
7	Orifice ID
8	Temperature Override
9	Pressure Override
10	BS&W Override
11	Equilibrium Pressure Override
12	Ratio of Heat
13	Viscosity
14	Pipe Thermal Expansion E-6
15	Orifice Thermal Expansion E-6
16	Reference Temperature of Pipe
17	Reference Temperature of Orifice
18	Kd2 Override
19	FA Override
20	Meter Factor
21	K Factor
22	Flow Cut Off Hertz
23	Use Stack DP 0=No, 1=Yes
24	Densitometer Type
25	Density Unit
26	Calculation Type
27	Y Factor Select
28	Temperature Assignment
29	Pressure Assignment
30	Densitometer Assignment
31	Flow Rate Threshold #1
32	Flow Rate Threshold #2
33	Flow Rate Threshold #3
34	Flow Rate Threshold #4
35	Linearization Factor #1
36	Linearization Factor #2
37	Linearization Factor #3
38	Linearization Factor #4
39	Venturi C Factor Override
40	SG Override
41	Density Override

60	Base Temperature
61	Base Pressure
62	Atmospheric Pressure
63	Pulse Output #1 Volume
64	Pulse Output #2 Volume
65	Density Correction Factor
66	Number of Meters
67	Pressure Unit
68	Flow Unit
69	Common Temperature
70	Common Pressure
71	Common Density
72	Flow Rate Display
73	Day Start Hour
74	Disable Alarms
75	Frequency Device K Factor Unit
76	@4mA/1-5V
77	@20mA/1-5V
78	Maintenance
79	Override
80	Fail Code
81	DP Unit
82	Product #1 Table
83	Product #2 Table
84	Product #3 Table
85	Product #4 Table
86	Product #5 Table
87	Product #6 Table
88	Product #7 Table
89	Product #8 Table
90	Mass Pulse Selection
180	*****SEE NOTE (next page)**

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

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

8105 **Old Value (Decimal Inferred in the 4th byte of 8109)**
00 01 86 a0 (Hex) 100000 (Digit)
4th byte of 8113 = 5 (Decimal Places)
result = 1.00000

8107 **New Vaule(Decimal Inferred in the 4th byte of 8109)**
00 01 ad b0 (Hex) 110000 (Digit)
4th byte of 8113 = 5 (Decimal Places)
Rsult = 1.10000

8109 **Code Flag**

00 00 41 05 in Hex
1st Byte
2nd Byte – 0,
3rd Byte – Audit Code – 41(Hex) 65 (Digit) – 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.

8501 System Start Date

8503 System Start Time

8505 System Failed Date

8507 System Failed Time

8509 Not Used

Previous Audit Data Area Ends

Previous Calibration/Verification Data Area

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

8101-8109 (2x16 bits 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 FF FF FF

METER#1: MODBUS ADDRESS 9533

METER#2: MODBUS ADDRESS 9535

The Current Alarm Status is a 4-byte string that resides at **Modbus address 9533 for Meter #1, 9535 for Meter #2**. 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	Table Gravity Out of Range
04	00	00	00	Net Flow Rate High
08	00	00	00	Net Flow Rate Low
10	00	00	00	Table Temperature Out of Range
20	00	00	00	Table Alpha-T Out of Range

OTHER ALARMS (MODBUS ADDRESS 9517)

4 Bytes in Hex - FF FF FF 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 FF FF 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 FF FF FF

01	00	00	00	
02	00	00	00	Slave#1 Communcation Failed
04	00	00	00	Slave#2 Communcation Failed
08	00	00	00	Slave#3 Communcation 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 FF FF FF

01	00	00	00	Analog Input #1 High
02	00	00	00	Analog Input #1 Low
04	00	00	00	Analog Input #2 High
08	00	00	00	Analog Input #2 Low
10	00	00	00	Analog Input #3 High
20	00	00	00	Analog Input #3 Low
40	00	00	00	Analog Input #4 High
80	00	00	00	Analog Input #4 Low
00	01	00	00	RTD Input High
00	02	00	00	RTD Input Low
00	04	00	00	Calibration Mode ON
00	08	00	00	Battery 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
DP	2664	2684
Temperature	2665	2685
Pressure	2666	2686
Density	2667	2687
DP High	2668	2688

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.

CHAPTER 6: Installation Drawings

Explosion-Proof Installation Drawings

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

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

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

8. DIVISION 2 WIRING METHOD.

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

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

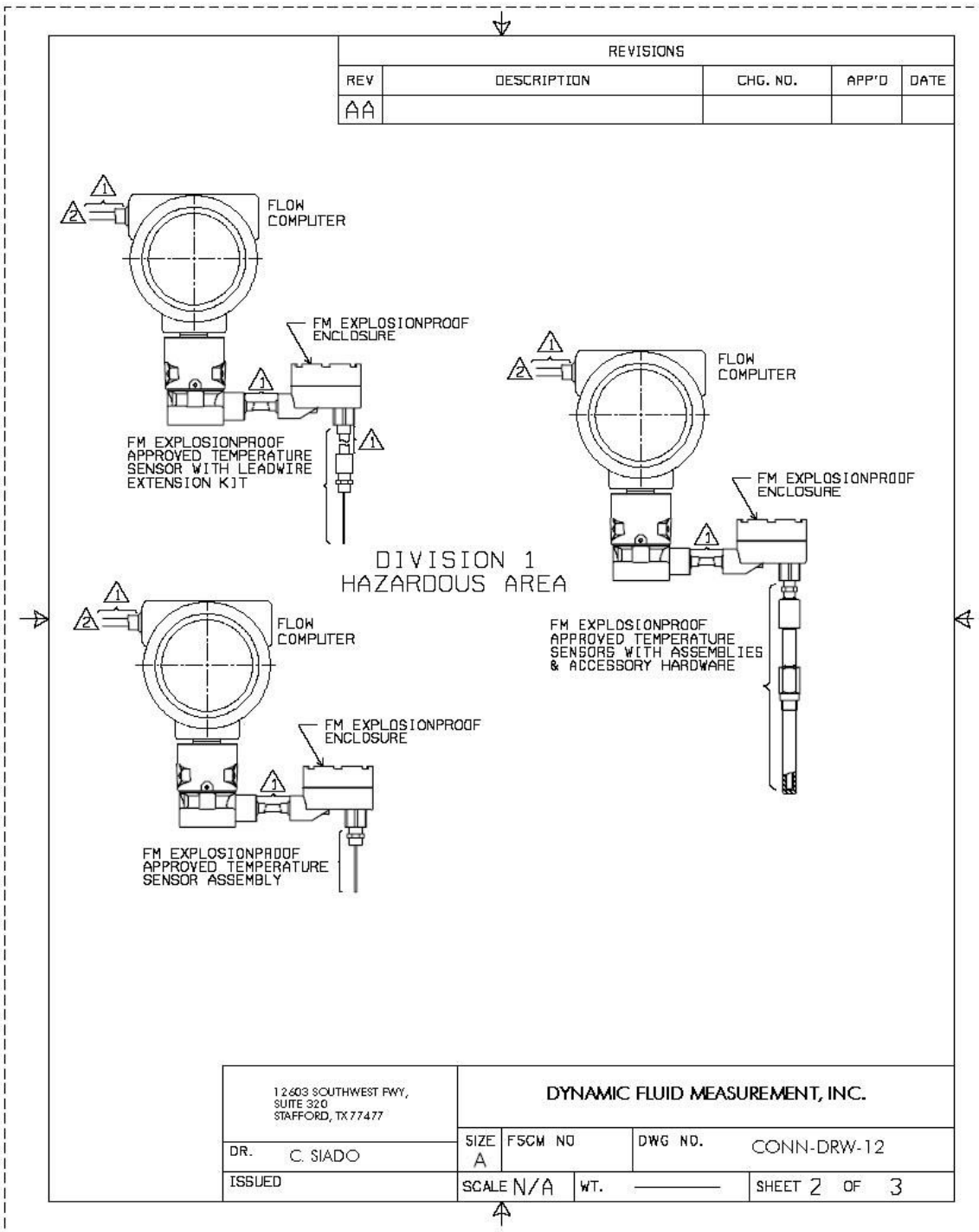
4. COMPONENTS REQUIRED TO BE APPROVED MUST BE FOR GAS GROUP APPROPIATE TO AREA CLASSIFICATION.

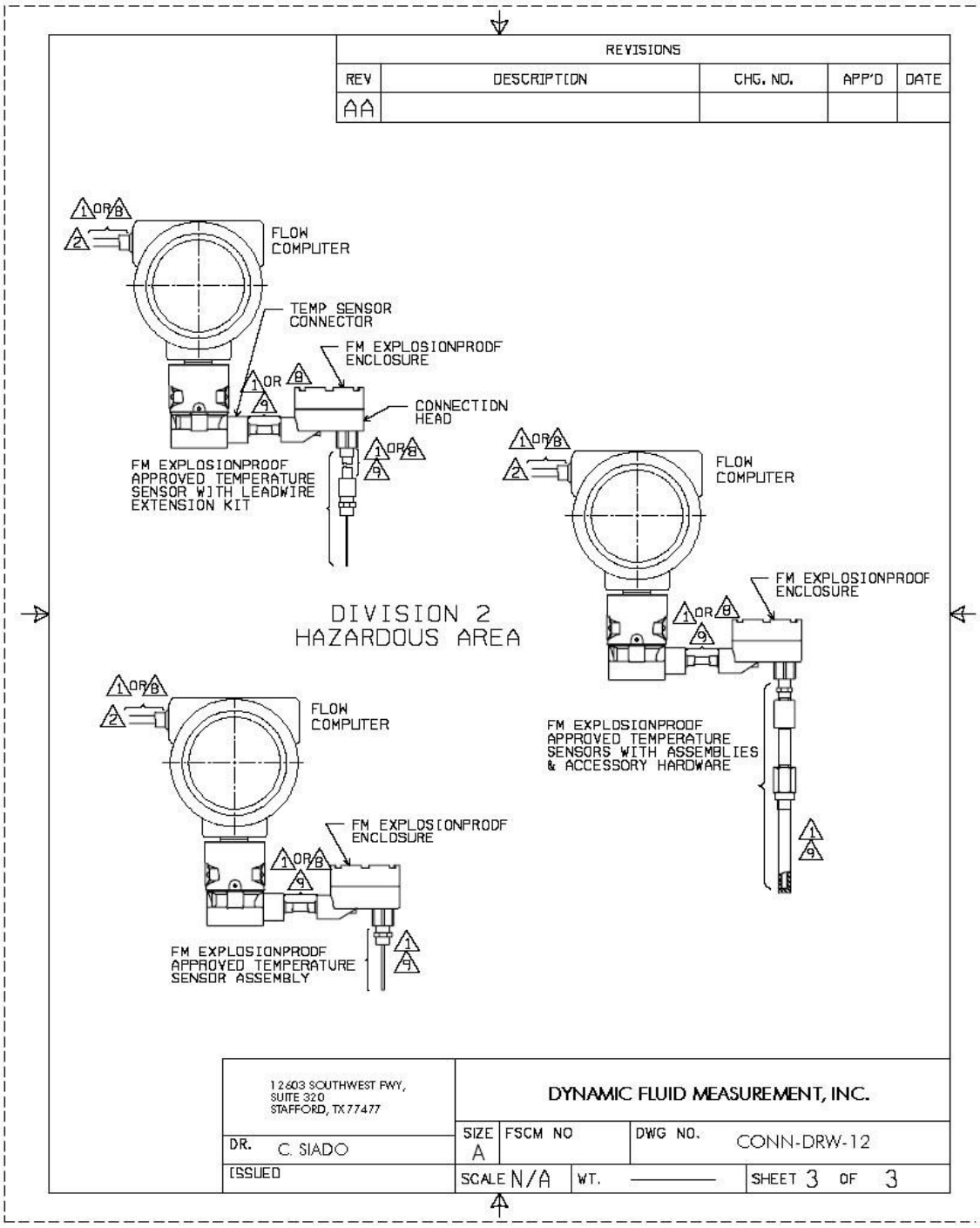
3. ALL CONDUITS THREADS TO BE ASSEMBLED WITH FIVE FULL THREADS MINIMUM.

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

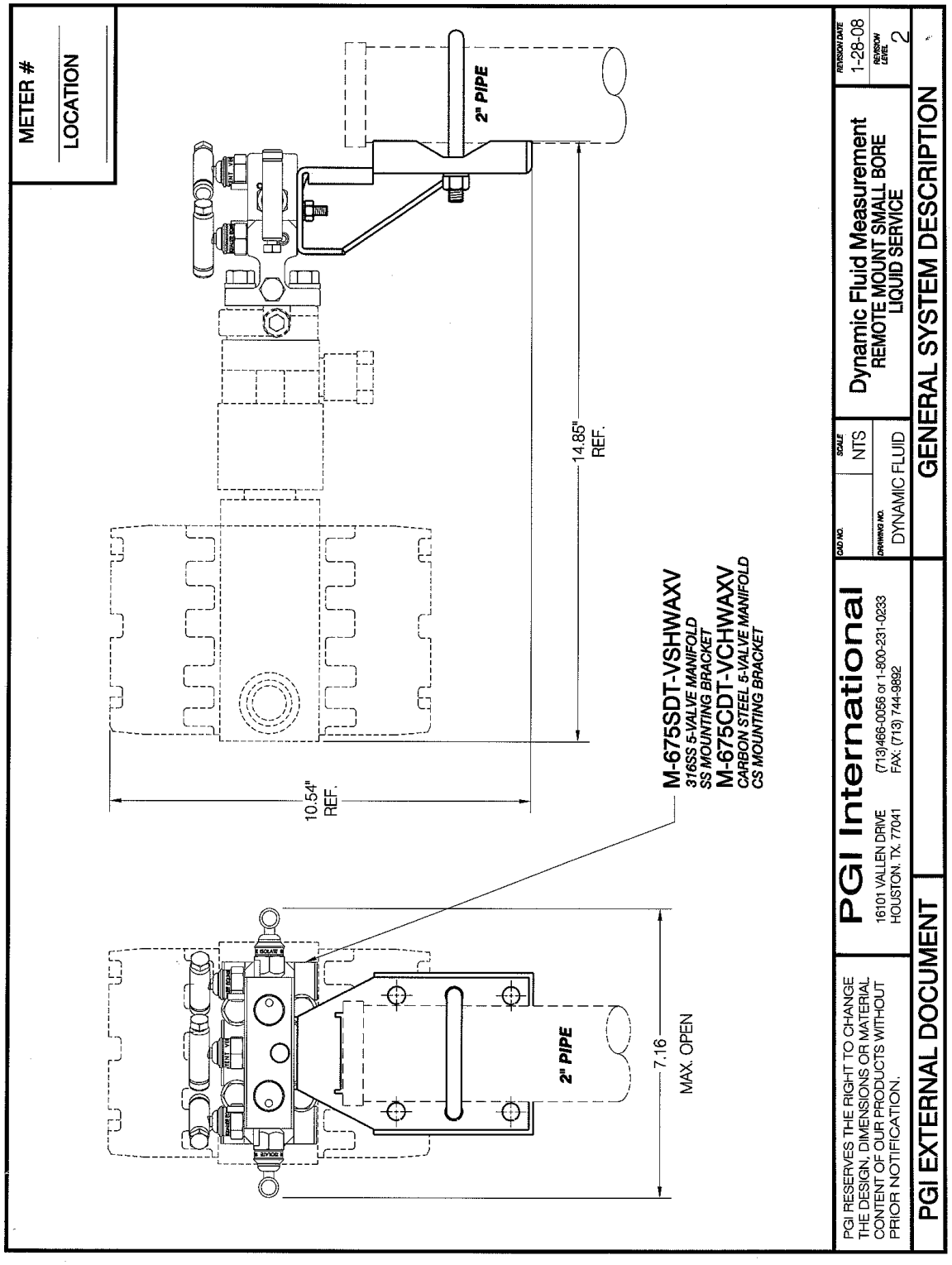
1. WIRING METHOD SUITABLE FOR CLASS I, DIV 1, ANY LENGTH.

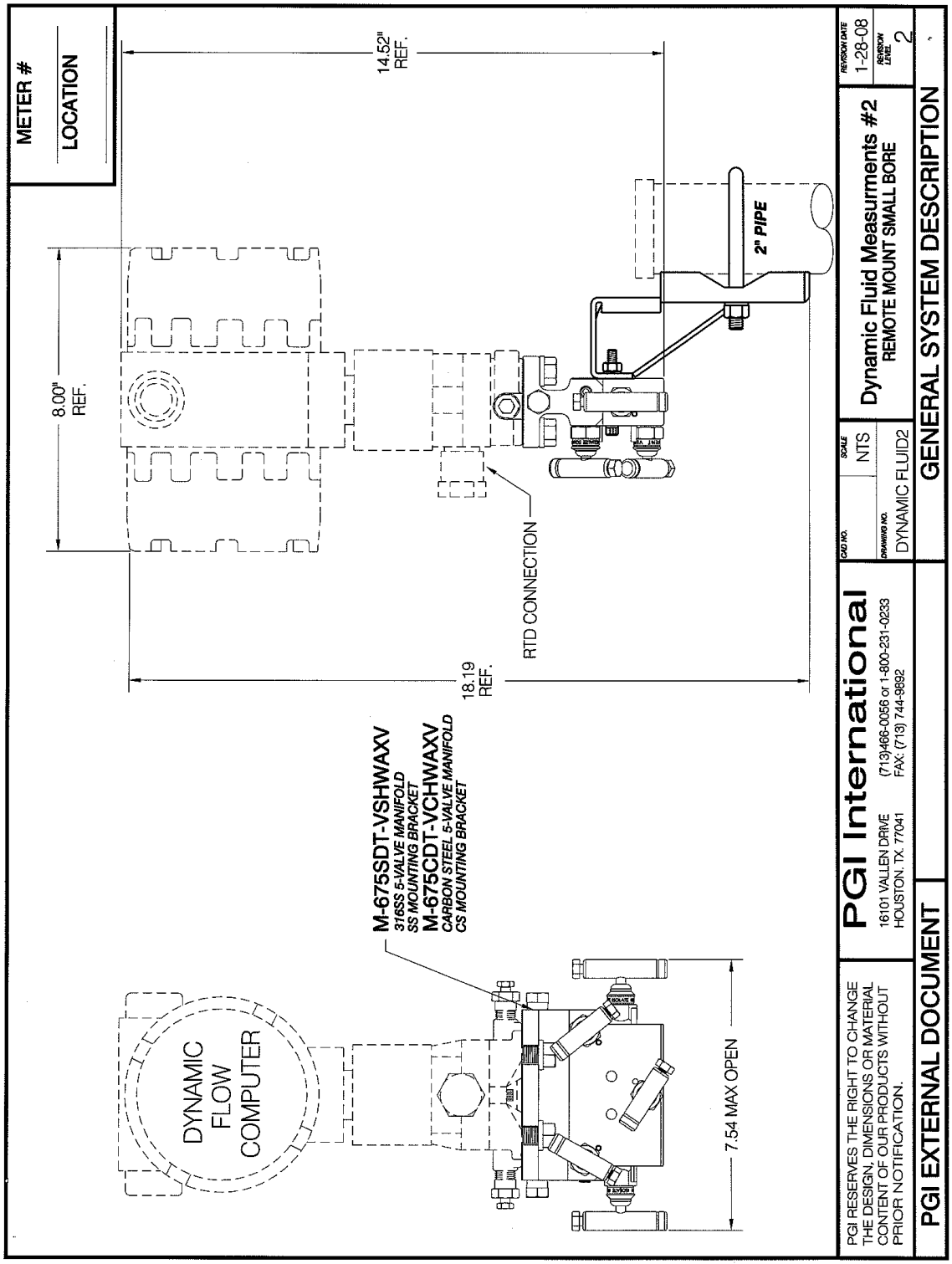
UNLESS OTHERWISE SPECIFIED DIMENSIONS IN INCHES [mm]. REMOVE ALL BURRS AND SHARP EDGES. MACHINE SURFACE FINISH 125	CONTRACT NO.	DYNAMIC FLUID MEASUREMENT, INC.	12603 SOUTHWEST FWY, SUITE 320 STAFFORD, TX 77477
	DR. C. SIADO	TITLE: MODEL MICROMV AND ECHART EXPLOSIONPROOF INSTALLATION DRAWING, FACTORY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

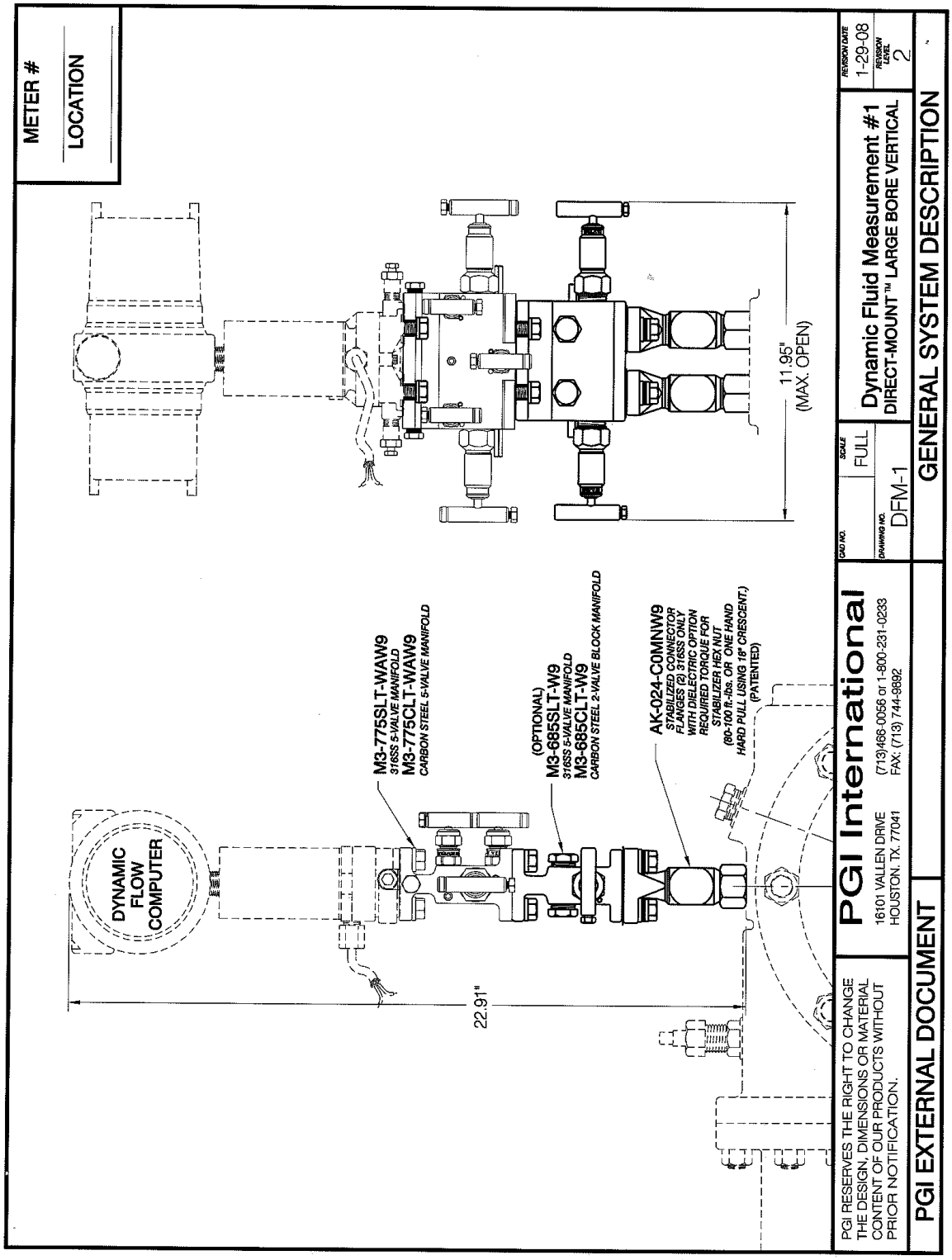

REVISIONS
REV
DESCRIPTION
CHG. NO.
APP'D
DATE
AA
FLOW COMPUTER
FM EXPLOSIONPROOF ENCLOSURE
FM EXPLOSIONPROOF APPROVED TEMPERATURE SENSOR WITH LEADWIRE EXTENSION KIT
FLOW COMPUTER
FM EXPLOSIONPROOF ENCLOSURE
FM EXPLOSIONPROOF APPROVED TEMPERATURE SENSORS WITH ASSEMBLIES & ACCESSORY HARDWARE
DIVISION 1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

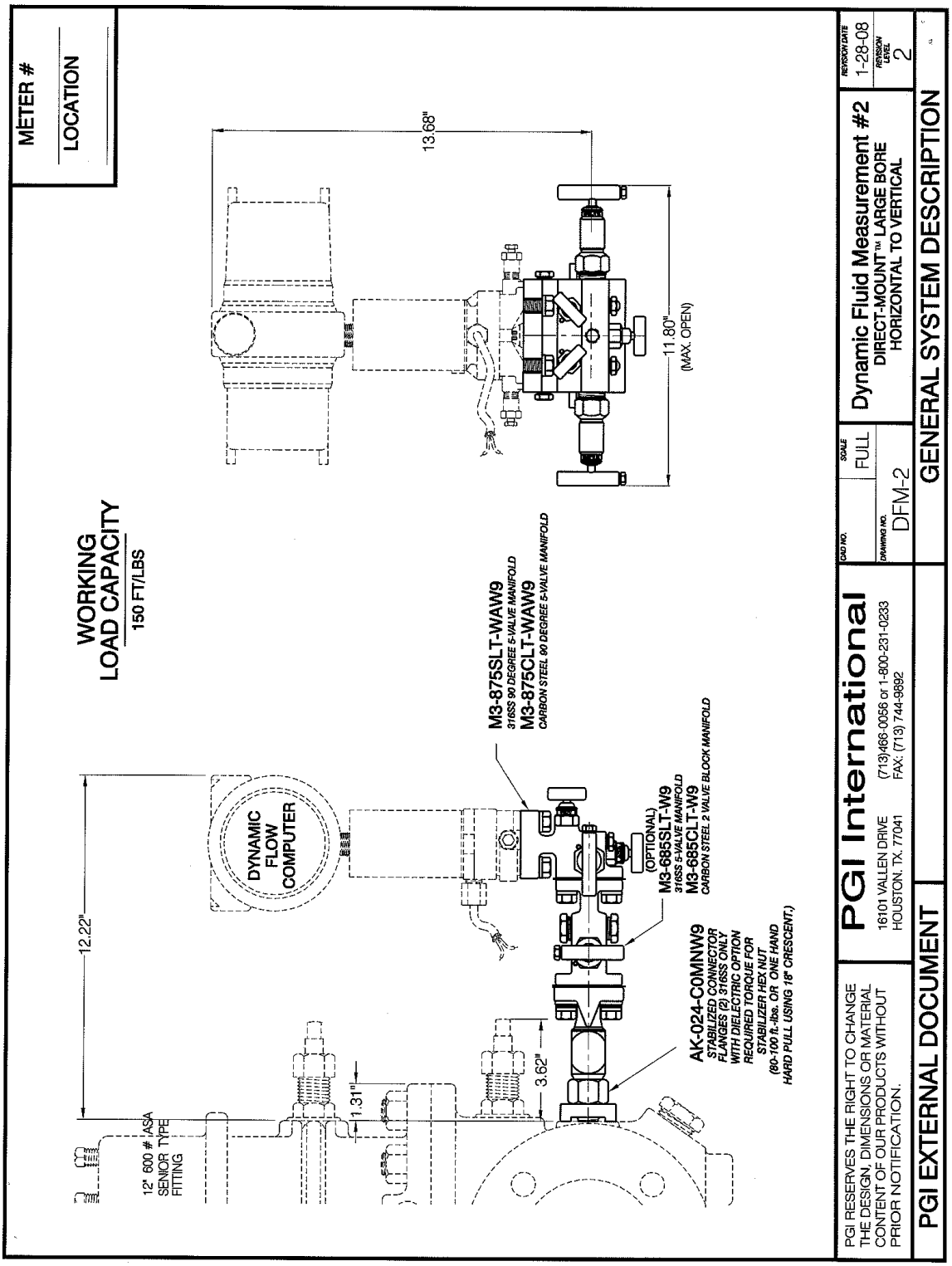

REVISIONS
REV
DESCRIPTION
CHG. NO.
APP'D
DATE
AA
FLOW COMPUTER
TEMP SENSOR CONNECTOR
FM EXPLOSIONPRODF ENCLOSURE
CONNECTION HEAD
FM EXPLOSIONPRODF APPROVED TEMPERATURE SENSOR WITH LEADWIRE EXTENSION KIT
DIVISION 2 HAZARDOUS AREA
FLOW COMPUTER
FM EXPLOSIONPRODF ENCLOSURE
FM EXPLOSIONPRODF APPROVED TEMPERATURE SENSORS WITH ASSEMBLIES & ACCESSORY HARDWARE
FLOW COMPUTER
FM EXPLOSIONPRODF ENCLOSURE
FM EXPLOSIONPRODF 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 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 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
GENERAL SYSTEM DESCRIPTION
PGI RESERVES THE RIGHT TO CHANGE THE DESIGN, DIMENSIONS OR MATERIAL CONTENT OF OUR PRODUCTS WITHOUT PRIOR NOTIFICATION.
PGI EXTERNAL DOCUMENT


METER #
LOCATION
DYNAMIC FLOW COMPUTER
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)
22.91"
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)
M3-875SLT-WAW9
316SS 90 DEGREE 5-VALVE MANIFOLD
M3-875CLT-WAW9
CARBON STEEL 90 DEGREE 5-VALVE MANIFOLD
DYNAMIC FLOW COMPUTER
(OPTIONAL)
M3-685SLT-W9
316SS 5-VALVE MANIFOLD
M3-685CLT-W9
CARBON STEEL 2 VALVE BLOCK MANIFOLD
12.22"
AK-024-COMNW9
STABILIZED CONNECTOR
FLANGES (2) 316SS ONLY
WITH DIELECTRIC OPTION
REQUIRED TORQUE FOR
STABILIZER HEX NUT
(60-100 ft.-lbs. OR ONE HAND
HARD PULL USING 18" CRESCENT.)
3.62"
1.31"
12" 600 # ASA
SENIOR TYPE
FITTING
PGI RESERVES THE RIGHT TO CHANGE THE DESIGN, DIMENSIONS OR MATERIAL CONTENT OF OUR PRODUCTS WITHOUT PRIOR NOTIFICATION.
PGI International
16101 VALLEN DRIVE
HOUSTON, TX. 77041
(713)466-0056 or 1-800-231-0233
FAX: (713) 744-9892
CAD NO.
DRAWING NO. DFM-2
SCALE FULL
Dynamic Fluid Measurement #2
DIRECT-MOUNT™ LARGE BORE
HORIZONTAL TO VERTICAL
REVISION DATE 1-28-08
REVISION LEVEL 2
PGI EXTERNAL DOCUMENT
GENERAL SYSTEM DESCRIPTION