MicroMP3/Micro100
Liquid Pulse
OPERATORS MANUAL

Flow Computer
Liquid Pulse Version

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Date: 12/17/2021

WARRANTY

Dynamic Flow Computers warrants to the owner of the Smart Flow Computer that the product delivered will be free from defects in material and workmanship for one (1) year following the date of purchase.
This warranty does not cover the product if it is damaged in the process of being installed or damaged by abuse, accident, misuse, neglect, alteration, repair, disaster, or improper testing.
If the product is found otherwise defective, Dynamic Flow Computers will replace or repair the product at no charge, provided that you deliver the product along with a return material authorization (RMA) number from Dynamic Flow Computers.
Dynamic Flow Computers will not assume any shipping charge or be responsible for product damage due to improper shipping.

THE ABOVE WARRANTY IS IN LIEU OF ANY OTHER WARRANTY EXPRESS IMPLIED OR STATUTORY. BUT NOT LIMITED TO ANY WARRANTY OF MERCHANTABILITY, FITNESS FOR PARTICULAR PURPOSE, OR ANY WARRANTY ARISING OUT OF ANY PROPOSAL, SPECIFICATION, OR SAMPLE.
LIMITATION OF LIABILITY:
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Date: 12/17/2021

CHAPTER 1: QUICK START

Introduction:

The MicroMP3 Liquid Flow Computer business was designed after careful consideration to our customers in all sectors of the oil and gas industry. It was built to address the different needs for refineries, chemical plants, gas processing plants, offshore platforms, pipeline and transmission, remote gas wells, and storage caverns. The focus has been to bring the different needs and requirements of these specialized industries into one hardware platform and therefore reducing the spare parts requirements, the training process, calibration, and overall cost of ownership. We believe the MicroMP3 Liquid Flow Computer has delivered and met the design intentions.

The MicroMP3 Liquid 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 MicroMP3 Liquid Flow Computer will be a simple pleasant experience, not intimidating in any way.

General Description: : The MicroMP3 is a three meters run bi-directional flow computer for the measurement of liquid products. Ten days of previous daily data, ten previous batch data, and ten previous hourly data are stored in the full format type reports. The previous 50 audit trail reports and 50 alarm reports are stored. Sixteen different product files are user-configurable with easy switch feature and product scheduling for batch operation.

One Rosemount multi-variable digital transducers can be connected to each MicroMP3 Liquid 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 MicroMP3 Liquid Flow Computer via RS485 serial interface.

The MicroMP3 Liquid 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 additional analog inputs, or two analog inputs and one three wire RTD inputs

One analog output.

One RS232, two RS485 with Modbus protocol, and one additional serial printer output.

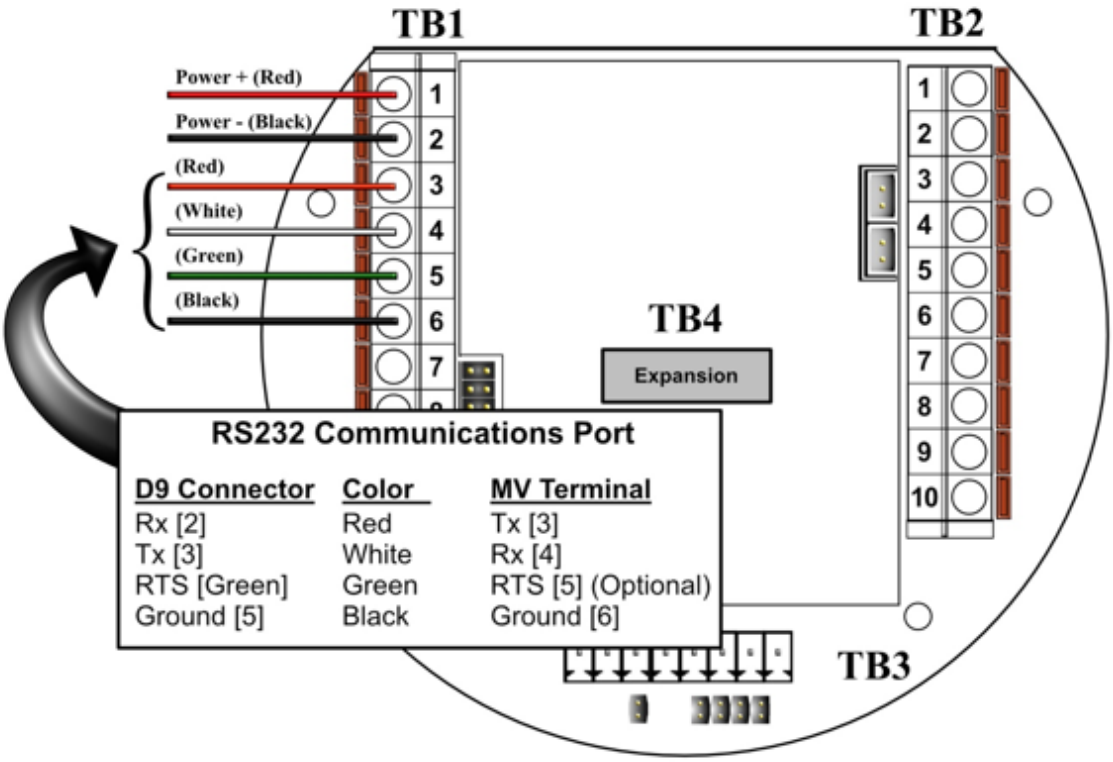
4 status inputs or digital outputs (user configurable). The fourth digital I/O is optional.

Prove expansion board has two additional digital outputs and one status input.

Quick Start Up

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

Main Board

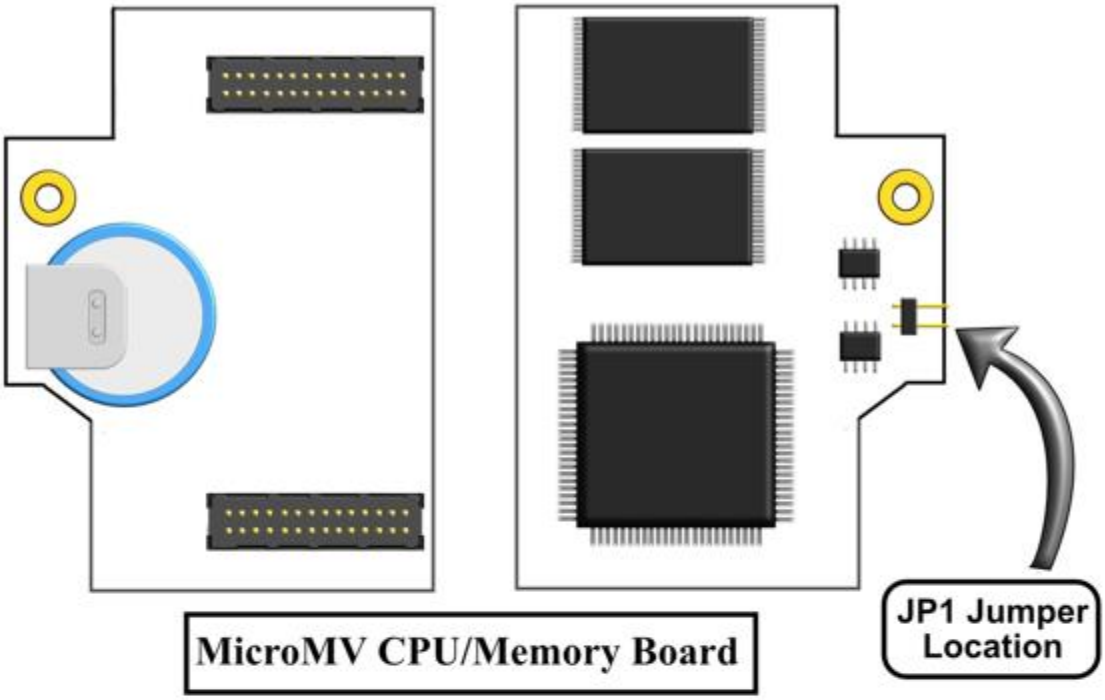


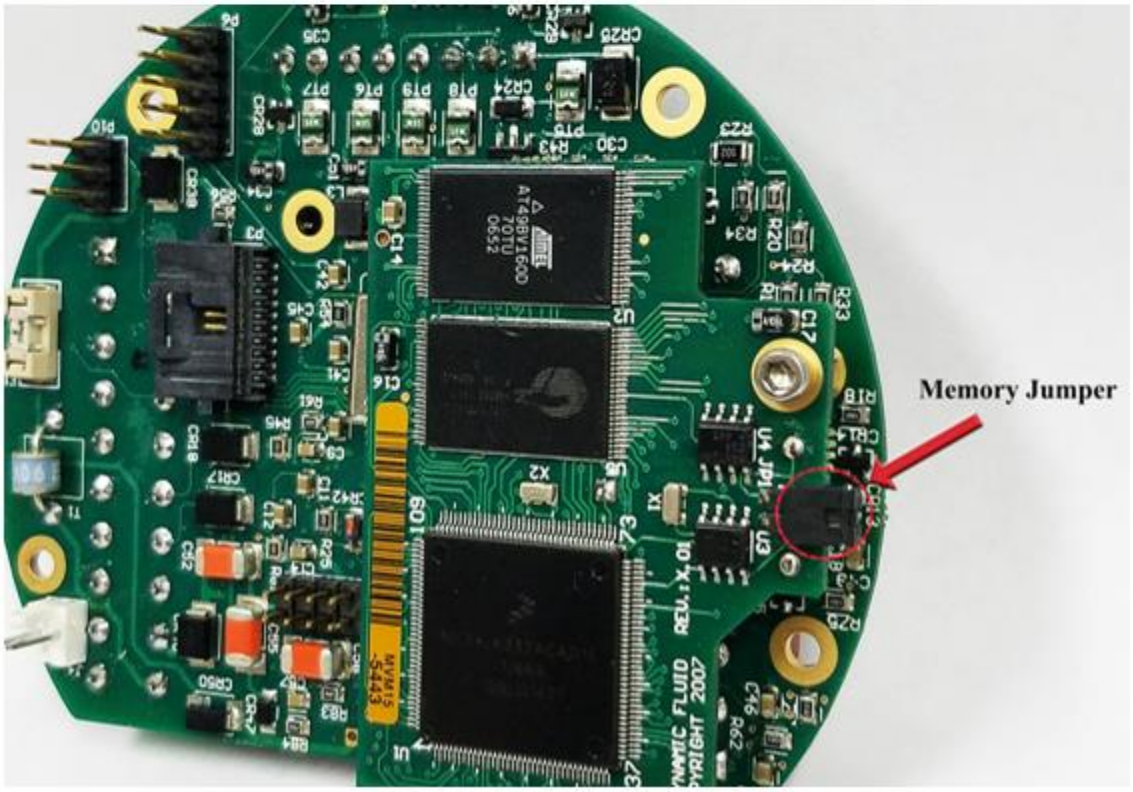
MV Step by Step Startup:

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**

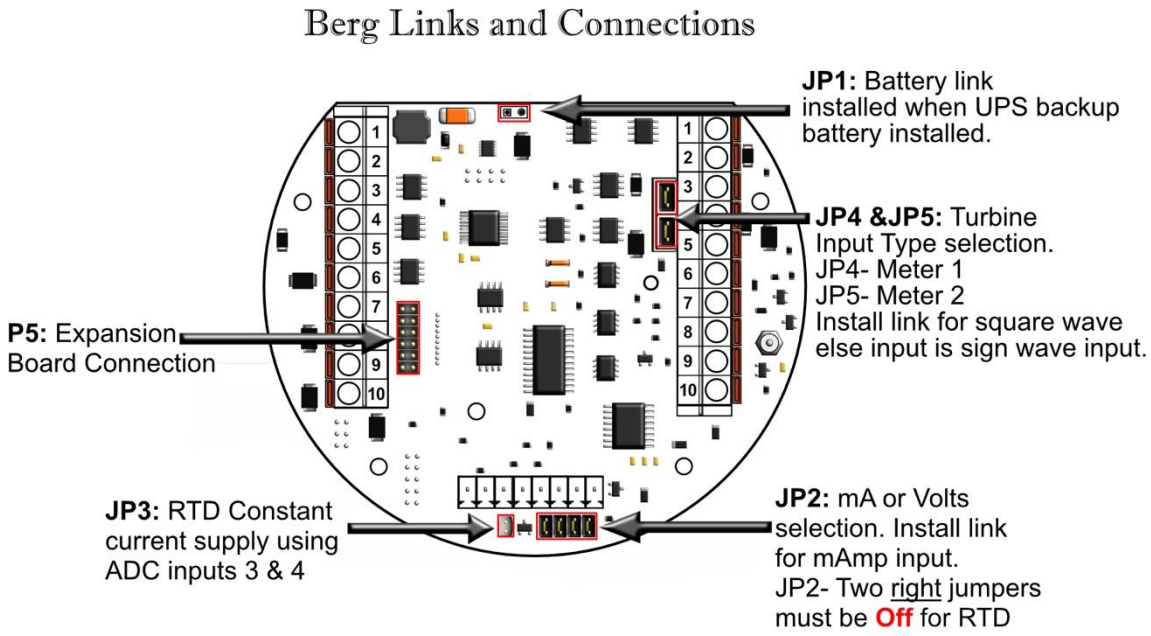
Version 2 - MicroMV Main/Memory Boards (Micro2009 and Later Model)

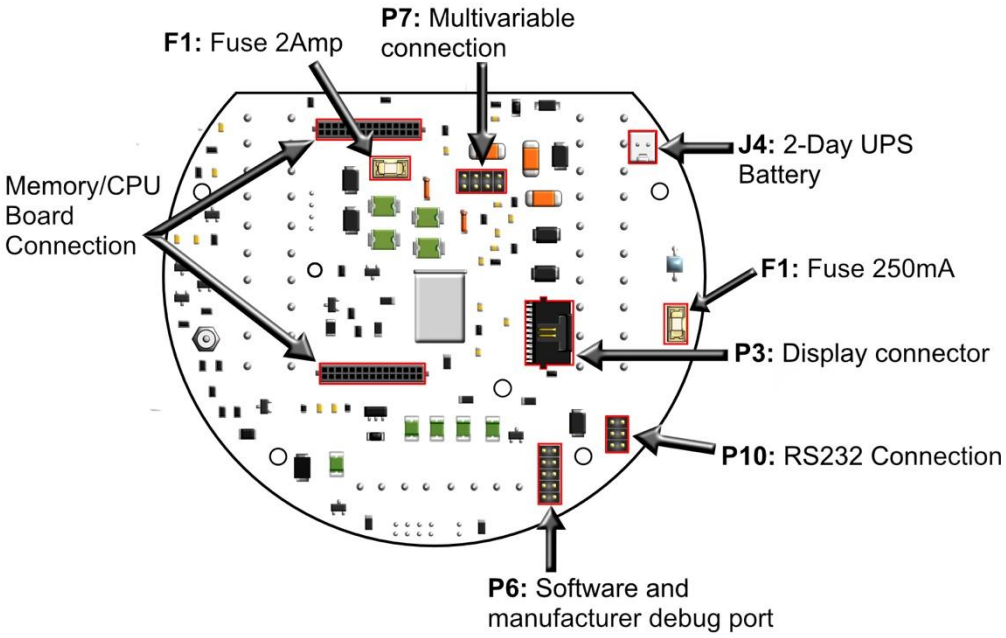
Memory/CPU Board



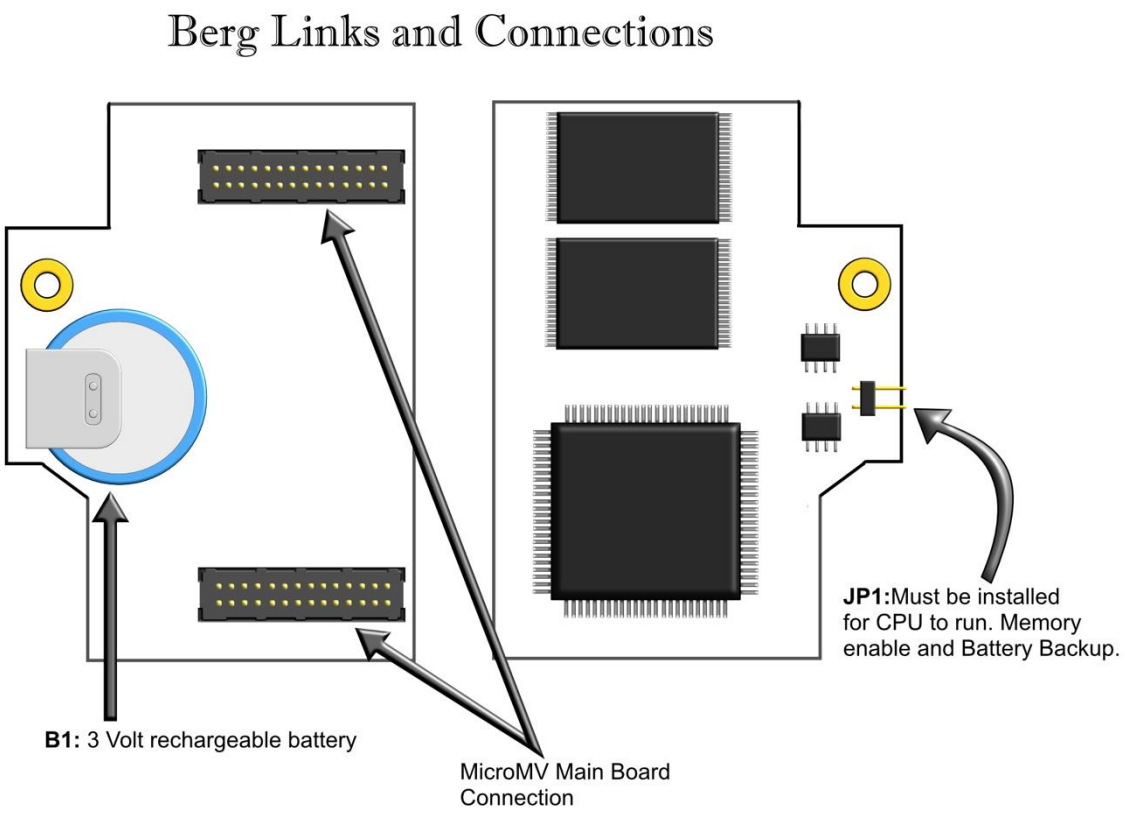


Version 2 - MicroMV Main Board (Micro2009 and Later Model)





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 > 5 VOLTS FOR SQUARE WAVE (Chanel 1 and 2 < 12 VOLTS)
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

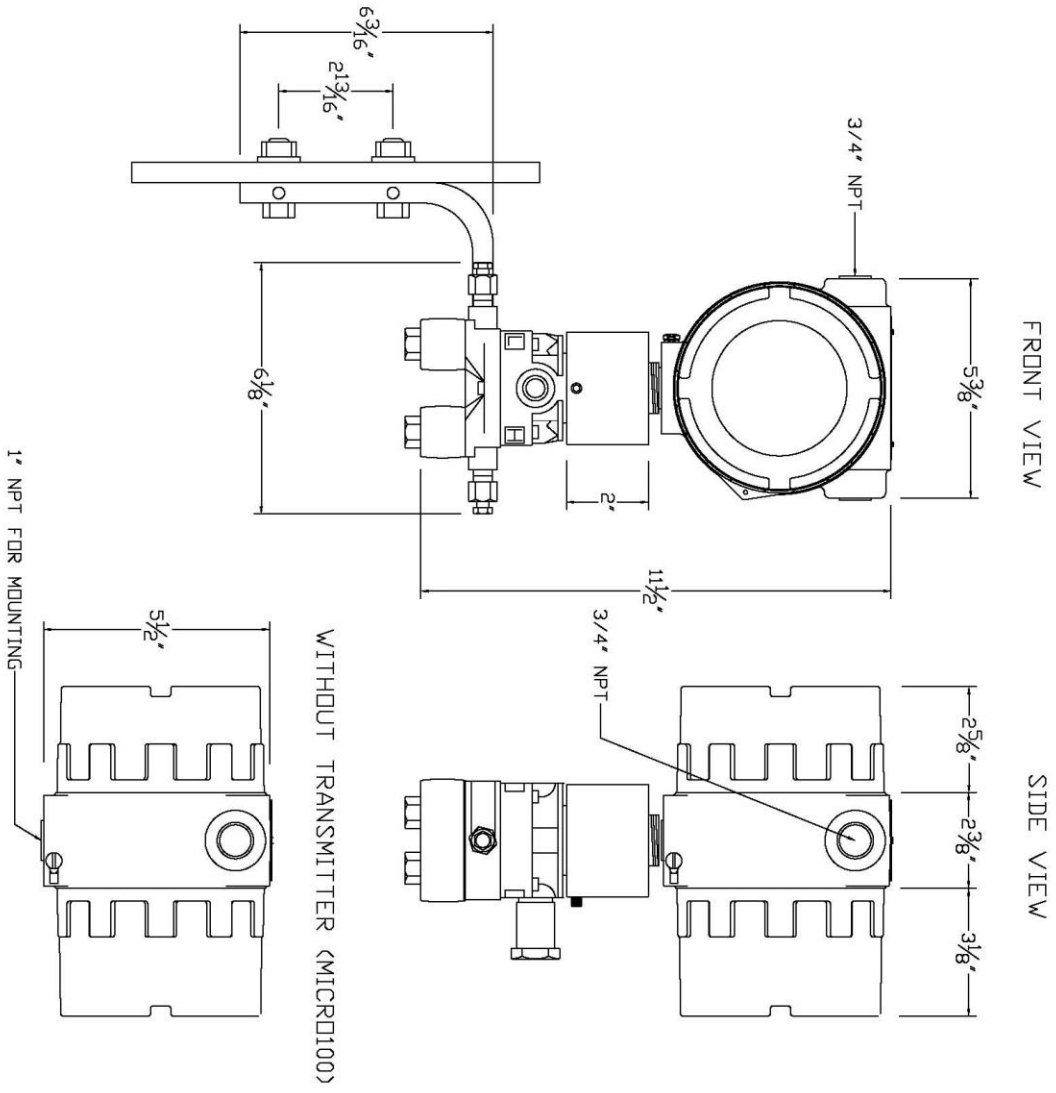
Parts List

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

PROVER MODULE DATA SHEET

POWER	
	• I/O VOLTAGE RANGE: 5-30 VDC • LOGIC OPEATING VOLTAGE: 3.3VDC
FEATURES	
	• HI SPEED 8051 PROCESSOR @ 40 MHZ • FIELD UPGRADABLE FIRMWARE • I/O IS DRY AND OPTICALLY ISOLATED FROM FLOW COMPUTER • DUAL AND SINGLE GATE PROVERS • DUAL CHRONOMETRY • FORWARD AND BI-DIRECTIONAL PROVERS
FREQUENCY INPUTS	
	• 2 FREQUENCY INPUT CHANNELS • SINE/SQUARE WAVE CAPABLE
GATES	
	• 2 GATES (DETECTOR SWITCH INPUTS) • SOFTWARE SELECTABLE SENSITIVITY • LOW RANGE FOR 9V TO 15V DETECTORS • HIGH RANGE FOR 18V TO 30V DETECTORS • GATES OPERATE WITH DIRECT OR REVERSE POLARITY
DIGITAL OUTPUTS	
	• TWO DIGITAL OUTS (SWITCH OUTPUTS) • OPEN COLLECTOR TYPE • OPERATING RANGE FROM 5V TO 30V • ABLE TO SINK UP TO 150mA
DIGITAL INPUTS	
	• ONE DIGITAL IN (STATUS INPUT) • OPERATING RANGE UP TO 30V

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, Windows 10)
- For Windows NT, 2000, XP or Vista: Administrator level access to create an ODBC system DNS.
- Minimum disk space available: 16 MB.
- 1 Serial Communication Port

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

What is a configuration file?

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

Downloading a configuration file to the flow computer.

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

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

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

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

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

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

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

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

What is an Image File?

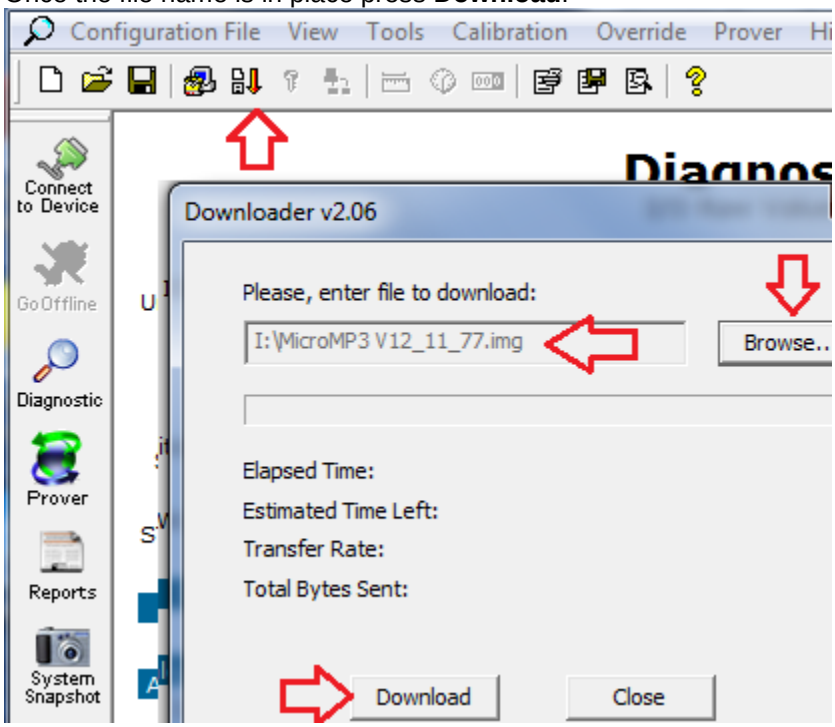
An image file is an EPROM code for a certain purpose (liquid, gas, prover, etc.) **The image file is only done when an application upgrade is needed**.
When an image file is downloaded to the flow computer, all the information in the computer is lost (configuration and historical data), so make sure to retrieve all the important information before changing the image file.

How to download an Image File

- Download an image file through **RS232 port** only.

- To Download an Image File to the Flow Computer select the **Tools | Download Program** option form the main menu or press the button in the toolbar.
- A small dialog will appear asking for the file name of the image file (Image file have the extension .img). Type it in or use the **Browse** button to locate it.

- Once the file name is in place press **Download**.

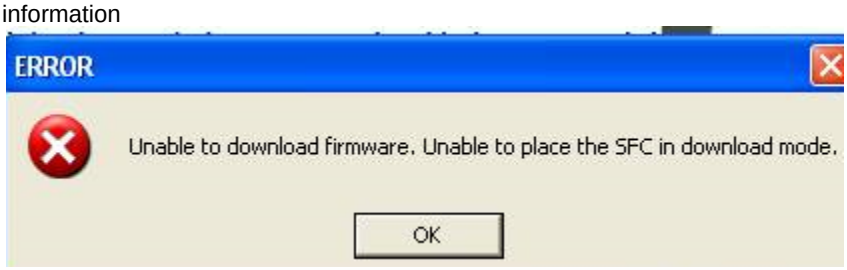


- If a retry message of small dialog appears, try to use **"Tools | Com Settings | Auto Detect Settings"** option, the user must insure that **only one MicroMV** computer is connected to the PC. More than one MicroMV Flow Computer in the loop will cause data collisions and unintelligible responses. Failure to communicate can occur because of a communication wiring problem, wrong PC port selection, communication parameter mismatch between PC and MicroMV (Modbus type, parity, baud rate, etc.) or lack of power to the MicroMV Flow Computer. After the device is detected, then you can follow steps described above.

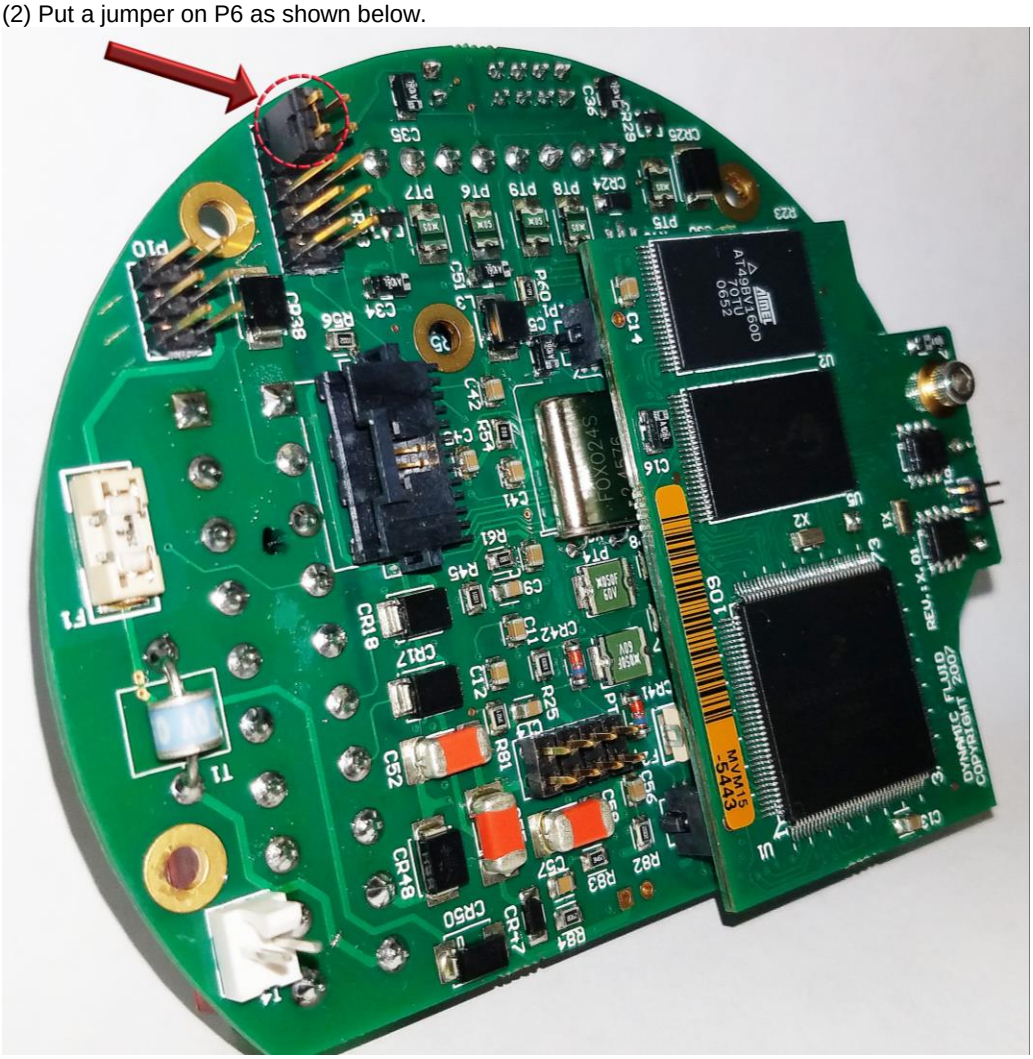
Warning messages will remind you that this action will erase **ALL** the information in the flow computer.
The download task will take about 7 minutes to be completed. Once the image file is in place, the flow computer is ready to be configured (enter calculation parameters and I/O assignments).

How to force a board into download mode

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



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

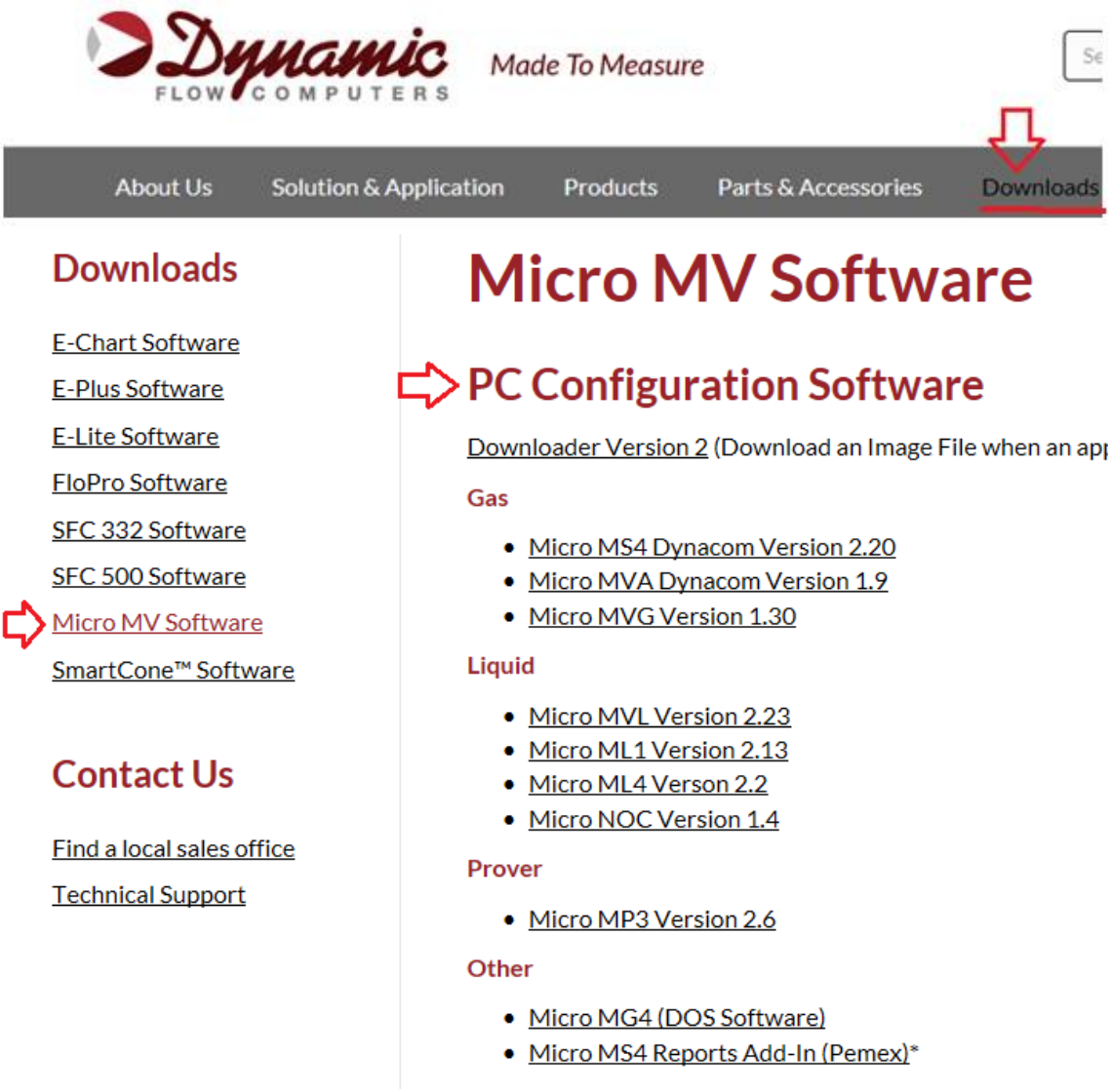


(3) Power up the board
(4) Board is in download mode
(5) Download image
(6) Remove power and jumper on P6 after a new image is loaded
(7) Board is ready

Website - DFC Configuration Software

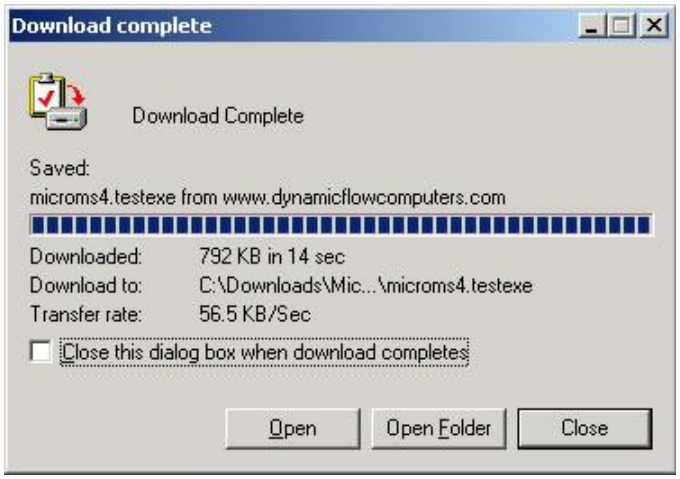
Step 1. Go to our website WWW.DYNAMICFLOWCOMPUTERS.COM

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



Step 3. Select application software based on Step 2.

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



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

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

Step 7. Follow the steps in the application setup.

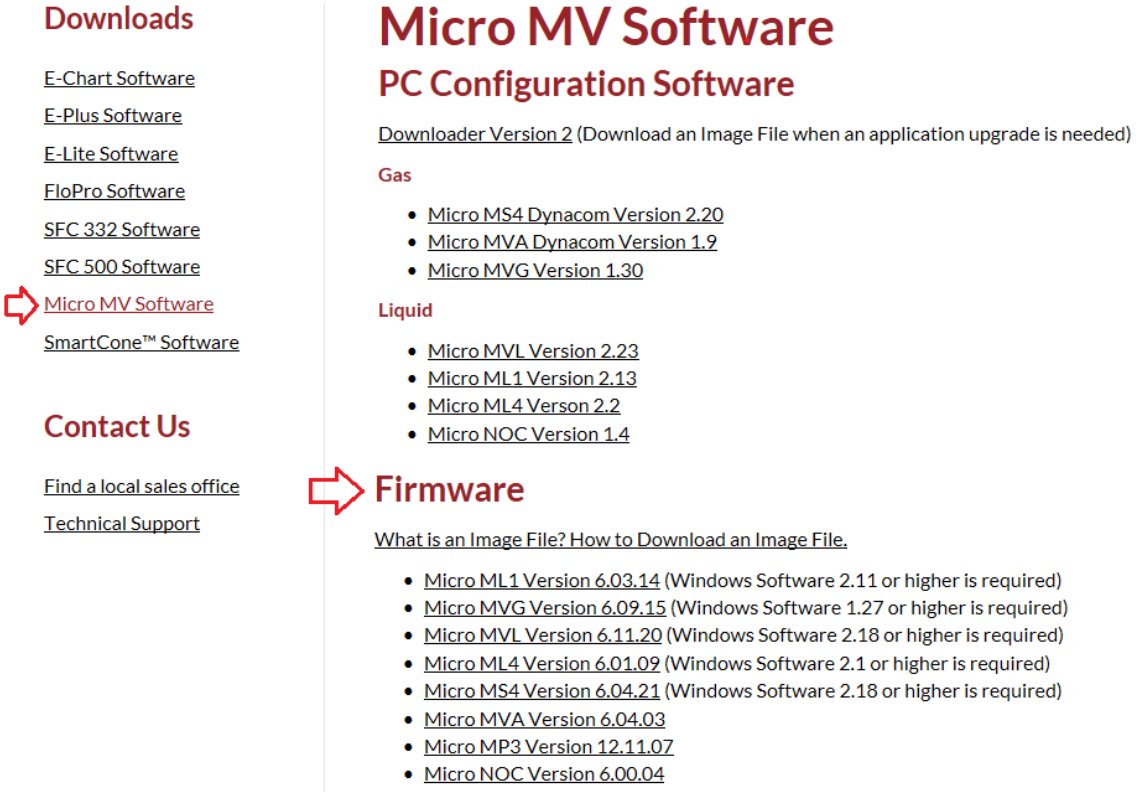
Website – Image File (Firmware)

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

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

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

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



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

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

Getting acquainted with the flow computer wiring:

Back Terminal Wiring:

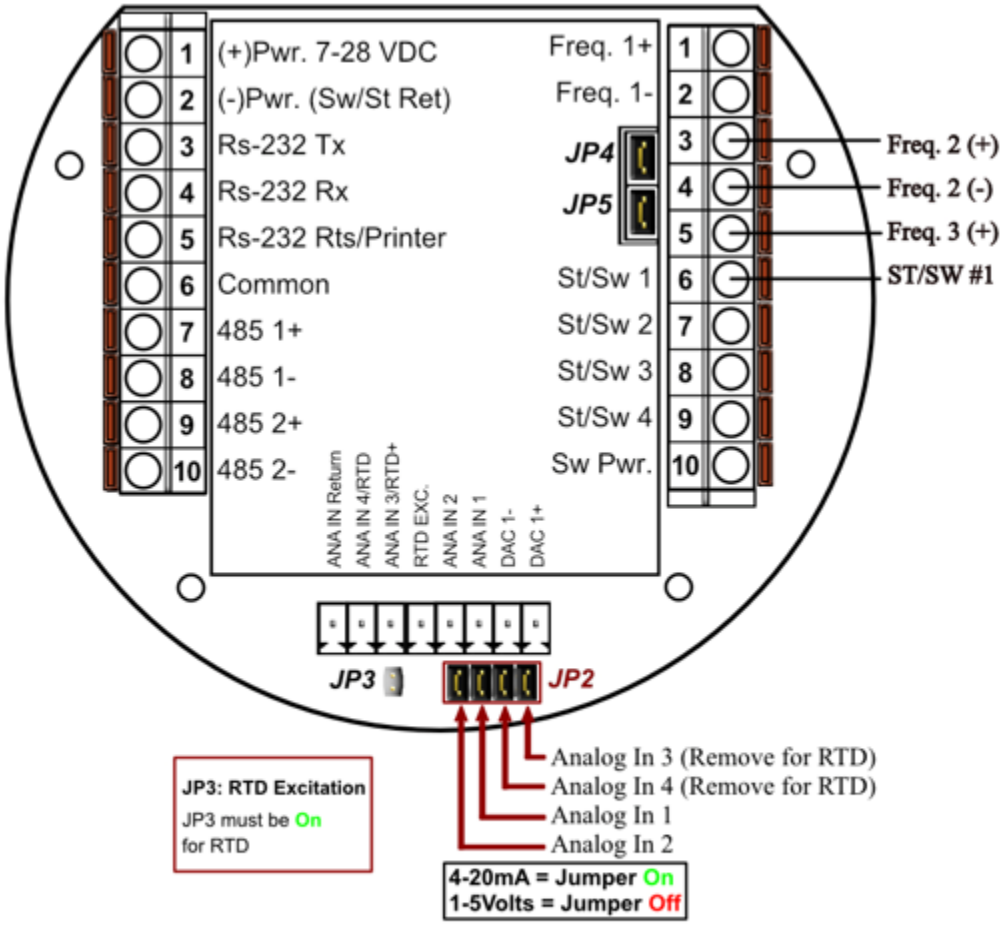
The back terminal wiring indicates the overall positions of the terminal plugs and their functions. Though the back panel's jumpers are also shown, refer to the next drawing, "Back Panel Jumpers", for information on their settings and functions.

The MicroMV receives its power via the .top two pins on Terminal P1, on the left of the board. Also on Terminal P1 from top to bottom are inputs to the four serial connections

To the right (P4), from top to bottom, are two turbine inputs, density frequency input, and switch/status inputs and output.

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

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



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

INPUT/OUTPUT: Assigning and Ranging Inputs

Input/Output Assignment

We will now configure your MicroMP3 Liquid Flow Computer's inputs and outputs. The flow computer allows the user to configure the inputs and outputs. The flow computer will not use the unassigned inputs.

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

1 Click "Configure Device", configuration menu is prompted

2 On configuration menu, click "Input Assignment"

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

4 **Assignment (1-*n*).** Assignments 1-4 are analog inputs attached to terminal of the back panel. These inputs accept 4-20mA or 1-5 volts input (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 Multi-variable module only. DP, pressure, and temperature for the meter can be assigned. When a frequency type primary element is hooked to the flow computer, the Multi Variable pressure and temperature can be used and the DP becomes a spare input that could be assigned for strainer differential.

Ranging the Transmitter Inputs:

1. **Enter the range values for analog inputs**: after assigning the analog inputs, click square box next to the assignment to scale the 4-20mA. Enter the value at **`@4mA`** and **`@20mA`**. Enter both values similar to the way the transmitter is ranged. 1-5 volts are equivalent to 4-20mA. Enter the 1 Volt value at the 4mA, and 5 volt value at 20mA. When the Multi Variable is used the 4-20 ma scale has no effect on anything and does not need to be configured for that input. The reason is simply that the flow computer gets the data via digital communication from the transmitter in engineering units, and therefore a scale is not needed. Normal pressure range is 0-3626, temperature –40 to 1200, DP –250 to 250, or -830 to 830 inches of water.
2. **Enter the high and low limits**: high limits and low limits are simply the alarm points in which you would like the flow computer to flag as an alarm condition. Enter these values with respect to the upper and lower range conditions. Try to avoid creating alarm log when conditions are normal. For example: If the line condition for the pressure is between 0 to 500 PSIG, then you should program less than zero for low pressure alarm, and 500 or more for high pressure alarm. High limits are also used in the SCALE for the Modbus variables. The high limit is equalant to 32767 or 4095. The low limit is not used for calculating the scale. The scale starts at zero to wherever the high limit value.
3. **Set up the fail code:** **`Maintenance`** and **`Failure Code`** values tell the flow computer to use a default value in the event the transmitter fails. The default value is stored in **`Maintenance`**. There are three outcomes: the transmitter value is always used, no matter what (**`Failure Code`** = 0); the **`Maintenance`** value is always used, no matter what (**`Failure Code`** = 1); and the **`Maintenance`** value is used only when the transmitter's value indicates that the transmitter has temporarily failed (**`Failure Code`** = 2).

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

WIRING:

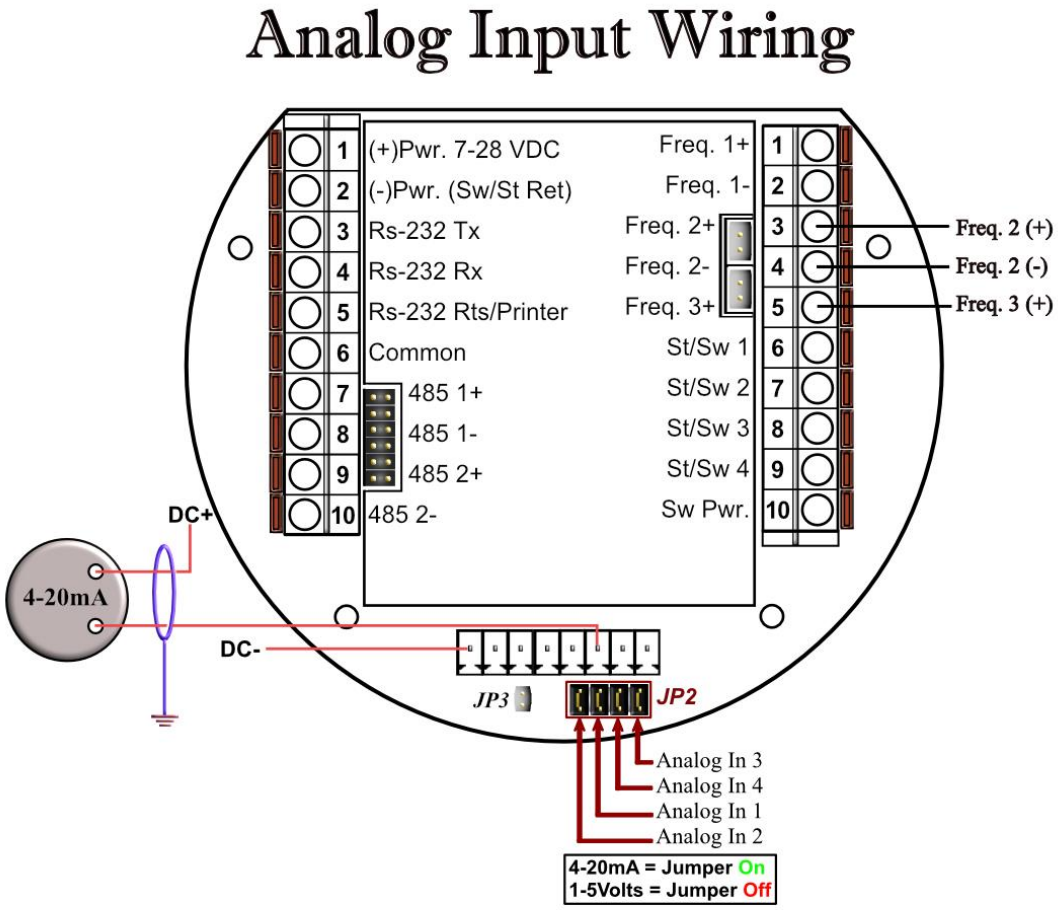
Wiring to the flow computer is very straightforward and simple. But still it is very important to get familiar with the wiring diagram.

Wiring of Analog Inputs: Version 2 Board

MicroMV Main/Memory Boards (Micro2009 and Later Model)

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

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

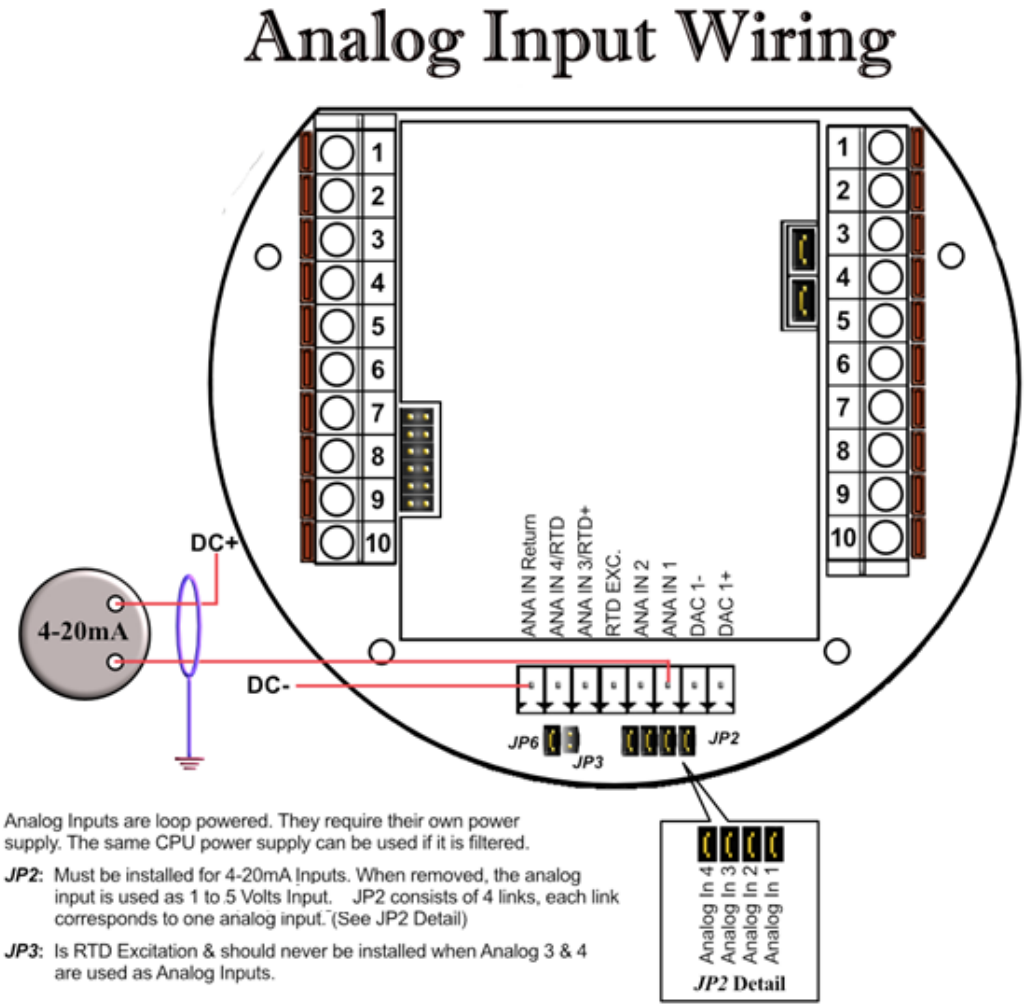


Wiring of Analog Inputs: Version 1 Board

MicroMV Board (Older MicroMV Models)

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

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



Analog Inputs are loop powered. They require their own power supply. The same CPU power supply can be used if it is filtered.

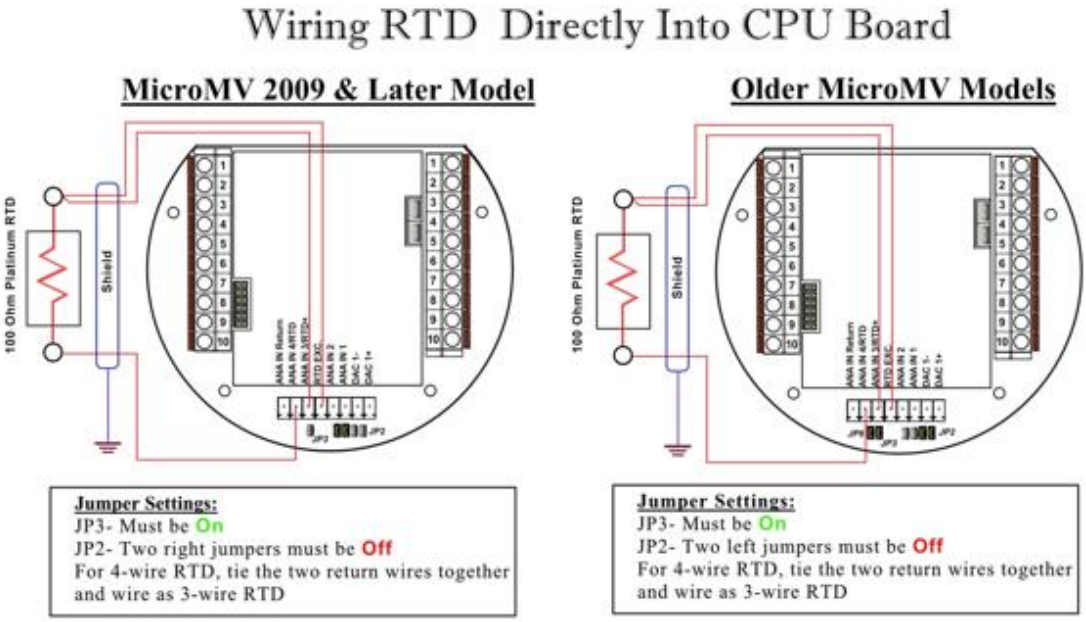
JP2: Must be installed for 4-20mA Inputs. When removed, the analog input is used as 1 to 5 Volts Input. JP2 consists of 4 links, each link corresponds to one analog input. (See JP2 Detail)

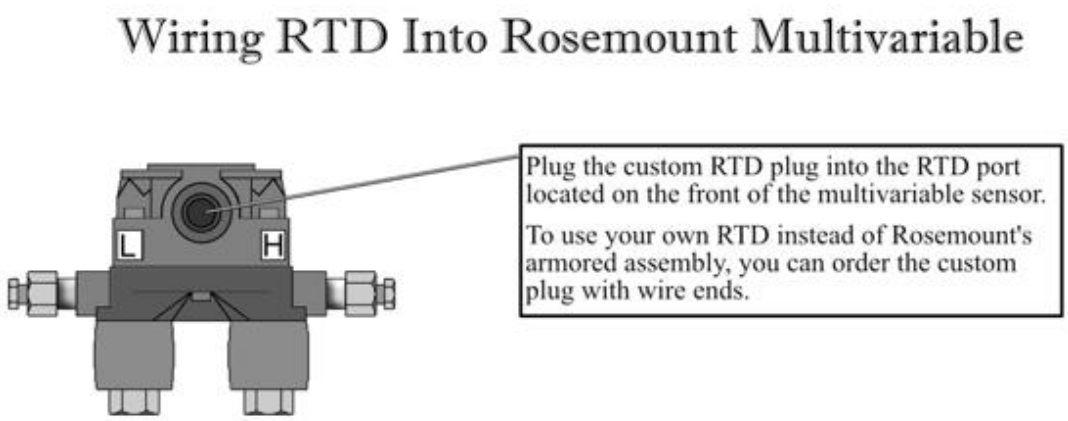
JP3: Is RTD Excitation & should never be installed when Analog 3 & 4 are used as Analog Inputs.

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.

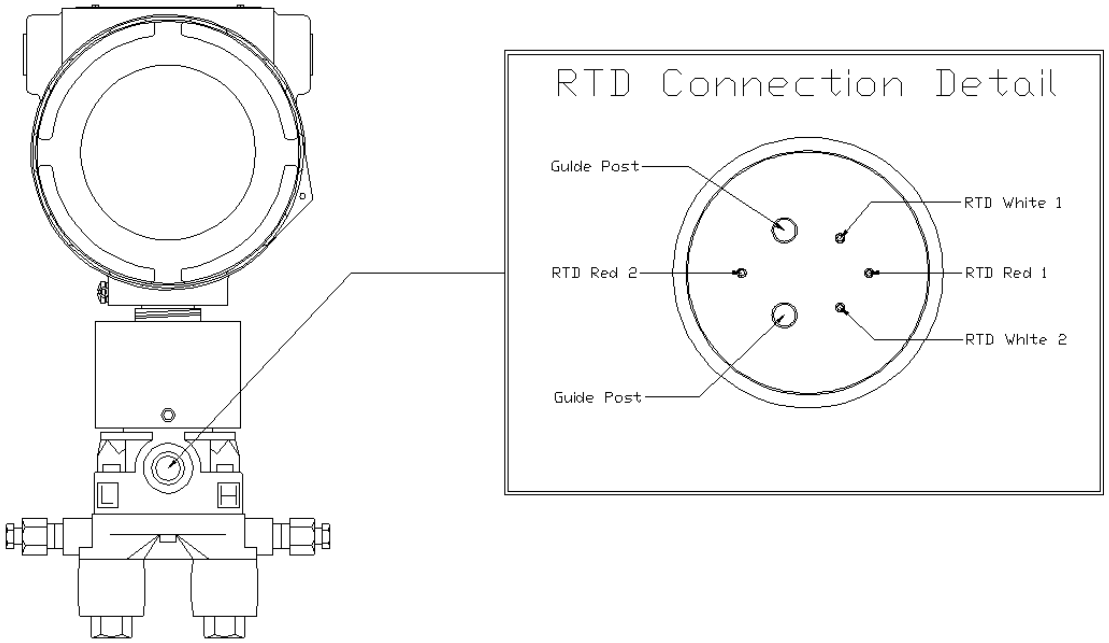
Wiring of RTD

100Ω platinum **must** be used; a temperature range of -43°F to +300°F can be measured. JP2 Jumper Settings – Two right jumpers must be OFF for MicroMV 2009 and Later Model. For Older MicroMV models – Two left jumpers must be OFF. The RTD excitation jumper (JP3) has to be installed for the RTD to function. In the figure below, notice that the RTD requires three wire connections. Internal excitation current source generated is in the micro AMP range.

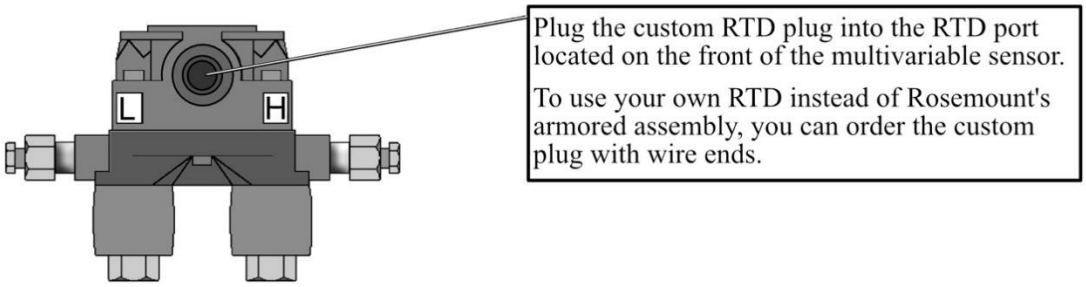




Rosemount RTD Connection

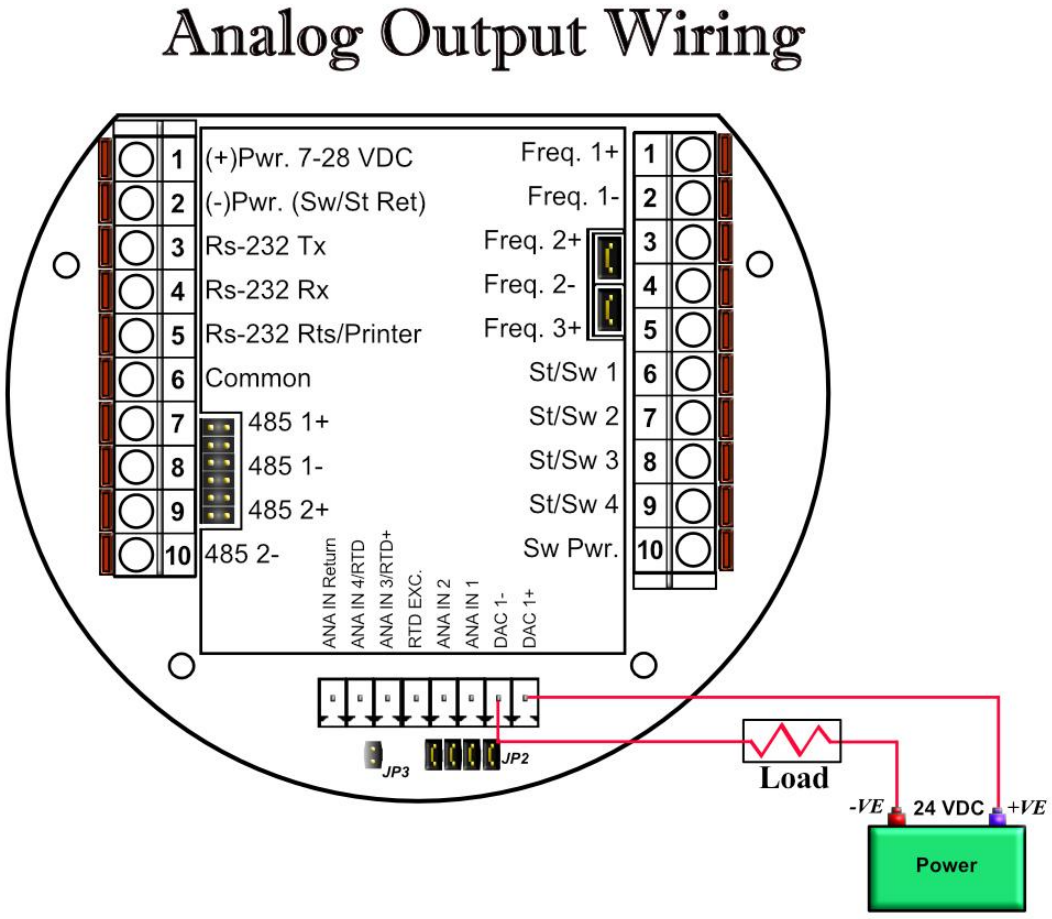


Wiring RTD Into Rosemount Multivariable



Wiring of Analog Output:

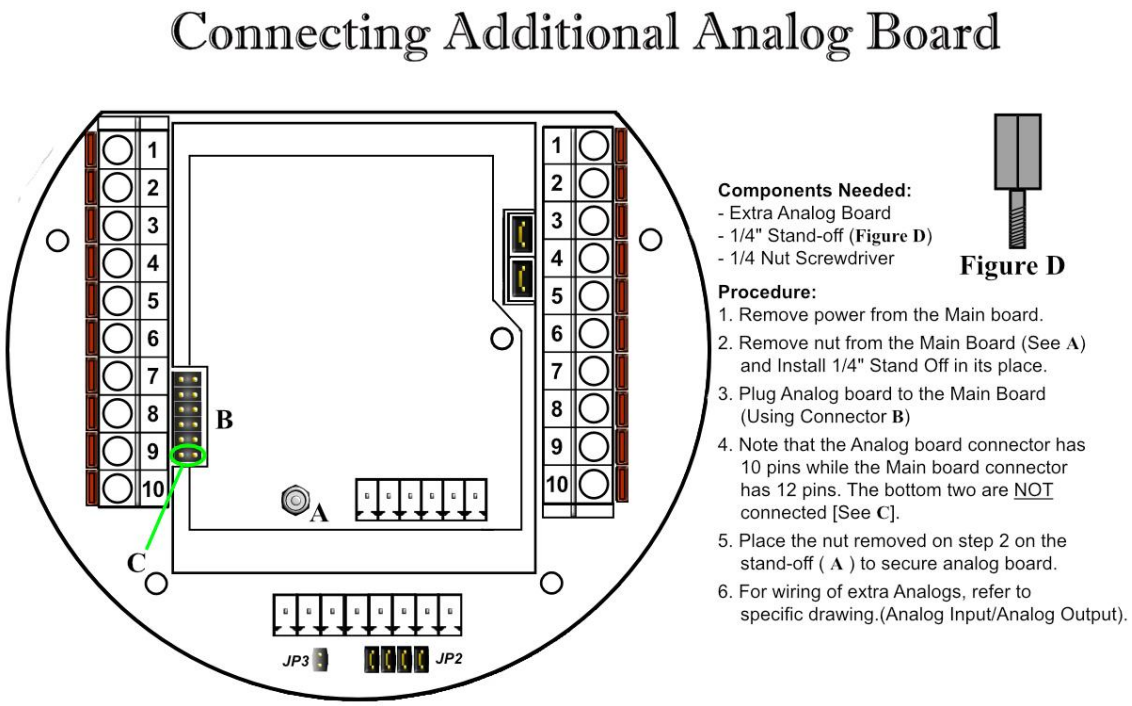
Wiring diagram shows typical Analog output wiring. Notice that analog outputs will regulate 4-20mA current loops but DOES NOT source the power for it. External power is required.



Assigning/Ranging the 4-20mA Analog Outputs:

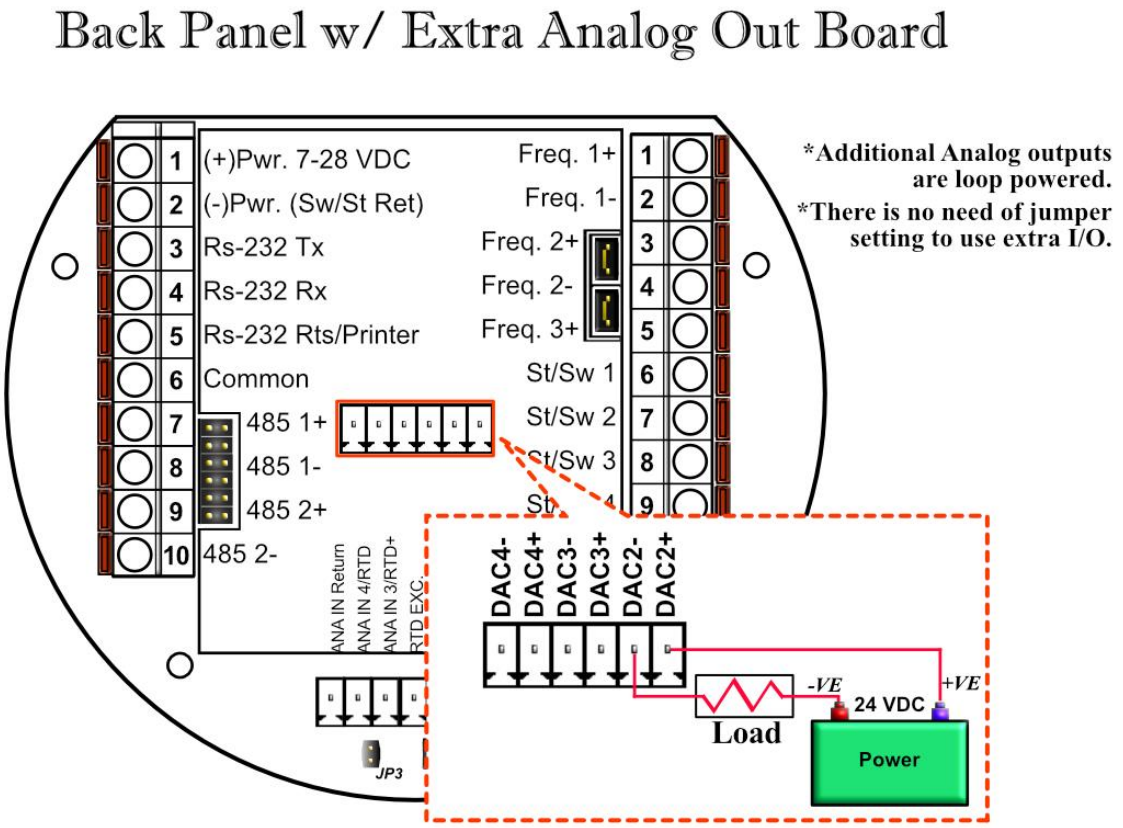
Go to the **`I/O`** assignment main menu and click **`Analog Output Assignment`**. A selection menu is prompted. Select the analog output number, and then enter what the 4mA output will indicate and the 20mA. Make sure that the 20mA assignment value exceeds the upper range limit of what you assigned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

Additional Analog Inputs or Analog Outputs – Board Installation



Back Panel - Additional Analog Outputs

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



Additional Prover Board – Board Installation

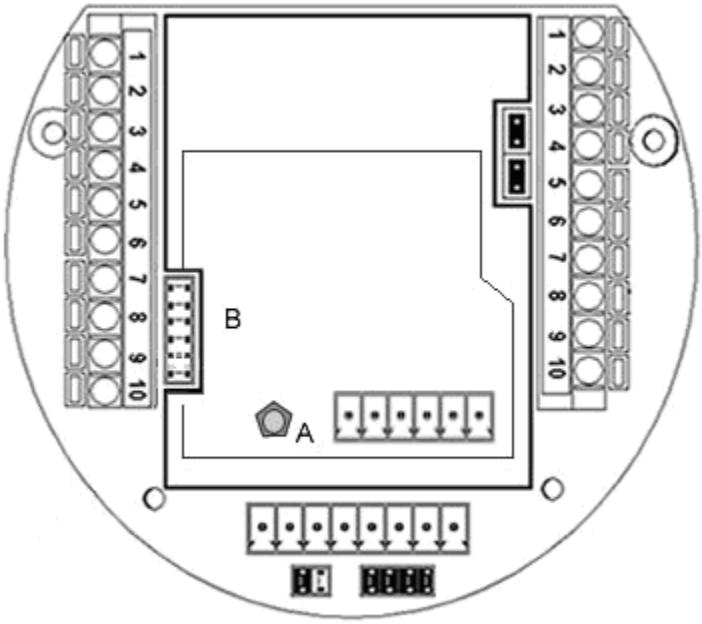


Figure D

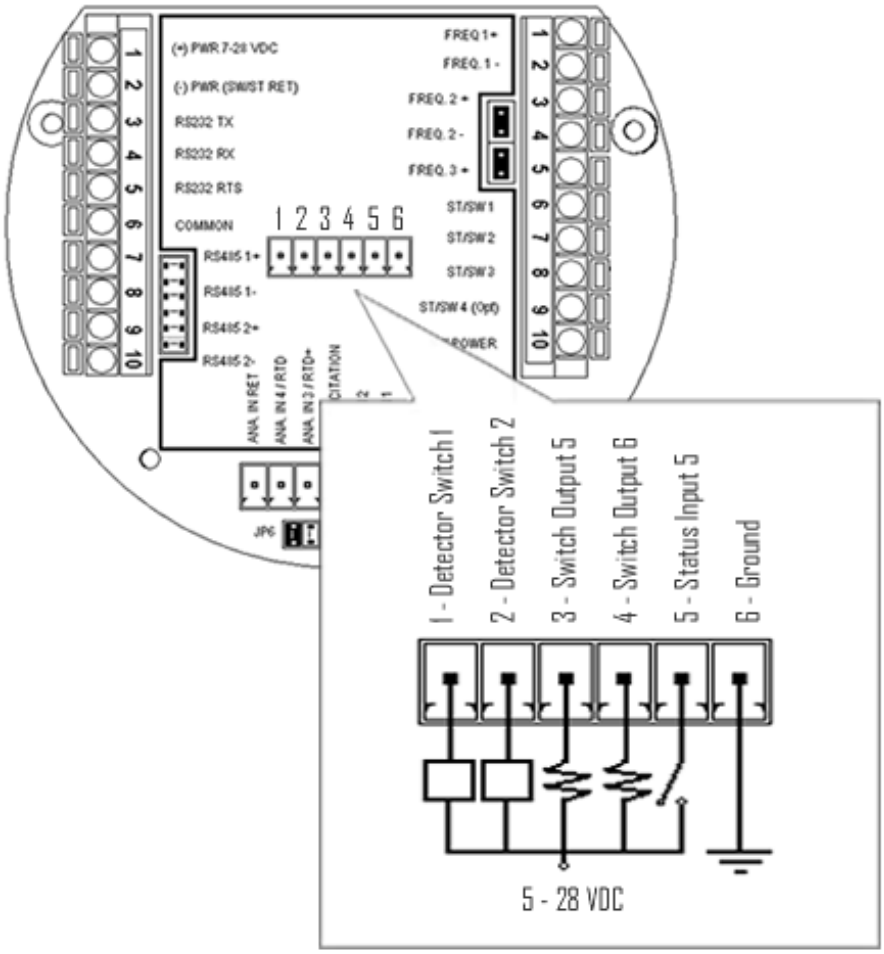
Components Needed:

- Prover Board
- ¼" Stand Off (Figure D)
- ¼" Nut Screw driver

Procedure:

1. Remove power from the Flow Computer
2. Remove nut from the main board (See A) and install ¼" Stand-off in its place
3. Plug Analog board to the main board using 12-pin connector B.
4. Place the nut removed on step 2 onto stand-off to secure the board (See A)
5. For wiring of the prover I/O follow the prover wiring diagrams.

Back Panel – Prover Board Wiring



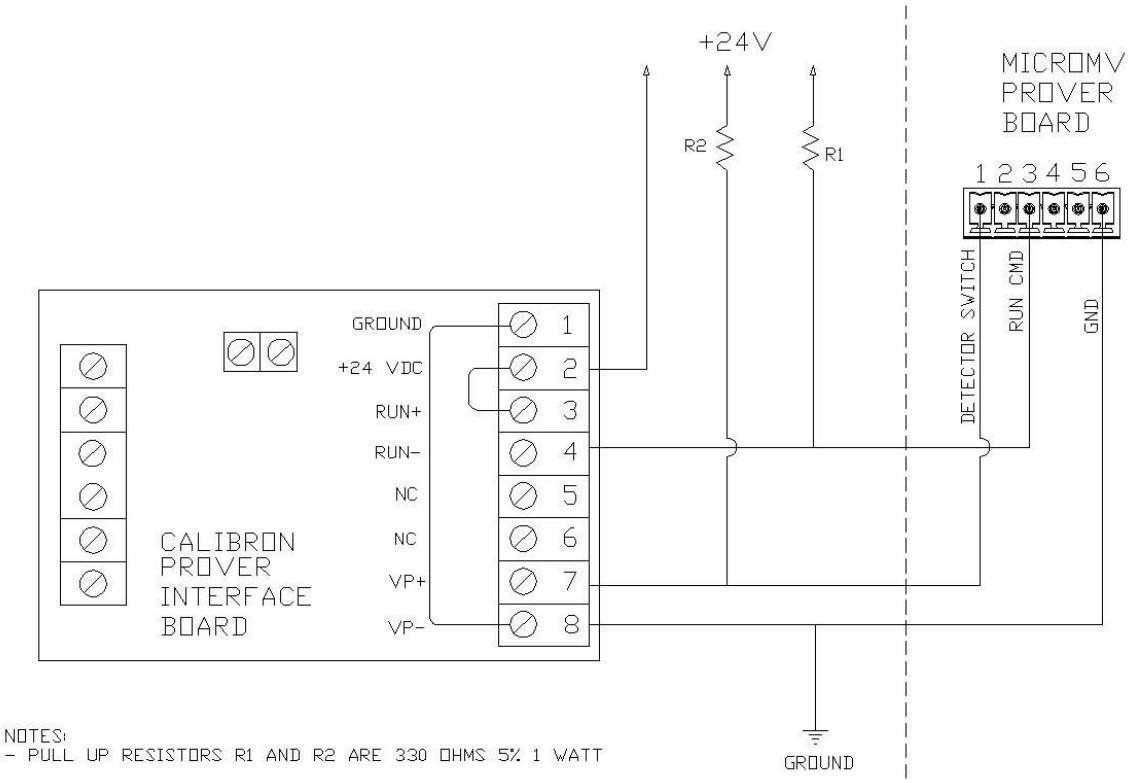
NOTE: The prover board inputs and outputs are dry and optically isolated from the main board.

Detector Switches 1 & 2
They have software selectable Sensitivity Mode
With Sensitivity **LOW** Range they work from 9 to 12V detectors
With Sensitivity **HIGH** Range they work from 18V to 30V detectors

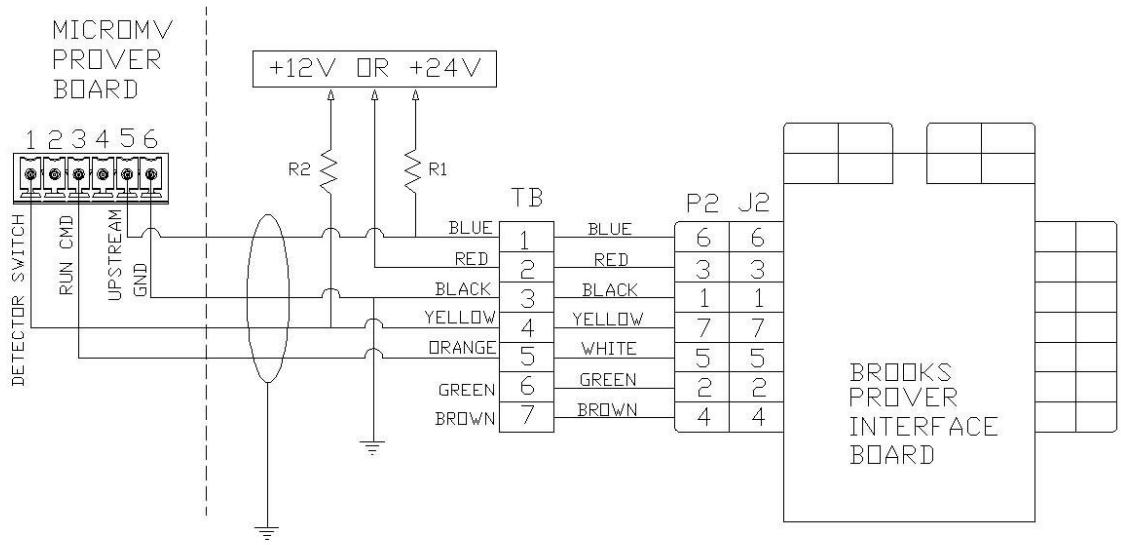
Switch Outputs 5 & 6
These are open collector outputs with an operating range from 5V to 30V and able to sink up to 150mA.

Status Input 5
The input is rated up to 30V.

Calibron Prover Wiring



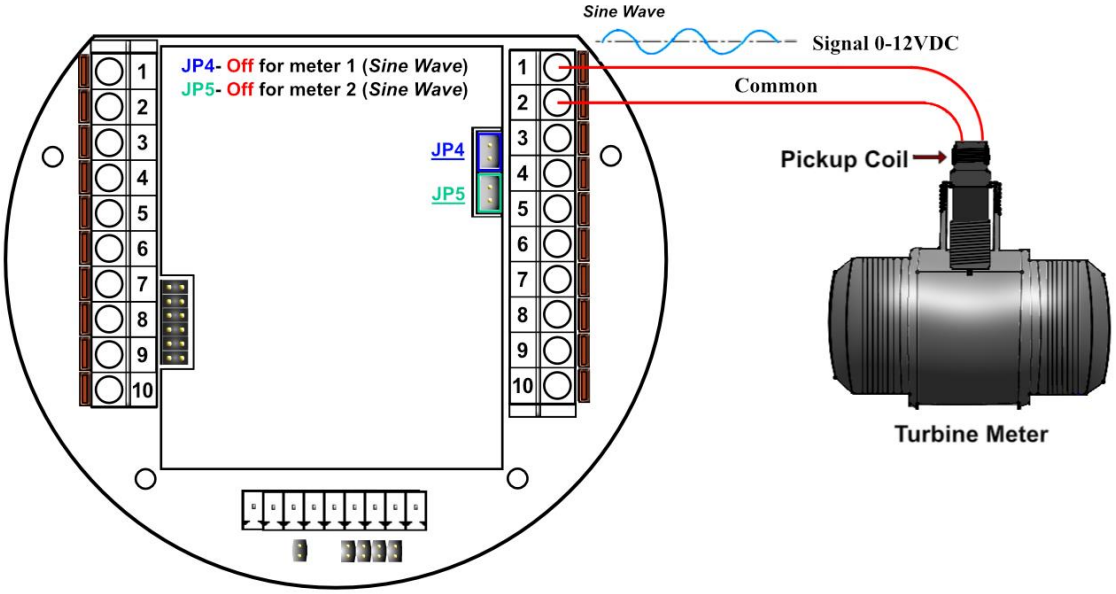
Brooks Prover Wiring



NOTES:
- PULL UP RESISTORS R1 AND R2 ARE 220 OHMS 5% 1 WATT
- "UPSTREAM SIGNAL" IS CALLED "PROVER READY" IN BROOKS TERMINOLOGY
- "RUN COMMAND" IS CALLED "PROVE LAUNCH" IN BROOKS TERMINOLOGY
- DETECTOR SWITCH IS ALSO CALLED "GATES" OR "PICK-OFF"

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.



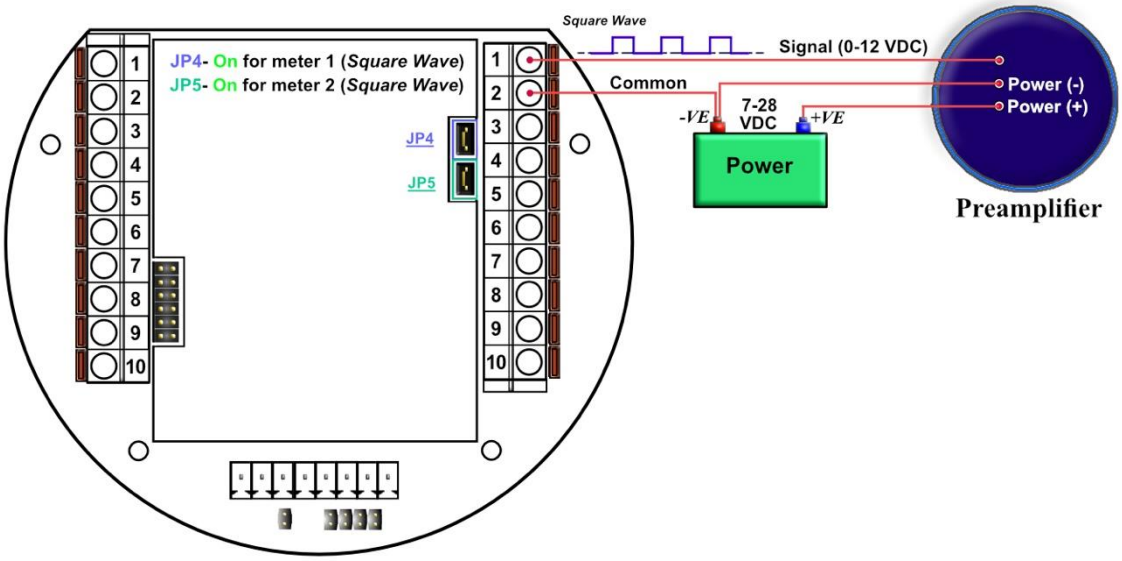
Note:	*When connecting square wave input, the JP4 and JP5 connect the turbine return to the flow computer power return. Therefore, signal polarity is very important. Reverse polarity could result in some **damage or power loss**. When sine wave is used the signal polarity is usually of no significance.*

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.

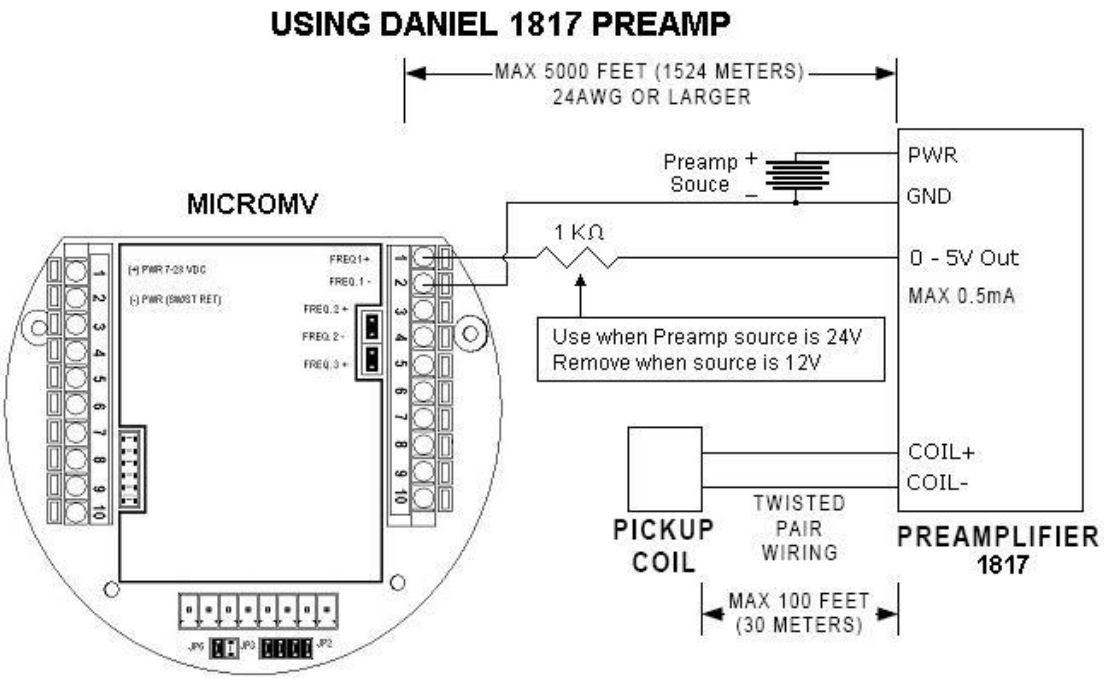
Turbine Input Wiring

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

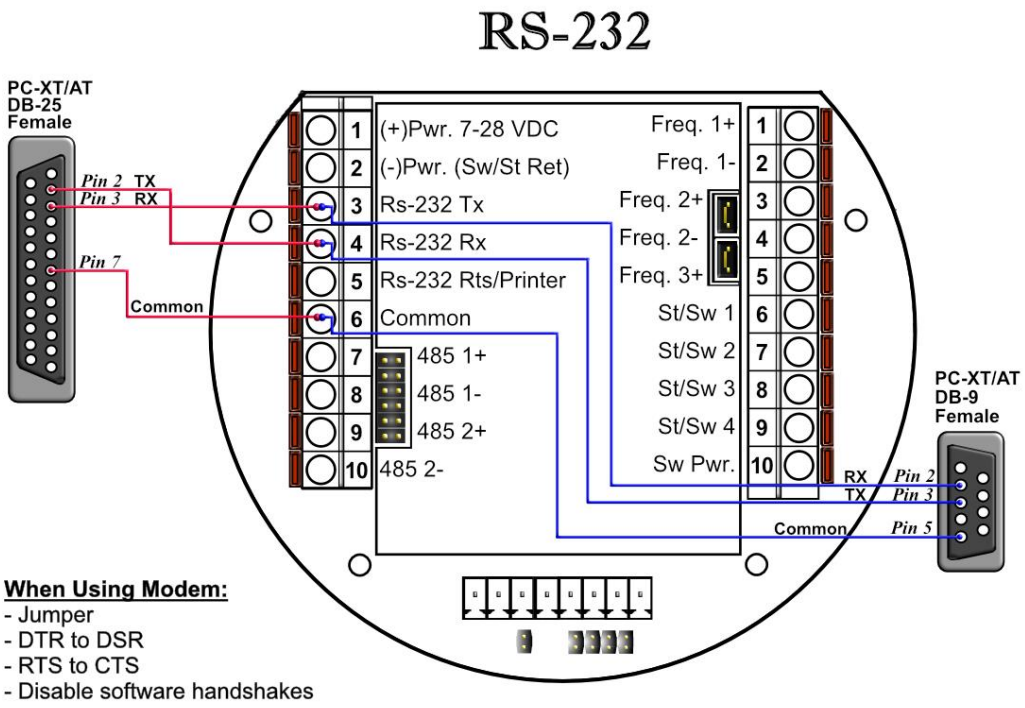


Date: 12/17/2021

RS-232 Connection:

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

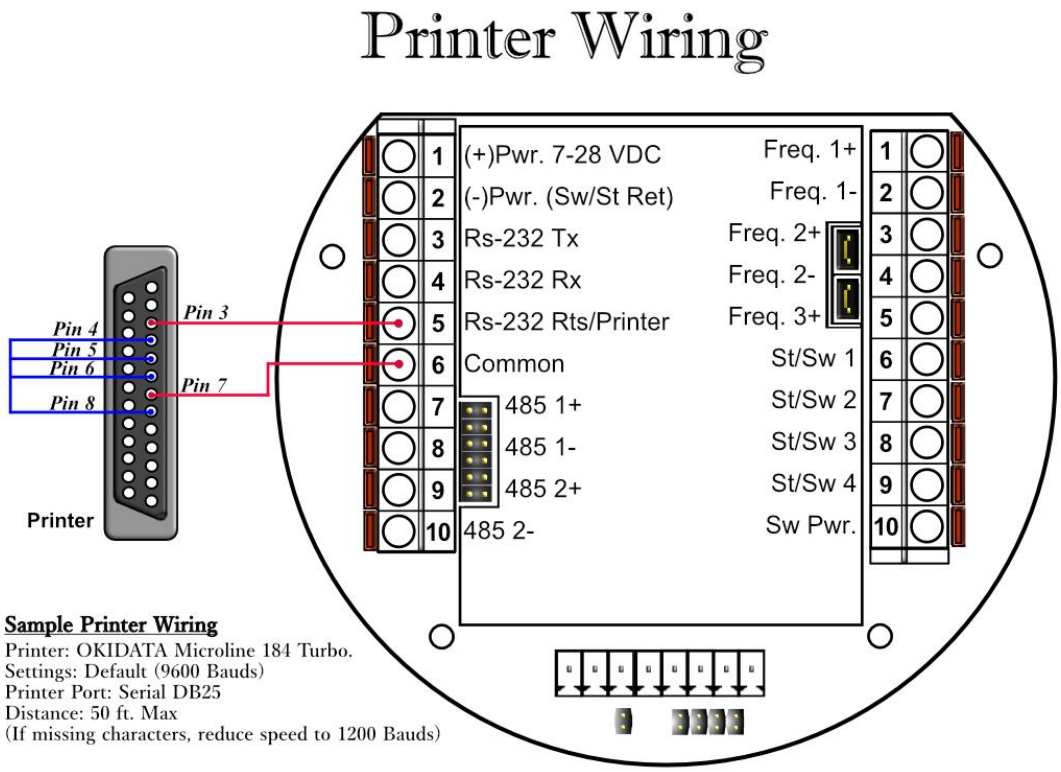
Note: Twisted shielded cable is required.



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

PRINTER Connection:

When RS232/Printer pin configured as a printer line it is a TRANSMIT line (TX)



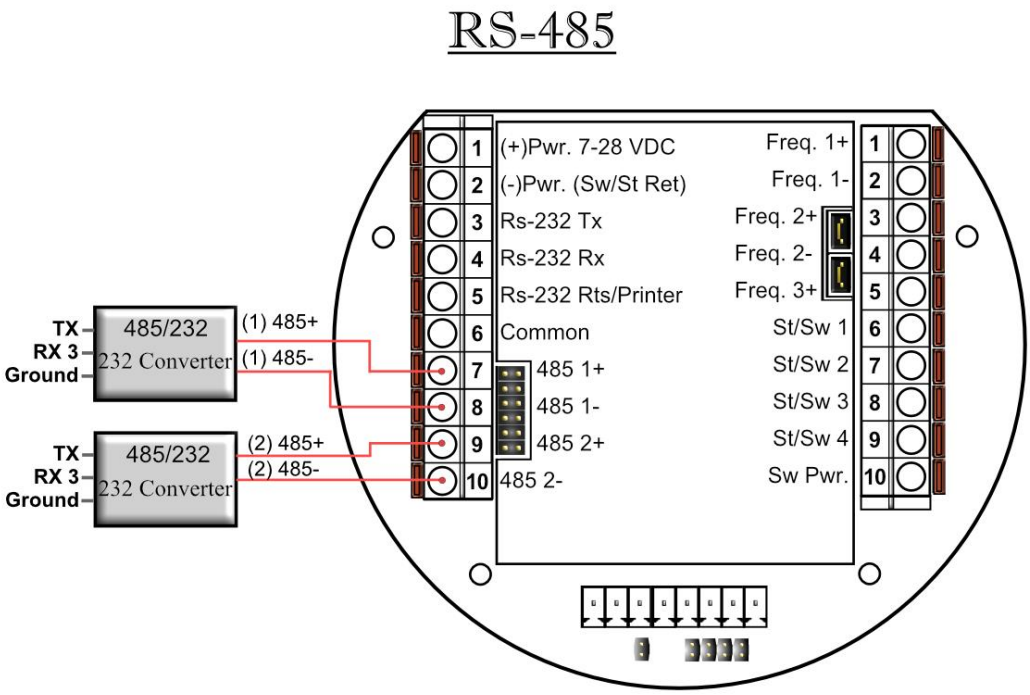
Sample Printer Wiring
Printer: OKIDATA Microline 184 Turbo.
Settings: Default (9600 Bauds)
Printer Port: Serial DB25
Distance: 50 ft. Max
(If missing characters, reduce speed to 1200 Bauds)

Avoid connecting pin 20 on DB25 if wanting to communicate flow computer to PC on the same port.
* Note 1: Jumper pins 1-4 only if not using the RS232 port for communication

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.



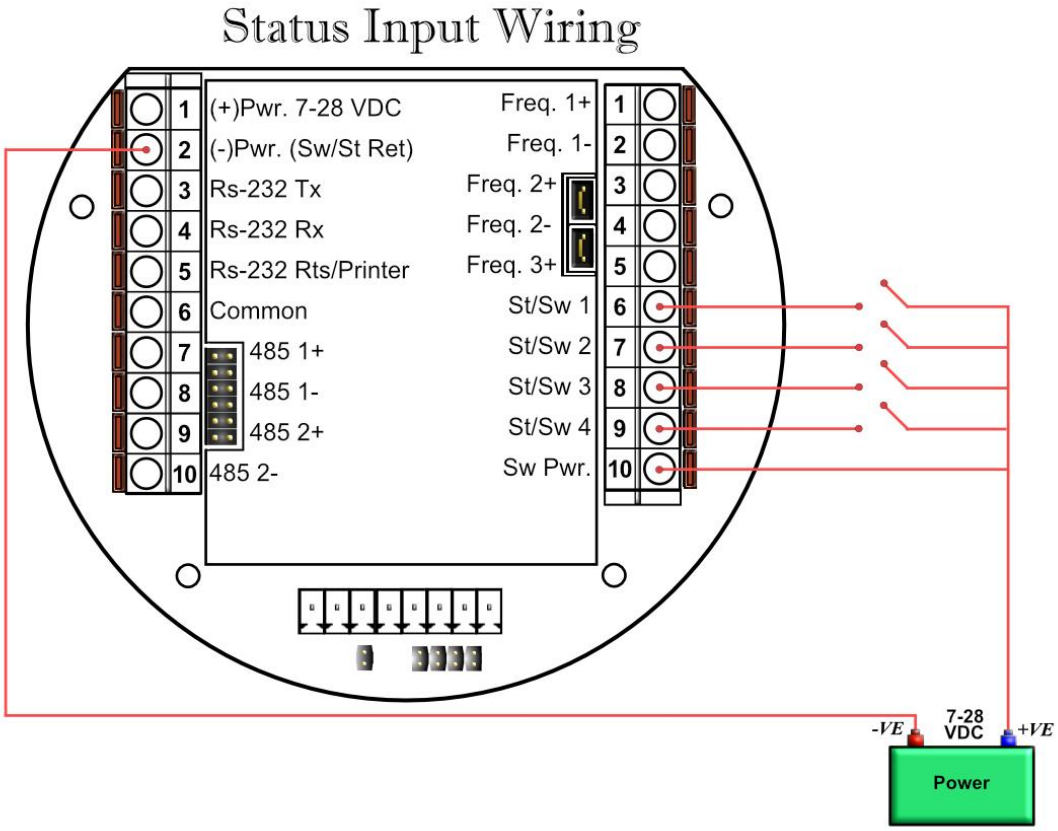
WARNING: When the RS-485 terminal is used, external transient protection and optical isolation is required, especially for long distance wiring.

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:

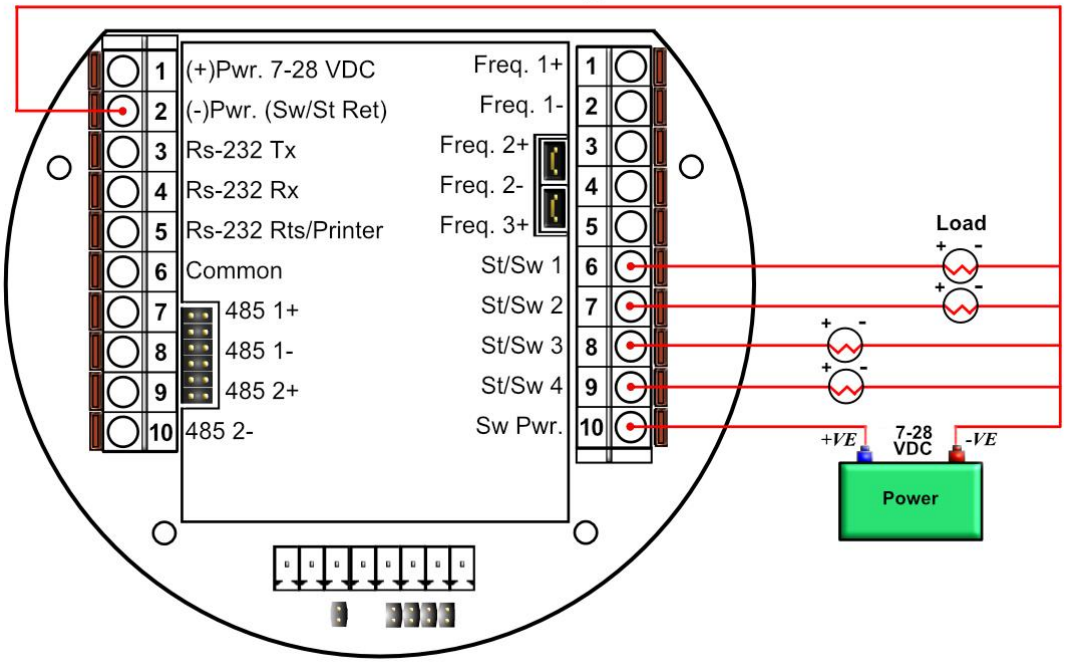
There are 4 digital inputs or outputs that are user configurable. The configuration software will configure the input to be a status input or a switch output.. The standard status input has 4 volts of noise hysteresis, with on trigger point of 5 volts and an off point of 1 Volt.



Wiring of Switch/Pulse Outputs:

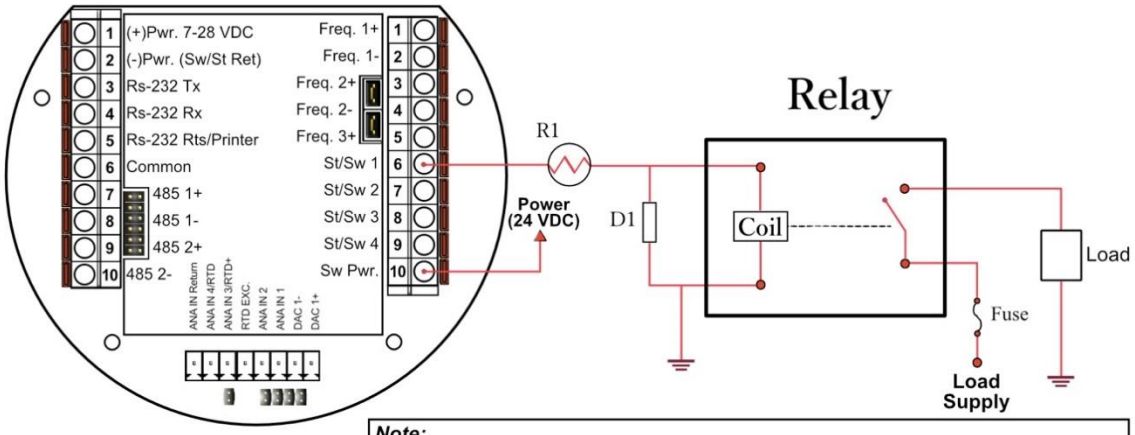
Switch one and two can be on /off or pulse type output up to 125 pulses per second. Notice that the switch outputs are transistor type outputs (open collector type with maximum DC rating of 350 mA continuous at 24 VDC) connections		
1	Status Input /switch output 1	Switch - Maximum rating: 350mA @24 volts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

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:

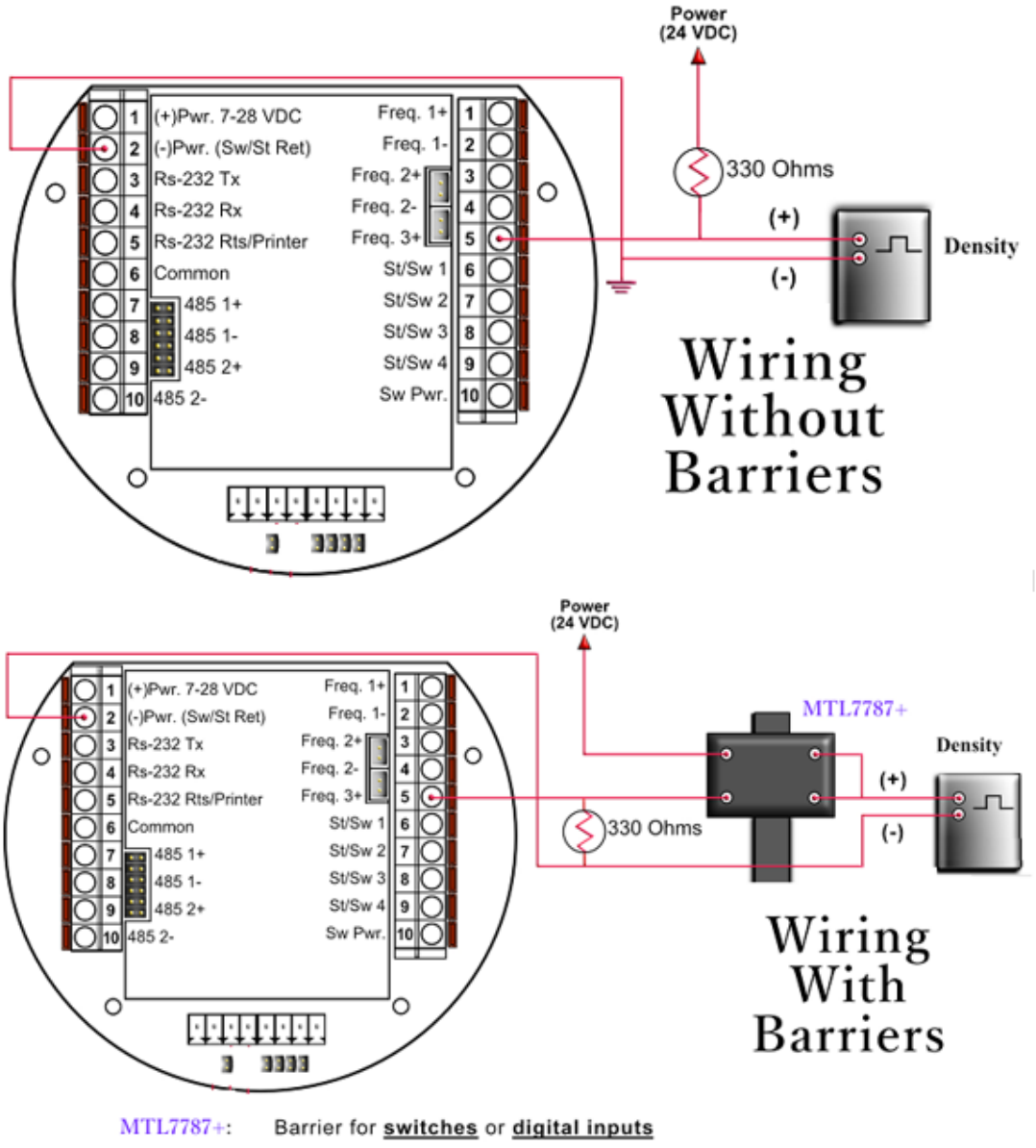
R1- Current limiting resistor. Current must not exceed 250mA.

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

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

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

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**. Reset calibration first if any wrong doing before staring full calibration procedure.**

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, wait 10 seconds, 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.

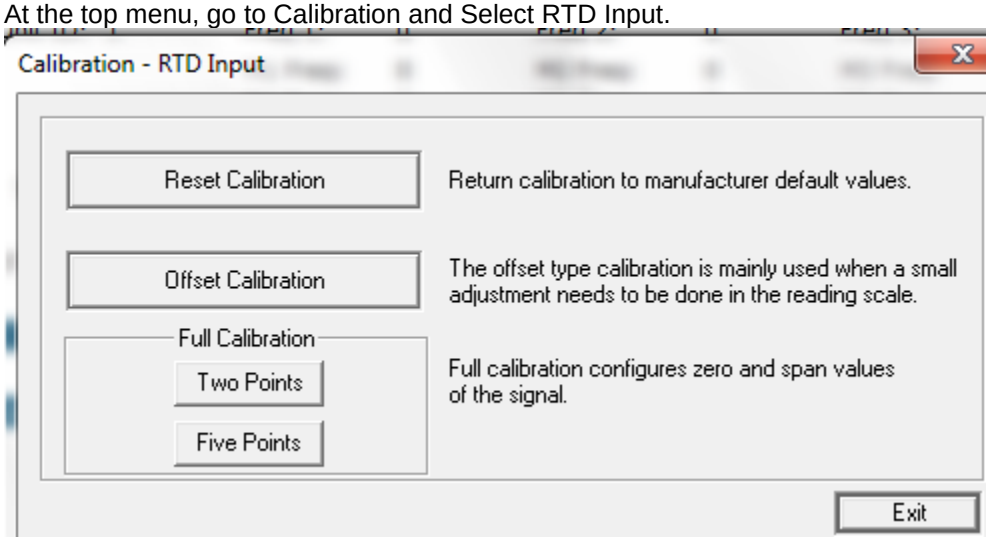
The purpose of the above procedure is to verify zero and span and make sure that the two points fall within the expected tolerance.

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.

RTD Calibration Procedures

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**

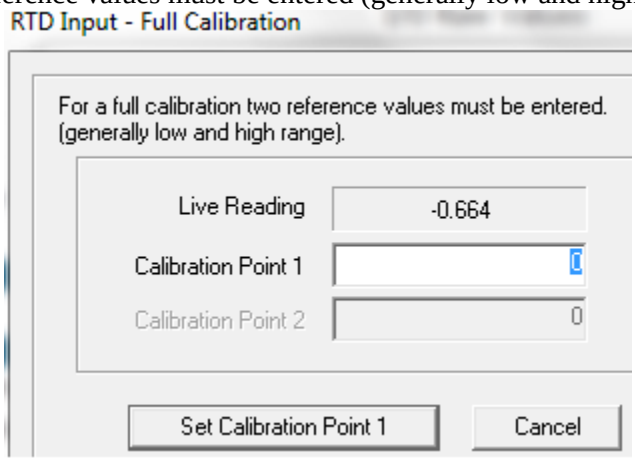
OFFSET CALIBRATION:
1. Select offset calibration method.
2. Induce a live value and wait 10 seconds for the reading to stabilize. Then enter the live value. The value entered must be in Ohm only.
3. **Now verify the live reading against the flow computer reading**

FULL SCALE CALIBRATION:

To perform full calibration be prepared to induce zero and span type signal**. Reset calibration first if any wrong doing before staring full calibration procedure.**

Full Calibration – Two Points

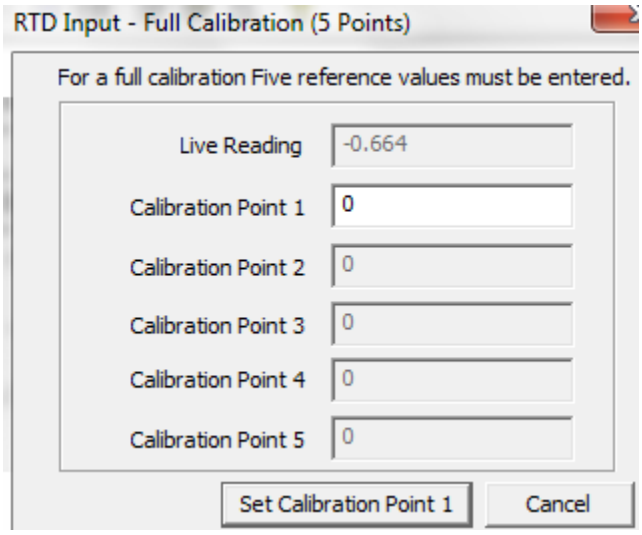
Two reference values must be entered (generally low and high range)



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**.

Full Calibration – Five Points

Five reference values must be entered (generally low, medium, and high range)



1. Prepare 5 range resistive inputs (i.e., 80 Ohm, 90Ohm, 100Ohm, 110Ohm, 120 Ohm).
2. Go to the calibration menu and select RTD full calibration – 5 points method. Induce the low end (80 Ohm.) resistive signal, wait 10 seconds, enter live value in Ohm, and click "Set Calibration Point button, repeat this process until 5 points are entered.
3. **Now verify the live reading against the flow computer reading.**

Calibration of Analog Output:

Follow the following steps to calibrate the analog output against the end device

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 4mA. Enter the live output value reading in the end device i.e. 4mA and click OK button. Now the flow computer will output full scale 20mA. 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 need 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

To perform full calibration be prepared to induce zero and span type signal**. Reset calibration first if any wrong doing before staring full calibration procedure.**

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, wait 10 seconds, enter the first point, and then click OK button.
5. Induce the high range signal, wait 10 seconds, 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) –Temperature

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.

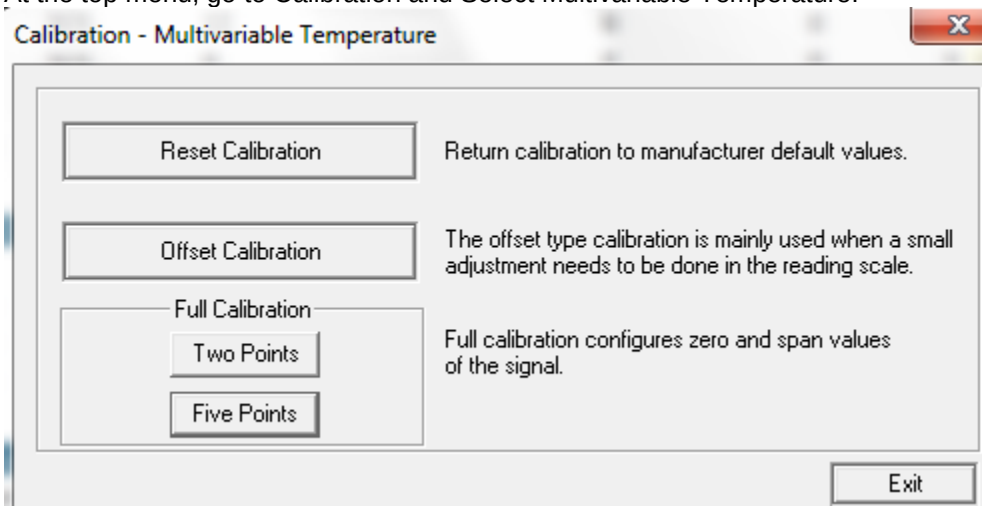
The purpose of the above procedure is to verify zero and span and make sure that the two points fall within the expected tolerance.

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 Multivariable Temperature.

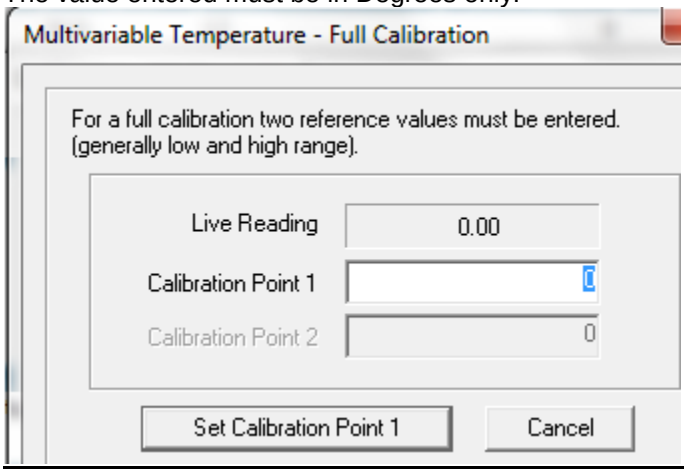


RESET TO DEFAULT CALIBRATION
1. Select Reset calibration method
2. **Now verify the live reading against the flow computer reading**

OFFSET CALIBRATION:
1. Select offset calibration method.
2. Induce a live value and wait 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 – 2 Points

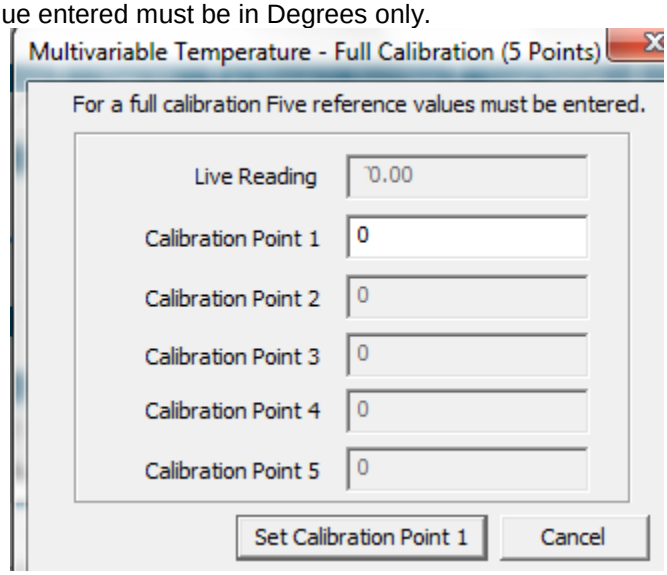
To perform full calibration be prepared to induce zero and span type signal**. Reset calibration first if any wrong doing before staring full calibration procedure.**
The value entered must be in Degrees only.



1. Induce the first point, wait 10 seconds, enter the first point, and then click “Set Calibration Point” button.
2. Induce the second point, wait 10 seconds, enter the second point, and then click “Set Calibration Point” button.
3. **Now verify the live reading against the flow computer reading**.

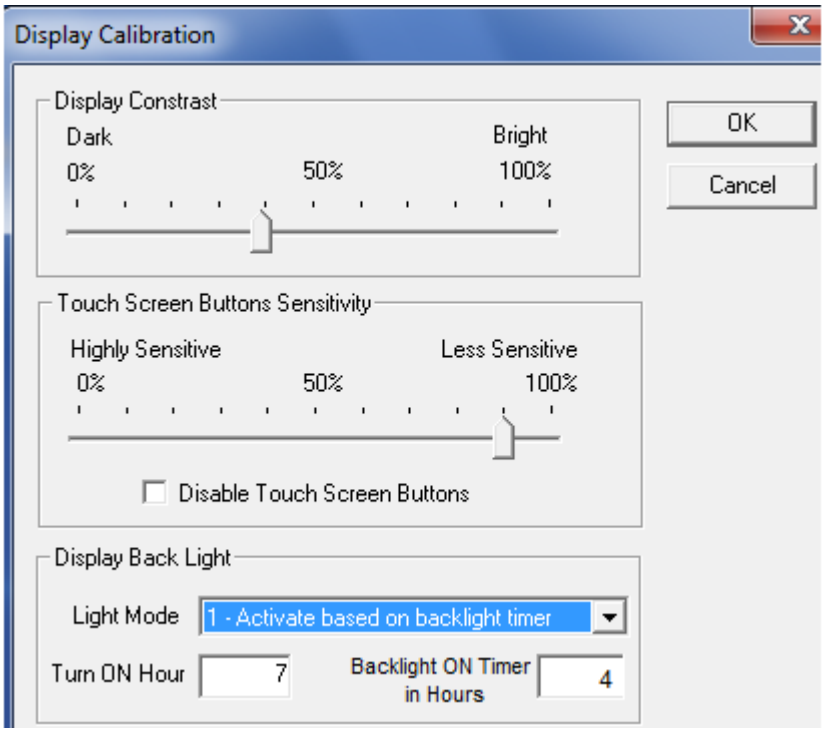
FULL SCALE CALIBRATION 5 Points:

To perform full calibration be prepared to induce zero and span type signal**. Reset calibration first if any wrong doing before staring full calibration procedure.**
The value entered must be in Degrees only.



1. Induce the first point, wait 10 seconds, enter the first point, and then click “Set Calibration Point” button.
2. Induce the second point, wait 10 seconds, enter the second point, and then click “Set Calibration Point” button, Repeat this process, until all five points are entered, and then then click “Set Calibration Point” button.
3. **Now verify the live reading against the flow computer reading**.

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

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.

Pulse Interpolation:

When interfacing with Small Volume Provers (SVP), Dynamic uses Dual chronometry as the pulse interpolation method which is required for provers providing less than 10,000 unaltered pulses.

Pulse interpolation is a pulse counting technique used to calculate the total number of meter pulses between two detectors, including fractional pulses. A conventional pipe prover requires a minimum of 10,000 unaltered pulses to ensure an accurate test. This minimum is based upon the assumption there is a potential error of 1 pulse each time a detector is passed, which equates to a 2-pulse error per run. The value of 2 pulses per 10,000 equates to a potential 0.02 % error. SVPs require less than 10,000 pulses, which would equate to a potential error greater than 0.02 %.

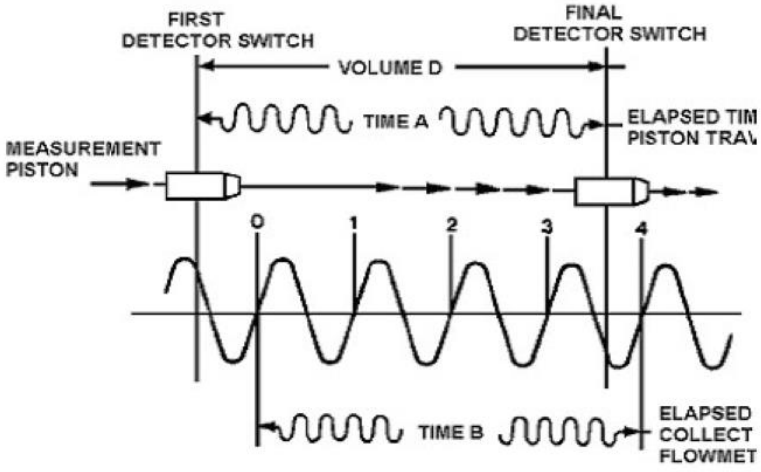
To enhance the meter's pulse output, Small Volume Provers use pulse interpolation for fractional meter pulse counting. To interpolate fractional meter pulses or to mathematically interpolate partial pulses, Dynamic uses the double chronometry method for this purpose since it is the method most widely used.

Double Chronometry:

Double chronometry pulse interpolation increments time precisely every millisecond. A high frequency master oscillator operates two time counters referred to as Time A and Time B. Time A starts when the first detector switch is tripped, and Time B starts with the leading edge of the first flow meter pulse after Time A has started. Time A is stopped when the final detector is tripped and Time B is stopped with the leading edge of the first flow meter pulse after Time A has stopped (see figure below). Using the ratio of Time A and Time B allows for counting of a fraction of the flow meter pulse.

$$K = \frac{Time\_A}{Time\_B} \times \frac{C}{D}$$

K = K Factor, or counts per unit Volume, from the flow meter.
A = Time for displaced volume.
B = Time for whole meter pulses.
C = Total number of whole meter pulses.
D = Displaced Volume



Double Chronometry Figure

CHAPTER 2: Data Entry and Configuration Menus

Introduction to the MicroMP3 Software

The MicroMP3 Liquid software is constructed around a menu-driven organization

Configuration File through Window Program

New

Create a new file to store all the programmed information for one MicroMP3 Liquid Flow Computer. After a file is opened it becomes the currently active file, its contents can be viewed and its parameters can be edited.

Open

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. Select the file to be opened.

Close

Close or exit configuration file.

Save

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

Save As

Use Save As to save the parameters in the currently active file (that is, the parameter values currently being edited) to a new file. The original file will remain in memory.

VIEW

View Drawings

Select the wiring diagram to be displayed. (See details in chapter 1)

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

TOOLS

Communication Port Settings

SERIAL PARAMETERS

Port - Communication Port Number

Enter the PC port used to communicate with the MicroMP3 Liquid Flow Computer.

Baud Rate

> *Note: this parameter must be set the same for both the PC and the MicroMP3 Liquid Flow Computer for communication to occur.*

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

Parity

> *Note: this parameter must be set the same for both the PC and the MicroMP3 Liquid Flow Computer for communication to occur.*

RTU - NONE
ASCII - EVEN or ODD

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

Data Bits

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

Stop Bits

Options available: 1, 1.5, or 2. Generally used: 1.

Modbus Type

> *Note: this parameter must be set the same for both the PC and the MicroMP3 Liquid 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 MicroMP3 Liquid 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 MicroMP3 Liquid Flow Computer.(Modbus type, parity, baud rate,

FLOW CONTROL

RTS Flow Control

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

DTR Flow Control

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

CTS Flow Control

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

INTERNET PROTOCOL

IP Address

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

Port

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

Protocol

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

UNIT ID NUMBER

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

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

TIME OUT

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

RETRY TIMES

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

Meter Configuration

METER SETTINGS

Units System

Selection	Description	Temperature	Pressure
0	US Unit	DEG.F	PSIG
1	Metric Unit	DEG.C	BAR, KG/CM2, KPA

Metric Pressure Units

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

Base Temperature – Metric Unit

Enter the basis reference temperature for all corrections. Used, for example, when seller contracts to sell to buyer at an agreed base temperature. Typically value is 15 °C or 20 °C in Metric units, 60.0 °F in US units.

Company Name

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

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.

Print Intervals in Minutes (0-1440)

When the second port (RS-232) of the MicroMP3 Liquid Flow Computer is configured as printer port, a snapshot report is generated every print interval (i.e., every five minutes, every hour, or every ten hours). Enter '0' to disable interval report.

Atmospheric Pressure

This pressure is local pressure or contracted atmospheric pressure. (i.e. 14.73 PSI-US unit, 101.325 KPA, or 1.01325 Bar in Metric unit).

GM/CC Conversion Factor

This factor is used to reference the density to density of water (i.e. .999016) to establish specific gravity and API gravity

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

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

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.

Volume Units

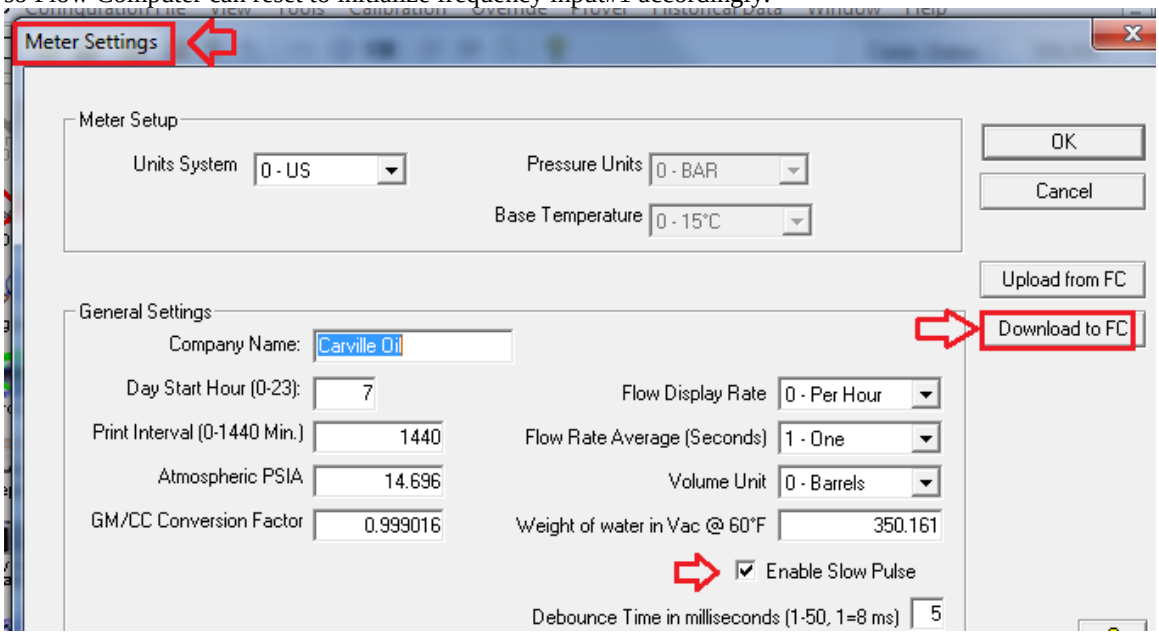
Select desired units 0=BBL, 1=GAL, 2=Liter, or 3=M3. Please save historical reports and reset system before changing volume units. The Flow Computer will not adjust volume if units selection is changed.

Weight of H2O in Vac @60 Deg.F

The weight of one barrel of water under vacuum conditions. (i.e. 350.1614 Lb/barrel)

Enable Slow Pulse

Check data box to select slow pulse resolution for Meter#1. Slow Pulse feature is only available for meter#1. Download a new setting is required to the Flow Computer from this "Meter Settings" screen or via Modbus, so Flow Computer can reset to initialize frequency input#1 accordingly.



Debounce Time in Milliseconds

Hysteresis time is required to insure proper debounce time in milliseconds.

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.

Daylight Saving Time (DST)

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

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

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

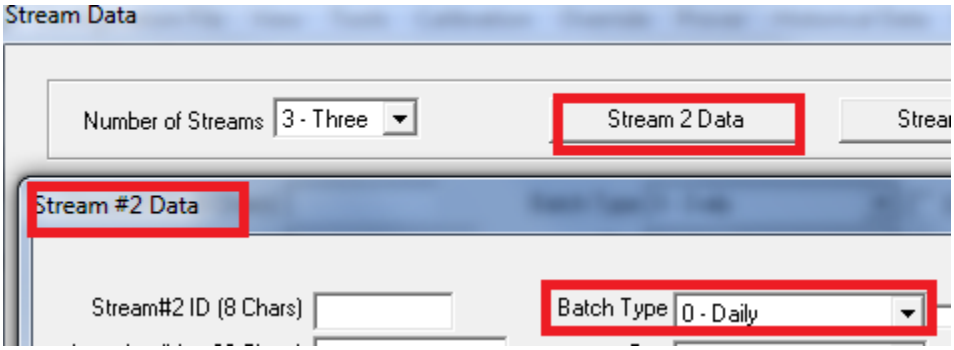
Effects of DST on Historical Data
Given the sudden time change that DST creates, the historical reports will show an hour with zero flow at 2:00 AM of Spring Forward Day and an hour with double flow at 1:00 AM of Fall Back Day, to achieve consistent 24-Hour a day flow records.

Enable Truck Loading

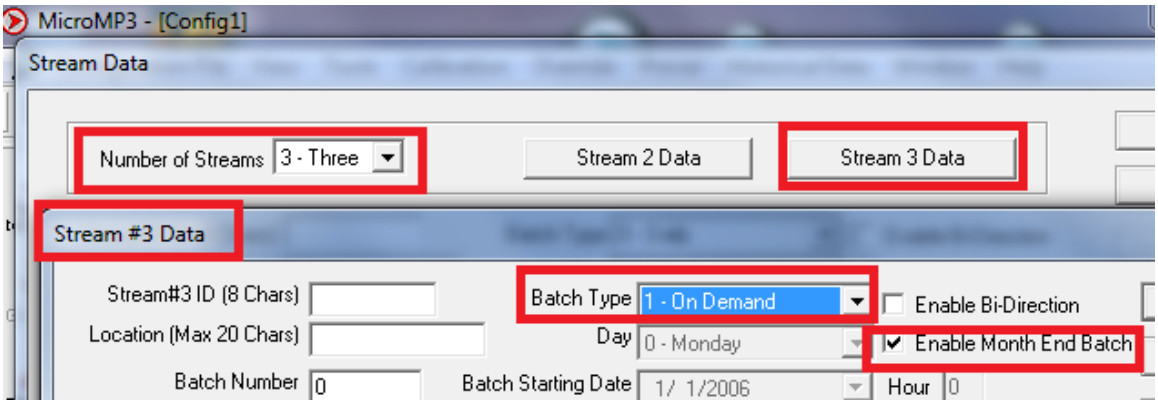
Enable this feature to set up three streams. The truck loading uses the parameters for stream 1 as stream 2 and stream 3 with *exceptions for ending batch method*, stream ID, stream location, stream batch id, stream ship id, stream receive id and meter id. Any override data will apply to all streams.

ex. Batch Type
Set stream#1 batch type to "1-On Demand" to end batch manually.

Set stream#2 batch type to "0-Daily" to end batch at day start hour on daily basis



Set stream#3 batch type to "1-On Demand" and Enable Month End Batch to end batch at day start hour of the first day of month.



This configuration will make stream#2 as daily batch, stream#3 as monthly batch, and stream#1as batch on command. Daily batch total reset on daily basis, monthly batch total reset on monthly basis or on command.

Manual Truck Loading Data
When a batch is ended, MP3 Flow Computer will activate “ready to start loading” signal after detecting “Run Ticket”, “Lease ID”, “Driver ID” are reset first and changed. Enable manual truck loading data not to wait for resetting and entering new run ticket, lease id, driver id data, but to active “ready to start loading” signal immediately.

Common Frequency
Check data box to enable a customized configuration - stream#1 (meter#1), stream#2 (meter#2), and stream#3 (meter#3) have the common frequency#1. Truck Loading Feature must be disabled.

STREAM DATA

Number of Streams

Up to three streams can be configured.

Stream ID

Up to 8 characters. This function will serve as Stream Tag.
If truck loading feature is enabled, "Stream#1 ID" is defined as "Lact ID", and enter up to 8 numeric characters.

Stream Location

Up to 20 characters. Stream location will appear in the reports.
If truck loading feature is enabled, "Stream#1 Location" is defined as "Run Ticket", and enter up to 12 numeric characters.

Batch Number

This number will increment by one at the end of 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 Flow Computer is requested to end the batch manually. Weekly based batch type will end batch at day start hour at the end of the week.

Batch Type –Weekly Based - Day

Weekly based batch type will end batch at day start hour at the end of the week. Enter the day of the week to end batch. (0=Monday,1=Tuesday,2=Wednesday,3=Thursday,4=Friday,5=Staturday,6=Sunday)

Batch Type – Time Based – Batch Starting Date/Hour

Time based batch type will end batch at specified hour of the specified date.

Enable Month End Batch

Month end batch type will end batch at day start hour of the first day of month.

Enable Bi-Direction

This feature allows a status input or multi-variable value, Modbus value to give direction for meter.

Enable Mass Meter

Check Master Meter if Mass input is used.

MASS Meter	**Gross Meter**
K Factor Units LB (US Units) M3 (Metric Units)	**K Factor Unit Selection** **0 – Barrels** **1 – Gallon** **2 - Liter** **3 – M3**

Next Batch Product Number

Enter the product number for the next batch.

Next Batch ID

Up to 12 characters. Enter the batch ID for the next batch.
If truck loading feature is enabled, “Stream#1 Next Batch ID” is defined as “Lease ID”, and enter up to 12 numeric characters.

Next Batch Ship ID

Up to 8 characters. Enter the ship ID for the next batch.

Next Batch Receive ID

Up to 8 characters. Enter the receive ID for the next batch.
If truck loading feature is enabled, “Stream#1 Next Batch Receive ID” is defined as “Driver ID”, and enter up to 8 numeric characters.

Enable Batch Schedule

If batch schedule is enabled, the Flow Computer will use product schedule to determine which product to be used in the next batch.

Batch Scheduling

Up to ten different products can be scheduled in sequence. When the flow computer receives end batch command, it will move the scheduled products one step up, and the product at the top of the schedule list will be used for the batch. The batch schedule can be altered at any time.

Enable Batch Preset

Enter ‘0’ to eliminate the warning and alarms associated with batch presets. Batch Preset does not end batch; it will provide switch output and warning indications.

End batch at preset

Enter ‘1’ to end batch when the batch has reached the preset limit.

Batch Preset Base

Batch preset values can be gross or net volume based

Next Batch Preset Warning

Batch Preset warns the operator the batch has reached the preset warning limit. Enter data for the next batch.

Next Batch Preset

Batch Preset warns the operator the batch has reached the preset limit. Enter data for the next batch. If ending batch at preset is configured and the batch has reached the preset limit, the batch will be ended.

METER DATA

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.

Meter ID

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

Bi-Directional Setting

This feature allows a status input, multivariable value, or Modbus value to give direction for the meters. Bi-directional totalizers will totalize accordingly.

Selection	DESCRIPTION
0	Digital Input
1	Multi. Variable DP > 0.001 Forward Direction
2	Modbus Override <4n338> 0:Forward Direction, 1:Reverse Direction
3	Customer Swap Only check Modbus Override Value when a new batch starts 0: Customer A (Forward Direction), 1:Customer B(Reverse Direction) <41338> Stream #1 Directional Modbus Override <42338> Stream #2 Directional Modbus Override <43338> Stream #3 Directional Modbus Override

Stream Selection

Single stream can be single meter or bank of two meters. Dual streams allow the user to monitor independent products on separate streams simultaneously.

Flow Cutoff Frequency (0-99)

The MicroMP3 Liquid Flow Computer will quit totalizing, when frequency is below the set limit. This feature is to reduce extraneous noise appearing as data when the meter is down for period of time. The totalizer will stop totalizing when the turbine frequency is below the limit.

Flow Polarity

Station total can add meters, or subtract one from the others.

K Factor

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

MASS Meter	Gross Meter
K Factor Units LB (US Units) M3 (Metric Units)	**K Factor Unit Selection** **(Volume Unit Selection)** **0 – Barrels** **1 – Gallon** **2 - Liter** **3 – M3**

Flow Rate High/Low 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.

Enter mass flow rate low minimum and maximum value in MLB (US units), TON (Metric Units) if diagnostic DP mode is enabled.
These mass flow rate minimum and maximum are used to develop a profile for 10 segments of an averaged 10 seconds of CD factor. A new profile will be generated when the current batch is ended.

$$CD\ Factor = \frac{Mass\ Flow\ Rate}{\sqrt{DP\ \times Density}}$$

The DP, density, and CD Factor measurement will take over if a health condition flag reading from the salve is 1 to indicate the master meter stall or failure. Set Flow Computer to read "Meter Factor/DP Override" from slave unit.

$$Mass\ FlowRate = \sqrt{DP \times Density} \times Averaged\ CD\ factor\ retrieved\ from\ Profile$$

Input Position Assignment

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

Assignment	Description
9	RTD Input for Temperature
20	Multi-Variable

DP Input Position Assignment

Set DP input position to enable diagnostic DP function and mass meter.
Set DP input position to none to disable diagnostic DP function.

Density Type

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

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

Density 4–20mA Type –US Unit		Metric Unit
Type 0	Specific Gravity 4-20mA	Density Signal 4-20mA in GM/CC
Type 1	API Gravity 4-20mA	
Type 2	Density Signal 4-20mA GM/CC	

Density 4-20mA Type (Gravity Unit)

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

Density 4–20mA Type –US Unit		Metric Unit
Type 0	Specific Gravity 4-20mA	Density Signal 4-20mA in GM/CC
Type 1	API Gravity 4-20mA	
Type 2	Density Signal 4-20mA in GM/CC	

Density 4-20mA Input Position Assignment

ASSIGNMENT	DESCRIPTION
1	Analog Input#1
2	Analog Input#2
3	Analog Input#3
4	Analog Input#4

Prove Volume Selection

ASSIGNMENT	DESCRIPTION
0	Upstream
1	Downstream

Product Meter Factor

Enter the meter factor for each product. This will be the default value used at the beginning of each new batch. Changing the value during the batch will not affect the meter factor for the current batch. To change current batch meter factor, use the "Meter Factor Override" entry. Changing the meter factor in the product meter factor file only applies the next time this product is selected.

Linear Factor

Enter the different correction factors for the meter at different flow rates. The flow computer will perform linear interpolation. Notice that even though using this feature enhances the measurement accuracy, performing audit trail on a linearized meter factor is very difficult.

PRODUCT DATA

Product Name

Up to 16 characters.

Table Selection –US Unit

12=	API2565-Propylene
13=	API2565-Ethylene
14=	ASTM1550-B
15=	NEW23
16=	NEW23/24
17=	Ethanol

18=	ASTM1550A/B
50=	Crude-API
51=	Product-API
52=	Lub.Prod-API
53=	Special-API

54=	Crude-SG
55=	Product-SG
56=	Lub.Product-SG
57=	Special-SG

Table Selection – Metric Unit

50=	Crude 2004
51=	Product 2004
52=	Lub.Product 2004
53=	Special Product 2004

21=	Old Table 53/54
22=	Old Table 54

OLD/NEW Tables are used in for LPG and NGLs.
Crude oil, natural gasoline, drip gasoline JP4 use 50. Gasoline, naphthalene, jet fuel, aviation fuel, kerosene, diesel, heating oil, and furnace oil use 51. Benzene, toluene, styrene, *ortho*-xylene, and *meta*-xylene, acetone use 53. Enter slope and intercept if ethanol product is selected.

Gravity/Density

Enter the gravity at base condition only if density at reference condition is known. The gravity at base is used to calculate the volume correction factor.

Alpha T E-6

The Alpha T will be prompted only if special product is selected. Enter Alpha T value, the number entered will be divided by 10^{-6}. Example: Entered Value 335 (Actual value 0.000335)

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}		

Corrosion Inhibitor or Antistatic

The switch output will be activated if flow exceeds flow cut off limit. If flow falls below flow cut off, the switch output will be de-activated after 30 seconds delay.
When corrosion inhibitor or antistatic is selected in the product file, and a switch output is assigned, the switch will be turned on when that product is used. When the flow stops, 30 second delay timer of the switch will be turned off.

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

Port #1/#3 Modbus Type

> *Note: this parameter must be set the same for both the PC and the MicroMP3 Liquid Flow Computer for communication to occur.*

The Modbus Communication Specification is either Binary RTU or ASCII.

Port #1/#3 Parity

> *Note: this parameter must be set the same for both the PC and the MicroMP3 Liquid Flow Computer for communication to occur.*

RTU - NONE
ASCII - EVEN or ODD

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

Port #1/#3 Baud Rate

> *Note: this parameter must be set the same for both the PC and the MicroMP3 Liquid Flow Computer for communication to occur.*

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

Port #1/#3 RTS Delay

This function allows modem delay time before transmission. The MicroMP3 Liquid Flow Computer will turn the RTS line high before transmission for the entered time delay period.

Port #2 Baud Rate

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

Port #2 Modbus Type

Note: this parameter must be set the same for both the PC and the MicroMP3 Liquid Flow Computer for communication to occur.

The Modbus Communication Specification is either Binary RTU or ASCII.

Port #2 Parity

RTU - NONE

ASCII - EVEN or ODD

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

Select 0=RTS, 1=Printer

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.

Port 2 RTS Delay

This function allows modem delay time before transmission. The MicroMP3 Liquid Flow Computer will turn the RTS line high before transmission for the entered time delay period.

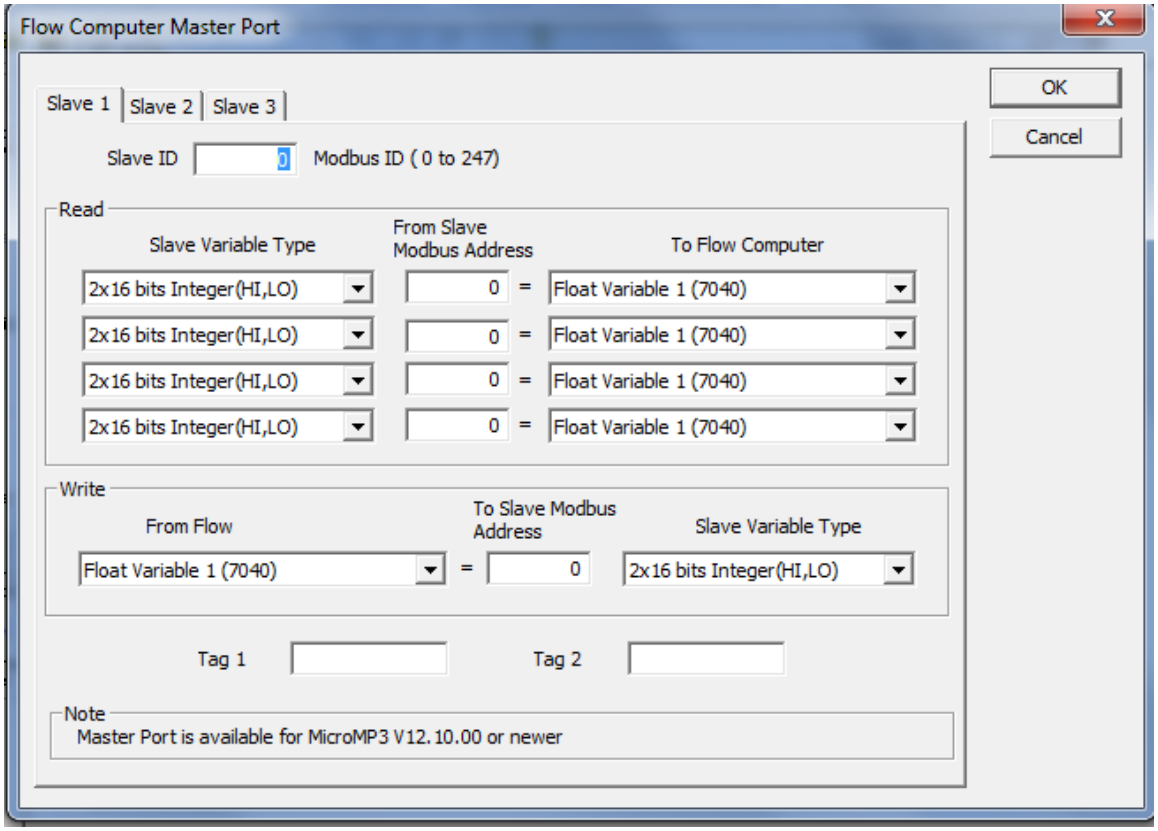
Printer Baud Rate

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

Printer Number of Nulls

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 MicroMP3 Liquid 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.

Master Port



The Micro MV can poll up to three slaves

Slave Unit

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

Read Function

Slave Variable Type

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

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

From Slave Modbus Address

It defines the actual registers being polled from the slave device. Slave Modbus 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

To Flow Computer (Destination Address)

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

0	Floating Var#1 (7040)
1	Floating Var#1 (7041)
2	Floating Var#1 (7042)
3	Floating Var#1 (7043)
4	Floating Var#1 (7044)
5	Floating Var#1 (7045)
6	Floating Var#1 (7046)
7	Floating Var#1 (7047)
8	Floating Var#1 (7048)
9	Floating Var#1 (7049)

10	Integer Var#1(4031)
11	Integer Var#2(4033)
12	Integer Var#3(4035)
13	Integer Var#4(4037)
14	Integer Var#5(4039)
15	Integer Var#6(4041)
16	Integer Var#7(4043)
17	Integer Var#8(4045)
18	Integer Var#9(4047)
19	Integer Var#10(4049)

20	Stream#1 Temperature
21	Stream#1 Pressure
22	Stream#1 Density
23	Stream#2 Temperature
24	Stream#2 Pressure
25	Stream#2 Density
26	Stream#3 Temperature
27	Stream#3 Pressure
28	Stream#3 Density
29	Opening/Current
30	Gain Factor Error
31	Meter Fail/DP Override

Write function

From Flow Computer (Source Address)

It defines the data of actual register being written to the slave device.

To Slave Modbus Address (Destination Address)

It defines the actual register being written to the slave device. Slave Modbus address is considered to be continuous without zero address in between.

Slave Variable Type

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

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

Slave Variable Tag

Up to 8 characters. This function will serve as Slave variable Tag.

TRANSDUCER INPUT

Transducer Tag ID

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

4mA

Enter the 4mA value for the transducer.

20mA

Enter the 20mA value for the transducer.

Transducer Lo/Hi Limit

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

Transducer Maintenance Value

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

Transducer Fail Code

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

MULTI-VARIABLE INPUT

Multi-Variable Tag ID

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

Multi-Variable Lo/Hi Limit

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

Multi-Variable Maintenance Value

The value is to be used when the multi-variable fails, or while calibrating. For calibration, set fail code to 1 while calibrating.

Multi-Variable Fail Code

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

DENSITOMETER INPUT

Densitometer Tag ID

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

Densitometer Lo/Hi Limit

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

Densitometer Maintenance Value

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

Densitometer 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 densitometer high period or below densitometer low period)

Densitometer Temperature I/O Position

Selection	I/O Position
0	None
1	Analog Input #1
2	Analog Input #2
3	Analog Input #3
4	Analog Input #4
9	RTD
20	Multi. Variable Temperature

Densitometer Pressure I/O Position

Selection	I/O Position
0	None
1	Analog Input #1
2	Analog Input #2
3	Analog Input #3
4	Analog Input #4
20	Multi. Variable Pressure

Density Period Low/High Limits

Density Period is the time period in micro-second. 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 Correction Factor

Enter the correction factor for the densitometer.

Densitometer Type

Type	Densitometer	
Type 0	None	
Type 1	Sarasota	**Frequency Type –** Sarasota Constants are required
Type 2	UGC	**Frequency Type –** UGC Constants are required
Type 3	Solartron	**Frequency Type –** Solartron Constants are required

Sarasota, UGC, or Solartron Constants

Enter the densitometer constants accordingly with the type selection.

STATUS INPUT/SWITCH OUTPUT ASSIGNMENT

Status Input Assignment

User can select any one of status input and assign it to input point.

	Assignment	Comments
1	End Stream#1 Batch	End the batch for Stream#1 and reset batch totalizer
2	End Stream#2 Batch	End the batch for Stream#2 and reset batch totalizer
3	End Stream#3 Batch	End the batch for Stream#3; reset batch totalizers
4	Alarm Acknowledge	Reset the previous occurred alarms output bit
5	Print Request	Step 1: set port 2 RTS type to 1 (printer type) Step 2: When this status is activated, the Flow Computer will send the "Request Report" to the printer via the serial port #2.
6	Request Prove Meter#1	
7	Request Prove Meter#2	
11	N/A	
12	Request Trial Prove Meter1	
13	Request Trial Prove Meter2	
18	Prover Ready (High) / Upstream Polarity	
19	Stream #1 Flow Direction	
20	Stream#1 Product ID Bit 0	Product ID Bits: Before ending batch, user can use status bits to select next product. These bits are read immediately at batch end. See the following table to specify a product.
21	Stream#1 Product ID Bit 1	
22	Stream#1Product ID Bit 2	
23	Stream#1 Product ID Bit 3	
24	Stream#2 Flow Direction	
25	Stream#2 Product ID Bit 0	Product ID Bits: Before ending batch, user can use status bits to select next product. These bits are read immediately at batch end. See the following table to specify a product.
26	Stream#2 Product ID Bit 1	
27	Stream#2 Product ID Bit 2	
28	Stream#2 Product ID Bit3	
29	Stream#3 Flow Direction	
30	Stream#3 Product Bit 0	Product ID Bits: Before ending batch, user can use status bits to select next product. These bits are read immediately at batch end. See the following table to specify a product.
31	Stream#3 Product Bit 1	
32	Stream#3 Product Bit 2	
33	Stream#3 Product Bit 3	
34	Display Freeze	
35	Display Toggle	
36	Stream#1 Partial Batch End	
37	Stream#2 Partial Batch End	
38	Stream#3 Partial Batch End	
39	End All Streams Batch	
40	End All Streams Partial Batch	
41	Truck – Start New Batch	When using truck loading, a signal is required to start a new batch. “Start New Batch” signals high to indicate batch is in progress.
42	Disable Sampler	Disable Sampler if Signal is High
43	Disable Stream#1 Sampler	Disable Stream#1 Sampler if Signal is High
44	Disable Stream#2 Sampler	Disable Stream#2 Sampler if Signal is High
45	Disable Stream#3 Sampler	Disable Stream#2 Sampler if Signal is High

Product ID Bits

Product Bit 3	Product Bit 2	Product Bit 1	Product Bit Bit 0	Product Number
0	0	0	0	= 1
0	0	0	1	= 2
0	0	1	0	= 3
0	0	1	1	= 4
0	1	0	0	= 5
0	1	0	1	= 6
0	1	1	0	= 7
0	1	1	1	= 8
1	0	0	0	= 9
1	0	0	1	= 10
1	0	1	0	= 11
1	0	1	1	= 12
1	1	0	0	= 13
1	1	0	1	= 14
1	1	1	0	= 15
1	1	1	1	= 16

Switch Output Assignment

User can assign an output to each of the MicroMP3 Liquid Flow Computer's output switches from this list. The MicroMP3 Liquid Flow Computer switch outputs are open collector type, requiring external D.C 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 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

Assignment	Description
118	Stream #1 Sampler
119	Stream #2 Sampler
120	Stream #3 Sampler

	M1	M2	M3	M4	M5	M6	Str1	Str1.R	Str2	Str2.R	Str3	Str3.R
IV	121	126	131	136	141	146	151	156	161	166	171	176
ISV	122	127	132	137	142	147	152	157	162	167	172	177
GSV	123	128	133	138	143	148	153	158	163	168	173	178
NSV	124	129	134	139	144	149	154	159	164	169	174	179
Mass	125	130	135	140	145	150	155	160	165	170	175	180

Assignments – Contact Type Outputs

Assignment	Description
181	Analog Input #1 High
182	Analog Input #2 High
183	Analog Input #3 High
184	Analog Input #4 High
185	RTD#9 High
187	Analog Input #1 Low
188	Analog Input #2 Low
189	Analog Input #3 Low
190	Analog Input #4 Low
191	RTD#9 Low
192	N/A
193	Analog Input #1 Failed
194	Analog Input #2 Failed
195	Analog Input #3 Failed
196	Analog Input #4 Failed
197	RTD#9 Failed
198	N/A
199	Analog Output Out of Range
200	Prove in Progress
201	Prove Launch Forward
202	Prove Launch Reverse
203	Prove Launch Forward/Reverse
204	Compact Prove Run
205	Prove Complete
206	Prove Abort

Assignment	Description
207	Prove Meter#1-Meter#2
208	Prove Meter#1
209	Prove Meter#2
211	Multivariable Pressure High
212	Multivariable Pressure Low
213	Multivariable Pressure Fail
214	Watchdog
215	Day End (30 Seconds)
216	Month End (30 Seconds)
217	Active Alarms
218	Occurred Alarms
219	Remote Control
220	Multivariable Temperature High
221	Multivariable Temperature Low
222	Multivariable Temperature Fail
223	M1 IV Flow Low
224	M1 IV Flow High
225	M1 SG Out of Range
226	M1 Calc TF Out of Range
227	M1 Alpha T Out of Range
228	M1 API2565 Out of Range
229	M1 Down
230	M1 Corr. Inhibitor
231	M1 Antistatic
232	M2 IV Flow Low

Assignment	Description
233	M2 IV Flow High
234	M2 SG Out of Range
235	M2 Calc TF Out of Range
236	M2 Alpha T Out of Range
237	M2 API2565 Out of Range
238	M2 Down
239	M2 Corr. Inhibitor
240	M2 Antistatic
241	M3 IV Flow Low
242	M3 IV Flow High
243	M3 SG Out of Range
244	M3 Calc TF Out of Range
245	M3 Alpha T Out of Range
246	M3 API2565 Out of Range
247	M3 Down
248	M3 Corr. Inhibitor
249	M3 Antistatic
250	Stream#1 Product Bit 0
251	Stream#1 Product Bit 1
252	Stream#1 Product Bit 2
253	Stream#1 Product Bit 3
254	St#1 Partial/ Batch End(30 Sec)
255	Stream#1 Batch Warning
256	Stream#1 Batch Preset
257	Stream#1 Partial Batch Ended
258	St#1 Traditional Batch Ended
259	Stream#1 Flow Direction

Assignment	Description
260	Stream#2 Product Bit 0
261	Stream#2 Product Bit 1
262	Stream#2 Product Bit 2
263	Stream#2 Product Bit 3
264	St#2 Partial/ Batch End(30 Sec)
265	Stream#2 Batch Warning
266	Stream#2 Batch Preset
267	Stream#2 Partial Batch Ended
268	Stream#2 Traditional Batch Ended
269	Stream#2 Flow Direction
270	Stream#3 Product Bit 0
271	Stream#3 Product Bit 1
272	Stream#3 Product Bit 2
273	Stream#3 Product Bit 3
274	St#3 Partial/ Batch End(30 Sec)
275	Stream#3 Batch Warning
276	Stream#3 Batch Preset
277	Stream#3 Partial Batch Ended
278	Stream#3 Traditional Batch Ended
279	Stream#3 Flow Direction
280	Densitometer Failed
281	Densitometer High
282	Densitometer Low
283	Ready to Start Loading**

****Note:**

Manual Truck Loading Data feature is disabled (Data Entry)

When a batch is ended, "Run Ticket", "Lease ID", "Driver ID" data must be reset. MP3 first, and MicroMP3 Flow Computer will activate "ready to start loading" signal after detecting new "Run Ticket", "Lease ID", "driver ID" data are entered.

Manual Truck Loading Data feature is enabled (Data Entry)

When a batch is ended, MP3 Flow Computer will activate "ready to start loading" signal immediately.

This permissive signal will hold high for the duration of the truck batch. MP3 Flow Computer will start batch when "start new batch" digital input signal goes high, end current batch when "start new batch" digital input signal goes low, and then permissive signal will go low to complete batch.

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 MicroMP3 Liquid 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 MicroMP3 Liquid Flow Computer can produce up to 50 pulses per second.

The MicroMP3 Liquid 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.

ANALOG OUTPUT ASSIGNMENT

TAG ID

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

Assignments:

	Meter 1	Meter 2	Meter 3	Mtr1.R	Mtr2.R	Mtr3.R
IV	101	201	301	401	501	601
ISV	102	202	302	402	502	602
GSV	103	203	303	403	503	603
NSV	104	204	304	404	504	604
Mass	105	205	305	405	505	605
Density	106	206	306	406	506	606
SG	107	207	307	407	507	607
SG at base	108	208	308	408	508	608
API	109	209	309	409	509	609
API at base	110	210	310	410	510	610
Temperature	111	211	311	411	511	611
Pressure	112	212	312	412	512	612
BS&W	113	213	313	413	513	613

	Stream 1	Stream 2	Stream 3
IV	701	801	901
ISV	702	802	902
GSV	703	803	903
NSV	704	804	904
Mass	705	805	905

Assignments	Description
51	**Analog Input#1**
52	**Analog Input#2**
53	**Analog Input#3**
54	**Analog Input#4**
59	**RTD**
63	**Remote Control** Data Range 0.00-100.00, 2 Decimal Inferred <30709> Analog Input #1 <30711> Analog Input #2 <30713> Analog Input #3 <30715> Analog Input #4

4-20mA

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

FLOW COMPUTER DISPLAY ASSIGNMENT

Display assignment selects up to 16 assignments. The MicroMP3 Liquid Flow Computer will scroll through them at the assigned delay time.

NO.	Description
101	Meter#1 IV/NSV/Mass Flow Rate
102	Meter#1 IV/ISV/GSV Flow Rate
106	Meter#1 IV/NSV/Mass Batch Total
107	Meter#1 IV/ISV/GSV Batch Total
111	Meter#1 IV/NSV/Mass Cum. Total
112	Meter#1 IV/ISV/GSV Cum Total
116	Meter#1 Prev.Day IV/NSV/Mass
117	Meter#1 Prev.Day IV/ISV/GSV
121	Meter#1 Prev.Batch IV/NSV/Mass
122	Meter#1 Prev.Batch IV/ISV/GSV
146	Meter#1 BS&W/Density/FWA
147	Meter#1 Temp/Pressure/FWA
148	Meter#1 Den.Temp/D.Press/FWA
149	Meter#1 SG/Base SG/FWA
150	Meter#1 API/Base API/FWA
151	Meter#1 ID/Batch/Steam/Product
201	Meter#2 IV/NSV/Mass Flow Rate
202	Meter#2 IV/ISV/GSV Flow Rate
206	Meter#2 IV/NSV/Mass Batch Total
207	Meter#2 IV/ISV/GSV Batch Total
211	Meter#2 IV/NSV/Mass Cum. Total
212	Meter#2 IV/ISV/GSV Cum Total
216	Meter#2 Prev.Day IV/NSV/Mass
217	Meter#2 Prev.Day IV/ISV/GSV
221	Meter#2 Prev.Batch IV/NSV/Mass
222	Meter#2 Prev.Batch IV/ISV/GSV
246	Meter#2 BS&W/Density/FWA
247	Meter#2 Temp/Pressure/FWA
248	Meter#2 Den.Temp/D.Press/FWA
249	Meter#2 SG/Base SG/FWA
250	Meter#2 API/Base API/FWA
251	Meter#2 ID/Batch/Steam/Product
301	Meter#3 IV/NSV/Mass Flow Rate
302	Meter#3 IV/ISV/GSV Flow Rate
306	Meter#3 IV/NSV/Mass Batch Total
307	Meter#3 IV/ISV/GSV Batch Total
311	Meter#3 IV/NSV/Mass Cum. Total
312	Meter#3 IV/ISV/GSV Cum Total
316	Meter#3 Prev.Day IV/NSV/Mass
317	Meter#3 Prev.Day IV/ISV/GSV
321	Meter#3 Prev.Batch IV/NSV/Mass

NO.	Description
1101	Meter#1.R IV/NSV/Mass Flow Rate
1102	Meter#1.R IV/ISV/GSV Flow Rate
1106	Meter#1.R IV/NSV/Mass Batch Total
1107	Meter#1.R IV/ISV/GSV Batch Total
1111	Meter#1.R IV/NSV/Mass Cum. Total
1112	Meter#1.R IV/ISV/GSV Cum Total
1116	Meter#1.R Prev.Day IV/NSV/Mass
1117	Meter#1.R Prev.Day IV/ISV/GSV
1121	Meter#1.R Prev.Batch IV/NSV/Mass
1122	Meter#1.R Prev.Batch IV/ISV/GSV
446	Meter#1.R BS&W/Density/FWA
447	Meter#1.R Temp/Pressure/FWA
448	Meter#1.R Den.Temp/D.Press/FWA
449	Meter#1.R SG/Base SG/FWA
450	Meter#1.R API/Base API/FWA
451	Meter#1.R ID/Batch/Steam/Product
1201	Meter#2.R IV/NSV/Mass Flow Rate
1202	Meter#2.R IV/ISV/GSV Flow Rate
1206	Meter#2.R IV/NSV/Mass Batch Total
1207	Meter#2.R IV/ISV/GSV Batch Total
1211	Meter#2.R IV/NSV/Mass Cum. Total
1212	Meter#2.R IV/ISV/GSV Cum Total
1216	Meter#2.R Prev.Day IV/NSV/Mass
1217	Meter#2.R Prev.Day IV/ISV/GSV
1221	Meter#2.R Prev.Batch IV/NSV/Mass
1222	Meter#2.R Prev.Batch IV/ISV/GSV
546	Meter#2.R BS&W/Density/FWA
547	Meter#2.R Temp/Pressure/FWA
548	Meter#2.R Den.Temp/D.Press/FWA
549	Meter#2.R SG/Base SG/FWA
550	Meter#2.R API/Base API/FWA
551	Meter#2.R ID/Batch/Steam/Product
1301	Meter#3.R IV/NSV/Mass Flow Rate
1302	Meter#3.R IV/ISV/GSV Flow Rate
1306	Meter#3.R IV/NSV/Mass Batch Total
1307	Meter#3.R IV/ISV/GSV Batch Total
1311	Meter#3.R IV/NSV/Mass Cum. Total
1312	Meter#3.R IV/ISV/GSV Cum Total
1316	Meter#3.R Prev.Day IV/NSV/Mass
1317	Meter#3.R Prev.Day IV/ISV/GSV
1321	Meter#3.R Prev.Batch IV/NSV/Mass

NO.	Description
322	Meter#3 Prev.Batch IV/ISV/GSV
346	Meter#3 BS&W/Density/FWA
347	Meter#3 Temp/Pressure/FWA
348	Meter#3 Den.Temp/D.Press/FWA
349	Meter#3 SG/Base SG/FWA
350	Meter#3 API/Base API/FWA
351	Meter#3 ID/Batch/Steam/Product
60	Densitometer TAG/Period/Freq.
61	Prover Temperature/Pressure
62	Prove Mode
63	Date/Time
64	Alarm*
701	Stream#1 IV/NSV/Mass Flow Rate
702	Stream#1 IV/ISV/GSV Flow Rate
706	Stream#1 IV/NSV/Mass Batch Total
707	Stream#1 IV/ISV/GSV Batch Total
711	Stream#1 IV/NSV/Mass Cum. Total
712	Stream#1 IV/ISV/GSV Cum. Total
716	Stream#1 Prev.Day IV/NSV/Mass
717	Stream#1 Prev.Day IV/ISV/GSV
721	Stream#1 Prev.Batch IV/NSV/Mass
722	Stream#1 Prev.Batch IV/NSV/Mass
801	Stream#2 IV/NSV/Mass Flow Rate
802	Stream#2 IV/ISV/GSV Flow Rate
806	Stream#2 IV/NSV/Mass Batch Total
807	Stream#2 IV/ISV/GSV Batch Total
811	Stream#2 IV/NSV/Mass Cum. Total
812	Stream#2 IV/ISV/GSV Cum. Total
816	Stream#2 Prev.Day IV/NSV/Mass
817	Stream#2 Prev.Day IV/ISV/GSV
821	Stream#2 Prev.Batch IV/NSV/Mass
822	Stream#2 Prev.Batch IV/NSV/Mass
901	Stream#3 IV/NSV/Mass Flow Rate
902	Stream#3 IV/ISV/GSV Flow Rate
906	Stream#3 IV/NSV/Mass Batch Total
907	Stream#3 IV/ISV/GSV Batch Total
911	Stream#3 IV/NSV/Mass Cum. Total
912	Stream#3 IV/ISV/GSV Cum. Total
916	Stream#3 Prev.Day IV/NSV/Mass
917	Stream#3 Prev.Day IV/ISV/GSV
921	Stream#3 Prev.Batch IV/NSV/Mass
922	Stream#3 Prev.Batch IV/NSV/Mass

NO.	Description
1322	Meter#3.R Prev.Batch IV/ISV/GSV
646	Meter#3.R BS&W/Density/FWA
647	Meter#3.R Temp/Pressure/FWA
648	Meter#3.R Den.Temp/D.Press/FWA
649	Meter#3.R SG/Base SG/FWA
650	Meter#3.R API/Base API/FWA
651	Meter#3.R ID/Batch/Steam/Product
1701	Stream#1.R IV/NSV/Mass Flow Rate
1702	Stream#1.R IV/ISV/GSV Flow Rate
1706	Stream#1.R IV/NSV/Mass Batch Total
1707	Stream#1.R IV/ISV/GSV Batch Total
1711	Stream#1.R IV/NSV/Mass Cum. Total
1712	Stream#1.R IV/ISV/GSV Cum. Total
1716	Stream#1.R Prev.Day IV/NSV/Mass
1717	Stream#1.R Prev.Day IV/ISV/GSV
1721	Stream#1.R Prev.Batch IV/NSV/Mass
1722	Stream#1.R Prev.Batch IV/NSV/Mass
1801	Stream#2.R IV/NSV/Mass Flow Rate
1802	Stream#2.R IV/ISV/GSV Flow Rate
1806	Stream#2.R IV/NSV/Mass Batch Total
1807	Stream#2.R IV/ISV/GSV Batch Total
1811	Stream#2.R IV/NSV/Mass Cum. Total
1812	Stream#2.R IV/ISV/GSV Cum. Total
1816	Stream#2.R Prev.Day IV/NSV/Mass
1817	Stream#2.R Prev.Day IV/ISV/GSV
1821	Stream#2.R Prev.Batch IV/NSV/Mass
1822	Stream#2.R Prev.Batch IV/NSV/Mass
1901	Stream#3.R IV/NSV/Mass Flow Rate
1902	Stream#3.R IV/ISV/GSV Flow Rate
1906	Stream#3.R IV/NSV/Mass Batch Total
1907	Stream#3.R IV/ISV/GSV Batch Total
1911	Stream#3.R IV/NSV/Mass Cum. Total
1912	Stream#3.R IV/ISV/GSV Cum. Total
1916	Stream#3.R Prev.Day IV/NSV/Mass
1917	Stream#3.R Prev.Day IV/ISV/GSV
1921	Stream#3.R Prev.Batch IV/NSV/Mass
1922	Stream#3.R Prev.Batch IV/NSV/Mass

Delay between Screens

Enter delay in seconds between screen displays. The MicroMP3 Liquid Flow Computer will scroll through them at the assigned delay time

***Display Alarm code (Hex)**

000000

020000	Meter #1 SG Out of Range
040000	Meter #1Table E Temperature Out of Range
080000	Meter #1 Alpha T Out of Range
100000	Meter #1 IV Flow Rate High
200000	Meter #1 IV Flow Rate Low
400000	Meter #1 API2565-Proplene/Ethylene. Out of Range
000200	Meter #2 SG Out of Range
000400	Meter #2 Table E Temperature Out of Range
000800	Meter #2 Alpha T Out of Range
001000	Meter #2 IV Flow Rate High
002000	Meter #2 IV Flow Rate Low
004000	Meter #2 API2565-Proplene/Ethylene Out of Range
000002	Meter #3 SG Out of Range
000004	Meter #3 Table E Temperature Out of Range
000008	Meter #3 Alpha T Out of Range
000010	Meter #3 IV Flow Rate High
000020	Meter #3 IV Flow Rate Low
000040	Meter #3 API2565-Proplene/Ethylene Out of Range

0000

0100	Analog Input #1 High
0200	Analog Input #1 Low
0400	Analog Input #2 High
0800	Analog Input #2 Low
1000	Analog Input #3 High
2000	Analog Input #3 Low
4000	Analog Input #4 High
8000	Analog Input #4 Low
0001	RTD Input High
0003	RTD Input Low

0000

1000	Slave Unit#1 Communication Failed
2000	Slave Unit#2 Communication Failed
4000	Slave Unit#3 Communication Failed
8000	Battery Low
0001	Multi. Variable Spare High (DP)
0002	Multi. Variable Spare Low (DP)
0004	Multi. Variable Pressure High
0008	Multi. Variable Pressure Low
0010	Multi. Variable Temperature High
0020	Multi. Variable Temperature Low

00

10	Analog Output #1Overrange
20	Analog Output #2Overrange
40	Analog Output #3Overrange
80	Analog Output #4Overrange

MODBUS SHIFT

Reassigns Modbus address registers on one MicroMP3 Liquid Flow Computer to variables for easy polling and convenience. Use Modbus Shift to collect values in scattered Modbus registers into a consecutive order. The MicroMP3 Liquid 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 manual for more details and a listing of the Modbus Address Table Registers.

Note: Modbus shift registers are for READ ONLY

Example: you want to read the current status of switches #1 and #2 (addresses 3045 and 3046) and the Daily IV Total for Meter #1 (Addresses 31331 and 31333). Make assignments such as:

```
3082=3045
3083=3046

3819=31331
3821=31333
```

***Note:**
(1) Modbus shift registers are READ ONLY registers.
(2) Historical data in Modus Shift area will not be good or functional until a proper sequence is executed.

PROVER DATA

Report Number

The number that will appear in the proving report.

Serial Number

The serial number of the prover that will appear in the proving report.

Prover Model

The prover model that will appear in the proving report.

Prover Size

The size of the prover.

Prover Type

0 = Ballistic type prover with piston action.
1 = Reduced type prover unidirectional with total pulse count less than 10,000.
2 = Reduced volume bi-directional with less than 10,000 pulses in each direction.

All the above will use the double chronometry method (pulse interpolation).

3 = Unidirectional big volume prover with pulse count over 10,000 counts
4 = Bi-directional large volume prover with pulse count in each direction exceeding 10,000 in each direction
5 = Smith with piston action

Implement Meter Factor Automatically

Enter '1' to automatically implement the new meter factor. The new meter factor will apply to the current batch and will be used for that product until next prove.

Prove Abort Time Out in Seconds

If the prove run was not achieved in the set time, then the prove will be aborted. The reason for this function is to accommodate the possibility the second detector switch was not triggered for one reason or another, or the proving was launched from the wrong direction.

Number of Prove Runs to Average

Numbers 1-10 are for the consecutive runs to achieve good meter factor and pulse deviation within set limit. After the number of prove runs to average is achieved within the pulse deviation limit, then the prove runs will stop.

Number of Total Runs

Numbers 1-20 are the total number of allowable runs to achieve repeatability. The Flow Computer will attempt to achieve consecutive runs within the repeatability limit.

Upstream/Downstream Prover Volume

The prover volume in user configured unit(barrels/gallon/liter/M3) at reference conditions per water draw.

Pre-travel in Volume

After the second detector switch is tripped. The Flow Computer allows for certain delay period proportional to time between prover run first and second detector switch. To allow for the prove ball to stabilize, after the time expires, the launch sequence will be re-initiated.

Prover Diameter

The diameter of the prover in inches (US unit) or in centimeter (Metric Unit)

Prover Wall Thickness

The thickness of prover wall in inches (US unit) or in centimeter (Metric Unit) assuming single wall prover.

Modulus of Elasticity

It is the elasticity coefficient of prover wall material.

Prover Base Temperature

Enter the temperature in which the prover volume was established. All steel correction factors will be based on base temperature.

Prover Base Pressure

The prover pressure correction factors will be based on the reference calibration pressure. The modulus of elasticity combined with the live pressure are used to calculate wall expansion due to pressure.

Detector Switch Type

Provers are always fitted with dual detector switches. Because of wiring considerations, many times both detectors are paralleled together. Select single detector, when both detectors are paralleled together. Select dual detector, when two isolated signals are used. Prover operation will not with the wrong prover controller chip.

333 chip is our most common prover controller chip. It uses a single detector switch. It is normal operation is for Active Low switches commonly found in Piston SVPs like Calibron and Brooks. It also supports Active High switches (sometimes called Reverse Polarity detector switch).

331 chip is generally used for Ball provers with dual detector switches like most traditional prover controllers, one switch for start and one to stop. It also supports Active High single detector provers.

Detector Switch Type	Description
0	Single Gate 1
1	Single Gate 2
2	Dual Gates
3	Single Gate 1 with Reverse Polarity
4	Dual Gates with Reverse Polarity
5	Single Gate 2 with Reverse Polarity

Single Detector Delay in seconds

When single detector is used, hysteresis time is required to insure proper debounce time.

Pulse Deviation

The pulse deviation limit is for setting the repeatability of runs. The Flow Computer will try to achieve consecutive runs within the programmed limits.

$$Pulse\ Deviation\ \% = \frac{Highest\ of\ Counts - Lowest\ of\ Counts}{Lowest\ of\ Counts} \times 100$$

Meter Factor Deviation

To implement proved meter factor; the deviation must be within these limits.

$$Meter\ Factor\ Deviation\ \% = \frac{Proved\ Meter\ Factor - Previous\ Meter\ Factor}{Previous\ Meter\ Factor} \times 100$$

Prover Temperature Sample Period in seconds

The prover temperature should be stable before proving. This would indicate that the prover and the fluid through the prover have similar temperatures. The sample period configured is a command to the Flow Computer to sample the prover temperature every so many minutes and compares the temperature to the previous sample.

Prover Temperature Allowable Change

Each time the prover temperature is sampled and compared to the previous sample. The deviation should not exceed the set limit. Once the prover temperature is stable the Flow Computer will give the command to initiate a prove.

Flowrate Change per Sample Period

The maximum flow rate fluctuation acceptable before initiating a prove. The temperature sample checking period is also used.

Prover and Meter Temperature Deviation

This will set the limit between the meter and prover temperature. If the difference between the meter and prover temperature is above the set limit the prove will be aborted

Gate Sensitivity

Detector Sensitivity can be configured to be low range for 9-12V or high range for 18-30V.

Selection	Description
0	9-12V
1	18-30V

Prove Seal

When prover seal signal is not available. The option for requiring prove ready signal is waived.

Coefficient of Cubical Expansion E-7

	US Unit	Metric Unit
mild carbon	62.0×10^{-7}/°F	3.35×10^{-5}/°C
316 stainless	88.3×10^{-7}/°F	4.77×10^{-5}/°C
304 stainless	96.0×10^{-7}/°F	5.18×10^{-5}/°C
7–14 pH stainless	60.0×10^{-7}/°F	3.24×10^{-5}/°C

Upstream Signal Polarity

The upstream signal polarity signals high or low is ready to launch signal. The logic polarity of the piston upstream can be programmed as low or high to indicate ready to launch.

Run Output Signal Polarity

When using ballistic provers, a signal is required to start prover, or bring the piston to launch position.

Detector Mounting

When piston type prover is selected, the detector switches distance will change with temperature. For ballistic provers, the user must select "on calibration section mounting". Pipe provers are normally "off calibration section mounting".

Shaft Temperature I/O Position

Selection	Description
0	None
1	Analog Input #1
2	Analog Input #2
3	Analog Input #3
4	Analog Input #4
9	RTD Input
13	Override Value

Area Thermal Coefficient E-7 (Piston Prover)

This is the coefficient of expansion for prover wall

	US Unit	Metric Unit
mild carbon	62.0×10^{-7}/°F	1.12×10^{-5}/°C
316 stainless	88.3×10^{-7}/°F	1.59×10^{-5}/°C
304 stainless	96.0×10^{-7}/°F	1.73×10^{-5}/°C
7–14 pH stainless	60.0×10^{-7}/°F	1.08×10^{-5}/°C

Coefficient of Expansion on Displacer Shaft E-7 (Piston Prover)

This is the coefficient of thermal expansion of the prover piston shaft

	US Unit	Metric Unit
mild carbon	62.0×10^{-7}/°F	1.12×10^{-5}/°C
316 stainless	88.3×10^{-7}/°F	1.59×10^{-5}/°C
304 stainless	96.0×10^{-7}/°F	1.73×10^{-5}/°C
7–14 pH stainless	60.0×10^{-7}/°F	1.08×10^{-5}/°C

Use Meter Temperature 1=Yes

If there is no prover temperature mounted on the prover, assign the meter temperature to be used for prover corrections.

Use Meter Pressure 1=Yes

If there is no prover pressure mounted on the prover, assign the meter pressure to be used for prover corrections.

Prover Temperature Transducer 0=Single,1=Dual

Inlet or outlet temperature transmitters are accepted. Inlet is used in forward direction and outlet in the reverse direction.

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

SECURITY CODES

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

Configuration: Allow user to modify device configuration settings.

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

Calibration: Let the user to calibrate the device inputs.

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

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

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

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

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

Connect to Device

Click 

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

Go Offline

Click 

to disconnect the communication.

Modbus Driver

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

Settings

Flow Computer Type

This window software can be used for MicroMP3, SFC3 or SFC500 application. Select the application only one time and check box to disable pop-up application selection question.

Report Templates

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.

Parameter Overrides:

Meter

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 MicroMP3 Liquid Flow Computer.

METER FACTOR OVERRIDE

Enter Meter Factor to override the current batch meter factor. This meter factor is used only for the current batch. If permanent modifications to the meter factor are needed, change the meter factor in the meter factor file.

EQUILIBRIUM PRESSURE OVERRIDE

Enter equilibrium pressure override to the current batch.

Stream

CURRENT BATCH PRESET

Enter the value to override the current batch preset or batch preset warning volume

GRAVITY 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.

BS&W OVERRIDE

Enter the BS&W override for the current batch (none retroactive).

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)

CTL SLOPE AND INTERCEPT

Slope and intercept are used if Ethanol product is configured.

END BATCH

The batch will end if requested through this menu. The current batch totalizer, flow weighted data and batch sampler counters will reset to zero. Non-resettable totalizers are not affected by the batch resetting Set new product data entries before ending a batch. ***A new product will only be applied to the meter when current batch is ended.***

TRUCK LOADING - STAREAM#1TRUCK LOADING SETUP

This Truck Loading Setup initialization is required if system reset or new firmware is downloaded. Stream#2 is set for daily batch and Stream#3 is set for monthly batch.

SYSTEM

DATE AND TIME
Change the date and time for the flow computer.

CLEAR PREVIOUS BATCHES
This is an irreversible process. All historical batch data and Truck loading data will be cleared if requested and confirmed through this menu.

RESET CUMULATIVE TOTALIZER
Enter reset code to reset accumulated volume.
Non-resettable gross and net accumulated volume will roll over at 999999999.
Non-resettable mass accumulated volume will roll over at 99999999.9.

CLEAR SYSTEM
Enter reset system code to reset all data.

Prover

PROVE REQUEST/ABORT
Enter the meter number to prove and then enter the prove sequence type. Single run sequence is one run one way in unidirectional prover and round trip in bi-directional. Sequence will be a sequence of run to achieve repeatability and meter factor.

TEMPERATURE OVERRIDE
When there is no live prover temperature connected to the flow computer, user can enter override value to be used in the proving calculations, or use the meter temperature.

PRESSURE OVERRIDE
When there is no live prover pressure connected to the flow computer, user can enter override value to be used in the proving calculations, or use the meter pressure.

PROVER GRAVITY OVERRIDE
Prover gravity override will be used for liquid corrections for both meter and prover. Gravity override is not used for batch correction, but only in the proving calculations.

PROVER SHAFT TEMPERATURE OVERRIDE
The shaft temperature override is used in piston type provers. The temperature for the shaft is normally the ambient temperature.

CTL OR CPL OVERRIDE
Enter the override value, the proving meter temperature and pressure correction will default to the override value. Zero in the data entry indicates use the calculated value.

HISTORICAL DATA

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 Batch Data

Up to 35 previous batch reports can be retrieved.

BATCH REPORT

Company Name: Carville Oil Unit ID : 1

Date 01/31/14 Time 02:48:32

Batch Opening Date 01/31/14 Time 02:46:59

STREAM #1						
ID	Batch	Batch ID	Lease_ID	Batch No	4	
Location	Run_Ticket	Rec.From	DriverID	Ship To	ShipID	
Product Name	Crude	Table	Crude-API			

	Meter 1
Meter ID	Batch
K Factor	1000.00
Dens. Corr. Factor	1.00000

Open Total	Meter 1
IV BBL	0
ISV BBL	0
GSV BBL	0
NSV BBL	0
Mass MLB	0.0

Batch Total	Meter 1
IV BBL	93
ISV BBL	93
GSV BBL	93
NSV BBL	93
Mass MLB	21.9

Cumulative Total	Meter 1
IV BBL	93
ISV BBL	93
GSV BBL	93
NSV BBL	93
Mass MLB	21.9

Average	Meter 1
Temperature °F	54.95
Pressure PSIG	333.371
API	77.8
API@60	80.0
SG	0.676090
SG@60	0.669030
Densitygm/cc	0.675425
Density@60	0.668372
LMF	1.00000
CTL	1.007099
CPL	1.003479
CTPL	0.000000
BSW%	0.14
Density Temperature	0.00
Density Pressure	0.000

Previous Daily Data

Up to 35 previous daily reports can be retrieved.

DAILY REPORT

Company Name: Carville Oil Unit ID : 1

Date 01/31/14 Time 00:00:00

Batch Opening Date 01/31/14 Time 02:48:37

STREAM #1					
ID	Batch	Batch ID	Lease_ID	Batch No	5
Location	Run_Ticket	Rec.From	DriverID	Ship To	ShipID
Product Name	Crude	Table	Crude-API		

	Meter 1
Meter ID	Batch
K Factor	1000.00
Dens. Corr. Factor	1.00000

Open Total	Meter 1
IV BBL	93
ISV BBL	93
GSV BBL	93
NSV BBL	93
Mass MLB	21.9

Batch Total	Meter 1
IV BBL	11780
ISV BBL	11760
GSV BBL	11760
NSV BBL	11723
Mass MLB	2746.4

Cumulative Total	Meter 1
IV BBL	11780
ISV BBL	11760
GSV BBL	11760
NSV BBL	11723
Mass MLB	2746.4

Average	Meter 1
Temperature °F	70.00
Pressure PSIG	500.000
API	80.4
API@60	80.0
SG	0.667814
SG@60	0.669030
Densitygm/cc	0.667157
Density@60	0.668372
LMF	1.00000
CTL	0.992345
CPL	1.005881
CTPL	0.998181
BSW%	0.31
Density Temperature	0.00
Density Pressure	0.000

Previous Hourly Data

Up to 35 previous hourly data are stored in the Flow Computer. Enter first report and the Flow Computer will go backward from that selected report. Current hour cannot be selected.

Previous Prove Data

Up to 16 previous prove data are stored in the Flow Computer. Enter first report and the Flow Computer will go backward from that selected report.

Alarm Report

Up to 200 previous alarm data can be retrieved. The data are starting from the most recent to the oldest.

Audit Report

The audit trail report shows configuration parameter that has changed which could influence the calculated numbers. The Flow Computer provides up to 200 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.

Report Name

The reports generated by "Dynacom Software" are extension DFM. The name can have any combination of letters and numbers.

Use Meter id as Report Name

By checking this option, the "Dynacom Software" will use meter ID to name the report.

Generate Additional files

The report generated by "Dynacom Software" can be only viewed using "Dynacom Software".

Additional report formats are provided to be viewed by other software applications.

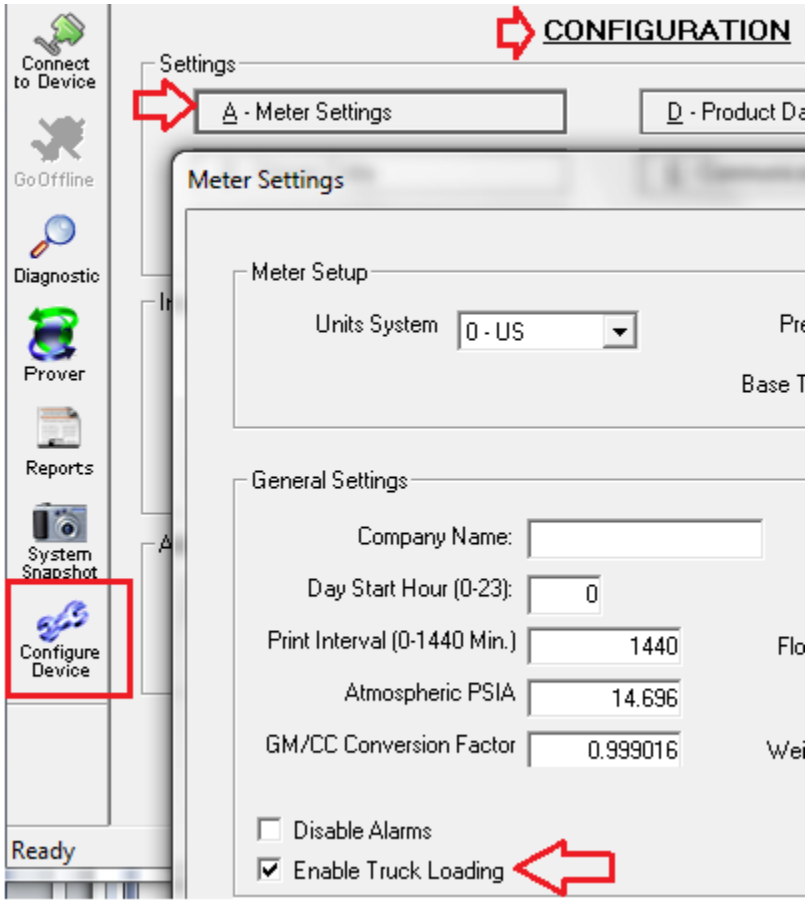
HTML Reports:
This format can be viewed with endless number of software applications, among them are Internet Explorer, Microsoft Excel, Microsoft Word, etc.

Viewing Saved Reports

Once a report is saved with DFM extension, the report can be viewed from this option.
The browse button can be used to locate the report.

Truck Loading Parameters

Enable Truck Loading



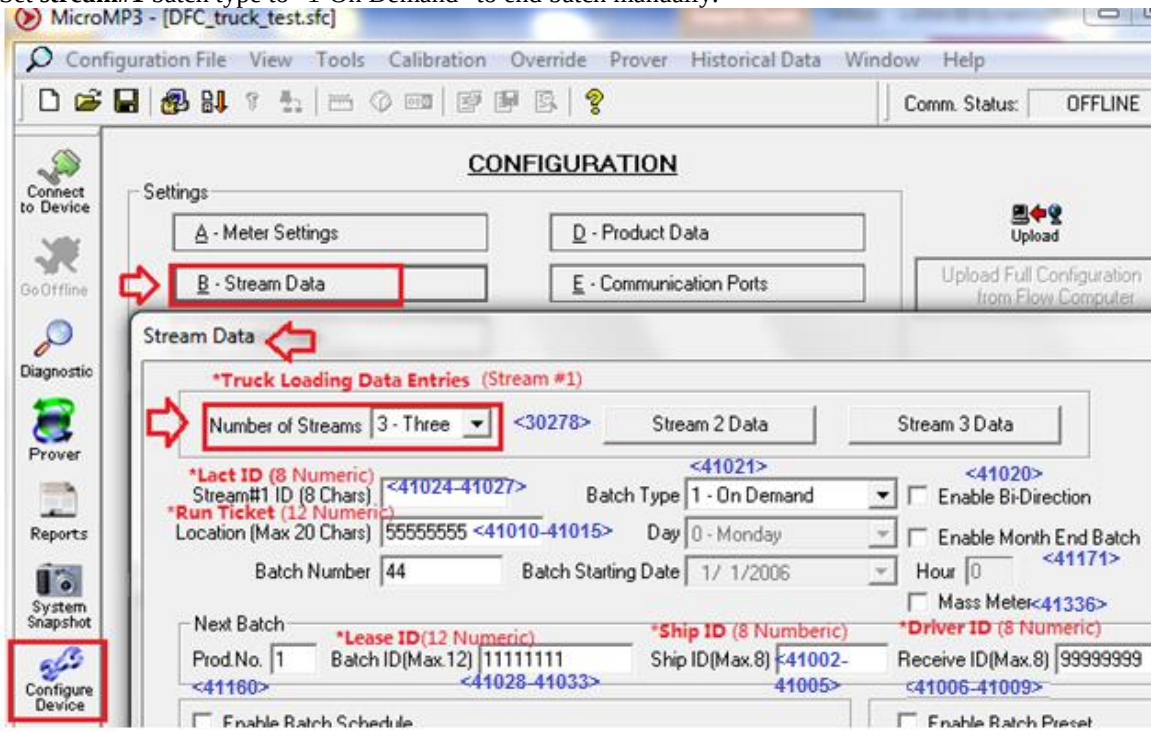
Stream Data

Set to three streams.

To utilize functionality of ticket, daily batch, and monthly batch, three streams must be selected.

STREAM #1 DATA

Set **stream#1** batch type to "1-On Demand" to end batch manually.



Stream ID (Lact ID)

When truck loading is enabled, "Stream#1 ID" is defined as "**Lact ID**" (max. 8 numeric characters)

Stream Location (Run Ticket)

When truck loading is enabled, "Stream#1 Location" is defined as "**Run Ticket**" (max. 12 numeric characters).

Next Batch ID (Lease ID)

When truck loading is enabled, "Stream#1 Next Batch ID" is defined as "**Lease ID**" (max. 12 numeric characters).

Next Batch Receive ID (Driver ID)

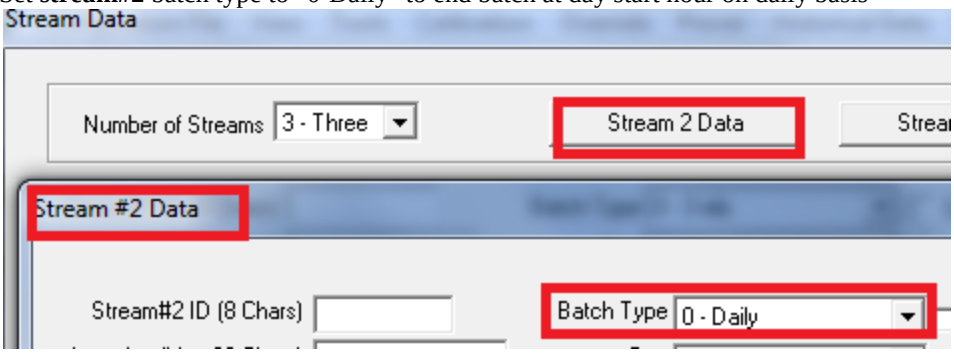
When truck loading is enabled, "Stream#1 Next Batch Receive ID" is defined as "**Driver ID**" (max. 8 numeric characters) .

Enable Bi-Direction

Bi-directional becomes a dual customer function to have two customers. Set Modbus value swap customers (Forward direction – Customer 1, Reverse direction – Customer 2)

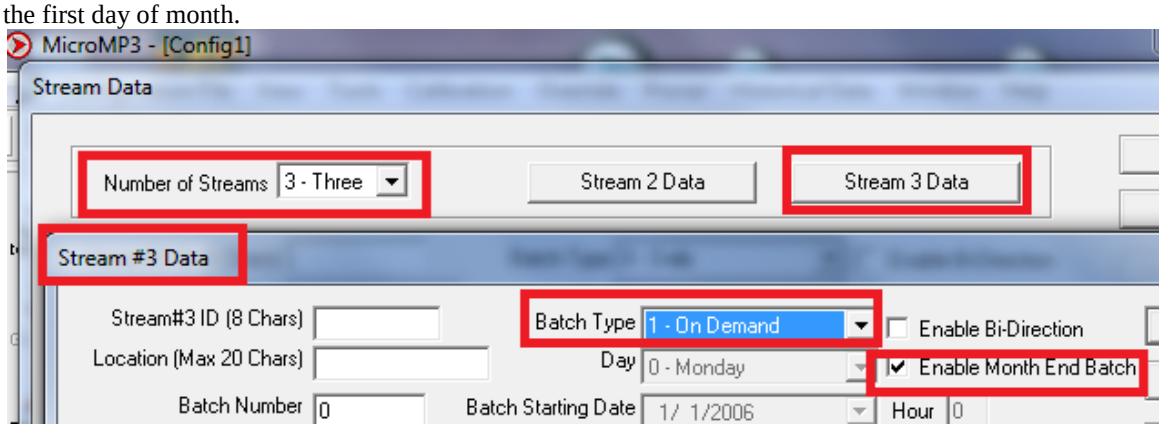
STREAM #2 DATA

Set **stream#2** batch type to "0-Daily" to end batch at day start hour on daily basis



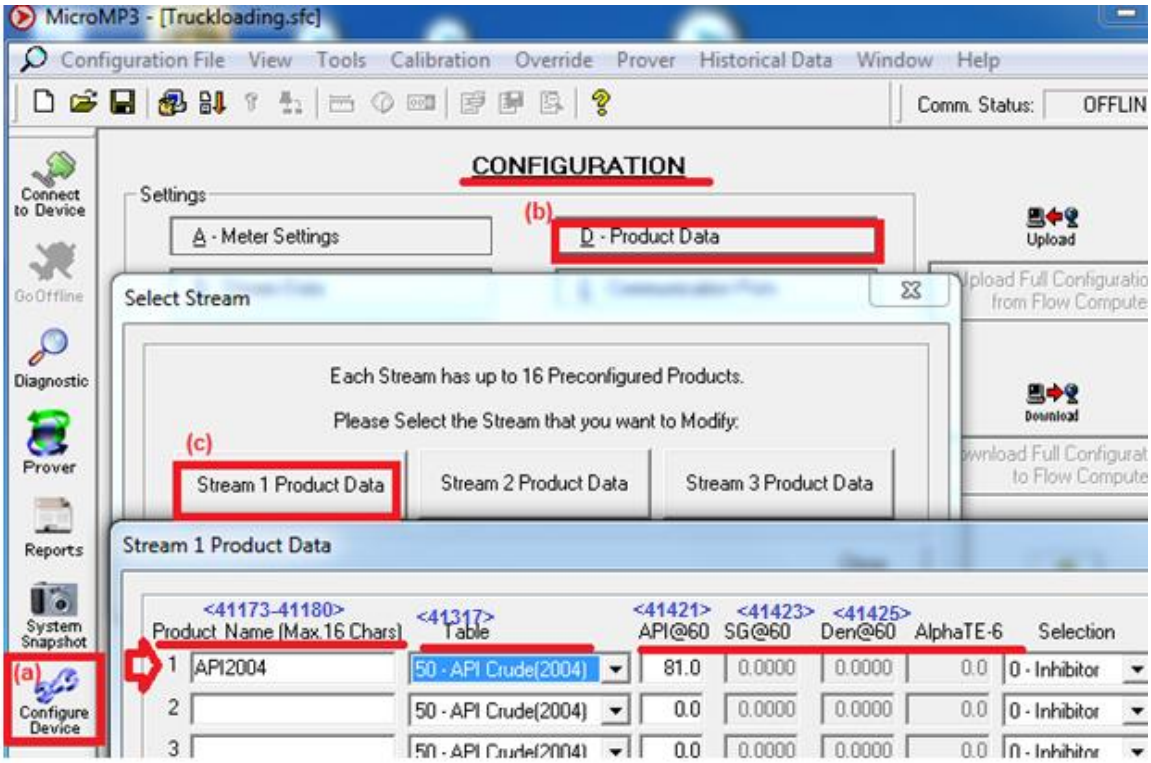
STREAM #3 DATA

Set stream#3 batch type to "1-On Demand" and Enable Month End Batch to end batch at day start hour of the first day of month.



Stream#1 Product Data Entries

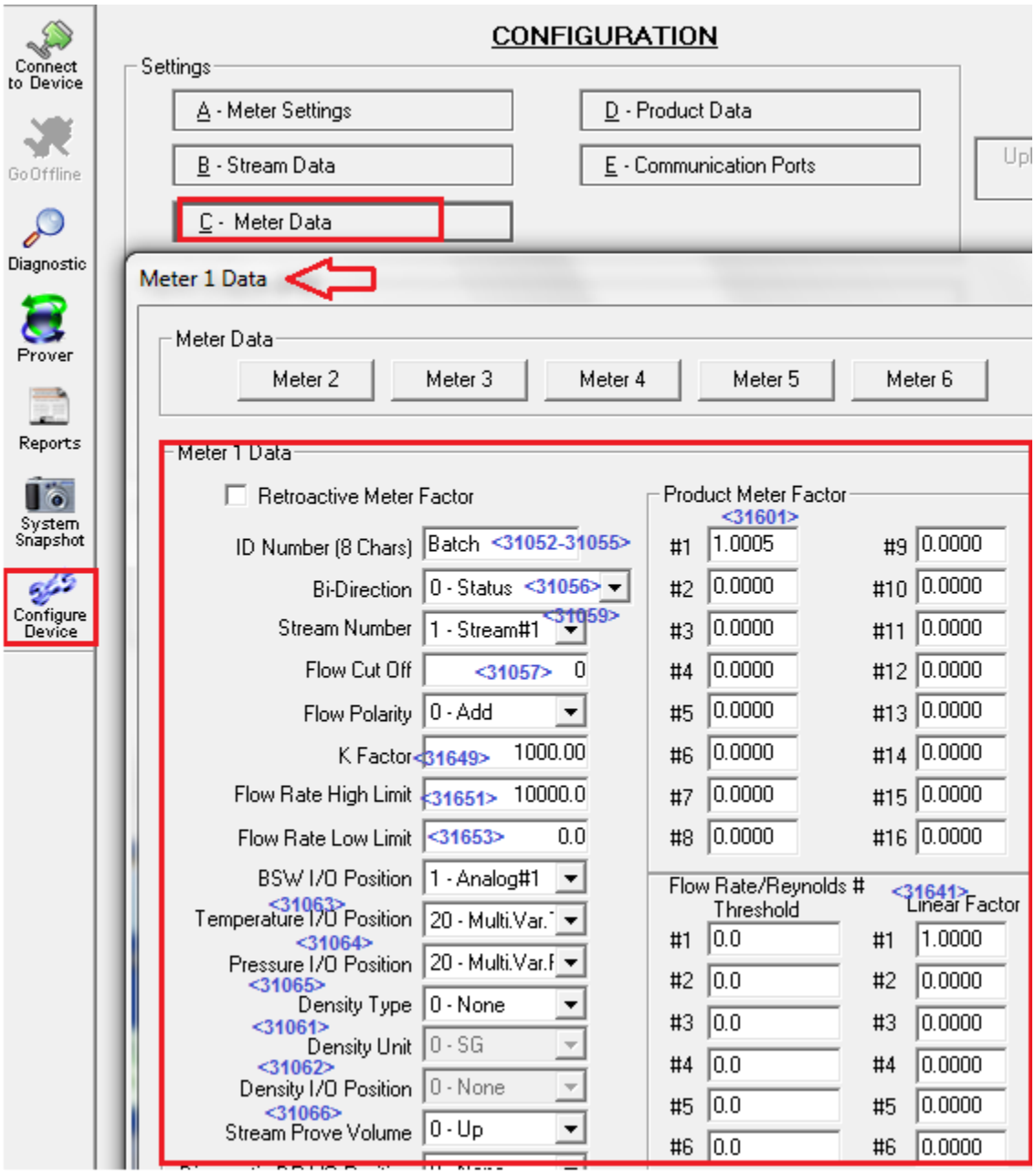
Enter the product data for stream#1 and it will apply to all other streams automatically.
Set API/SG/ Density@60 to ZERO if a live densitometer is used, otherwise the API/SG/Density@60 must be entered



Meter Data Entries

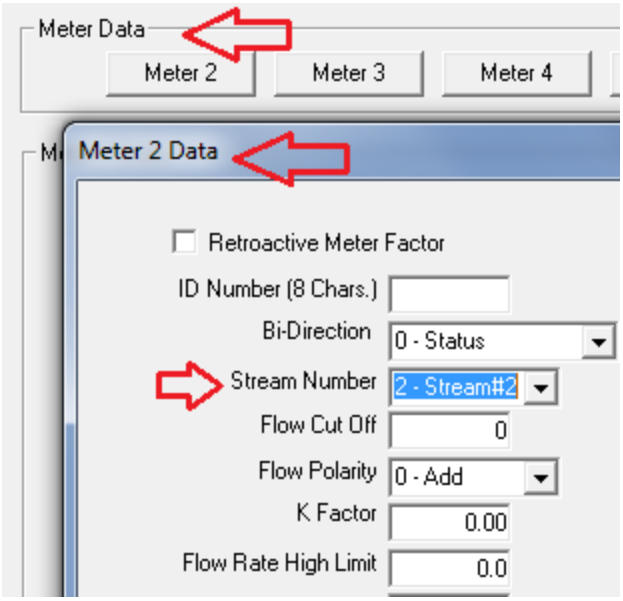
Enter data for meter#1 and it will apply to all other meter automatically. To handle multi-customer, set bi-directional data entry to “Customer Swap”.

METER 1 DATA



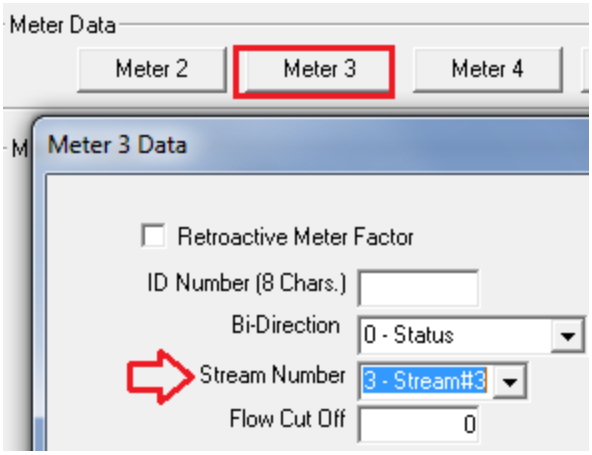
METER 2 DATA

Set **stream number to two**



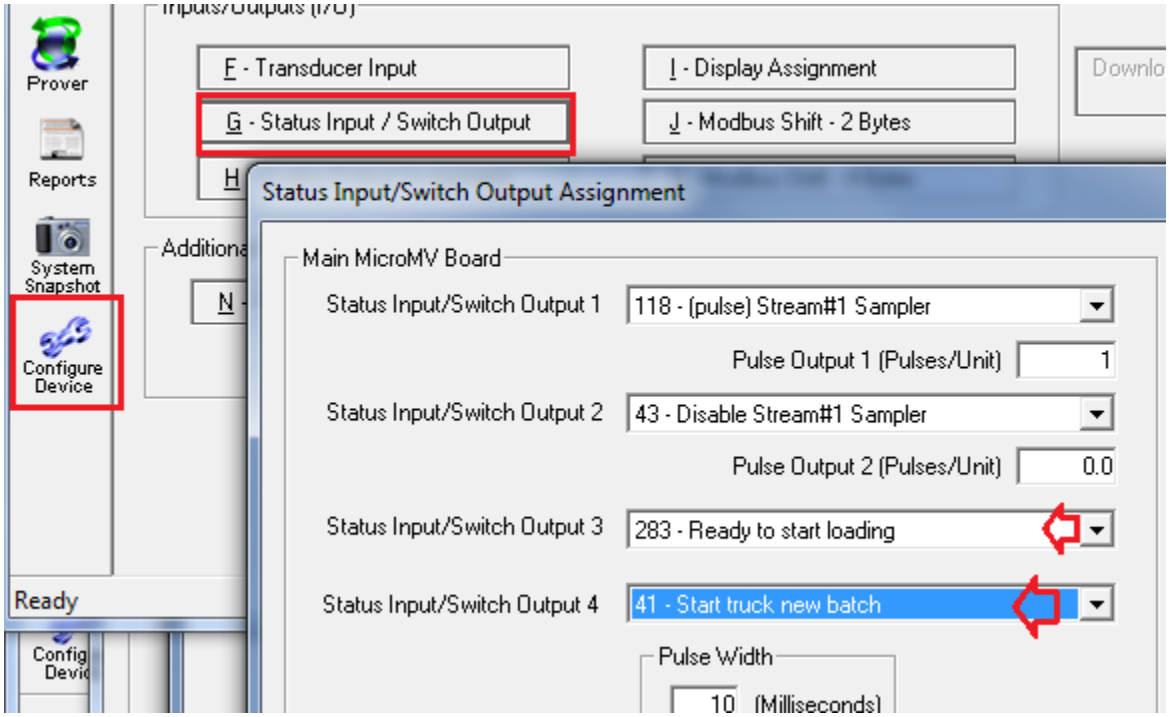
METER 3 DATA

Set **stream number to three**



Status Input/ Switch Output Data Entries

Configuration settings to use one output signal for permissive and one input signal to start a truck batch and end batch



Assignments – Contact Type Outputs

283	Ready to Start Loading

Status Input Assignment

41	**Truck – Start New Batch**	When using truck loading, this signal is for starting a new batch. "Start New Batch" signals high to indicate batch is in progress.
42	Disable Sampler	Disable Sampler if Signal is High
43	Disable Stream#1 Sampler	Disable Stream#1 Sampler if Signal is High

For example:

"283-Ready to Start Loading" is the digital output from DFC to the PLC as the permissive after "Driver ID", "Ticket Number", "Lease ID' are cleared and changed. **Enable** "**Manual Truck Loading data**" to bypass reset and enter new "Driver ID", "Ticket Number", and "Lease ID".

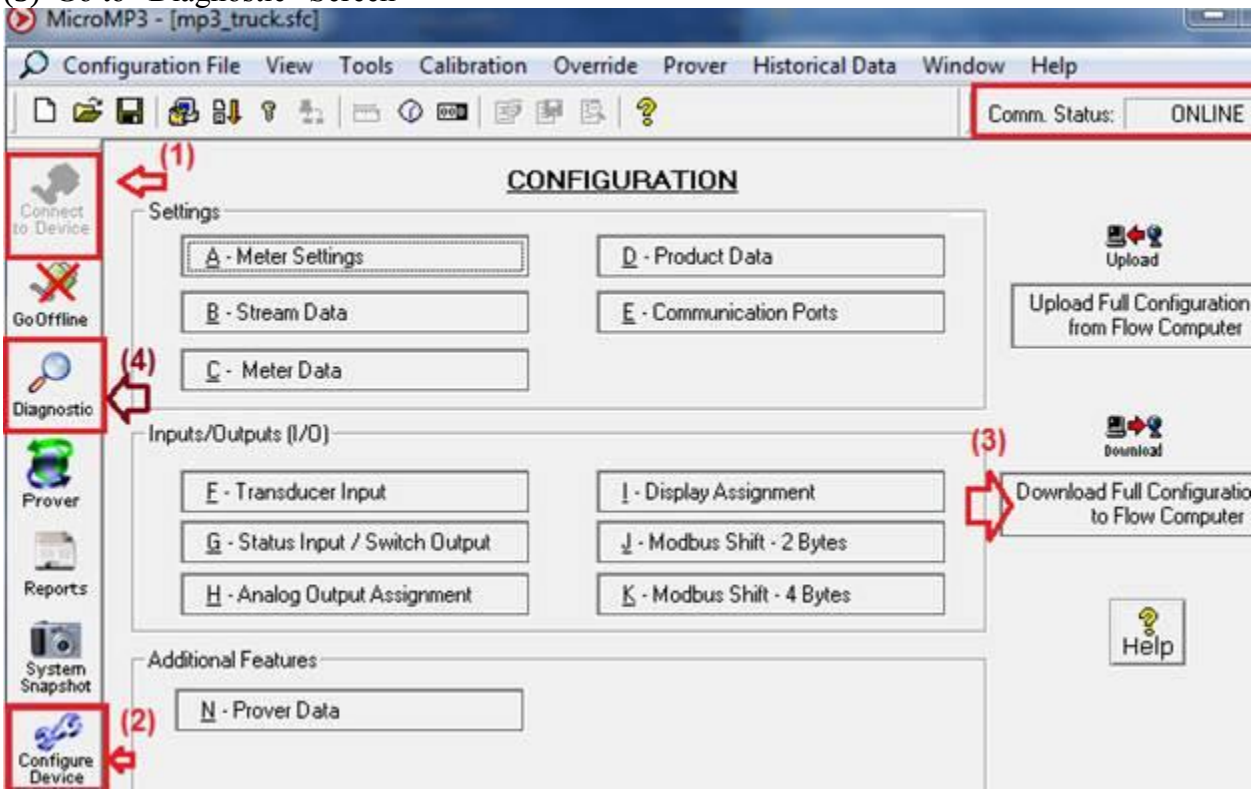
This permissive signal will hold high for the duration of the truck batch

"41-Start New Truck Batch" is the digital input as the PLC Command the DFC status input to start a new batch. MicroMP3 Flow Computer will start new batch when this digital input signal (start new truck batch) goes **high**, end batch when this digital input signal goes low, and then permissive signal will go low to complete batch.

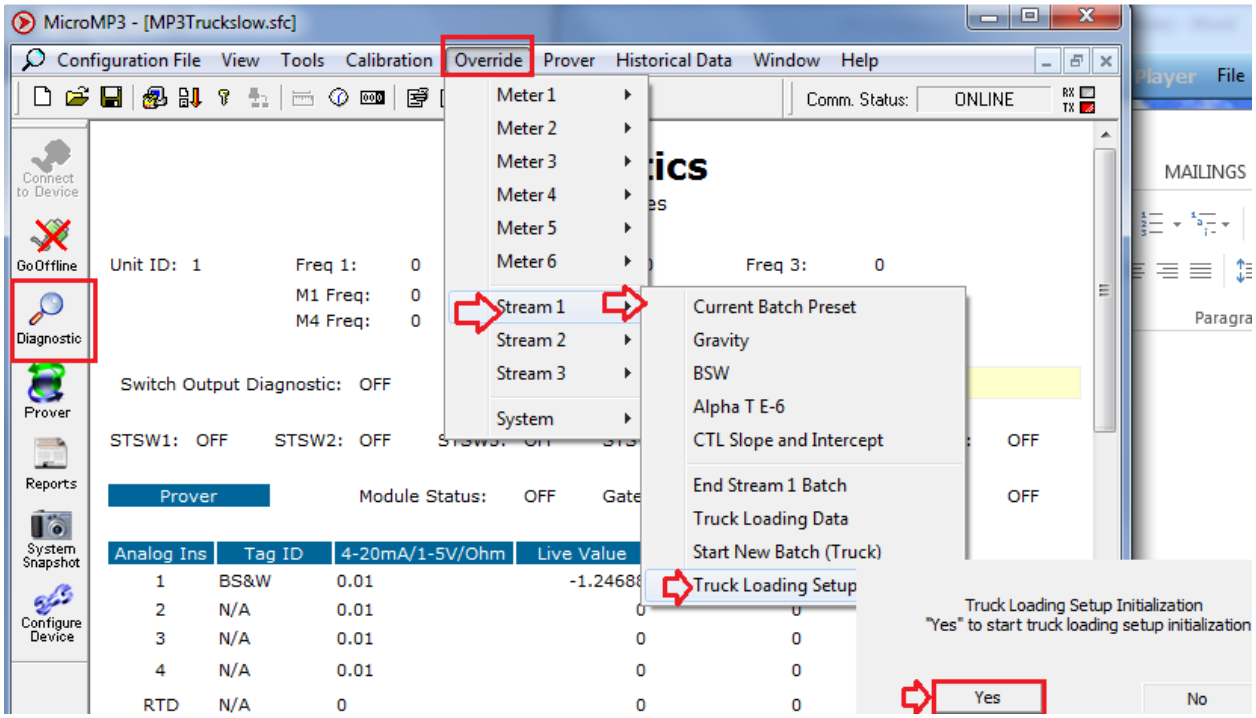
Truck Loading Setup Initialization –

This setup is required if system is reset or new firmware is downloaded to initialize to start truck loading feature.

(1) Connect to MicroMP3 Flow Computer.
(2) When connected first time, select "NO" not to full upload configuration data from Flow Computer because not configured yet
(3) Select "Configure Device"
(4) Download Full Truck Loading pre-configured Configuration Data
(5) Go to "Diagnostic" Screen



(6) Go to "Override", "Stream **1**", "Truck Loading Setup" , click on "Yes" button to start initialization



Use a Modbus Driver Program

(1) Set up Truck Loading Configuration

(2) Set Modbus Address 2210 to 1 to initialize Truck Loading Setup
The MicroMP3 FC will acknowledge, start initialization, and set back to zero.

Now, Stream#1, #2, and #3 have the same product table, stream#1 is set as batch on command, stream#2 is set up as daily batch, and stream#3 is set up as monthly batch or on command.

Truck Loading Batch Sequence –

***Three** Methods to start and end a truck batch*

Method 1: Use one output signal for permissive and one input signal to start a truck batch

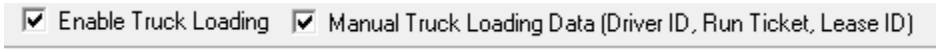
Switch Output Assignment – 283: Ready to start loading (PLC permissive). When signal is high, a batch ticket is staged and ready to start flow. Low held high for duration of truck unload

Status Input Assignment – 41: Start Truck New Batch. This signal is to start a truck batch. Momentary low to high from PLC to start new truck unload batch ticket. Momentary high to low from PLC to end unload ticket to complete the batch.

Ready for the next prompt sequence

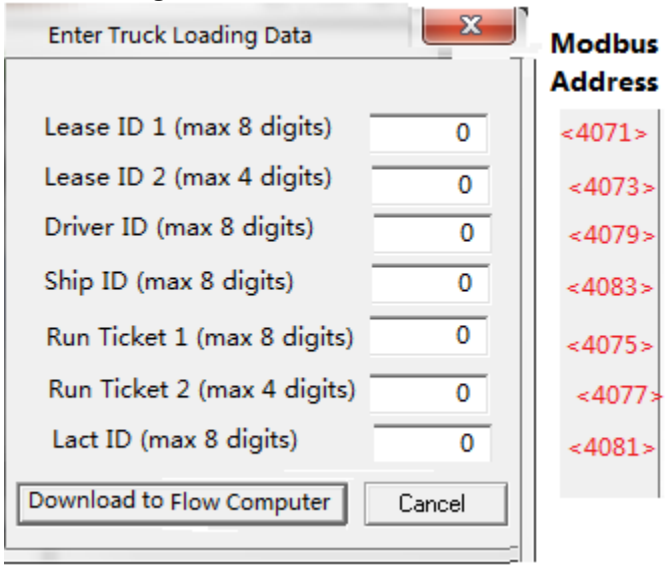
After a truck batch is completed and truck loading stage will stay in idle (not in progress). Driver ID, Lact ID, Run Ticket number, Ship ID, or Lease ID can be entered or changed through Modbus or below configuration data screen during the idle stage.

When a batch is ended, "Run Ticket", "Lease ID", "Driver ID" data must be reset first, and MicroMP3 Flow Computer will activate the "ready to start loading" permissive signal after detecting new "Run Ticket", "Lease ID", "Driver ID" data are entered. Enable "Manual Truck Loading" to bypass reset and enter new data.

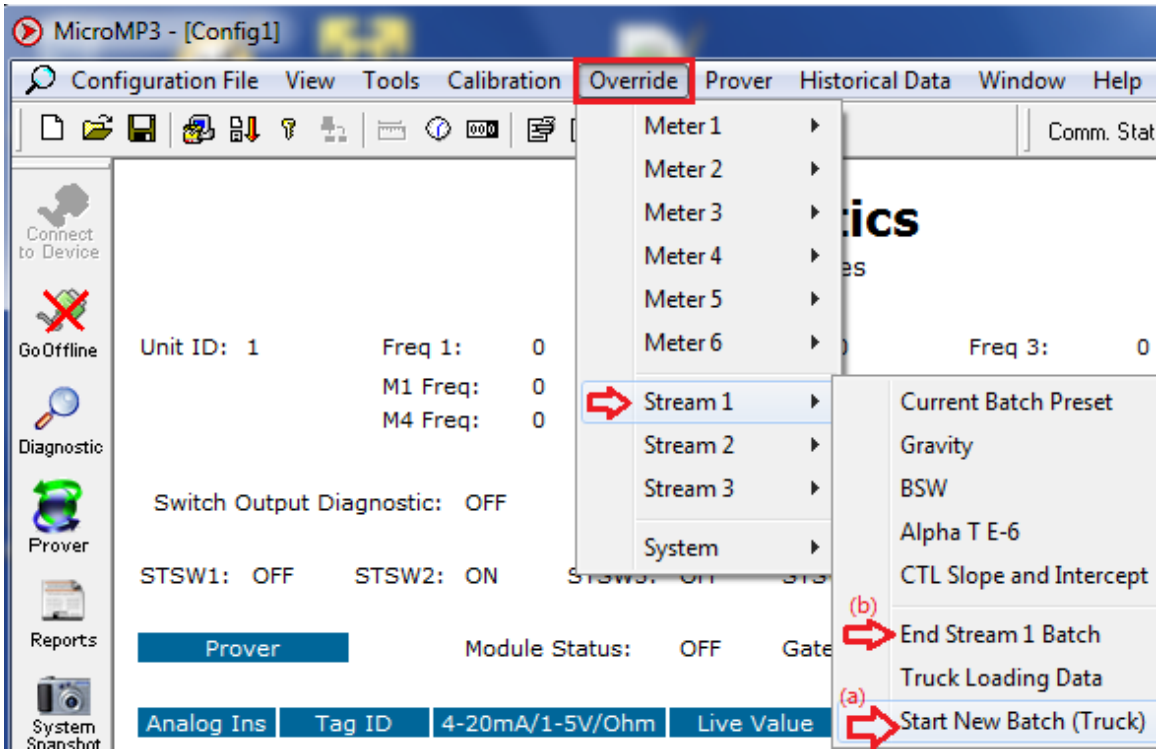


"Lease ID", "Driver ID" , "Ship ID" , "Run Ticket" , and "Lact ID" data can be changed through Modbus (2x16 bit integer) or the following data screen

Truck loading data screen



Method 2: Use MicroMP3 PC configuration program to start a truck batch and end batch
(2.a) To start a truck batch
(2.b) To end batch



Method 3: Use Modbus command to start a truck batch and end batch (1x16 bit integer)
(3.a) Set <41337> to 1, the MicroMP3 flow computer will start a truck batch and set <41337> to zero
(3.b) Set <41001> to 1, the MicroMP3 flow computer will end batch, and set <41001> to zero

Truck Loading Data Modbus Address

	Modbus Address 2x16 bit Integer		Modbus Address 1x16 Integer
Lease ID 1 (max 8 digits)	4071	Lease ID (12 numeric char)	41028-41033
Lease ID 2 (max 4 digits)	4073		
Driver ID (max 8 digits)	4079	Driver ID (8 numeric char)	41006-41009
Ship ID (max 8 digits)	4083	Ship ID (8 numeric char)	41002-41005
Run Ticket 1 (max 8 digits)	4075	Run Ticket(12 numeric char)	41010-41015
Run Ticket 2 (max 4 digits)	4077		
Lact ID (max 8 digits)	4081	Lact ID (8 numeric char)	41024-41027

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 key, right arrow key**
These keys can be used by using 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.

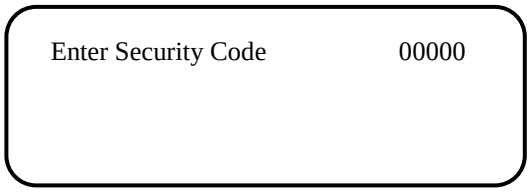
Down Arrow Key, Right Arrow Key

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**

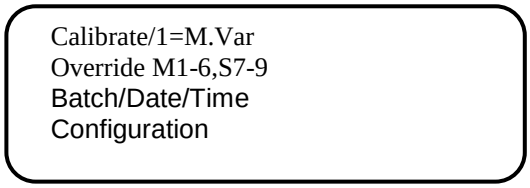
MAIN MENU

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

Security Code

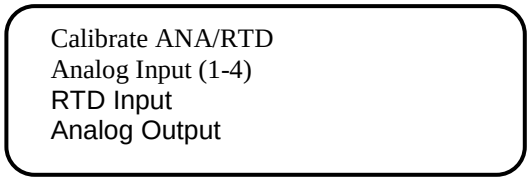


Enter the right security code to be able to change data.



Calibrate /1=M.Var

Enter 0 to calibrate analog input 1-4, RTD, analog output, or enter '1' to calibrate multivariable.

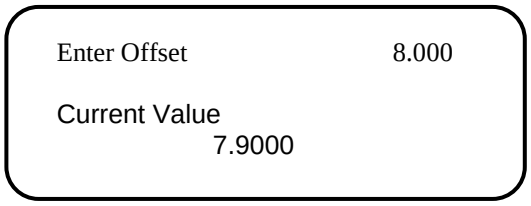


Calibrate Analog Input, RTD

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.

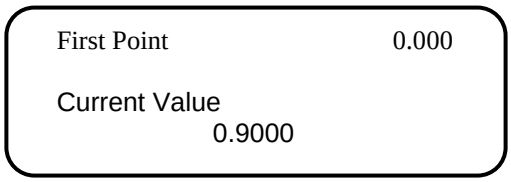
OFFSET (SINGLE POINT)

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

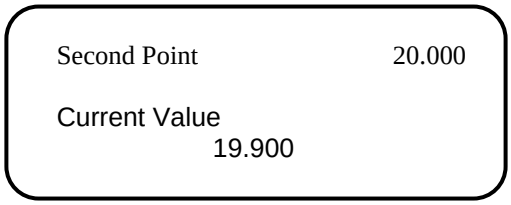


FULL (ZERO AND SPAN CALIBRATION)

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.



Calibrate High Point (20mA or 120 Ω), induce 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.

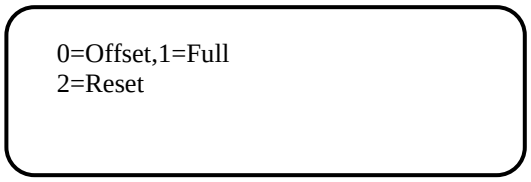


RESET (USE DEFAULT)

Enter '2' to use manufacture default.

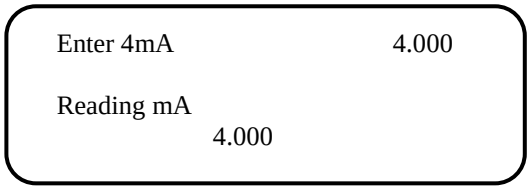
Calibrate Analog Output

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.

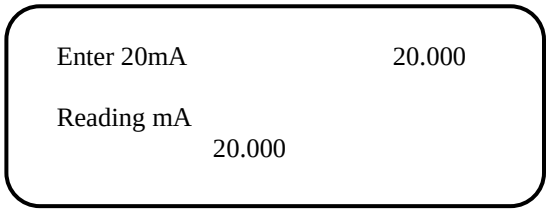


FULL (ZERO AND SPAN CALIBRATION)

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

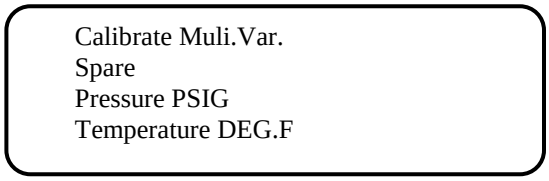


RESET (USE DEFAULT)

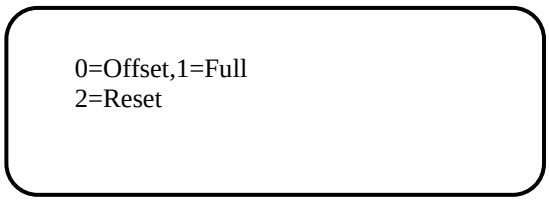
Enter '2' to use manufacture default.

Calibrate Multivariable

Select Spare, Pressure, or Temperature to be calibrated.

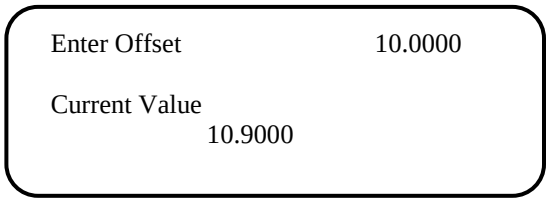


Enter the calibrate method (0=Offset, 1=Full, 2=Reset).



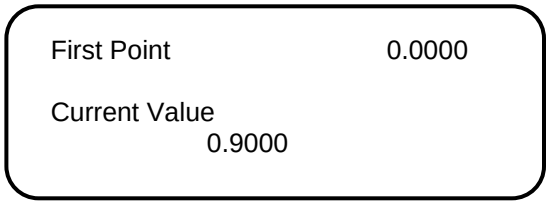
OFFSET (SINGLE POINT)

Induce the live value, then enter the offset.

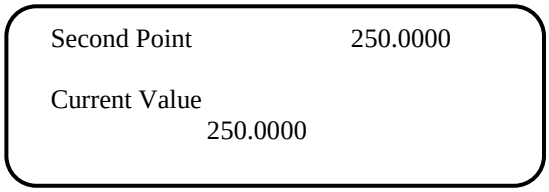


FULL (ZERO AND SPAN CALIBRATION)

Calibrate Low Point - induces the low range signal, and enters in that value.



Calibrate High Point - induce the high range signal, and enter in that value.

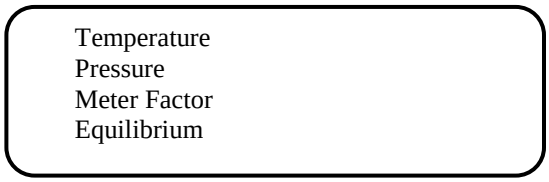


RESET (USE DEFAULT)

Enter '2' to use manufacture default.

Override Meter No1-6,Stream 7-9

Enter the meter number 1, 2, 3, 4, 5, or 6 to change meter override value



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

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

Meter Factor
Enter the value to change current meter factor

Equilibrium Pressure
Enter the value to replace current equilibrium pressure.

Stream Gravity 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.

Stream BS&W Override
Enter the BS&W override for the current batch (none retroactive).

Stream Alpha 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)

Batch/Date/Time

End Batch
Change Date
Change Time

END BATCH/START NEW BATCH (TRUCK LOADING)

S1 Next Prod.No. 01
S2 Next Prod.No. 01
S3 Next Prod.No. 0
End 1=S1,2=S2,3=S3, 4=Start New

S1 Next Product Number - Enter stream#1 product number for next batch.
S2 Next Product Number – Enter stream#2 product number for next batch.
S3 Next Product Number - Enter stream#3 product number for next batch.
End Batch / Start New Batch – Enter '1' to end stream#1, '2' to end stream#2, or s'3' to end stream#3 batch, or '4' to start new batch (Truck Loading)

CHANGE DATE

Month 09
Day 08
Year 00
Change Date 1=Yes

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

CHANGE TIME

Hour 09
Minute 08
Second 00
Change Time 1=Yes

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

Configuration

Configuration Meter No.1-6
Configure I/O
Pulse Output
Others

Configure Meter Data

Meter ID: 1
Flow Cut Off
K Factor
Product Meter Factor(1-16)

Flow Cutoff
The MicroMP3 Liquid Flow Computer will quit totalizing, when frequency is below the set limit. This feature is to reduce extraneous noise appearing as data when the meter is down for period of time. The totalizer will stop totalizing when the turbine frequency is below the limit.

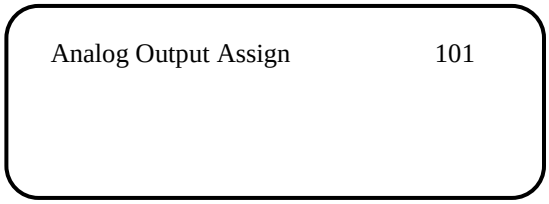
K Factor
K Factor is the number of pulses per unit volume, i.e. 1000 pulses/Unit. The meter's tag would normally indicate the K Factor.

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

Configure I/O

Analog Output 1
Meter I/O
Status/Switch
F.C. Display

Analog Output



Assignments:

	Meter 1	Meter 2	Meter 3	Mtr1.R	Mtr2.R	Mtr3.R
IV	101	201	301	401	501	601
ISV	102	202	302	402	502	602
GSV	103	203	303	403	503	603
NSV	104	204	304	404	504	604
Mass	105	205	305	405	505	605
Density	106	206	306	406	506	606
SG	107	207	307	407	507	607
SG@60	108	208	308	408	508	608
API	109	209	309	409	509	609
API60	110	210	310	410	510	610
Temperature	111	211	311	411	511	611
Pressure	112	212	312	412	512	612

	Stream 1	Stream 2	Stream 3
IV	701	801	901
ISV	702	802	902
GSV	703	803	903
NSV	704	804	904
Mass	705	805	905

4-20mA
4-20mA selection must be proportional and within the range of the selected parameter. 4-20mA signals are 12 bits.

Meter I/O

Meter ID:	1
Temperature Assign	20
Pressure Assign	20
BS&W Assign	1

Temperature I/O Position

Selection	Description
0	None
1	Analog Input #1
2	Analog Input #2
3	Analog Input #3
4	Analog Input #4
9	RTD Input
20	Multi.-Variable

Pressure I/O Position

Selection	Description
0	None
1	Analog Input #1
2	Analog Input #2
3	Analog Input #3
4	Analog Input #4
20	Multi-Variable

BS&W I/O Position

Selection	Description
0	None
1	Analog Input #1
2	Analog Input #2
3	Analog Input #3
4	Analog Input #4

Status Input /Switch Output Assignment

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

Status Input

	Assignment	Comments
1	End Stream#1 Batch	End the batch for Stream#1 and reset batch totalizer
2	End Stream#2 Batch	End the batch for Stream#2 and reset batch totalizer
3	End Stream#3 Batch	End the batch for Stream#3; reset batch totalizers
4	Alarm Acknowledge	Reset the previous occurred alarms output bit
5	Print Request	Step 1: set port 2 RTS type to 1 (printer type) Step 2: When this status is activated, the Flow Computer will send the "Request Report" to the printer via the serial port #2.
6	Request Prove Meter#1	
7	Request Prove Meter#2	
11	N/A	
12	Request Trial Prove Meter1	
13	Request Trial Prove Meter2	
18	Prover Ready (High) / Upstream Polarity	
19	Stream #1 Flow Direction	
20 **21** **22** **23**	Stream#1 Product ID Bit 0 Stream#1 Product ID Bit 1 Stream#1Product ID Bit 2 Stream#1 Product ID Bit 3	Product ID Bits: Before ending batch, user can use status bits to select next product. These bits are read immediately at batch end. See the following table to specify a product.
24	Stream#2 Flow Direction	
25 **26** **27** **28**	Stream#2 Product ID Bit 0 Stream#2 Product ID Bit 1 Stream#2 Product ID Bit 2 Stream#2 Product ID Bit3	Product ID Bits: Before ending batch, user can use status bits to select next product. These bits are read immediately at batch end. See the following table to specify a product.
29	Stream#3 Flow Direction	
30 **31** **32** **33**	Stream#3 Product Bit 0 Stream#3 Product Bit 1 Stream#3 Product Bit 2 Stream#3 Product Bit 3	Product ID Bits: Before ending batch, user can use status bits to select next product. These bits are read immediately at batch end. See the following table to specify a product.
34	Display Freeze	
35	Display Toggle	
36	Stream#1 Partial Batch End	
37	Stream#2 Partial Batch End	
38	Stream#3 Partial Batch End	
39	End All Streams Batch	
40	End All Streams Partial Batch	
41	Truck – Start New Batch	When using truck loading, a signal is required to start a new batch. "Start New Batch" signals high to indicate batch is in progress.

Product ID Bits

Product Bit 2	Product Bit 1	Product Bit 0	Product Number
0	0	1	= 1
0	1	0	= 2
0	1	1	= 3
1	0	0	= 4
1	0	1	= 5
1	1	0	= 6
1	1	1	= 7

Switch Output Assignments – Pulse Outputs

	M1	M2	M3	M4	M5	M6	Str1	Str1.R	Str2	Str2.R	Str3	Str3.R
IV	121	126	131	136	141	146	151	156	161	166	171	176
ISV	122	127	132	137	142	147	152	157	162	167	172	177
GSV	123	128	133	138	143	148	153	158	163	168	173	178
NSV	124	129	134	139	144	149	154	159	164	169	174	179
Mass	125	130	135	140	145	150	155	160	165	170	175	180

Assignments – Contact Type Outputs

Assignment	Description
181	Analog Input #1 High
182	Analog Input #2 High
183	Analog Input #3 High
184	Analog Input #4 High
185	RTD#9 High
187	Analog Input #1 Low
188	Analog Input #2 Low
189	Analog Input #3 Low
190	Analog Input #4 Low
191	RTD#9 Low
192	N/A
193	Analog Input #1 Failed
194	Analog Input #2 Failed
195	Analog Input #3 Failed
196	Analog Input #4 Failed
197	RTD#9 Failed
198	N/A
199	Analog Output Out of Range
200	Prove in Progress
201	Prove Launch Forward
202	Prove Launch Reverse
203	Prove Launch Forward/Reverse
204	Compact Prove Run
205	Prove Complete
206	Prove Abort
233	M2 IV Flow High
234	M2 SG Out of Range
235	M2 Calc TF Out of Range
236	M2 Alpha T Out of Range
237	M2 API2565 Out of Range
238	M2 Down
239	M2 Corr. Inhibitor
240	M2 Antistatic
241	M3 IV Flow Low
242	M3 IV Flow High
243	M3 SG Out of Range
244	M3 Calc TF Out of Range
245	M3 Alpha T Out of Range
246	M3 API2565 Out of Range
247	M3 Down
248	M3 Corr. Inhibitor
249	M3 Antistatic
250	Stream#1 Product Bit 0
251	Stream#1 Product Bit 1
252	Stream#1 Product Bit 2
253	Stream#1 Product Bit 3
254	St#1 Partial/ Batch End(30 Sec)
255	Stream#1 Batch Warning
256	Stream#1 Batch Preset
257	Stream#1 Partial Batch Ended

Assignment	Description
207	Prove Meter#1-Meter#2
208	Prove Meter#1
209	Prove Meter#2
211	Multivariable Pressure High
212	Multivariable Pressure Low
213	Multivariable Pressure Fail
214	Watchdog
215	Day End (30 Seconds)
216	Month End (30 Seconds)
217	Active Alarms
218	Occurred Alarms
219	Remote Control
220	Multivariable Temperature High
221	Multivariable Temperature Low
222	Multivariable Temperature Fail
223	M1 IV Flow Low
224	M1 IV Flow High
225	M1 SG Out of Range
226	M1 Calc TF Out of Range
227	M1 Alpha T Out of Range
228	M1 API2565 Out of Range
229	M1 Down
230	M1 Corr. Inhibitor
231	M1 Antistatic
232	M2 IV Flow Low
260	Stream#2 Product Bit 0
261	Stream#2 Product Bit 1
262	Stream#2 Product Bit 2
263	Stream#2 Product Bit 3
264	St#2 Partial/ Batch End(30 Sec)
265	Stream#2 Batch Warning
266	Stream#2 Batch Preset
267	Stream#2 Partial Batch Ended
268	Stream#2 Traditional Batch Ended
269	Stream#2 Flow Direction
270	Stream#3 Product Bit 0
271	Stream#3 Product Bit 1
272	Stream#3 Product Bit 2
273	Stream#3 Product Bit 3
274	St#3 Partial/ Batch End(30 Sec)
275	Stream#3 Batch Warning
276	Stream#3 Batch Preset
277	Stream#3 Partial Batch Ended
278	Stream#3 Traditional Batch Ended
279	Stream#3 Flow Direction
280	Densitometer Failed
281	Densitometer High
282	Densitometer Low
258	St#1 Traditional Batch Ended
259	Stream#1 Flow Direction
283	Permissive Signal (Ready to Start Loading)

Pulse Output and Pulse Output Width Assignment

Pulse Output	
#1 Pulse/Unit	0.001
#2 Pulse/Unit	1.000
Pulse Width	100

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 MicroMP3 Liquid 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 MicroMP3 Liquid Flow Computer can produce up to 50 pulses per second.
The MicroMP3 Liquid 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.

Others

Day Start Hour	007
Print Interval	001
0=Hour,1=Day,2=Minutes	000
Disable Alarms	000

Day Start Hour
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.

Print Interval
When the second port (RS-232) of the MicroMP3 Liquid Flow Computer is configured as printer port, a snapshot report is generated every print interval (i.e., every five minutes, every hour, or every ten hours). Enter '0' to disable interval report.

Select Flow Rate Display
The flow rate will be based on daily basis, hourly, or minute.

Disable Alarms

Flow Computer Display Assignment

FC.Display#1 Assignment	102
FC.Display#2 Assignment	101
FC.Display#3 Assignment	103
FC.Display#4 Assignment	104

NO.	Description
101	Meter#1 IV/NSV/Mass Flow Rate
102	Meter#1 IV/ISV/GSV Flow Rate
106	Meter#1 IV/NSV/Mass Batch Total
107	Meter#1 IV/ISV/GSV Batch Total
111	Meter#1 IV/NSV/Mass Cum. Total
112	Meter#1 IV/ISV/GSV Cum Total
116	Meter#1 Prev.Day IV/NSV/Mass
117	Meter#1 Prev.Day IV/ISV/GSV
121	Meter#1 Prev.Batch IV/NSV/Mass
122	Meter#1 Prev.Batch IV/ISV/GSV
146	Meter#1 BS&W/Density/FWA
147	Meter#1 Temp/Pressure/FWA
148	Meter#1 Den.Temp/D.Press/FWA
149	Meter#1 SG/Base SG/FWA
150	Meter#1 API/Base API/FWA
151	Meter#1 ID/Batch/Steam/Product
201	Meter#2 IV/NSV/Mass Flow Rate
202	Meter#2 IV/ISV/GSV Flow Rate
206	Meter#2 IV/NSV/Mass Batch Total
207	Meter#2 IV/ISV/GSV Batch Total
211	Meter#2 IV/NSV/Mass Cum. Total
212	Meter#2 IV/ISV/GSV Cum Total
216	Meter#2 Prev.Day IV/NSV/Mass
217	Meter#2 Prev.Day IV/ISV/GSV
221	Meter#2 Prev.Batch IV/NSV/Mass
222	Meter#2 Prev.Batch IV/ISV/GSV
246	Meter#2 BS&W/Density/FWA
247	Meter#2 Temp/Pressure/FWA
248	Meter#2 Den.Temp/D.Press/FWA
249	Meter#2 SG/Base SG/FWA
250	Meter#2 API/Base API/FWA
251	Meter#2 ID/Batch/Steam/Product

NO.	Description
1101	Meter#1.R IV/NSV/Mass Flow Rate
1102	Meter#1.R IV/ISV/GSV Flow Rate
1106	Meter#1.R IV/NSV/Mass Batch Total
1107	Meter#1.R IV/ISV/GSV Batch Total
1111	Meter#1.R IV/NSV/Mass Cum. Total
1112	Meter#1.R IV/ISV/GSV Cum Total
1116	Meter#1.R Prev.Day IV/NSV/Mass
1117	Meter#1.R Prev.Day IV/ISV/GSV
1121	Meter#1.R Prev.Batch IV/NSV/Mass
1122	Meter#1.R Prev.Batch IV/ISV/GSV
446	Meter#1.R BS&W/Density/FWA
447	Meter#1.R Temp/Pressure/FWA
448	Meter#1.R Den.Temp/D.Press/FWA
449	Meter#1.R SG/Base SG/FWA
450	Meter#1.R API/Base API/FWA
451	Meter#1.R ID/Batch/Steam/Product
1201	Meter#2.R IV/NSV/Mass Flow Rate
1202	Meter#2.R IV/ISV/GSV Flow Rate
1206	Meter#2.R IV/NSV/Mass Batch Total
1207	Meter#2.R IV/ISV/GSV Batch Total
1211	Meter#2.R IV/NSV/Mass Cum. Total
1212	Meter#2.R IV/ISV/GSV Cum Total
1216	Meter#2.R Prev.Day IV/NSV/Mass
1217	Meter#2.R Prev.Day IV/ISV/GSV
1221	Meter#2.R Prev.Batch IV/NSV/Mass
1222	Meter#2.R Prev.Batch IV/ISV/GSV
546	Meter#2.R BS&W/Density/FWA
547	Meter#2.R Temp/Pressure/FWA
548	Meter#2.R Den.Temp/D.Press/FWA
549	Meter#2.R SG/Base SG/FWA
550	Meter#2.R API/Base API/FWA
551	Meter#2.R ID/Batch/Steam/Product

NO.	Description		NO.	Description
301	Meter#3 IV/NSV/Mass Flow Rate		1301	Meter#3.R IV/NSV/Mass Flow Rate
302	Meter#3 IV/ISV/GSV Flow Rate		1302	Meter#3.R IV/ISV/GSV Flow Rate
306	Meter#3 IV/NSV/Mass Batch Total		1306	Meter#3.R IV/NSV/Mass Batch Total
307	Meter#3 IV/ISV/GSV Batch Total		1307	Meter#3.R IV/ISV/GSV Batch Total
311	Meter#3 IV/NSV/Mass Cum. Total		1311	Meter#3.R IV/NSV/Mass Cum. Total
312	Meter#3 IV/ISV/GSV Cum Total		1312	Meter#3.R IV/ISV/GSV Cum Total
316	Meter#3 Prev.Day IV/NSV/Mass		1316	Meter#3.R Prev.Day IV/NSV/Mass
317	Meter#3 Prev.Day IV/ISV/GSV		1317	Meter#3.R Prev.Day IV/ISV/GSV
321	Meter#3 Prev.Batch IV/NSV/Mass		1321	Meter#3.R Prev.Batch IV/NSV/Mass
322	Meter#3 Prev.Batch IV/ISV/GSV		1322	Meter#3.R Prev.Batch IV/ISV/GSV
346	Meter#3 BS&W/Density/FWA		646	Meter#3.R BS&W/Density/FWA
347	Meter#3 Temp/Pressure/FWA		647	Meter#3.R Temp/Pressure/FWA
348	Meter#3 Den.Temp/D.Press/FWA		648	Meter#3.R Den.Temp/D.Press/FWA
349	Meter#3 SG/Base SG/FWA		649	Meter#3.R SG/Base SG/FWA
350	Meter#3 API/Base API/FWA		650	Meter#3.R API/Base API/FWA
351	Meter#3 ID/Batch/Steam/Product		651	Meter#3.R ID/Batch/Steam/Product
60	Densitometer TAG/Period/Freq.			
61	Prover Temperature/Pressure			
62	Prove Mode			
63	Date/Time			
64	Alarm			
701	Stream#1 IV/NSV/Mass Flow Rate		1701	Stream#1.R IV/NSV/Mass Flow Rate
702	Stream#1 IV/ISV/GSV Flow Rate		1702	Stream#1.R IV/ISV/GSV Flow Rate
706	Stream#1 IV/NSV/Mass Batch Total		1706	Stream#1.R IV/NSV/Mass Batch Total
707	Stream#1 IV/ISV/GSV Batch Total		1707	Stream#1.R IV/ISV/GSV Batch Total
711	Stream#1 IV/NSV/Mass Cum. Total		1711	Stream#1.R IV/NSV/Mass Cum. Total
712	Stream#1 IV/ISV/GSV Cum. Total		1712	Stream#1.R IV/ISV/GSV Cum. Total
716	Stream#1 Prev.Day IV/NSV/Mass		1716	Stream#1.R Prev.Day IV/NSV/Mass
717	Stream#1 Prev.Day IV/ISV/GSV		1717	Stream#1.R Prev.Day IV/ISV/GSV
721	Stream#1 Prev.Batch IV/NSV/Mass		1721	Stream#1.R Prev.Batch IV/NSV/Mass
722	Stream#1 Prev.Batch IV/NSV/Mass		1722	Stream#1.R Prev.Batch IV/NSV/Mass
801	Stream#2 IV/NSV/Mass Flow Rate		1801	Stream#2.R IV/NSV/Mass Flow Rate
802	Stream#2 IV/ISV/GSV Flow Rate		1802	Stream#2.R IV/ISV/GSV Flow Rate
806	Stream#2 IV/NSV/Mass Batch Total		1806	Stream#2.R IV/NSV/Mass Batch Total
807	Stream#2 IV/ISV/GSV Batch Total		1807	Stream#2.R IV/ISV/GSV Batch Total
811	Stream#2 IV/NSV/Mass Cum. Total		1811	Stream#2.R IV/NSV/Mass Cum. Total
812	Stream#2 IV/ISV/GSV Cum. Total		1812	Stream#2.R IV/ISV/GSV Cum. Total
816	Stream#2 Prev.Day IV/NSV/Mass		1816	Stream#2.R Prev.Day IV/NSV/Mass
817	Stream#2 Prev.Day IV/ISV/GSV		1817	Stream#2.R Prev.Day IV/ISV/GSV
821	Stream#2 Prev.Batch IV/NSV/Mass		1821	Stream#2.R Prev.Batch IV/NSV/Mass
822	Stream#2 Prev.Batch IV/NSV/Mass		1822	Stream#2.R Prev.Batch IV/NSV/Mass
901	Stream#3 IV/NSV/Mass Flow Rate		1901	Stream#3.R IV/NSV/Mass Flow Rate
902	Stream#3 IV/ISV/GSV Flow Rate		1902	Stream#3.R IV/ISV/GSV Flow Rate
906	Stream#3 IV/NSV/Mass Batch Total		1906	Stream#3.R IV/NSV/Mass Batch Total
907	Stream#3 IV/ISV/GSV Batch Total		1907	Stream#3.R IV/ISV/GSV Batch Total
911	Stream#3 IV/NSV/Mass Cum. Total		1911	Stream#3.R IV/NSV/Mass Cum. Total
912	Stream#3 IV/ISV/GSV Cum. Total		1912	Stream#3.R IV/ISV/GSV Cum. Total
916	Stream#3 Prev.Day IV/NSV/Mass		1916	Stream#3.R Prev.Day IV/NSV/Mass
917	Stream#3 Prev.Day IV/ISV/GSV		1917	Stream#3.R Prev.Day IV/ISV/GSV
921	Stream#3 Prev.Batch IV/NSV/Mass		1921	Stream#3.R Prev.Batch IV/NSV/Mass
922	Stream#3 Prev.Batch IV/NSV/Mass		1922	Stream#3.R Prev.Batch IV/NSV/Mass

CHAPTER 4: FLOW EQUATIONS

FLOW RATES -

$$Indicated\ Volume - IV\ (Units/Hour) = \frac{Total\ (Pulses/Seconds)}{Nominal\ K\ Factor\ (Pulses/Units)} \times 3600$$

$$Indicated\ Standard\ Volume - ISV\ (Units/Hour) = IV \times CTPL$$

$$Gross\ Standard\ Volume - GSV\ (Units/Hour) = IV \times CTPL \times LMF$$

$$Net\ Standard\ Volume - NSV\ (Units/Hour) = IV \times CTPL \times LMF \times (1 - \frac{BSW}{100})$$

Mass Flow Rate – US Units (MLB/Hour) $= IV \times LMF \times (100 - BSW)\% \times SG \times \frac{Weight\ of\ Water}{1000}$

Mass Flow Rate – Metric Units (Ton/Hour) $= IV \times LMF \times (100 - BSW)\% \times Density$

Where

***Units* – Data Entry: 0=BBL, 1=GAL, 2=Liter, or 3=M3.**

***CTPL**:*

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)

Ethylene:
No live densitometer: CTLP=Compressibility factor of API2565 Ethylene equation
Live densitometer: CTL= Density / Density at 60 Deg.F (Units: GM/CC)

Propylene:
CTL= Density / Density at 60 Deg.F (Units: GM/CC)

Others: CTLP = CTL x CPL

***Density* in gm/cc**

***LMF*=** Linear Factor × Meter Factor

Weight of Water
The weight of one barrel of water under vacuum conditions. (i.e. 350.1614 LB/Barrel)

FLOW RATES – Mass Meter

$$Mass\ Flow\ (Per\ Hour)\ =\ \frac{Total\ (Pulses/Seconds)}{Nominal\ K\ Factor\ (Pulses/Units)} \times 3600$$

K Factor: Pulses/LB (US Units), Pulses/KG (Metric Units)
Mass Units – MLB (US Units), Tonne (Metric Units)

$$Indicated\ Volume - IV\ \ (Units/\ Hour) = \frac{Mass\ Volume}{Density} \times 3600 \times Units\ of\ Conversion$$

Volume Units Selection – BBL, GAL, LITR, or M3

$$Indicated\ Standard\ Volume - ISV\ (Units/Hour)\ \ = IV \times CTPL$$

$$Gross\ Standard\ Volume - GSV\ (Units/Hour) = IV \times CTPL \times LMF$$

$$Net\ Standard\ Volume - NSV\ (Units/Hour)\ = IV \times CTPL \times LMF \times (1 - \frac{BSW}{100})$$

Prove Equation

Prove IV Flowrate:

Pipe Prover :

$$= \frac{Total\ (Pulses/sec)}{Pulses\ /\ Unit} \times 3600$$

Compact Prover :

$$= \frac{BPV}{TDVOL} \times 3600$$

$$\text{Corrected Prover Volume} = BPV \times CTSP \times CPSP \times CPLP \times CTLP$$

$$\text{Meter Volume} = \frac{Total\ Counts}{K\ Factor}$$

$$\text{Corrected Meter Volume} = Meter\ Volume \times CTLM \times CPLM$$

$$\text{Prove Meter Factor} = \frac{Corrected\ Prover\ Volume}{Corrected\ Meter\ Volume}$$

Where:

$BPV = Base\ Prover\ Volume$

$CTLP = Correction\ for\ the\ effect\ of\ Prover\ Temperature$

$= CTL\ when\ T_{Actual} = Avg.Temp.at\ prover\ during\ a\ prove$

$CPLP = Correction\ for\ the\ effect\ of\ Prover\ Pressure$

$= CPL\ when\ P = Avg.Pressure\ at\ prover\ during\ a\ prove$

$CTLM = Volume\ Correction\ Factor\ of\ Meter\ Temperature$

$= CTL\ when\ T_{Actual} = Avg.Temp.at\ meter\ during\ a\ prove$

$CPLM = Correction\ for\ the\ effect\ of\ Meter\ Pressure$

$= CPL\ when\ P = Avg.Pressure\ at\ prover\ during\ a\ prove$

Additional Information refer to “API Chapter 4 and Chapter 12” that describe full terms and rules for meter proving.

CTSP = *Correction for the effect of temperature*

Compact Prover : Detector Mounting Calibration Section - OFF

$$CTSP = 1 + G_a(T_p - T_b)$$

Compact Prover : Detector Mounting Calibration Section - ON

$$CTSP = [1 + G_a(T_p - T_b)] \times [1 + G_l(T_p - T_b)]$$

Pipe Prover :

$$CTSP = 1 + G_a(T_p - T_b)$$

T_p = *Temperature of prover chamber*

T_b = *Base temperature*

G_a = *Area thermal coefficien t of expansion for prover chamber.*

G_l = *Linear thermal coefficien t of expansion on displacer shaft.*

CPSP = *Correction for the effect of pressure*

Compact Prover : $CPSP = 1 + \dfrac{ID\,(P - P_b)}{E \times WT}$

Pipe Prover : $CPSP = 1 + \dfrac{ID \times P}{E \times WT}$

P = *Internal operating pressure of prover*

P_b = *Base Pressure*

ID = *Internal diameter of prover*

E = *Modulus of elasticity for prover material*

WT = *Wall thickness of prover*

DENSITY EQUATIONS

Sarasota Density GM/CC

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

$$\boldsymbol{Correct\ Density} = DCF \times D_0 \times \frac{(t - T_{0P})}{T_{0P}} \times \left[2 + K \times \left(\frac{(t - T_{0P})}{T_{0P}}\right)\right]$$

Where:
DCF = Density Correction Factor
t = Densitometer oscillation period in microseconds
D_0 = Calibration Constant, gm/cc
$K = Sraasota\ Constant$

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

T_0 = A Calibration Constant in Microseconds
$T_{coef} = Temperature\ Coefficient\ in\ Microseconds\ /\ °F(US), ℃\ (Metric)$
$Tf = Flowing\ Temperature\ in\ °F(US), ℃(Metric)$
$T_{cal} = Calibration\ Temperture\ in\ °F(US), ℃(Metric)$
$P_{coef} = Pressure\ Coefficient\ in\ Microseconds\ /\ PSIG(US), Bar\ (Metric)$
$Pf = Flowing\ Pressure\ in\ PSIG(US), Bar(Metric)$
$P_{cal} = Calibration\ Pressure\ in\ PSIG(US), Bar(Metric)$

UGC Density GM/CC

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

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

Where:

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

K_0, K_1, K_2 = *Calibration Constants*

t = *Densitometer oscillation period in microseconds*

DCF = *Density Correction Factor*

K = *Pressure Constant*

P_{off} = *Pressure Offset*

K_T = *Temperature Coefficient*

T_{cal} = *Temperature coefficient in microseconds/°F(US),∘C(Metric)*

Solartron Density GM/CC

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(USUnit), at 20^{O}C and 0 Bar(Metric Unit)

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

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

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

Temperature Corrected Density- US Unit

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

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

Temperature Corrected Density- Metric Unit

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

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

Temperature and Pressure Corrected Density

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

$$\text{Where :}$$

$$P = \text{Pressure in PSIG(US),Bar(Metric)}$$

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

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

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

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.***

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

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

Propylene Density (US Unit only)

Density at flowing Temperature and pressure is calculated using API Chapter 11.3.3.2 (API 2565)

Temperature Range	20–165 °F
Pressure Range	Saturation–1600 PSIA

Ethylene Density (US Unit only)

Ethylene density is calculated using API Chapter 11.3.3.2

Temperature Range	65–167 °F
Pressure Range	200–2100 PSIA

CHAPTER 5: MODBUS DATA

MODBUS PROTOCOL

TRANSMISSION MODE

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

ASCII FRAMING

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

ASCII MESSAGE FORMAT

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

RTU FRAMING

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

RTU MESSAGE FORMAT

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

FUNCTION CODE

To inform the slave device of what function to perform

FUNCTION CODE	ACTION
06	Write a Single 16 Bits
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 none will respond when that 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 3n001-3n070 (n=1-6),
2211-2301, 2601-2701, 3001-3220, 30001-30669, 4m001-4m339 (m=1-3)

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

READ A LONG WORD NUMERIC VARIABLE

The long word numeric variable is a *two 16-bit integers* with decimal places 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 Word Variable Modbus Address: from 3n201 to 3n993 (n=1-6),
3819-6799, 30701-30997,40227-40759,4m341-4m995 (m=1,2,3)

Read Address 31241

ADDR	FUNC CODE	STARTING Address		# OF Registers		CRC CHECK	
		HI	LO	HI	LO		
01	03	7A	09	00	**02**	0D	11

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**	**00**	**1B**	**58**	F1	39

Data Bytes - 00 00 1B 58 (Hex) = 7000 (decimal)
Data with 2 decimal places inferred = 70.00

For Example:
Delta-V Modbus system - read address **71241**
Data Calculation
Value = High Word x 65536 + Low Word
High Word = 00 00 (Hex), 0 (Decimal)
Low Word = 1B 58 (Hex), 7000 (Decimal)
= 7000
Two decimal places inferred
= 70.00

READ A FLOATING POINT VARIABLE

The floating point variable is a single precision floating point value

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 (**one register with 4 data bytes**)

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
2211	Slave#1 Unit ID	0 Inferred	Read/Write
2212	Slave#1 Variable#1 Type	0 Inferred	Read/Write
2213	Slave#1 Variable#2 Type	0 Inferred	Read/Write
2214	Slave#1 Variable#3 Type	0 Inferred	Read/Write
2215	Slave#1 Variable#4 Type	0 Inferred	Read/Write
2216	Slave#1 Variable#5 Type	0 Inferred	Read/Write
2217	Slave#1 Variable#1 Desitination	0 Inferred	Read/Write
2218	Slave#1 Variable#2 Desitination	0 Inferred	Read/Write
2219	Slave#1 Variable#3 Desitination	0 Inferred	Read/Write
2220	Slave#1 Variable#4 Desitination	0 Inferred	Read/Write
2221	Slave#1 Variable#5 Desitination	0 Inferred	Read/Write
2222	Slave#1 Variable#1 Source Address	0 Inferred	Read/Write
2223	Slave#1 Variable#2 Source Address	0 Inferred	Read/Write
2224	Slave#1 Variable#3 Source Address	0 Inferred	Read/Write
2225	Slave#1 Variable#4 Source Address	0 Inferred	Read/Write
2226	Slave#1 Variable#5 Source Address	0 Inferred	Read/Write
2227	Slave#2 Unit ID	0 Inferred	Read/Write
2228	Slave#2 Variable#1 Type	0 Inferred	Read/Write
2229	Slave#2 Variable#2 Type	0 Inferred	Read/Write
2230	Slave#2 Variable#3 Type	0 Inferred	Read/Write
2231	Slave#2 Variable#4 Type	0 Inferred	Read/Write
2232	Slave#2 Variable#5 Type	0 Inferred	Read/Write
2233	Slave#2 Variable#1 Desitination	0 Inferred	Read/Write
2234	Slave#2 Variable#2 Desitination	0 Inferred	Read/Write
2235	Slave#2 Variable#3 Desitination	0 Inferred	Read/Write
2236	Slave#2 Variable#4 Desitination	0 Inferred	Read/Write
2237	Slave#2 Variable#5 Desitination	0 Inferred	Read/Write
2238	Slave#2 Variable#1 Source Address	0 Inferred	Read/Write
2239	Slave#2 Variable#2 Source Address	0 Inferred	Read/Write
2240	Slave#2 Variable#3 Source Address	0 Inferred	Read/Write
2241	Slave#2 Variable#4 Source Address	0 Inferred	Read/Write
2242	Slave#2 Variable#5 Source Address	0 Inferred	Read/Write
2243	Slave#3 Unit ID	0 Inferred	Read/Write
2244	Slave#3 Variable#1 Type	0 Inferred	Read/Write
2245	Slave#3 Variable#2 Type	0 Inferred	Read/Write
2246	Slave#3 Variable#3 Type	0 Inferred	Read/Write
2247	Slave#3 Variable#4 Type	0 Inferred	Read/Write
2248	Slave#3 Variable#5 Type	0 Inferred	Read/Write
2249	Slave#3 Variable#1 Desitination	0 Inferred	Read/Write
2250	Slave#3 Variable#2 Desitination	0 Inferred	Read/Write
2251	Slave#3 Variable#3 Desitination	0 Inferred	Read/Write
2252	Slave#3 Variable#4 Desitination	0 Inferred	Read/Write
2253	Slave#3 Variable#5 Desitination	0 Inferred	Read/Write
2254	Slave#3 Variable#1 Source Address	0 Inferred	Read/Write
2255	Slave#3 Variable#2 Source Address	0 Inferred	Read/Write
2256	Slave#3 Variable#3 Source Address	0 Inferred	Read/Write
2257	Slave#3 Variable#4 Source Address	0 Inferred	Read/Write
2258	Slave#3 Variable#5 Source Address	0 Inferred	Read/Write
2259-2262	Slave#1 Tag 1	8 Chars	Read/Write

Modbus Address Table – 16 Bits Integer

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
2263-2266	Slave#1 Tag 2	8 Chars	Read/Write
2267-2270	Slave#2 Tag 1	8 Chars	Read/Write
2271-2274	Slave#2 Tag 2	8 Chars	Read/Write
2275-2278	Slave#3 Tag 1	8 Chars	Read/Write
2279-2282	Slave#3 Tag 2	8 Chars	Read/Write
2283	Slave Unit Update Flag (1=Slave)	0 Inferred	Read/Write
2285	Enable Slow Pulse (1=Yes)	0 Inferred	Read/Write
2608	Stream#1 Frequency Override	0 Inferred	Read/Write
2609	Stream#2 Frequency Override	0 Inferred	Read/Write
2610	Stream#3 Frequency Override	0 Inferred	Read/Write
3001	Unit ID	0 Inferred	Read
3002	No of Stream	0 Inferred	Read
3003	Reserved	0 Inferred	Read
3004	Meter #1 Stream Number	0 Inferred	Read
3005	Meter #2 Stream Number	0 Inferred	Read
3006	Meter #3 Stream Number	0 Inferred	Read
3007	Meter #4 Stream Number	0 Inferred	Read
3008	Meter #5 Stream Number	0 Inferred	Read
3009	Meter #6 Stream Number	0 Inferred	Read
3010-3012	Reserved		
3013	Meter #1 Polarity	0 Inferred	Read
3014	Meter #2 Polarity	0 Inferred	Read
3015	Meter #3 Polarity	0 Inferred	Read
3016	Meter #4 Polarity	0 Inferred	Read
3017	Meter #5 Polarity	0 Inferred	Read
3018	Meter #6 Polarity	0 Inferred	Read
3019	Spare		
3020	Last Prove Report Request(1=Latest,16=Oldest)	0 Inferred	Write
3021-3024	Reserved		
3025	Reserved		
3026	Meter #1 Frequency	0 Inferred	Read
3027	Meter #2 Frequency	0 Inferred	Read
3028	Meter #3 Frequency	0 Inferred	Read
3029	Meter #4 Frequency	0 Inferred	Read
3030	Meter #5 Frequency	0 Inferred	Read
3031	Meter #6 Frequency	0 Inferred	Read
3032-3034	Reserved		
3035	Status Input #1 Status(1=ON,0=OFF)	0 Inferred	Read
3036	Status Input #2 Status(1=ON,0=OFF)	0 Inferred	Read
3037	Status Input #3 Status(1=ON,0=OFF)	0 Inferred	Read
3038	Status Input #4 Status(1=ON,0=OFF)	0 Inferred	Read
3039	Status Input #5 Status(1=ON,0=OFF)	0 Inferred	Read
3040-3044	Reserved		
3045	Switch output#1 Status(1=ON,0=OFF)	0 Inferred	Read
3046	Switch output#2 Status(1=ON,0=OFF)	0 Inferred	Read
3047	Switch output#3 Status(1=ON,0=OFF)	0 Inferred	Read
3048	Switch output#4 Status(1=ON,0=OFF)	0 Inferred	Read
3049	Switch output#5 Status(1=ON,0=OFF)	0 Inferred	Read
3050	Switch output#6 Status(1=ON,0=OFF)	0 Inferred	Read
3051-3054	Reserved		
3055	Live Analog Input#1 Fail Code	0 Inferred	Read

Modbus Address Table – 16 Bits Integer

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
3056	Live Analog Input#2 Fail Code	0 Inferred	Read
3057	Live Analog Input#3 Fail Code	0 Inferred	Read
3058	Live Analog Input#4 Fail Code	0 Inferred	Read
3059-3062	Reserved		
3063	Live RTD Input Fail Code	0 Inferred	Read
3064-3066	Reserved		
3967-3077	Current Alarm Status	0 Inferred	Read
3078-3087	Reserved		
3088	Analog Input #1 Calibration Index	0 Inferred	Read/Write
3089	Analog Input #2 Calibration Index	0 Inferred	Read/Write
3090	Analog Input #3 Calibration Index	0 Inferred	Read/Write
3091	Analog Input #4 Calibration Index	0 Inferred	Read/Write
3092-3095	Reserved		
3096	RTD Input Calibration Index	0 Inferred	Read/Write
3097-3099	Reserved		
3100	Analog Output Calibration Index	0 Inferred	Read/Write
3101-3108	Reserved		
3109-3147	Modbus Shift Data Area – 2 Bytes	0 Inferred	Read/Write
3149	Display Delay	0 Inferred	Read
3150	Display Assignment #1	0 Inferred	Read
3151	Display Assignment #2	0 Inferred	Read
3152	Display Assignment #3	0 Inferred	Read
3153	Display Assignment #4	0 Inferred	Read
3154	Display Assignment #5	0 Inferred	Read
3155	Display Assignment #6	0 Inferred	Read
3156	Display Assignment #7	0 Inferred	Read
3157	Display Assignment #8	0 Inferred	Read
3158	Display Assignment #9	0 Inferred	Read
3159	Display Assignment 10	0 Inferred	Read
3160	Display Assignment 11	0 Inferred	Read
3161	Display Assignment 12	0 Inferred	Read
3162	Display Assignment 13	0 Inferred	Read
3163	Display Assignment 14	0 Inferred	Read
3164	Display Assignment 15	0 Inferred	Read
3165	Display Assignment 16	0 Inferred	Read
3166-3185	Reserved		
3186-3187	Spare		
3188	Multi.Variable Spare Calibration Index	0 Inferred	Read
3189	Multi.Variable Pressure Calibration Index	0 Inferred	Read
3190	Multi.Variable Temperature Calibration Index	0 Inferred	Read
3191-3194	Reserved		
3195	Stream#1 Direction Cofig. (0=Forward,1=Reverse)	0 Inferred	Read
3196	Stream#2 Direction Cofig. (0=Forward,1=Reverse)	0 Inferred	Read
3197	Stream#3 Direction Cofig. (0=Forward,1=Reverse)	0 Inferred	Read
3198-3207, When the event occurs, the counter will be incremented by one. (roll over at:37677)			
3198	Audit Index Counter	0 Inferred	Read
3199	Alarm Index Counter	0 Inferred	Read
3200	Stream #1 Batch Index Counter	0 Inferred	Read
3201	Stream #2 Batch Index Counter	0 Inferred	Read
3202	Stream #3 Batch Index Counter	0 Inferred	Read
3203	Prove Index Counter	0 Inferred	Read
3204	Daily Index Counter	0 Inferred	Read
3205	Hourly Index Counter	0 Inferred	Read

Modbus Address Table – 16 Bits Integer

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
3206	Prove Abort Index Counter	0 Inferred	Read
3207	Abort Prove Command (set to 1)	0 Inferred	Read
3208	Display Sensitive Entry	0 Inferred	Read/Write
3209-3211	Reserved		
3212-3213	Spare		
3214	Truck Off Loading 0:Disabled,1:In Progress,2:Idle	0 Inferred	Read
3216	Spare		
3217	Frequency #1	0 Inferred	Read/Write
3218	Frequency #2	0 Inferred	Read/Write
3219	Frequency #3	0 Inferred	Read/Write
3220	Frequency #4	0 Inferred	Read/Write

Modbus Address Table – 16 Bits Integer

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
30001	Version Number	0 inferred	Read
30002	Application Tag	0 inferred	Read
30003	Reserved		

30004 Meter /Stream Status

Bit position	Status
0	Proving Meter #1
1	Meter #1 temperature out of range
2	Stream #1 batch ended flag
3	Proving Meter #2
4	Meter #2 temperature out of range
5	Stream #2 batch ended flag
7	Meter #3 temperaure out of range
8	Stream #3 batch ended flag
9	Proving Meter #4
10	Meter #4 temperature out of range
12	Proving Meter #5
13	Meter #5 temperature out of range
15	Meter #6 temperature out of range

30005 Prove Meter Status

Meter	#1	#2	#4
Aborted	Bit-0 on	Bit 2 on	Bit 6 on
Completed	Bit 1 on	Bit 3 on	Bit 7 on

30006 Prove Meter 5 Status

Meter	#5
Aborted	Bit 0 on
Completed	Bit 1 on

30007-30009	Spare	0 Inferred	Read
30010	Volume Unit (0=BBL,1=GAL,2=Liter,3=M3)	0 Inferred	Read
30011	Mass Unit (0=MLB,1=TON)	0 Inferred	Read
30012	Pressure Unit(0=PSIG,1=Bar,2=KG/CM2,3=KPA)	0 Inferred	Read
30013	Temperature Unit(0=DEG.F,1=DEG.C)	0 Inferred	Read
30014	Reserved	0 Inferred	Read
30015	Temperature Base(0=60,1=15,2=20)	0 Inferred	Read
30016	Version Number 2	0 Inferred	Read
30017-30019	Reserved		
30020	Flow Computer ID	0 Inferred	Read/Write
30021	Reserved		
30022	Port 1 Modbus Type (0=RTU,1=ASCII)	0 Inferred	Read/Write
30023	Port 1 Parity(0=None,1=Odd,2=Even)	0 Inferred	Read/Write
30024	Port 1 Baud Rate(0=1200,1=2400,3=4800,4=9600)		
30025	Reserved		
30026	Port 1 RTS Delay in Milliseconds	0 Inferred	Read/Write
30027-30030	Reserved		

Modbus Address Table – 16 Bits Integer

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
30031	Port 2 Select 0=RTS,1=Printer	0 Inferred	Read/Write
30032	Port 2 Modbus Type (0=RTU,1=ASCII)	0 Inferred	Read/Write
30033	Port 2 Parity(0=None,1=Odd,2=Even)	0 Inferred	Read/Write
30034	Port 2 Baud Rate(0=1200,1=2400,3=4800,4=9600)		
30035	Printer Baudrate(0=1200,1=2400,3=4800..)	0 Inferred	Read/Write
30036	Port 2 RTS Delay in Milliseconds	0 Inferred	Read/Write
30037	Printer Number of Nulls	0 Inferred	Read/Write
30038-30041	Spare		
30042	Port 3 Modbus Type (0=RTU,1=ASCII)	0 Inferred	Read/Write
30043	Port 3 Parity(0=None,1=Odd,2=Even)	0 Inferred	Read/Write
30044	Port 3 Baud Rate(0=1200,1=2250,3=4800,4=9600)		
30045	Spare		
30046	Port 2 RTS Delay in Milliseconds	0 Inferred	Read/Write
30047-30085	Spare		
30086	Analog #1 Input Scale Data	0 Inferred	Read
30087	Analog #2 Input Scale Data	0 Inferred	Read
30088	Analog #3 Input Scale Data	0 Inferred	Read
30089	Analog #4 Input Scale Data	0 Inferred	Read
30090-30093	Reserved		
30094	RTD Input Scale Data	0 Inferred	Read
30095-30097	Reserved		
30098	Density Input Scale Data	0 Inferred	Read
30099	Reserved		
30100	Spare		
30101	Switch Output/Digital Input #1 Assign	0 Inferred	Read/Write
30102	Switch Output/Digital Input #2 Assign	0 Inferred	Read/Write
30103	Switch Output/Digital Input #3 Assign	0 Inferred	Read/Write
30104	Switch Output/Digital Input #4 Assign	0 Inferred	Read/Write
30105	Switch Output #5 Assign	0 Inferred	Read/Write
30106	Switch Output #6 Assign	0 Inferred	Read/Write
30107-30120	Spare		
30121-30130	Spare		
30131-30150	Reserved		
30151-30160	Spare		
30161	Status Input #1 Status	0 Inferred	Read/Write
30162	Status Input #2 Status	0 Inferred	Read/Write
30163	Status Input #3 Status	0 Inferred	Read/Write
30164	Status Input #4 Status	0 Inferred	Read/Write
30165	Status Input #5 Status	0 Inferred	Read/Write
30161-30180	Reserved		
30181-30190	Spare		
30191	Switch Output #1 Status	0 Inferred	Read/Write
30192	Switch Output #2 Status	0 Inferred	Read/Write
30193	Switch Output #3 Status	0 Inferred	Read/Write
30194	Switch Output #4 Status	0 Inferred	Read/Write
30195	Switch Output #5 Status	0 Inferred	Read/Write
30196	Switch Output #6 Status	0 Inferred	Read/Write
30197-30210	Reserved		
30211-30220	Spare		
30221	Analog Output Assignment	0 Inferred	Read/Write
30222-30224	Reserved		
30225-30226	Spare		

Modbus Address Table – 16 Bits Integer

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
30227	Reserved	0 Inferred	Read/Write
30228-30230	Reserved		
30231-30240	Spare		
30240	Spring Forward Month	0 Inferred	Read/Write
30241	Spring Forward Day	0 Inferred	Read/Write
30242	Fall Back Month	0 Inferred	Read/Write
30243	Fall Back Day	0 Inferred	Read/Write
30244	Enable Daylight Time Saving	0 Inferred	Read/Write
30246	Select 0=US,1=Metric Unit	0 Inferred	Read/Write
30247	Metric Unit Temperature Base (0=15,1=20 DEG.C)	0 Inferred	Read/Write
30248	Metric Pressure Unit (0=Bar,1=KG/CM2,2=KPA)	0 Inferred	Read/Write
30249	Spare		
30250	Spare		
30251	Spare		
30252	Day Start Hour	0 Inferred	Read/Write
30253	Disable Alarms ? (1=Yes)	0 Inferred	Read/Write
30254	Display Volume Unit	0 Inferred	Read/Write
30255	Print Interval in Minutes (0-1440)	0 Inferred	Read/Write
30256	Spare		
30257	Pulse Width	0 Inferred	Read/Write
30258	Flowrate Display (0=Hour,1=Day,2=Minutes)	0 Inferred	Read/Write
30259	Flowrate Average Second	0 Inferred	Read/Write
30260	Spare		
30261-30270	Company Name	20 Chars.	Read/Write
30271-30275	Weight of H2O	10 Chars.	Read/Write
30276-30277	Reserved		
30278	Number of Streams	0 Inferred	Read/Write
30279	Enable Truck Loading	0 Inferred	Read/Write
30280	Manual Truck Loading	0 Inferred	Read/Write
30281	Common Frequency	0 Inferred	Read/Write
30282-30288	Spare		
30289-30292	Multi.Var#1 Spare Tag Name	8 Chars.	Read/Write
30293-30296	Multi.Var#1 Pressure Tag Name	8 Chars.	Read/Write
30297-30300	Multi.Var#1 Temperature Tag Name	8 Chars.	Read/Write
30301-30312	Reserved		
30313-30316	Analog Input #1 Tag Name	8 Chars.	Read/Write
30317-30320	Analog Input #2 Tag Name	8 Chars.	Read/Write
30321-30324	Analog Input #3 Tag Name	8 Chars.	Read/Write
30325-30328	Analog Input #4 Tag Name	8 Chars.	Read/Write
30329-30344	Reserved		
30345-30348	RTD Input Tag Name	8 Chars.	Read/Write
30349-30360	Reserved		
30361-30364	Analog Output#1 Tag Name	8 Chars.	Read/Write
30365-30368	Analog Output#2 Tag Name	8 Chars.	Read/Write
30369-30372	Analog Output#3 Tag Name	8 Chars.	Read/Write
30373-30376	Analog Output#4 Tag Name	8 Chars.	Read/Write
30377-30380	Densitometer Tag Name	8 Chars.	Read/Write
30381-30384	Reserved		
30385-30392	Spare		
30393	Multi.Var #1 Spare Fail Code	0 Inferred	Read/Write
30394	Multi.Var #1 Pressure Fail Code	0 Inferred	Read/Write
30395	Multi.Var #1 Temperature Fail Code	0 Inferred	Read/Write
30396-30398	Reserved		

Modbus Address Table – 16 Bits Integer

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
30399	Analog Input #1 Fail Code	0 Inferred	Read/Write
30400	Analog Input #2 Fail Code	0 Inferred	Read/Write
30401	Analog Input #3 Fail Code	0 Inferred	Read/Write
30402	Analog Input #4 Fail Code	0 Inferred	Read/Write
30403-30406	Reserved		
30407	RTD Input Fail Code	0 Inferred	Read/Write
30408-30410	Reserved		
30411	Densitometer Fail Code	0 Inferred	Read/Write
30412	Densitometer IO Position	0 Inferred	Read/Write
30413	Densitometer Selection	0 Inferred	Read/Write
30414	Densitometer Temperature Assignment	0 Inferred	Read/Write
30415	Densitometer Pressure Assignment	0 Inferred	Read/Write
30416-30420	Reserved		
30421-30438	Spare		
30439	Use Meter Temperature as Prover Temp	0 Inferred	Read/Write
30440	Use Meter Pressure as Prover Pressure	0 Inferred	Read/Write
30441	Prove Meter Number (1,2,4,or 5)	0 Inferred	**Write**
30442	Request Prove (1=Trail, 2=Sequence)	0 Inferred	Write
30443	Spare		
30444-30447	Prover Serial Number	8 Chars	Read/Write
30448-30451	Prover Model Number	8 Chars	Read/Write
30452	Reserved	0 Inferred	Read/Write
30453	Prove Type	0 Inferred	Read/Write
30454	Prover Detector Switch Type	0 Inferred	Read/Write
30455	Single Detector Delay in millisecond	0 Inferred	Read/Write
30456	Prover Detector Mount Type	0 Inferred	Read/Write
30457	Require Prover Seal (1=Yes)	0 Inferred	Read/Write
30458	Number of Average Prove Run	0 Inferred	Read/Write
30459	Number of Total Prove Run	0 Inferred	Read/Write
30460	Signal Polarity	0 Inferred	Read/Write
30461	Run Output Signal Polarity	0 Inferred	Read/Write
30462	Prove Abort Delay Period in Seconds	0 Inferred	Read/Write
30463	Prover Temperature Sample Period	0 Inferred	Read/Write
30464	Change Meter Factor Automatically	0 Inferred	Read/Write
30465	Prover Pressure Assignment	0 Inferred	Read/Write
30466	Prover Temperature Transducer 0=Single,1=Dual	0 Inferred	Read/Write
30467	Prover Temperature Assignment	0 Inferred	Read/Write
30468	Prover Left Temperature Assignment	0 Inferred	Read/Write
30469	Prover Right Temperature Assignment	0 Inferred	Read/Write
30470	Prover Shaft Temperature Assignment	0 Inferred	Read/Write
30471	Gate Sensitivity (0=9-15V,1=18-30V)	0 Inferred	Read/Write
30472-30499	Sapre		
30500	Modbus Shift Update Flag	0 Inferred	Read/Write
30501-30540	Modbus Shift Address – 2 Bytes	0 Inferred	Read/Write
30541-30630	Modbus Shift Address – 4 Bytes	0 Inferred	Read/Write

Modbus Address Table – 16 Bits Integer

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE

Scaled Data Area (N: 1-meter1, 2-meter2, … 6-meter6)

3n001	Meter #n IV Flowrate	0 Inferred	Read
3n002	Meter #n ISV Flowrate	0 Inferred	Read
3n003	Meter #n GSV Flowrate	0 Inferred	Read
3n004	Meter #n NSV Flowrate	0 Inferred	Read
3n005	Meter #n MASS Flowrate	0 Inferred	Read
3n006	Meter #n Batch IV	0 Inferred	Read
3n007	Meter #n Batch ISV	0 Inferred	Read
3n008	Meter #n Batch GSV	0 Inferred	Read
3n009	Meter #n Batch NSV	0 Inferred	Read
3n010	Meter #n Batch MASS	0 Inferred	Read
3n011-3n050	Spare		

End of Scaled Data Area

3n052-3n055	Meter #n ID	8 Chars.	Read/Write
3n056	Stream Meter #n Direction (0:Status,1:MultiV,2=Modbus,3=Customer Swap)		

Modbus Override <4n338> 0:Forward, 1:Reverse Direction

Customer Swap – only check flow directional setting < 4n338> when a new batch starts

3n057	Meter #n Flow Cut Off Freq.(0-99)	0 Inerred	Read/Write
3n058	Meter #n Retroactive Meter Factor	0 Inerred	Read/Write
3n059	Meter #n Stream Number	0 Inerred	Read/Write
3n060	Meter #n Flow Polarity	0 Inerred	Read/Write
3n061	Meter #n Density Type	0 Inerred	Read/Write
3n062	Meter #n Density Unit	0 Inerred	Read/Write
3n063	Meter #n BS&W Assignment	0 Inerred	Read/Write
3n064	Meter #n Temperature Assignment	0 Inerred	Read/Write
3n065	Meter #n Pressure Assignment	0 Inerred	Read/Write
3n066	Meter #n Density Assignment	0 Inerred	Read/Write
3n067	Reserved	0 Inerred	Read/Write
31068	DP IO Position		
3n067-3n200	Spare		

Modbus Address Table – 16 Bits Integer

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
Stream Data Area (N=: 1=Stream #1, 2=Stream#2, 3=Stream#3)			
4n001	Stream #n End Batch	0 Inerred	Read/Write
4n002-4n005	Stream #n Next Batch – Ship To ID	8 Chars	Read/Write
4n006-4n009	Stream #n Next Batch – Receive From ID	8 Chars	Read/Write
(Note: If truck loading feature is enabled, “Stream#1 Next Batch- Receive From ID” is defined as “Driver ID”. Up to 8 numeric characters)			
4n010-4n019	Stream #n Location	20 Chars	Read/Write
(Note: If truck loading feature is enabled, “Stream#1 Location” is defined as “Run Ticket”. Up to 12 numeric characters)			
4n020	Stream #n Direction Select	0 Inerred	Read/Write
4n021	Stream #n Batch Type 0=Daily,1=On Demond	0 Inerred	Read/Write
4n022	Stream #n Enable Batch Schedule	0 Inerred	Read/Write
4n023	Stream #n Enable Batch Preset (1=Yes)	0 Inerred	Read/Write
4n024-4n027	Stream #n ID	8 Chars.	Read/Write
(Note: If truck loading feature is enabled, “Stream#1 ID” is defined as “ Lact ID”. Up to 8 numeric characters)			
4n028-4n033	Stream #n ID Next Batch ID	12 Chars.	Read/Write
(Note: If truck loading feature is enabled, “Stream#1 Next Batch ID” is defined as Lact ID. Up to 12 numeric characters)			
4n034-4n039	Stream #n Batch Schedule#1 Batch ID	12 Chars	Read/Write
4n040-4n045	Stream #n Batch Schedule#2 Batch ID	12 Chars	Read/Write
4n046-4n051	Stream #n Batch Schedule#3 Batch ID	12 Chars	Read/Write
4n052-4n057	Stream #n Batch Schedule#4 Batch ID	12 Chars	Read/Write
4n058-4n063	Stream #n Batch Schedule#5 Batch ID	12 Chars	Read/Write
4n064-4n069	Stream #n Batch Schedule#6 Batch ID	12 Chars	Read/Write
4n070-4n075	Stream #n Batch Schedule#7 Batch ID	12 Chars	Read/Write
4n076-4n081	Stream #n Batch Schedule#8 Batch ID	12 Chars	Read/Write
4n082-4n087	Stream #n Batch Schedule#9 Batch ID	12 Chars	Read/Write
4n088-4n091	Stream #n Batch Schedule#1 Ship to ID	8 Chars	Read/Write
4n092-4n095	Stream #n Batch Schedule#2 Ship to ID	8 Chars	Read/Write
4n096-4n099	Stream #n Batch Schedule#3 Ship to ID	8 Chars	Read/Write
4n100-4n103	Stream #n Batch Schedule#4 Ship to ID	8 Chars	Read/Write
4n104-4n107	Stream #n Batch Schedule#5 Ship to ID	8 Chars	Read/Write
4n108-4n111	Stream #n Batch Schedule#6 Ship to ID	8 Chars	Read/Write
4n112-4n115	Stream #n Batch Schedule#7 Ship to ID	8 Chars	Read/Write
4n116-4n119	Stream #n Batch Schedule#8 Ship to ID	8 Chars	Read/Write
4n120-4n123	Stream #n Batch Schedule#9 Ship to ID	8 Chars	Read/Write
4n124-4n127	Stream #n Batch Schedule#1 Rec. From ID	8 Chars	Read/Write
4n128-4n131	Stream #n Batch Schedule#2 Rec. From ID	8 Chars	Read/Write
4n132-4n135	Stream #n Batch Schedule#3 Rec. From ID	8 Chars	Read/Write
4n136-4n139	Stream #n Batch Schedule#4 Rec. From ID	8 Chars	Read/Write
4n140-4n143	Stream #n Batch Schedule#5 Rec. From ID	8 Chars	Read/Write
4n144-4n147	Stream #n Batch Schedule#6 Rec. From ID	8 Chars	Read/Write
4n148-4n151	Stream #n Batch Schedule#7 Rec. From ID	8 Chars	Read/Write
4n152-4n155	Stream #n Batch Schedule#8 Rec. From ID	8 Chars	Read/Write
4n156-4n159	Stream #n Batch Schedule#9 Rec. From ID	8 Chars	Read/Write
4n160	Stream #n Next Batch Product Number	0 Inferred	Read/Write

Modbus Address Table – 16 Bits Integer

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
4n161	Stream #n Batch Schedule#1 Product No.	0 Inferred	Read/Write
4n162	Stream #n Batch Schedule#2 Product No.	0 Inferred	Read/Write
4n163	Stream #n Batch Schedule#3 Product No.	0 Inferred	Read/Write
4n164	Stream #n Batch Schedule#4 Product No.	0 Inferred	Read/Write
4n165	Stream #n Batch Schedule#5 Product No.	0 Inferred	Read/Write
4n166	Stream #n Batch Schedule#6 Product No.	0 Inferred	Read/Write
4n167	Stream #n Batch Schedule#7 Product No.	0 Inferred	Read/Write
4n168	Stream #n Batch Schedule#8 Product No.	0 Inferred	Read/Write
4n169	Stream #n Batch Schedule#9 Product No.	0 Inferred	Read/Write
4n170	Stream #n Weekly Batch(0=Monday,1=Tur..)	0 Inferred	Read/Write
4n171	Stream #n Month End Batch	0 Inferred	Read/Write
4n172	Stream #n Batch Ended Flag	0 Inferred	Read/Write
4n173-4n180	Stream #n Product #1 Name	16 Chars	Read/Write
4n181-4n188	Stream #n Product #2 Name	16 Chars	Read/Write
4n189-4n196	Stream #n Product #3 Name	16 Chars	Read/Write
4n197-4n204	Stream #n Product #4 Name	16 Chars	Read/Write
4n205-4n212	Stream #n Product #5 Name	16 Chars	Read/Write
4n213-4n220	Stream #n Product #6 Name	16 Chars	Read/Write
4n221-4n228	Stream #n Product #7 Name	16 Chars	Read/Write
4n229-4n236	Stream #n Product #8 Name	16 Chars	Read/Write
4n237-4n244	Stream #n Product #9 Name	16 Chars	Read/Write
4n245-4n252	Stream #n Product #10 Name	16 Chars	Read/Write
4n253-4n260	Stream #n Product #11 Name	16 Chars	Read/Write
4n261-4n268	Stream #n Product #12 Name	16 Chars	Read/Write
4n269-4n276	Stream #n Product #13 Name	16 Chars	Read/Write
4n277-4n284	Stream #n Product #14 Name	16 Chars	Read/Write
4n285-4n292	Stream #n Product #15 Name	16 Chars	Read/Write
4n293-4n300	Stream #n Product #16 Name	16 Chars	Read/Write
4n301	Stream #n Product #1Table Select	0 Inferred	Read/Write
4n302	Stream #n Product #2 Table Select	0 Inferred	Read/Write
4n303	Stream #n Product #3 Table Select	0 Inferred	Read/Write
4n304	Stream #n Product #4 Table Select	0 Inferred	Read/Write
4n305	Stream #n Product #5 Table Select	0 Inferred	Read/Write
4n306	Stream #n Product #6 Table Select	0 Inferred	Read/Write
4n307	Stream #n Product #7 Table Select	0 Inferred	Read/Write
4n308	Stream #n Product #8 Table Select	0 Inferred	Read/Write
4n309	Stream #n Product #9 Table Select	0 Inferred	Read/Write
4n310	Stream #n Product #10 Table Select	0 Inferred	Read/Write
4n311	Stream #n Product #11 Table Select	0 Inferred	Read/Write
4n312	Stream #n Product #12 Table Select	0 Inferred	Read/Write
4n313	Stream #n Product #13 Table Select	0 Inferred	Read/Write
4n314	Stream #n Product #14 Table Select	0 Inferred	Read/Write
4n315	Stream #n Product #15 Table Select	0 Inferred	Read/Write
4n316	Stream #n Product #16 Table Select	0 Inferred	Read/Write
4n317	Stream #n Prod#1 Selection 0=Inhibitor,1=Antistatic,2=Inhibitor/Anistatic	0 Inferred	Read/Write
4n318	Stream #n Prod#2 1 Selection 0=Inhibitor,1=Antistatic,2=Inhibitor/Anistatic	0 Inferred	Read/Write

Modbus Address Table – 16 Bits Integer

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE

4n319	Stream #n Prod#3 Selection
	0=Inhibitor,1=Antistatic,2=Inhibitor/Anistatic
		0 Inferred	Read/Write

4n320	Stream #n Prod#4 Selection
	0=Inhibitor,1=Antistatic,2=Inhibitor/Anistatic
		0 Inferred	Read/Write

4n321	Stream #n Prod#5 Selection
	0=Inhibitor,1=Antistatic,2=Inhibitor/Anistatic
		0 Inferred	Read/Write

4n322	Stream #n Prod#6 Selection
	0=Inhibitor,1=Antistatic,2=Inhibitor/Anistatic
		0 Inferred	Read/Write

4n323	Stream #n Prod#7 Selection
	0=Inhibitor,1=Antistatic,2=Inhibitor/Anistatic
		0 Inferred	Read/Write

4n324	Stream #n Prod#8 Selection
	0=Inhibitor,1=Antistatic,2=Inhibitor/Anistatic
		0 Inferred	Read/Write

4n325	Stream #n Prod#9 Selection
	0=Inhibitor,1=Antistatic,2=Inhibitor/Anistatic
		0 Inferred	Read/Write

4n326	Stream #n Prod#10 Selection
	0=Inhibitor,1=Antistatic,2=Inhibitor/Anistatic
		0 Inferred	Read/Write

4n327	Stream #n Prod#11 Selection
	0=Inhibitor,1=Antistatic,2=Inhibitor/Anistatic
		0 Inferred	Read/Write

4n328	Stream #n Prod#12 Selection
	0=Inhibitor,1=Antistatic,2=Inhibitor/Anistatic
		0 Inferred	Read/Write

4n329	Stream #n Prod#13 Selection
	0=Inhibitor,1=Antistatic,2=Inhibitor/Anistatic
		0 Inferred	Read/Write

4n330	Stream #n Prod#14 Selection
	0=Inhibitor,1=Antistatic,2=Inhibitor/Anistatic
		0 Inferred	Read/Write

4n331	Stream #n Prod#15 Selection
	0=Inhibitor,1=Antistatic,2=Inhibitor/Anistatic
		0 Inferred	Read/Write

4n332	Stream #n Prod#16 Selection
	0=Inhibitor,1=Antistatic,2=Inhibitor/Anistatic
		0 Inferred	Read/Write

4n333	Stream #n Batch Preset Base 0=Gross,1=Net	0 Inferred	Read/Write
4n334	Stream #n End Batch at Preset 1=Yes	0 Inferred	Read/Write
4n335	Stream #n End at Batch Date Start Hour	0 Inferred	Read/Write
41336	Stream #n Mass Meter (1=Enable)		
41337	Stream#1 Start New Batch (Truck)	0 Inferred	Read/Write
4n338	Stream#n Modbus Override Direction	0 Inferred	Read/Write
42336-42338	Spare		
43336-43338	Spare		
4n339	Stream #n Partial End Batch Command	0 Inferred	Read/Write

Modbus 16-bit Address Table End

Modbus Address Table – 2x16 Bits Integer

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
3819-3997	Modbus Shift Area – 4 Bytes		
4001-4069	Reserved		
The followning registers 4071-4081 are for truck loading data entries			
4071	Lease ID_1 (Max. 8 Digits)	0 Inferred	Read/Write
4073	Lease ID_2 (Max. 4 Digits) Ex. LeaseID_1=12345678, Lease ID_2= 1234 It will display “Batch ID 123456781234” on the DFC report.	0 Inferred	Read/Write
4075	Run Ticket_1 (Max. 8 Digits)	0 Inferred	Read/Write
4077	Run Ticket_2 (Max. 4 Digits) Ex. Run Ticket_1 = 87654321, Run Ticket_2 = 23 It will display “Location 8765432123” on the DFC report	0 Inferred	Read/Write
4079	Driver ID (Max. 8 Digits) Ex. Driver ID = 87654321 It will display “Rec.From 87654321” on the DFC report	0 Inferred	Read/Write
4081	Lact ID (Max. 8 Digits) Ex. Lact ID = 1234 It will display “Stream#1 ID 1234” on the DFC report	0 Inferred	Read/Write
4083	Ship ID (Max. 8 Digits) Ex. Ship ID = 1234 It will display “Ship ID 1234” on the DFC report	0 Inferred	Read/Write
4085-4103	Reserved		

Modbus Address Table – 2x16 Bits Integer

*4105-4175 are not configuration data entries, but for truck loading

4105	Load Conformation Base	0 Inferred	Read/Write
4107	Driver Number	0 Inferred	Read/Write
4109	Driver Batch GSV	2 Inferred	Read/Write
4111	Driver Batch Temperature	2 Inferred	Read/Write
4113	Driver Batch API	1 Inferred	Read/Write
4115	Driver Batch BS&W	4 Inferred	Read/Write
4117-4119	Site Name	8 Chars	Read/Write
4121-4123	Rack Nr./Lact ID	8 Chars	Read/Write
4125-4127	Transporter	8 Chars	Read/Write
4129-4131	Lease Name 1	8 Chars	Read/Write
4133-4135	Lease Name 2	8 Chars	Read/Write
4137-4139	Lease Name 3	8 Chars	Read/Write
4141-4143	Driver Name	8 Chars	Read/Write
4145-4147	Lease ID 1	8 Chars	Read/Write
4149-4151	Lease ID 2	8 Chars	Read/Write
4153-4155	Lease ID 3	8 Chars	Read/Write
4157-4159	Ticket Number	8 Chars	Read/Write
4161-4163	Truck Number	8 Chars	Read/Write
4165-4167	Order Number 1	8 Chars	Read/Write
4169-4171	Order Number 2	8 Chars	Read/Write
4173-4175	Order Number 3	8 Chars	Read/Write
4177-4179	Driver Last Name	8 Chars	Read/Write
4181-4183	Location Name1	8 Chars	Read/Write
4185-4187	Location Name2	8 Chars	Read/Write
4189-4191	Location Name3	8 Chars	Read/Write
4193-4199	Meter Station Name	16 Chars	Read/Write

Modbus Address Table – 2x16 Bits Integer

Register 4847 and 4848 are reserved for ASCII registers

*4847	ASCII Registers-Date	mm/dd/yy	Read/Write
One register, 8 bytes of ASCII data (ex. 30372F30342F3135 – 07/04/15)			
*4848	ASCII Registers-Time	hh/mm/ss	Read/Write
One register, 8 bytes of ASCII data (ex. 30393A30363A3033 – 09:06:03)			
5001-5003	Reserved		
5005	Analog Input#1 Calibration Data Entry	3 Inferred	Read/Write
5007	Analog Input#2 Calibration Data Entry	3 Inferred	Read/Write
5009	Analog Input#3 Calibration Data Entry	3 Inferred	Read/Write
5011	Analog Input#4 Calibration Data Entry	3 Inferred	Read/Write
5013-5019	Reserved		
5021	RTD Input Calibration Data Entry	3 Inferred	Read/Write
5023-5035	Reserved		
5037	Display Contrast Data Entry	0 Inferred	Read/Write
5039	Analog Input #1 mA Value	3 Inferred	Read
5041	Analog Input #2 mA Value	3 Inferred	Read
5043	Analog Input #3 mA Value	3 Inferred	Read
5045	Analog Input #4 mA Value	3 Inferred	Read
5047-5053	Reserved		
5055	RTD Input Ohm Value	3 Inferred	Read
5057-5061	Spare		
5063	Analog Output mA Value	3 Inferred	Read
5065-5069	Reserved		
5071-5073	Spare		
5075	Display Contrast	0 Inferred	Read
5077-5087	Reserved		
5089	Spare		
5091	Stream#1 Last Batch Number	0 Inferred	Read
5093	Stream#2 Last Batch Number or Daily Batch Number for one stream setting	0 Inferred	Read
5095	Stream#3 Last Batch Number or Stream#1 last batch no for one stream setting	0 Inferred	Read
5097	Spare		
5099	Last Alarm Request(1-50)	0 Inferred	Write
5101-5209	Historical Alarm Data Area		
5211	Multi-Variable Spare Calibration Data	4 Inferred	Read/Write
5213	Multi-Variable Pressure Calibration Data	3 Inferred	Read/Write
5215	Multi-Variable Temperature Calibration Data	2 Inferred	Read/Write
5217-5221	Spare		
5223	Multi-Variable Spare	4 Inferred	Read
5225	Multi-Variable Pressure	3 Inferred	Read
5227	Multi-Variable Temperature	2 Inferred	Read
5229-5233	Spare		
5235	Multi-Variable Communication Status	0 Inferred	Read
5237	Battery Voltage	2 Inferred	Read
5239	Last Audit Request(1-50)	0 Inferred	Write
5241-5393	Historical Audit Data Area		
5395	Spare		
5397	Reserved		

Modbus Address Table – 2x16 Bits Integer

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
Last Prove Data Area			
6001	No of Good Run	0 Inferred	Read
6003	Date	0 Inferred	Read
6005	Time	0 Inferred	Read
6007	Prove Report Number	0 Inferred	Read
6009-6011	Prove Model Number	8 Chars.	Read
6013-6015	Prove Meter ID	8 Chars.	Read
6017-6019	Prove Serial Number	8 Chars.	Read
6021-6027	Prove Product Name	16 Chars.	Read
6029	Prove Product Table	0 Inferred	Read
6031	Prover Size	2 Inferred	Read
6033	Prover Diameter	3 Inferred	Read
6035	Prover Elasticity E+7	1 Inferred	Read
6037	Prover Coeff.of Shaft E-7	1 Inferred	Read
6039	Area Coeff E-7	1 Inferred	Read
6041	Wall Thickness in Inches	4 Inferred	Read
6043	Cubic Expansion E-7	1 Inferred	Read
6045	Equilibrium Pressure	3 Inferred	Read
6047	Cum.IV Total	0 Inferred	Read
6049	Averaged Prove Counts	1 Inferred	Read
6051	Averaged Meter Temperature	2 Inferred	Read
6053	Averaged Prove Temperature	2 Inferred	Read
6055	Averaged Meter Pressure	3 Inferred	Read
6057	Averaged Prove Pressure	3 Inferred	Read
6059	Averaged Density GM/CC	6 Inferred	Read
6061	Averaged IV Flowrate	1 Inferred	Read
6063	Averaged Interpolated Counts	3 Inferred	Read
6065	Averaged TFMP	5 Inferred	Read
6067	Averaged TDVOL	5 Inferred	Read
6069	Prove Base Volume	5 Inferred	Read
6071	Prove CTSP	5 Inferred	Read
6073	Prove CPSP	5 Inferred	Read
6075	Prove CTLP	6 Inferred	Read
6077	Prove CPLP	6 Inferred	Read
6079	Prove Corrected Prove Volume	5 Inferred	Read
6081	Prove Averaged Interpolated Counts	3 Inferred	Read
6083	Prove Meter Volume	5 Inferred	Read
6085	Prove K Factor	2 Inferred	Read
6087	Prove CTLM	6 Inferred	Read
6089	Prove CPLM	6 Inferred	Read
6091	Prove Corrected Meter Volume	5 Inferred	Read
6093	Prove Meter Factor	5 Inferred	Read
6095	Prove Actual K Factor	2 Inferred	Read
6097	Prove Pulse Deviation	2 Inferred	Read
6099	Prove Meter Factor Deviation	2 Inferred	Read
6101	Reserved		
6103	Change Meter Factor Flag	0 Inferred	Read
6105	Last Prove Data 1 – Date	0 Inferred	Read
6107	Last Prove Data 1 – Time	0 Inferred	Read
6109	Last Prove Data 1 – Temperature	2 Inferred	Read

Modbus Address Table – 2x16 Bits Integer

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
6111	Last Prove Data 1 – Pressure	3 Inferred	Read
6113	Last Prove Data 1 – Density GM/CC	6 Inferred	Read
6115	Last Prove Data 1 – IV Flowrate	1 Inferred	Read
6117	Last Prove Data 1 – Meter Factor	5 Inferred	Read
6119	Last Prove Data 2 – Date	0 Inferred	Read
6121	Last Prove Data 2 – Time	0 Inferred	Read
6123	Last Prove Data 2 – Temperature	2 Inferred	Read
6125	Last Prove Data 2 – Pressure	3 Inferred	Read
6127	Last Prove Data 2 – Density GM/CC	6 Inferred	Read
6129	Last Prove Data 2 – IV Flowrate	1 Inferred	Read
6131	Last Prove Data 2 – Meter Factor	5 Inferred	Read
6133	Last Prove Data 3 – Date	0 Inferred	Read
6135	Last Prove Data 3 – Time	0 Inferred	Read
6137	Last Prove Data 3 – Temperature	2 Inferred	Read
6139	Last Prove Data 3 – Pressure	3 Inferred	Read
6141	Last Prove Data 3 – Density GM/CC	6 Inferred	Read
6143	Last Prove Data 3 – IV Flowrate	1 Inferred	Read
6145	Last Prove Data 3 – Meter Factor	5 Inferred	Read
6147	Prove Run #1 Counts	0 Inferred	Read
6149	Prove Run #1 Total Counts	0 Inferred	Read
6151	Prove Run #1 Interpolated Counts	3 Inferred	Read
6153	Prove Run #1 TFMP	5 Inferred	Read
6155	Prove Run #1 TDVOL	5 Inferred	Read
6157	Prove Run #1 Meter Temperature	2 Inferred	Read
6159	Prove Run #1 Prover Temperature	2 Inferred	Read
6161	Prove Run #1 Meter Pressure	3 Inferred	Read
6163	Prove Run #1 Prover Pressure	3 Inferred	Read
6165	Prove Run #1 Density GM/CC	6 Inferred	Read
6167	Prove Run #1 IV Flowrate	1 Inferred	Read
6169	Prove Run #2 Counts	0 Inferred	Read
6171	Prove Run #2 Total Counts	0 Inferred	Read
6173	Prove Run #2 Interpolated Counts	3 Inferred	Read
6175	Prove Run #2 TFMP	5 Inferred	Read
6177	Prove Run #2 TDVOL	5 Inferred	Read
6179	Prove Run #2 Meter Temperature	2 Inferred	Read
6181	Prove Run #2 Prover Temperature	2 Inferred	Read
6183	Prove Run #2 Meter Pressure	3 Inferred	Read
6185	Prove Run #2 Prover Pressure	3 Inferred	Read
6187	Prove Run #2 Density GM/CC	6 Inferred	Read
6189	Prove Run #2 IV Flowrate	1 Inferred	Read
6191	Prove Run #3 Counts	0 Inferred	Read
6193	Prove Run #3 Total Counts	0 Inferred	Read
6195	Prove Run #3 Interpolated Counts	3 Inferred	Read
6197	Prove Run #3 TFMP	5 Inferred	Read
6199	Prove Run #3 TDVOL	5 Inferred	Read
6201	Prove Run #3 Meter Temperature	2 Inferred	Read
6203	Prove Run #3 Prover Temperature	2 Inferred	Read
6205	Prove Run #3 Meter Pressure	3 Inferred	Read
6207	Prove Run #3 Prover Pressure	3 Inferred	Read
6209	Prove Run #3 Density GM/CC	6 Inferred	Read
6211	Prove Run #3 IV Flowrate	1 Inferred	Read

Modbus Address Table – 2x16 Bits Integer

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
6213	Prove Run #4 Counts	0 Inferred	Read
6215	Prove Run #4 Total Counts	0 Inferred	Read
6217	Prove Run #4 Interpolated Counts	3 Inferred	Read
6219	Prove Run #4 TFMP	5 Inferred	Read
6221	Prove Run #4 TDVOL	5 Inferred	Read
6223	Prove Run #4 Meter Temperature	2 Inferred	Read
6225	Prove Run #4 Prover Temperature	2 Inferred	Read
6227	Prove Run #4 Meter Pressure	3 Inferred	Read
6229	Prove Run #4 Prover Pressure	3 Inferred	Read
6231	Prove Run #4 Density GM/CC	6 Inferred	Read
6233	Prove Run #4 IV Flowrate	1 Inferred	Read
6235	Prove Run #5 Counts	0 Inferred	Read
6237	Prove Run #5 Total Counts	0 Inferred	Read
6239	Prove Run #5 Interpolated Counts	3 Inferred	Read
6241	Prove Run #5 TFMP	5 Inferred	Read
6243	Prove Run #5 TDVOL	5 Inferred	Read
6245	Prove Run #5 Meter Temperature	2 Inferred	Read
6247	Prove Run #5 Prover Temperature	2 Inferred	Read
6249	Prove Run #5 Meter Pressure	3 Inferred	Read
6251	Prove Run #5 Prover Pressure	3 Inferred	Read
6253	Prove Run #5 Density GM/CC	6 Inferred	Read
6255	Prove Run #5 IV Flowrate	1 Inferred	Read
6257	Prove Run #6 Counts	0 Inferred	Read
6259	Prove Run #6 Total Counts	0 Inferred	Read
6261	Prove Run #6 Interpolated Counts	3 Inferred	Read
6263	Prove Run #6 TFMP	5 Inferred	Read
6265	Prove Run #6 TDVOL	5 Inferred	Read
6267	Prove Run #6 Meter Temperature	2 Inferred	Read
6269	Prove Run #6 Prover Temperature	2 Inferred	Read
6271	Prove Run #6 Meter Pressure	3 Inferred	Read
6273	Prove Run #6 Prover Pressure	3 Inferred	Read
6275	Prove Run #6 Density GM/CC	6 Inferred	Read
6277	Prove Run #6 IV Flowrate	1 Inferred	Read
6279	Prove Run #7 Counts	0 Inferred	Read
6281	Prove Run #7 Total Counts	0 Inferred	Read
6283	Prove Run #7 Interpolated Counts	3 Inferred	Read
6285	Prove Run #7 TFMP	5 Inferred	Read
6287	Prove Run #7 TDVOL	5 Inferred	Read
6289	Prove Run #7 Meter Temperature	2 Inferred	Read
6291	Prove Run #7 Prover Temperature	2 Inferred	Read
6293	Prove Run #7 Meter Pressure	3 Inferred	Read
6295	Prove Run #7 Prover Pressure	3 Inferred	Read
6297	Prove Run #7 Density GM/CC	6 Inferred	Read
6299	Prove Run #7 IV Flowrate	1 Inferred	Read
6301	Prove Run #8 Counts	0 Inferred	Read
6303	Prove Run #8 Total Counts	0 Inferred	Read
6305	Prove Run #8 Interpolated Counts	3 Inferred	Read
6307	Prove Run #8 TFMP	5 Inferred	Read
6309	Prove Run #8 TDVOL	5 Inferred	Read
6311	Prove Run #8 Meter Temperature	2 Inferred	Read

Modbus Address Table – 2x16 Bits Integer

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
6313	Prove Run #8 Prover Temperature	2 Inferred	Read
6315	Prove Run #8 Meter Pressure	3 Inferred	Read
6317	Prove Run #8 Prover Pressure	3 Inferred	Read
6319	Prove Run #8 Density GM/CC	6 Inferred	Read
6321	Prove Run #8 IV Flowrate	1 Inferred	Read
6323	Prove Run #9 Counts	0 Inferred	Read
6325	Prove Run #9 Total Counts	0 Inferred	Read
6327	Prove Run #9 Interpolated Counts	3 Inferred	Read
6329	Prove Run #9 TFMP	5 Inferred	Read
6331	Prove Run #9 TDVOL	5 Inferred	Read
6333	Prove Run #9 Meter Temperature	2 Inferred	Read
6335	Prove Run #9 Prover Temperature	2 Inferred	Read
6337	Prove Run #9 Meter Pressure	3 Inferred	Read
6339	Prove Run #9 Prover Pressure	3 Inferred	Read
6341	Prove Run #9 Density GM/CC	6 Inferred	Read
6343	Prove Run #9 IV Flowrate	1 Inferred	Read
6345	Prove Run #10 Counts	0 Inferred	Read
6347	Prove Run #10 Total Counts	0 Inferred	Read
6349	Prove Run #10 Interpolated Counts	3 Inferred	Read
6351	Prove Run #10 TFMP	5 Inferred	Read
6353	Prove Run #10 TDVOL	5 Inferred	Read
6355	Prove Run #10 Meter Temperature	2 Inferred	Read
6357	Prove Run #10 Prover Temperature	2 Inferred	Read
6359	Prove Run #10 Meter Pressure	3 Inferred	Read
6361	Prove Run #10 Prover Pressure	3 Inferred	Read
6363	Prove Run #10 Density GM/CC	6 Inferred	Read
6365	Prove Run #10 IV Flowrate	1 Inferred	Read
6367	Averaged Shaft Temperature	2 Inferred	Read
6369	Prove Run #1 Shaft Temperature	2 Inferred	Read
6371	Prove Run #2 Shaft Temperature	2 Inferred	Read
6373	Prove Run #3 Shaft Temperature	2 Inferred	Read
6375	Prove Run #4 Shaft Temperature	2 Inferred	Read
6377	Prove Run #5 Shaft Temperature	2 Inferred	Read
6379	Prove Run #6 Shaft Temperature	2 Inferred	Read
6521	Prove Run #7 Shaft Temperature	2 Inferred	Read
6523	Prove Run #8 Shaft Temperature	2 Inferred	Read
6525	Prove Run #9 Shaft Temperature	2 Inferred	Read
6527	Prove Run #10 Shaft Temperature	2 Inferred	Read

End of Last Prove Data Area

Modbus Address Table – 2x16 Bits Integer

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE

Current Prove Data Area

6381	Prove Run #1 Counts	0 Inferred	Read
6383	Prove Run #1 Total Counts	0 Inferred	Read
6385	Prove Run #2 Counts	0 Inferred	Read
6387	Prove Run #2 Total Counts	0 Inferred	Read
6389	Prove Run #3 Counts	0 Inferred	Read
6391	Prove Run #3 Total Counts	0 Inferred	Read
6393	Prove Run #4 Counts	0 Inferred	Read
6395	Prove Run #4 Total Counts	0 Inferred	Read
6397	Prove Run #5 Counts	0 Inferred	Read
6399	Prove Run #5 Total Counts	0 Inferred	Read
6401	Current Prove Run Counts	0 Inferred	Read
6403	Current Prove Run Total Counts	0 Inferred	Read
6405	Prover Temperature	2 Inferred	Read
6407	Prover Pressure	3 Inferred	Read
6409	Meter Temperature	2 Inferred	Read
6411	Meter Pressure	3 Inferred	Read
6413	Prove Status	0 Inferred	Read

01 00 00 00 - Prove Meter #1,#2,#4,and #5
02 00 00 00 – Prove Meter #1 (or 03 00 00 00) 00 08 00 00 – Prove Meter #4 (or 01 08 00 00)
04 00 00 00 – Prove Meter #2 (or 05 00 00 00) 00 10 00 00 – Prove Meter #5 (or 01 10 00 00)

08 00 00 00 – Launch Forward
10 00 00 00 – Launch Reverse
40 00 00 00 – Proving in Progress
00 01 00 00 – Prove Completed
20 00 00 00 – Launch Ball
80 00 00 00 – Compact/Smith Proving in Progress
00 02 00 00 – Prove Aborted
00 00 00 00 – Prove not in Progress

Combination Examples:
43 00 00 00 – Meter#1 Proving in Progress
45 00 00 00 – Meter#2 Proving in Progress
41 04 00 00 –
41 08 00 00 – Meter#4 Proving in Progress
41 10 00 00 – Meter#5 Proving in Progress
41 20 00 00 –
6b 00 00 00 – Meter #1 Launch ball Forward
6d 00 00 00 – Meter #2 Launch ball Forward

6415	Prove Run Number	0 Inferred	Read
6417	Prove Run #6 Counts	0 Inferred	Read
6419	Prove Run #6 Total Counts	0 Inferred	Read
6421	Prove Run #7 Counts	0 Inferred	Read
6423	Prove Run #7 Total Counts	0 Inferred	Read
6425	Prove Run #8 Counts	0 Inferred	Read
6427	Prove Run #8 Total Counts	0 Inferred	Read
6429	Prove Run #9 Counts	0 Inferred	Read
6431	Prove Run #9 Total Counts	0 Inferred	Read
6433	Prove Run #10 Counts	0 Inferred	Read
6435	Prove Run #10 Total Counts	0 Inferred	Read
6437	Shaft Temperature	2 Inferred	Read

End of Current Prove Data Area

Modbus Address Table – 2x16 Bits Integer

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
Last Single Prove Report Data Area			
6451	Date	0 Inferred	Read
6453	Time	0 Inferred	Read
6455-6457	Prove Model Number	8 Chars.	Read
6459-6461	Prove Meter ID	8 Chars.	Read
6463-6465	Prove Serial Number	8 Chars.	Read
6467-6473	Prove Product Name	16 Chars.	Read
6475	Prove Product Table	0 Inferred	Read
6477	Prover Size	2 Inferred	Read
6479	Prover Diameter	3 Inferred	Read
6481	Prover Elasticity E+7	1 Inferred	Read
6483	Prover Coeff.of Shaft E-7	1 Inferred	Read
6485	Area Coeff	1 Inferred	Read
6487	Wall Thickness in Inches	4 Inferred	Read
6489	Cubic Expansion	1 Inferred	Read
6491	Cum.IV Total	0 Inferred	Read
6493	Counts	0 Inferred	Read
6495	Total Counts	0 Inferred	Read
6497	Interpolated Counts	3 Inferred	Read
6499	TFMP	5 Inferred	Read
6501	TDVOL	5 Inferred	Read
6503	Meter Temperature	2 Inferred	Read
6505	Prover Temperature	2 Inferred	Read
6507	Meter Pressure	3 Inferred	Read
6509	Prover Pressure	3 Inferred	Read
6511	Density GM/CC	6 Inferred	Read
6513	IV Flowrate	1 Inferred	Read
6515	Prover Type	0 Inferred	Read
6517	Shaft Temperature	2 Inferred	Read

End of Last Single Prove Report Data Area

Modbus Address Table – 2x16 Bits Integer

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
Last Abort Prove Report Data Area			
6531	Prove Run #1 Shaft Temperature	2 Inferred	Read
6533	Prove Run #2 Shaft Temperature	2 Inferred	Read
6535	Prove Run #3 Shaft Temperature	2 Inferred	Read
6537	Prove Run #4 Shaft Temperature	2 Inferred	Read
6539	Prove Run #5 Shaft Temperature	2 Inferred	Read
6541	Prove Run #6 Shaft Temperature	2 Inferred	Read
6543	Prove Run #7 Shaft Temperature	2 Inferred	Read
6545	Prove Run #8 Shaft Temperature	2 Inferred	Read
6547	Prove Run #9 Shaft Temperature	2 Inferred	Read
6549	Prove Run #10 Shaft Temperature	2 Inferred	Read
6551	No of Good Run	0 Inferred	Read
6553	Date	0 Inferred	Read
6555	Time	0 Inferred	Read
6557-6559	Prove Meter ID	8 Chars.	Read
6561-6567	Prove Product Name	16 Chars.	Read
6569	Prove Product Table	0 Inferred	Read
6571	Prove Run #1 Counts	0 Inferred	Read
6573	Prove Run #1 Total Counts	0 Inferred	Read
6575	Prove Run #1 Interpolated Counts	3 Inferred	Read
6577	Prove Run #1 TFMP	5 Inferred	Read
6579	Prove Run #1 TDVOL	5 Inferred	Read
6581	Prove Run #1 Meter Temperature	2 Inferred	Read
6583	Prove Run #1 Prover Temperature	2 Inferred	Read
6585	Prove Run #1 Meter Pressure	3 Inferred	Read
6587	Prove Run #1 Prover Pressure	3 Inferred	Read
6589	Prove Run #1 Density GM/CC	6 Inferred	Read
6591	Prove Run #1 IV Flowrate	1 Inferred	Read
6593	Prove Run #2 Counts	0 Inferred	Read
6595	Prove Run #2 Total Counts	0 Inferred	Read
6597	Prove Run #2 Interpolated Counts	3 Inferred	Read
6599	Prove Run #2 TFMP	5 Inferred	Read
6601	Prove Run #2 TDVOL	5 Inferred	Read
6603	Prove Run #2 Meter Temperature	2 Inferred	Read
6605	Prove Run #2 Prover Temperature	2 Inferred	Read
6607	Prove Run #2 Meter Pressure	3 Inferred	Read
6609	Prove Run #2 Prover Pressure	3 Inferred	Read
6611	Prove Run #2 Density GM/CC	6 Inferred	Read
6613	Prove Run #2 IV Flowrate	1 Inferred	Read
6615	Prove Run #3 Counts	0 Inferred	Read
6617	Prove Run #3 Total Counts	0 Inferred	Read
6619	Prove Run #3 Interpolated Counts	3 Inferred	Read
6621	Prove Run #3 TFMP	5 Inferred	Read
6623	Prove Run #3 TDVOL	5 Inferred	Read
6625	Prove Run #3 Meter Temperature	2 Inferred	Read
6627	Prove Run #3 Prover Temperature	2 Inferred	Read
6629	Prove Run #3 Meter Pressure	3 Inferred	Read
6631	Prove Run #3 Prover Pressure	3 Inferred	Read
6633	Prove Run #3 Density GM/CC	6 Inferred	Read
6635	Prove Run #3 IV Flowrate	1 Inferred	Read

Modbus Address Table – 2x16 Bits Integer

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
6637	Prove Run #4 Counts	0 Inferred	Read
6639	Prove Run #4 Total Counts	0 Inferred	Read
6641	Prove Run #4 Interpolated Counts	3 Inferred	Read
6643	Prove Run #4 TFMP	5 Inferred	Read
6645	Prove Run #4 TDVOL	5 Inferred	Read
6647	Prove Run #4 Meter Temperature	2 Inferred	Read
6649	Prove Run #4 Prover Temperature	2 Inferred	Read
6651	Prove Run #4 Meter Pressure	3 Inferred	Read
6653	Prove Run #4 Prover Pressure	3 Inferred	Read
6655	Prove Run #4 Density GM/CC	6 Inferred	Read
6657	Prove Run #4 IV Flowrate	1 Inferred	Read
6659	Prove Run #5 Counts	0 Inferred	Read
6661	Prove Run #5 Total Counts	0 Inferred	Read
6663	Prove Run #5 Interpolated Counts	3 Inferred	Read
6665	Prove Run #5 TFMP	5 Inferred	Read
6667	Prove Run #5 TDVOL	5 Inferred	Read
6669	Prove Run #5 Meter Temperature	2 Inferred	Read
6671	Prove Run #5 Prover Temperature	2 Inferred	Read
6673	Prove Run #5 Meter Pressure	3 Inferred	Read
6675	Prove Run #5 Prover Pressure	3 Inferred	Read
6677	Prove Run #5 Density GM/CC	6 Inferred	Read
6679	Prove Run #5 IV Flowrate	1 Inferred	Read
6681	Prove Run #6 Counts	0 Inferred	Read
6683	Prove Run #6 Total Counts	0 Inferred	Read
6685	Prove Run #6 Interpolated Counts	3 Inferred	Read
6687	Prove Run #6 TFMP	5 Inferred	Read
6689	Prove Run #6 TDVOL	5 Inferred	Read
6691	Prove Run #6 Meter Temperature	2 Inferred	Read
6693	Prove Run #6 Prover Temperature	2 Inferred	Read
6695	Prove Run #6 Meter Pressure	3 Inferred	Read
6697	Prove Run #6 Prover Pressure	3 Inferred	Read
6699	Prove Run #6 Density GM/CC	6 Inferred	Read
6701	Prove Run #6 IV Flowrate	1 Inferred	Read
6703	Prove Run #7 Counts	0 Inferred	Read
6705	Prove Run #7 Total Counts	0 Inferred	Read
6707	Prove Run #7 Interpolated Counts	3 Inferred	Read
6709	Prove Run #7 TFMP	5 Inferred	Read
6711	Prove Run #7 TDVOL	5 Inferred	Read
6713	Prove Run #7 Meter Temperature	2 Inferred	Read
6715	Prove Run #7 Prover Temperature	2 Inferred	Read
6717	Prove Run #7 Meter Pressure	3 Inferred	Read
6719	Prove Run #7 Prover Pressure	3 Inferred	Read
6721	Prove Run #7 Density GM/CC	6 Inferred	Read
6723	Prove Run #7 IV Flowrate	1 Inferred	Read

Modbus Address Table – 2x16 Bits Integer

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
6725	Prove Run #8 Counts	0 Inferred	Read
6727	Prove Run #8 Total Counts	0 Inferred	Read
6729	Prove Run #8 Interpolated Counts	3 Inferred	Read
6731	Prove Run #8 TFMP	5 Inferred	Read
6733	Prove Run #8 TDVOL	5 Inferred	Read
6735	Prove Run #8 Meter Temperature	2 Inferred	Read
6737	Prove Run #8 Prover Temperature	2 Inferred	Read
6739	Prove Run #8 Meter Pressure	3 Inferred	Read
6741	Prove Run #8 Prover Pressure	3 Inferred	Read
6743	Prove Run #8 Density GM/CC	6 Inferred	Read
6745	Prove Run #8 IV Flowrate	1 Inferred	Read
6747	Prove Run #9 Counts	0 Inferred	Read
6749	Prove Run #9 Total Counts	0 Inferred	Read
6751	Prove Run #9 Interpolated Counts	3 Inferred	Read
6753	Prove Run #9 TFMP	5 Inferred	Read
6755	Prove Run #9 TDVOL	5 Inferred	Read
6757	Prove Run #9 Meter Temperature	2 Inferred	Read
6759	Prove Run #9 Prover Temperature	2 Inferred	Read
6761	Prove Run #9 Meter Pressure	3 Inferred	Read
6763	Prove Run #9 Prover Pressure	3 Inferred	Read
6765	Prove Run #9 Density GM/CC	6 Inferred	Read
6767	Prove Run #9 IV Flowrate	1 Inferred	Read
6769	Prove Run #10 Counts	0 Inferred	Read
6771	Prove Run #10 Total Counts	0 Inferred	Read
6773	Prove Run #10 Interpolated Counts	3 Inferred	Read
6775	Prove Run #10 TFMP	5 Inferred	Read
6777	Prove Run #10 TDVOL	5 Inferred	Read
6779	Prove Run #10 Meter Temperature	2 Inferred	Read
6781	Prove Run #10 Prover Temperature	2 Inferred	Read
6783	Prove Run #10 Meter Pressure	3 Inferred	Read
6785	Prove Run #10 Prover Pressure	3 Inferred	Read
6787	Prove Run #10 Density GM/CC	6 Inferred	Read
6789	Prove Run #10 IV Flowrate	1 Inferred	Read
6791	Prove Abort Flag 11 – prove was in progress. 12 – deviation between prover and meter temperature 13 – not ready 14 – pulse deviation out of limit 15 – time out 16 – no pulse	0 Inferred	Read

End of Last Prove Abort Data Area

Modbus Address Table – 2x16 Bits Integer

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
30709	Analog Output#1 Remote Data (0-100)	2 Inferred	Read/Write
30711	Analog Output#2 Remote Data (0-100)	2 Inferred	Read/Write
30713	Analog Output#3 Remote Data (0-100)	2 Inferred	Read/Write
30715	Analog Output#4 Remote Data (0-100)	2 Inferred	Read/Write
30717	Spare		
30719	Spare		
30721	Date (MMDDYY)	0 Inferred	Read/Write
30723	Time (HHMMSS)	0 Inferred	Read/Write
30725	Spare		
30727	GM/CC Conversion Factor	6 Inferred	Read/Write
30729	Atmospheric Pressure	**Inferred	Read/Write
30731-30733	Spare		
30735	Pulse Output #1 Volume	3 Inferred	Read/Write
30737	Pulse Output #2 Volume	3 Inferred	Read/Write
30739-30743	Spare		
30745	Multi.Variable Spare Override	4 Inferred	Read/Write
30746-30789	Spare		
30791	Density Period Low Limit	3 Inferred	Read/Write
30793	Density Period High Limit	3 Inferred	Read/Write
30795	Density Correction Factor	5 Inferred	Read/Write
30797	Density Low Limit	6 Inferred	Read/Write
30799	Density High Limit	6 Inferred	Read/Write
30801	Density Maintenance	6 Inferred	Read/Write
30803	Spare		
30805-30813	Reserved		

**Note:

Modbus Address Table – 2x16 Bits Integer

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
Meter Data Area (N=: 1=Meter#1, 2= Meter#2, 3= Meter #3)			
3n201	Meter #n Frequency	0 Inferred	Read
3n203	Meter #n Flow Flag/Flow Direction	0 Inferred	Read
3n205	Meter #n Alarm Status* (First Byte	0 Inferred	Read

First Byte	Second Byte	Third Byte	Fourth Byte
B7 B6 B5 B4 B3 B2 B1 B0			

B0 : Meter Down (Frequency < Flow Cut off)
B1 : SG Out of Range
B2 : Table E Temperature Out of Range
B3 : Alpha T Out of Range
B4 : Gross Flow Rate High
B5 : Gross Flow Rate Low
B6 : Ethylene/Propylene Out of Range

3n207	Meter #n Stream Number	0 Inferred	Read
3n209	Spare		
3n211	Meter #n FWA Temperature	2 Inferred	Read
3n213	Meter #n FWA Pressure	3 Inferred	Read
3n215	Meter #n FWA CTL	6 Inferred	Read
3n217	Meter #n FWA CPL	6 Inferred	Read
3n219	Meter #n FWA Linear Factor	5 Inferred	Read
3n221	Meter #n FWA BS&W	2 Inferred	Read
3n223	Meter #n FWA Equil Pressure	3 Inferred	Read
3n225	Meter #n FWA Dens.Temperature	2 Inferred	Read
3n227	Meter #n FWA Dens.Pressure	3 Inferred	Read
3n229	Meter #n FWA Density gm/cc	6 Inferred	Read
3n231	Meter #n FWA Density@60	6 Inferred	Read
3n233	Meter #n FWA SG	6 Inferred	Read
3n235	Meter #n FWA SG@60	6 Inferred	Read
3n237	Meter #n FWA API	1 Inferred	Read
3n239	Meter #n FWA API@60	1 Inferred	Read
3n241	Meter #n Temperature	2 Inferred	Read
3n243	Meter #n Pressure	3 Inferred	Read
3n245	Meter #n CTL	6 Inferred	Read
3n247	Meter #n CPL	6 Inferred	Read
3n249	Meter #n Linear Meter Factor	5 Inferred	Read
3n251	Meter #n BS&W	2 Inferred	Read
3n253	Meter #n Equil Pressure	3 Inferred	Read
3n255	Meter #n Dens.Temperature	2 Inferred	Read
3n257	Meter #n Dens.Pressure	3 Inferred	Read
3n259	Meter #n Density gm/cc	6 Inferred	Read
3n261	Meter #n Density@60	6 Inferred	Read
3n263	Meter #n SG	6 Inferred	Read
3n265	Meter #n SG@60	6 Inferred	Read
3n267	Meter #n API	1 Inferred	Read
3n269	Meter #n API@60	1 Inferred	Read
3n271	Meter #n Table Used	0 Inferred	Read
3n273	Meter #n Batch Number	0 Inferred	Read

Modbus Address Table – 2x16 Bits Integer

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
3n275	Meter #n Batch Start Date	0 Inferred	Read
3n277	Meter #n Batch Start Time	0 Inferred	Read
3n279	Meter #n Batch End Date	0 Inferred	Read
3n281	Meter #n Batch End Time	0 Inferred	Read
3n283	Meter #n Product Used	0 Inferred	Read
3n285	Meter #n Unit of Measurement	0 Inferred	Read
3n287-3n293	Meter #n Product ID	16 Chars.	Read
3n295-3n299	Meter #n Batch ID	12 Chars	Read
3n301-3n303	Meter #n ID	8 Chars	Read
3n305	Meter #n K Factor	2 Inferred	Read
3n307	Meter #n Density Correction Factor	5 Inferred	Read
3n309	Meter #n Meter Factor	5 Inferred	Read
3n311-3n319	Meter #n Meter Location	20 Chars.	Read
3n321	Meter #n IV Flowrate	1 Inferred	Read
3n323	Meter #n ISV Flowrate	1 Inferred	Read
3n325	Meter #n GSV Flowrate	1 Inferred	Read
3n327	Meter #n NSV Flowrate	1 Inferred	Read
3n329	Meter #n MASS Flowrate	2 Inferred	Read
3n331	Meter #n Batch IV	0 Inferred	Read
3n333	Meter #n Batch ISV	0 Inferred	Read
3n335	Meter #n Batch GSV	0 Inferred	Read
3n337	Meter #n Batch NSV	0 Inferred	Read
3n339	Meter #n Batch MASS	1 Inferred	Read
3n341	Meter #n Cum. IV	0 Inferred	Read
3n343	Meter #n Cum. ISV	0 Inferred	Read
3n345	Meter #n Cum. GSV	0 Inferred	Read
3n347	Meter #n Cum. NSV	0 Inferred	Read
3n349	Meter #n Cum. MASS	1 Inferred	Read
3n351	Meter #n Opening IV	0 Inferred	Read
3n353	Meter #n Opening ISV	0 Inferred	Read
3n355	Meter #n Opening GSV	0 Inferred	Read
3n357	Meter #n Opening NSV	0 Inferred	Read
3n359	Meter #n Opening MASS	1 Inferred	Read
3n361-3n363	Meter #n Stream ID	8 Chars.	Read
3n365-3n367	Meter #n Ship to ID	8 Chars.	Read
3n369-3n371	Meter #n Receieved From ID	8 Chars.	Read
3n373	Meter #n CTPL	6 Inferred	Read
3n375	Meter #n FWA CTPL	6 Inferred	Read
3n377	Meter #n Meter Density gm/cc	6 Inferred	Read
3n379	Meter #n FWA Meter Density	6 Inferred	Read
3n381	Meter #n Daily IV	0 Inferred	Read
3n383	Meter #n Daily ISV	0 Inferred	Read
3n385	Meter #n Daily GSV	0 Inferred	Read
3n387	Meter #n Daily NSV	0 Inferred	Read
3n389	Meter #n Daily MASS	1 Inferred	Read
3n391	Meter #n Previous Daily IV	0 Inferred	Read
3n393	Meter #n Previous Daily ISV	0 Inferred	Read
3n395	Meter #n Previous Daily GSV	0 Inferred	Read

Modbus Address Table – 2x16 Bits Integer

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
3n397	Meter #n Previous Daily NSV	0 Inferred	Read
3n399	Meter #n Previous Daily MASS	1 Inferred	Read
3n401	Meter #n Last Batch IV	0 Inferred	Read
3n403	Meter #n Last Batch ISV	0 Inferred	Read
3n405	Meter #n Last Batch GSV	0 Inferred	Read
3n407	Meter #n Last Batch NSV	0 Inferred	Read
3n409	Meter #n Last Batch MASS	1 Inferred	Read
3n601	Meter #n Product #1 Meter Factor	5 Inferred	Read/Write
3n603	Meter #n Product #2 Meter Factor	5 Inferred	Read/Write
3n605	Meter #n Product #3 Meter Factor	5 Inferred	Read/Write
3n607	Meter #n Product #4 Meter Factor	5 Inferred	Read/Write
3n609	Meter #n Product #5 Meter Factor	5 Inferred	Read/Write
3n611	Meter #n Product #6 Meter Factor	5 Inferred	Read/Write
3n613	Meter #n Product #7 Meter Factor	5 Inferred	Read/Write
3n615	Meter #n Product #8 Meter Factor	5 Inferred	Read/Write
3n617	Meter #n Product #9 Meter Factor	5 Inferred	Read/Write
3n619	Meter #n Product #10 Meter Factor	5 Inferred	Read/Write
3n621	Meter #n Product #11 Meter Factor	5 Inferred	Read/Write
3n623	Meter #n Product #12 Meter Factor	5 Inferred	Read/Write
3n625	Meter #n Product #13 Meter Factor	5 Inferred	Read/Write
3n627	Meter #n Product #14 Meter Factor	5 Inferred	Read/Write
3n629	Meter #n Product #15 Meter Factor	5 Inferred	Read/Write
3n631	Meter #n Product #16 Meter Factor	5 Inferred	Read/Write
3n633	Meter #n Flowrate Threshold #1	1 Inferred	Read/Write
3n635	Meter #n Flowrate Threshold #2	1 Inferred	Read/Write
3n637	Meter #n Flowrate Threshold #3	1 Inferred	Read/Write
3n639	Meter #n Flowrate Threshold #4	1 Inferred	Read/Write
3n641	Meter #n Flowrate Linear Factor #1	5 Inferred	Read/Write
3n643	Meter #n Flowrate Linear Factor #2	5 Inferred	Read/Write
3n645	Meter #n Flowrate Linear Factor #3	5 Inferred	Read/Write
3n647	Meter #n Flowrate Linear Factor #4	5 Inferred	Read/Write
3n649	Meter #n K Factor	2 Inferred	Read/Write
3n651	Meter #n Gross Low Limit	1 Inferred	Read/Write
3n653	Meter #n Gross High Limit	1 Inferred	Read/Write
3n655	Meter #n Meter Factor Override	5 Inferred	Read/Write
3n657	Meter #n Equilibrium Pressure Override	3 Inferred	Read/Write
3n659	Meter #n Temperature Override	2 Inferred	Read/Write
3n661	Meter #n Pressure Override	3 Inferred	Read/Write
3n663	Meter #n Flowrate Threshold #5	1 Inferred	Read/Write
3n665	Meter #n Flowrate Threshold #6	1 Inferred	Read/Write
3n667	Meter #n Flowrate Threshold #7	1 Inferred	Read/Write
3n669	Meter #n Flowrate Threshold #8	1 Inferred	Read/Write
3n671	Meter #n Flowrate Linear Factor #5	5 Inferred	Read/Write
3n673	Meter #n Flowrate Linear Factor #6	5 Inferred	Read/Write
3n675	Meter #n Flowrate Linear Factor #7	5 Inferred	Read/Write
3n677	Meter #n Flowrate Linear Factor #8	5 Inferred	Read/Write

Modbus Address Table – 2x16 Bits Integer

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE

Last Batch/Daily/Hourly Data Area

3n753	Stream Number Requested (1=Stream1..)	0 Inferred	Read/Write
3n755	Last Batch Report Request (1= Latest, 35=Oldest)	0 Inferred	Write
3n757	Last Hourly Report Request(1=Latest, 35=Oldest)	0 Inferred	Write
3n759	Last Daily Report Request (1=Latest, 35=Oldest)	0 Inferred	Write

For Example: Reqest the latest batch report
Set Strem Number <31753> to 1: stream#1 data, 2: stream#2 data, 3: stream#3 data
Set Last Batch Report request <31755 > to 1 = Latest, 35 = Oldest
The MicroMP3 Flow Computer wil retrieve, polulate data, and set <31755> back to zero.
n: 1: meter#1 data, 2:meter#2, 3:meter#3, 4:meter4, 5:meter#5, 6:meter#6

3n761	Meter #n Frequency	0 Inferred	Read
3n763-3n769	Spare		
3n771	Meter #n FWA Temperature	2 Inferred	Read
3n773	Meter #n FWA Pressure	3 Inferred	Read
3n775	Meter #n FWA CTL	6 Inferred	Read
3n777	Meter #n FWA CPL	6 Inferred	Read
3n779	Meter #n FWA Linear Meter Factor	5 Inferred	Read
3n781	Meter #n FWA BS&W	2 Inferred	Read
3n783	Meter #n FWA Equil Pressure	3 Inferred	Read
3n785	Meter #n FWA Dens.Temperature	2 Inferred	Read
3n787	Meter #n FWA Dens.Pressure	3 Inferred	Read
3n789	Meter #n FWA Density gm/cc	6 Inferred	Read
3n791	Meter #n FWA Density@60	6 Inferred	Read
3n793	Meter #n FWA SG	6 Inferred	Read
3n795	Meter #n FWA SG@60	6 Inferred	Read
3n797	Meter #n FWA API	1 Inferred	Read
3n799	Meter #n FWA API@60	1 Inferred	Read
3n801	Meter #n Temperature	2 Inferred	Read
3n803	Meter #n Pressure	3 Inferred	Read
3n805	Meter #n CTL	6 Inferred	Read
3n807	Meter #n CPL	6 Inferred	Read
3n809	Meter #n Linear Meter Factor	5 Inferred	Read
3n811	Meter #n BS&W	2 Inferred	Read
3n813	Meter #n Equil Pressure	3 Inferred	Read
3n815	Meter #n Dens.Temperature	2 Inferred	Read
3n817	Meter #n Dens.Pressure	3 Inferred	Read
3n819	Meter #n Density gm/cc	6 Inferred	Read
3n821	Meter #n Density@60	6 Inferred	Read
3n823	Meter #n SG	6 Inferred	Read
3n825	Meter #n SG@60	6 Inferred	Read
3n827	Meter #n API	1 Inferred	Read
3n829	Meter #n API@60	1 Inferred	Read
3n831	Meter #n Table Used	0 Inferred	Read
3n833	Meter #n Batch Number	0 Inferred	Read
3n835	Meter #n Batch/Day/Hour Start Date	0 Inferred	Read
3n837	Meter #n Batch/Day/Hour Start Time	0 Inferred	Read
3n839	Meter #n Batch/Day/Hour End Date	0 Inferred	Read
3n841	Meter #n Batch Day/Hour End Time	0 Inferred	Read
3n843	Meter #n Product Used	0 Inferred	Read
3n845	Meter #n Unit of Measurement	0 Inferred	Read

Modbus Address Table – 2x16 Bits Integer

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
3n847-3n853	Meter #n Product ID	16 Chars.	Read
3n855-3n859	Meter #n Batch ID	16 Chars	Read
3n861-3n863	Meter #n ID	8 Chars	Read
3n865	Meter #n K Factor	2 Inferred	Read
3n867	Meter #n Density Correction Factor	5 Inferred	Read
3n869	Meter #n Meter Factor	5 Inferred	Read
3n871-3n879	Meter #n Meter Location	20 Chars.	Read
3n881	Meter #n IV Flowrate	1 Inferred	Read
3n883	Meter #n ISV Flowrate	1 Inferred	Read
3n885	Meter #n GSV Flowrate	1 Inferred	Read
3n887	Meter #n NSV Flowrate	1 Inferred	Read
3n889	Meter #n MASS Flowrate	2 Inferred	Read
3n891	Meter #n Batch/Daily IV	0 Inferred	Read
3n893	Meter #n Batch/Daily ISV	0 Inferred	Read
3n895	Meter #n Batch/Daily GSV	0 Inferred	Read
3n897	Meter #n Batch/Daily NSV	0 Inferred	Read
3n899	Meter #n Batch/Daily MASS	1 Inferred	Read
3n901	Meter #n Closing/Cum. IV	0 Inferred	Read
3n903	Meter #n Closing/Cum. ISV	0 Inferred	Read
3n905	Meter #n Closing/Cum. GSV	0 Inferred	Read
3n907	Meter #n Closing/Cum. NSV	0 Inferred	Read
3n909	Meter #n Closing/Cum. MASS	1 Inferred	Read
3n911	Meter #n Opening IV	0 Inferred	Read
3n913	Meter #n Opening ISV	0 Inferred	Read
3n915	Meter #n Opening GSV	0 Inferred	Read
3n917	Meter #n Opening NSV	0 Inferred	Read
3n919	Meter #n Opening MASS	1 Inferred	Read
3n921-3n923	Meter #n Stream ID	8 Chars.	Read
3n925-3n927	Meter #n Ship to ID	8 Chars.	Read
3n929-3n931	Meter #n Receieved From ID	8 Chars.	Read
3n933	Meter #n CTPL	6 Inferred	Read
3n935	Meter #n FWA CTPL	6 Inferred	Read
3n937	Meter #n Meter Density gm/cc	6 Inferred	Read
3n939	Meter #n FWA Meter Density	6 Inferred	Read
3n941-3n943	Trucking Loading Slave#1Tag	8 Chars.	Read
3n945-3n947	Trucking Loading Slave#2Tag	8 Chars.	Read
3n949	Trucking Loading Sampler Counts	0 Inferred	Read
3n951	Trucking Loading Sampler Pulse Per Unit	3 Inferred	Read
Stream Data Area - Last Batch/Daily/Hourly Data Area			
4n881	Stream #n Forward IV Flowrate	1 Inferred	Read
4n883	Stream #n Forward ISV Flowrate	1 Inferred	Read
4n885	Stream #n Forward GSV Flowrate	1 Inferred	Read
4n887	Stream #n Forward NSV Flowrate	1 Inferred	Read
4n889	Stream #n Forward Mass Flowrate	2 Inferred	Read
4n891	Stream #n Forward Batch/Daily IV	0 Inferred	Read
4n893	Stream #n Forward Batch/Daily ISV	0 Inferred	Read
4n895	Stream #n Forward Batch/Daily GSV	0 Inferred	Read
4n897	Stream #n Forward Batch/Daily NSV	0 Inferred	Read
4n899	Stream #n Forward Batch/Daily Mass	1 Inferred	Read

Modbus Address Table – 2x16 Bits Integer

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
4n901	Stream #n Forward Closing/Cum IV	0 Inferred	Read
4n903	Stream #n Forward Closing/Cum ISV	0 Inferred	Read
4n905	Stream #n Forward Closing/Cum GSV	0 Inferred	Read
4n907	Stream #n Forward Closing/Cum NSV	0 Inferred	Read
4n909	Stream #n Forward Closing/Cum Mass	1 Inferred	Read
4n911	Stream #n Forward Open IV	0 Inferred	Read
4n913	Stream #n Forward Open ISV	0 Inferred	Read
4n915	Stream #n Forward Open GSV	0 Inferred	Read
4n917	Stream #n Forward Open NSV	0 Inferred	Read
4n919	Stream #n Forward Open Mass	1 Inferred	Read
4n921	Stream #n Reverse IV Flowrate	1 Inferred	Read
4n923	Stream #n Reverse ISV Flowrate	1 Inferred	Read
4n925	Stream #n Reverse GSV Flowrate	1 Inferred	Read
4n927	Stream #n Reverse NSV Flowrate	1 Inferred	Read
4n929	Stream #n Reverse Mass Flowrate	2 Inferred	Read
4n931	Stream #n Reverse Batch/Daily IV	0 Inferred	Read
4n933	Stream #n Reverse Batch/Daily ISV	0 Inferred	Read
4n935	Stream #n Reverse Batch/Daily GSV	0 Inferred	Read
4n937	Stream #n Reverse Batch/Daily NSV	0 Inferred	Read
4n939	Stream #n Reverse Batch/Daily Mass	1 Inferred	Read
4n941	Stream #n Reverse Closing/Cum IV	0 Inferred	Read
4n943	Stream #n Reverse Closing/Cum ISV	0 Inferred	Read
4n945	Stream #n Reverse Closing/Cum GSV	0 Inferred	Read
4n947	Stream #n Reverse Closing/Cum NSV	0 Inferred	Read
4n949	Stream #n Reverse Closing/Cum Mass	1 Inferred	Read
4n951	Stream #n Reverse Open IV	0 Inferred	Read
4n953	Stream #n Reverse Open ISV	0 Inferred	Read
4n955	Stream #n Reverse Open GSV	0 Inferred	Read
4n957	Stream #n Reverse Open NSV	0 Inferred	Read
4n959	Stream #n Reverse Open Mass	1 Inferred	Read
4n961	Stream #1 Batch Status (0=Regular, 1=Parital) (Up to 15 bits – 00 00 00 01 in Hex, the latest batch is partial batch)	0 Inferred	Read

End of Last Batch/Daily/Hourly Data Area

Modbus Address Table – 2x16 Bits Integer

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
Stream Data Area (N=: 1=Stream #1, 2=Stream#2, 3=Stream#3)			
4n341	Stream #n Forward IV Flowrate	1 Inferred	Read
4n343	Stream #n Forward ISV Flowrate	1 Inferred	Read
4n345	Stream #n Forward GSV Flowrate	1 Inferred	Read
4n347	Stream #n Forward NSV Flowrate	1 Inferred	Read
4n349	Stream #n Forward Mass Flowrate	2 Inferred	Read
4n351	Stream #n Forward Batch IV	0 Inferred	Read
4n353	Stream #n Forward Batch ISV	0 Inferred	Read
4n355	Stream #n Forward Batch GSV	0 Inferred	Read
4n357	Stream #n Forward Batch NSV	0 Inferred	Read
4n359	Stream #n Forward Batch Mass	1 Inferred	Read
4n361	Stream #n Forward Cum. IV	0 Inferred	Read
4n363	Stream #n Forward Cum. ISV	0 Inferred	Read
4n365	Stream #n Forward Cum. GSV	0 Inferred	Read
4n367	Stream #n Forward Cum. NSV	0 Inferred	Read
4n369	Stream #n Forward Cum. Mass	1 Inferred	Read
4n371	Stream #n Forward Opening IV	0 Inferred	Read
4n373	Stream #n Forward Opening ISV	0 Inferred	Read
4n375	Stream #n Forward Opening GSV	0 Inferred	Read
4n377	Stream #n Forward Opening NSV	0 Inferred	Read
4n379	Stream #n Forward Opening Mass	1 Inferred	Read
4n381	Stream #n Reverse IV Flowrate	1 Inferred	Read
4n383	Stream #n Reverse ISV Flowrate	1 Inferred	Read
4n385	Stream #n Reverse GSV Flowrate	1 Inferred	Read
4n387	Stream #n Reverse NSV Flowrate	1 Inferred	Read
4n389	Stream #n Reverse Mass Flowrate	2 Inferred	Read
4n391	Stream #n Reverse Batch IV	0 Inferred	Read
4n393	Stream #n Reverse Batch ISV	0 Inferred	Read
4n395	Stream #n Reverse Batch GSV	0 Inferred	Read
4n397	Stream #n Reverse Batch NSV	0 Inferred	Read
4n399	Stream #n Reverse Batch Mass	1 Inferred	Read
4n401	Stream #n Reverse Cum. IV	0 Inferred	Read
4n403	Stream #n Reverse Cum. ISV	0 Inferred	Read
4n405	Stream #n Reverse Cum. GSV	0 Inferred	Read
4n407	Stream #n Reverse Cum. NSV	0 Inferred	Read
4n409	Stream #n Reverse Cum. Mass	1 Inferred	Read
4n411	Stream #n Reverse Opening IV	0 Inferred	Read
4n413	Stream #n Reverse Opening ISV	0 Inferred	Read
4n415	Stream #n Reverse Opening GSV	0 Inferred	Read
4n417	Stream #n Reverse Opening NSV	0 Inferred	Read
4n419	Stream #n Reverse Opening Mass	1 Inferred	Read

Modbus Address Table – 2x16 Bits Integer

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
4n421	Stream #n Product # 1 API at Base	1 Inferred	Read/Write
4n423	Stream #n Product # 1 SG at Base	6 Inferred	Read/Write
4n425	Stream #n Product # 1 Density gm/cc at Base	6 Inferred	Read/Write
4n427	Stream #n Product # 1 Alpha T E-6	3 Inferred	Read/Write
4n429	Stream #n Product # 2 API at Base	1 Inferred	Read/Write
4n431	Stream #n Product # 2 SG at Base	6 Inferred	Read/Write
4n433	Stream #n Product # 2 Density gm/cc at Base	6 Inferred	Read/Write
4n435	Stream #n Product # 2 Alpha T E-6	3 Inferred	Read/Write
4n437	Stream #n Product # 3 API at Base	1 Inferred	Read/Write
4n439	Stream #n Product # 3 SG at Base	6 Inferred	Read/Write
4n441	Stream #n Product # 3 Density gm/cc at Base	6 Inferred	Read/Write
4n443	Stream #n Product # 3 Alpha T E-6	3 Inferred	Read/Write
4n445	Stream #n Product # 4 API at Base	1 Inferred	Read/Write
4n447	Stream #n Product # 4 SG at Base	6 Inferred	Read/Write
4n449	Stream #n Product # 4 Density gm/cc at Base	6 Inferred	Read/Write
4n451	Stream #n Product # 4 Alpha T E-6	3 Inferred	Read/Write
4n453	Stream #n Product # 5 API at Base	1 Inferred	Read/Write
4n455	Stream #n Product # 5 SG at Base	6 Inferred	Read/Write
4n457	Stream #n Product # 5 Density gm/cc at Base	6 Inferred	Read/Write
4n459	Stream #n Product # 5 Alpha T E-6	3 Inferred	Read/Write
4n461	Stream #n Product # 6 API at Base	1 Inferred	Read/Write
4n463	Stream #n Product # 6 SG at Base	6 Inferred	Read/Write
4n465	Stream #n Product # 6 Density gm/cc at Base	6 Inferred	Read/Write
4n467	Stream #n Product # 6 Alpha T E-6	3 Inferred	Read/Write
4n469	Stream #n Product # 7 API at Base	1 Inferred	Read/Write
4n471	Stream #n Product # 7 SG at Base	6 Inferred	Read/Write
4n473	Stream #n Product # 7 Density gm/cc at Base	6 Inferred	Read/Write
4n475	Stream #n Product # 7 AlphaT E-6	3 Inferred	Read/Write
4n477	Stream #n Product # 8 API at Base	1 Inferred	Read/Write
4n479	Stream #n Product # 8 SG at Base	6 Inferred	Read/Write
4n481	Stream #n Product # 8 Density gm/cc at Base	6 Inferred	Read/Write
4n483	Stream #n Product # 8 Alpha T E-6	3 Inferred	Read/Write
4n485	Stream #n Product # 9 API at Base	1 Inferred	Read/Write
4n487	Stream #n Product # 9 SG at Base	6 Inferred	Read/Write
4n489	Stream #n Product # 9 Density gm/cc at Base	6 Inferred	Read/Write
4n491	Stream #n Product # 9 Alpha T E-6	3 Inferred	Read/Write
4n493	Stream #n Product # 10 API at Base	1 Inferred	Read/Write
4n495	Stream #n Product # 10 SG at Base	6 Inferred	Read/Write
4n497	Stream #n Product # 10 Density gm/cc at Base	6 Inferred	Read/Write
4n499	Stream #n Product # 10 Alpha T E-6	3 Inferred	Read/Write
4n501	Stream #n Product # 11 API at Base	1 Inferred	Read/Write
4n503	Stream #n Product # 11 SG at Base	6 Inferred	Read/Write
4n505	Stream #n Product # 11 Density gm/cc at Base	6 Inferred	Read/Write
4n507	Stream #n Product # 11 Alpha T E-6	3 Inferred	Read/Write
4n509	Stream #n Product # 12 API at Base	1 Inferred	Read/Write
4n511	Stream #n Product # 12 SG at Base	6 Inferred	Read/Write
4n513	Stream #n Product # 12 Density gm/cc at Base	6 Inferred	Read/Write
4n515	Stream #n Product # 12 Alpha T E-6	3 Inferred	Read/Write

Modbus Address Table – 2x16 Bits Integer

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE
4n517	Stream #n Product # 13 API at Base	1 Inferred	Read/Write
4n519	Stream #n Product # 13 SG at Base	6 Inferred	Read/Write
4n521	Stream #n Product # 13 Density gm/cc at Base	6 Inferred	Read/Write
4n523	Stream #n Product # 13 Alpha T E-6	3 Inferred	Read/Write
4n525	Stream #n Product # 14 API at Base	1 Inferred	Read/Write
4n527	Stream #n Product # 14 SG at Base	6 Inferred	Read/Write
4n529	Stream #n Product # 14 Density gm/cc at Base	6 Inferred	Read/Write
4n531	Stream #n Product # 14 Alpha T E-6	3 Inferred	Read/Write
4n533	Stream #n Product # 15 API at Base	1 Inferred	Read/Write
4n535	Stream #n Product # 15 SG at Base	6 Inferred	Read/Write
4n537	Stream #n Product # 15 Density gm/cc at Base	6 Inferred	Read/Write
4n539	Stream #n Product # 15 Alpha T E-6	3 Inferred	Read/Write
4n541	Stream #n Product # 16 API at Base	1 Inferred	Read/Write
4n543	Stream #n Product # 16 SG at Base	6 Inferred	Read/Write
4n545	Stream #n Product # 16 Density gm/cc at Base	6 Inferred	Read/Write
4n547	Stream #n Product # 16 Alpha T E-6	3 Inferred	Read/Write
4n549	Stream #n BS&W Override	2 Inferred	Read/Write
4n551	Stream #n Density gm/cc Override	6 Inferred	Read/Write
4n553	Stream #n SG Override	6 Inferred	Read/Write
4n555	Stream #n API Override	1 Inferred	Read/Write
4n557	Stream #n Alpha T E-6 Override	3 Inferred	Read/Write
4n559	Stream #n Next Batch Preset #1	0 Inferred	Read/Write
4n561	Stream #n Next Batch Preset Warning	0 Inferred	Read/Write
4n563	Stream #n Batch Preset	0 Inferred	Read/Write
4n565	Stream #n Batch Preset Warning	0 Inferred	Read/Write
4n567	Stream #n Batch Number	0 Inferred	Read/Write
4n569	Stream #n Batch End Date (mmddyy)	0 Inferred	Read/Write
4n571	Stream #n Next Batch Preset #2	0 Inferred	Read/Write
4n573	Stream #n Next Batch Preset #3	0 Inferred	Read/Write
4n575	Stream #n Next Batch Preset #4	0 Inferred	Read/Write
4n577	Stream #n Next Batch Preset #5	0 Inferred	Read/Write
4n579	Spare		
4n581-4n591	Reserved		
4n593	Stream #n Slope	5 Inferred	Read/Write
4n595	Stream #n Intercept	5 Inferred	Read/Write

Modbus Address Table – 2x16 Bits Integer

ADDRESS	DESCRIPTION	DECIMAL	READ/WRITE

****Note: PSIA, KPA-3 decimal places inferred, Bar, KG/CM2-5 decimal inferred.**

40271	Prove Report Number	0 Inferred	Read/Write
40273	Prover Size	2 Inferred	Read/Write
40275	Coeff of Shaft Temperature E-7	1 Inferred	Read/Write
40277	Area Thermal Coefficient E-7	1 Inferred	Read/Write
40279	Prover Base Temperature	2 Inferred	Read/Write
40281	Prover Base Pressure	3 Inferred	Read/Write
40283	Pre-Travel in Volume	5 Inferred	Read/Write
40285	Prove Volume	5 Inferred	Read/Write
40287	Prover Diameter	3 Inferred	Read/Write
40289	Prover Wall Thickness	4 Inferred	Read/Write
40291	Modulus of Elasticity E+7	1 Inferred	Read/Write
40293	Coeff. of Cubical Expansion E-7	1 Inferred	Read/Write
40295	Prover Temperature Deviation	2 Inferred	Read/Write
40297	Prover and Meter Temperature Deviation	2 Inferred	Read/Write
40299	Flowrate Change Per Sample Period	2 Inferred	Read/Write
40301	Pulse Deviation	2 Inferred	Read/Write
40303	Prove Meter Factor Deviation	2 Inferred	Read/Write
40305	Prover Temperature Override	2 Inferred	Read/Write
40307	Prover Pressure Override	3 Inferred	Read/Write
40309	Prover API Override	1 Inferred	Read/Write
40311	Prover SG Override	6 Inferred	Read/Write
40313	Prover Density Override	6 Inferred	Read/Write
40315	Prover Shaft Temp. Override	2 Inferred	Read/Write
40317	Prove Meter CTL Override	6 Inferred	Read/Write
40319	Prove Meter CPL Override	6 Inferred	Read/Write

Alarms and Audit Trail Data

Previous Data Alarm Area

Set last alarm status request **(5099**) to 1. (5099, 2x16 bits Integer, Write Only)

5101-5109 (2x16 bits Integers, Read only)

5101	last alarm date mmddyy
5103	last alarm time hhmmss
5105	last alarm flag = (ID x 10^6) + (CODE x 10^4) + (ACODE x 10^2) + STATUS
5107	Cumulative total
5109	Spare

ID	CODE	ACODE	STATUS

ID

1	Analog Input #1	24	Meter#4
2	Analog Input #2	25	Meter#5
3	Analog Input #3	26	Meter#6
4	Analog Input #4		
5-8	N/A	31	Stream #1
9	RTD Input	32	Stream #2
10-12	N/A	33	Stream #3
13	Analog Output#1	34	Slave#1 Communication
14	Analog Output#2	35	Slave#2 Communication
15	Analog Output#3	36	Slave#3 Communication
16	Analog Output#4		
17	Densitometer		
21	Meter#1	41	Multi.Var Spare
22	Meter#2	42	Multi.Var Pressure
23	Meter#3	43	Multi.Var Temperature
80	Battery		

CODE

1	IV (Indicated Volume)	5	API2565(Ethylene/Propylene) Out of Range
2	Gravity Out of Range	6	Batch Preset Warning
3	Temperature Out of Range	7	Batch Preset
4	ALPHA T Out of Range		

ACODE

1	Stream #1 Forward	11	Stream #1 Reverse
2	Stream #2 Forward	12	Stream #2 Reverse
3	Stream #3 Forward	13	Stream #3 Reverse

STATUS

0	ID = 17	
	Others	STATUS - OK
1	HI	
2	LO	
3	ID = 17	STATUS - OK
	Others	
6	Failed OK	
4,7	FAILED	
5	OVERRANGE	

Previous Audit Data Area

Set last audit data request (5239) to 1. (5239, 2x16 bits Integer, Write Only)

5241-5253 (2x16 bits Integers, Read only)

5241	Last Audit Date mmddyy
5243	Last Audit Time hhmmss
5245	Old Value
5247	New Value
5249	Stream Cumulative Totalizer
5251	Spare
5253	Code Flag

Code Flag

Config Code	No.	Audit Code	Old/New Value Decimal Inferred

Config Code

1	Stream #1 Forward
2	Stream #2 Forward
3	Stream #3 Forward

11	Stream #1 Reverse
12	Stream #2 Reverse
13	Stream #3 Reverse

NO.

1	Meter 1 ID
2	Meter 2 ID
3	Meter 3 ID
4	Meter 4 ID
5	Meter 5 ID
6	Meter 6 ID
7	Stream #1 ID
8	Stream #2 ID
9	Stream #3 ID
11	Analog Input #1 Tag
12	Analog Input #2 Tag
13	Analog Input #3 Tag
14	Analog Input #4 Tag

19	RTD Tag
23	Analog Output#1 Tag
24	Analog Output#2 Tag
25	Analog Output#3 Tag
26	Analog Output#4 Tag
27	Densitometer Tag
41	Multi.Variable Spare Tag
42	Multi.Variable Temperature Tag
43	Multi.Variable Pressure Tag

Audit Codes

2	Meter Factor Override
3	Temperature Override
4	Pressure Override
6	Equilibrium Pressure Override
7	K Factor
8	Flow Threshold #1
9	Flow Threshold #2
10	Flow Threshold #3
11	Flow Threshold #4
12	Linear Factor #1
13	Linear Factor #2
14	Linear Factor #3
15	Linear Factor #4
16	Product #1 Meter Factor
17	Product #2 Meter Factor
18	Product #3 Meter Factor
19	Product #4 Meter Factor
20	Product #5 Meter Factor
21	Product #6 Meter Factor
22	Product #7 Meter Factor
23	Product #8 Meter Factor
24	Product #9 Meter Factor
25	Product 10 Meter Factor
26	Product 11 Meter Factor
27	Product 12 Meter Factor
28	Product 13 Meter Factor
29	Product 14 Meter Factor
30	Product 15 Meter Factor
31	Product 16 Meter Factor
32	At @4mA
33	At @20mA
34	Maintenance Value
35	GM/CC Conversion Factor
36	Atmospheric PSIA
37	Pulse Output Volume #1
38	Pulse Output Volume #2
39	N/A
40	N/A
41	N/A
42	Override
51	Product #1 API Override
52	Product #2 API Override
53	Product #3 API Override
54	Product #4 API Override
55	Product #5 API Override
56	Product #6 API Override
57	Product #7 API Override
58	Product #8 API Override
59	Product #9 API Override

91	Product #1 Density Override
92	Product #2 Density Override
93	Product #3 Density Override
94	Product #4 Density Override
95	Product #5 Density Override
96	Product #6 Density Override
97	Product #7 Density Override
98	Product #8 Density Override
99	Product #9 Density Override
100	Product 10 Density Override
101	Product 11 Density Override
102	Product 12 Density Override
103	Product 13 Density Override
104	Product 14 Density Override
105	Product 15 Density Override
106	Product 16 Density Override
111	Product #1 Alpha T Override
112	Product #2 Alpha T Override
113	Product #3 Alpha T Override
114	Product #4 Alpha T Override
115	Product #5 Alpha T Override
116	Product #6 Alpha T Override
117	Product #7 Alpha T Override
118	Product #8 Alpha T Override
119	Product #9 Alpha T Override
120	Product 10 Alpha T Override
121	Product 11 Alpha T Override
122	Product 12 Alpha T Override
123	Product 13 Alpha T Override
124	Product 14 Alpha T Override
125	Product 15 Alpha T Override
126	Product 16 Alpha T Override
141	Flow Threshold #5
142	Flow Threshold #6
143	Flow Threshold #7
144	Flow Threshold #8
145	Linear Factor #5
146	Linear Factor #6
147	Linear Factor #7
148	Linear Factor #8
150	BS&W Override
151	Density Override
152	SG Override
153	API Override
154	Alpha T Override
160	N/A
161	Flow Cut Off
162	Retroactive Meter Factor

60	Product 10 API Override		163	Stream Number
61	Product 11 API Override		164	Flow Polarity
62	Product 12 API Override		165	Density Type
63	Product 13 API Override		166	Density Unit
64	Product 14 API Override		167	BS&W Assignment
65	Product 15 API Override		168	Temperature Assignment
66	Product 16 API Override		169	Pressure Assignment
71	Product #1 SG Override		170	Density Assignment
72	Product #2 SG Override		172	Enable Truck Loading
73	Product #3 SG Override		173	Day Start Hour
74	Product #4 SG Override		174	Disable Alarms
75	Product #5 SG Override		175	Volume Units
76	Product #6 SG Override		185	Fail Code
77	Product #7 SG Override		186	Calibration
78	Product #8 SG Override			
79	Product #9 SG Override		**180**	*****SEE NOTE**
80	Product 10 SG Override			
81	Product 11 SG Override			
82	Product 12 SG Override			
83	Product 13 SG Override			
84	Product 14 SG Override			
85	Product 15 SG Override			
86	Product 16 SG Override			

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

5241	*System Start Date*
5243	*System Start Time*
5245	*System Failed Date*
5247	*System Failed Time*
5249	*Not Used*
5251	*Not Used*

Previous Audit Data Area Ends

Current Alarm Status

Modbus Address 3067-3077 (in Hex)-

3067 – 0100	Meter #1 Down
3067 – 0200	Meter #1 SG Out of Range
3067 – 0400	Meter #1Table E Temperature Out of Range
3067 – 0800	Meter #1 Alpha T Out of Range
3067 – 1000	Meter #1 IV Flow Rate High
3067 – 2000	Meter #1 IV Flow Rate Low
3067 – 4000	Meter #1 API2565-Prop/Ethy. Out of Range

3067 – 0001	Meter #2 Down
3067 – 0002	Meter #2 SG Out of Range
3067 – 0004	Meter #2 Table E Temperature Out of Range
3067 – 0008	Meter #2 Alpha T Out of Range
3067 – 0010	Meter #2 IV Flow Rate High
3067 – 0020	Meter #2 IV Flow Rate Low
3067 – 0040	Meter #2 API2565-Prop/Ethy. Out of Range

3068 – 0100	Meter #3 Down
3068 – 0200	Meter #3 SG Out of Range
3068 – 0400	Meter #3 Table E Temperature Out of Range
3068 – 0800	Meter #3 Alpha T Out of Range
3068 – 1000	Meter #3 IV Flow Rate High
3068 – 2000	Meter #3 IV Flow Rate Low
3068 – 4000	Meter #3 API2565-Prop/Ethy. Out of Range

3068 – 0001	Meter #4 Down
3068 – 0002	Meter #4 SG Out of Range
3068 – 0004	Meter #4 Table E Temperature Out of Range
3068 – 0008	Meter #4 Alpha T Out of Range
3068 – 0010	Meter #4 IV Flow Rate High
3068 – 0020	Meter #4 IV Flow Rate Low
3068 – 0040	Meter #4 API2565-Prop/Ethy. Out of Range

3069 – 0100	Meter #5 Down
3069 – 0200	Meter #5 SG Out of Range
3069 – 0400	Meter #5 Table E Temperature Out of Range
3069 – 0800	Meter #5 Alpha T Out of Range
3069 – 1000	Meter #5 IV Flow Rate High
3069 – 2000	Meter #5 IV Flow Rate Low
3069 – 4000	Meter #5 API2565-Prop/Ethy. Out of Range

3069 – 0001	Meter #6 Down
3069 – 0002	Meter #6 SG Out of Range
3069 – 0004	Meter #6 Table E Temperature Out of Range
3069 – 0008	Meter #6 Alpha T Out of Range
3069 – 0010	Meter #6 IV Flow Rate High
3069 – 0020	Meter #6 IV Flow Rate Low
3069 – 0040	Meter #6 API2565-Prop/Ethy. Out of Range

Current Alarm Status

3070 – 1000	Stream #1 Batch Preset Warning
3070 – 2000	Stream #1 Batch Preset
3070 – 0010	Stream #2 Batch Preset Warning
3070 – 0020	Stream #2 Batch Preset
3071 – 1000	Stream #3 Batch Preset Warning
3071 – 2000	Stream #3 Batch Preset

3071 – 0001	Analog Input #1 High
3071 – 0002	Analog Input #1 Low
3071 – 0004	Analog Input #2 High
3071 – 0008	Analog Input #2 Low
3071 – 0010	Analog Input #3 High
3071 – 0020	Analog Input #3 Low
3071 – 0040	Analog Input #4 High
3071 – 0080	Analog Input #4 Low

3072 – 0001	RTD Input High
3072 – 0002	RTD Input Low

3073 – 1000	Analog Output #1Overrange
3073 – 2000	Analog Output #2Overrange
3073 – 4000	Analog Output #3Overrange
3073 – 8000	Analog Output #4Overrange
3073 – 0002	Densitometer Failed
3073 – 0004	Densitometer High Alarm
3073 – 0008	Densitometer Low Alarm

Current Alarm Status

3075 - 1000	Slave Unit#1 Communication Failed
3075 - 2000	Slave Unit#2 Communication Failed
3075 - 4000	Slave Unit#3 Communication Failed
3075 – 8000	Battery Low

3075 – 0001	Multi.Var. Spare High
3075 – 0002	Multi.Var .Spare Low
3075 – 0004	Multi.Var. Pressure High
3075 – 0008	Multi.Var. Pressure Low
3075 – 0010	Multi.Var. Temperature High
3075 – 0020	Multi.Var. Temperature Low

Current Alarms Status Section Ends

Data Packet

Last Truck Loading Batch (Stream#1 Batch) Data Packet (701)

Use function code 03 to read last batch archive flow data 701 is up to 124 points (248 data bytes) and 703 is up to 32 points (64 data bytes)

The long word numeric variable is a *two 16-bit integers* with decimal places inferred
Data: two 16-bit (32 bits, two words: high word, low word).
Sign bit - first bit of high word (0:positive, 1:negative)

FUNCTION CODE 03 (Multiple Register Points)

RTU MODE -

ADDR	FUNC CODE	STARTING POINT		# OF POINTS		CRC CHECK	
		HI	LO	HI	LO		
01	03	02	BD	00	50	D4	6A

Response

ADDR	FUNC CODE	BYTE COUNTS	DATA …(Repeat n Times)		CRC CHECK	
			HI	LO		
01	03	A0	00	01..		

701 Response Data Format – Last Truck Loading Data (Stream#1 Batch Data)

Total # of point	Variable Name	Data Type	Bytes	Total Bytes
2	Batch Opening date	Long (ddmmyy)	4	4
4	Batch Opening time	Long (hhmmss)	4	8
6	Batch Closing date	Long (ddmmyy)	4	12
8	Batch Closing time	Long (hhmmss)	4	16
10	Driver ID (Max.8 Digits)/Driver No.	Long	4	20
12	Spare/Load Confirmation Base	Long	4	24
14	Lease ID_1 (Max.8 Digits)	Long	4	28
16	Lease ID_2 (Max. 4 Digits)	Long	4	32
18	Batch Averaged CTPL	Long (6 Decimal Inferred)	4	36
20	Batch Number Sequence(Batch No)	Long	4	40
22	Lact ID (Max. 8 Digits)	Long	4	44
24	Ship ID (Max. 8 Digits)	Long	4	48
26	Run Ticket_1 (Max. 8 Digits)	Long	4	52
28	Run Ticket_2 (Max. 4 Digits)	Long	4	56
30	Customer ID : Customer 0:A/1:B	Long	4	60
34	Meter ID/Site Name	8 Chars	8	68
36	Batch Averaged Temperature	Long (2 Decimal Inferred)	4	72
38	Batch Averaged Pressure	Long (3 Decimal Inferred)	4	76
40	Batch Averaged BS&W	Long (4 Decimal Inferred)	4	80
42	Batch Averaged API	Long (1 Decimal Inferred)	4	84
44	Batch Averaged GM/CC	Long (6 Decimal Inferred)	4	88
46	Batch Averaged LMF	Long (5 Decimal Inferred)	4	92
48	Batch Averaged CTL	Long (6 Decimal Inferred)	4	96
50	Batch Averaged CPL	Long (6 Decimal Inferred)	4	100
52	Batch IV	Long (2 Decimal Inferred)	4	104
54	Batch ISV	Long (2 Decimal Inferred)	4	108
56	Batch GSV	Long (2 Decimal Inferred)	4	112
58	Batch NSV	Long (2 Decimal Inferred)	4	116
60	Batch Mass	Long (3 Decimal Inferred)	4	120
62	Batch Opening IV	Long (2 Decimal Inferred)	4	124
64	Batch Opening ISV	Long (2 Decimal Inferred)	4	128
66	Batch Opening GSV	Long (2 Decimal Inferred)	4	132
68	Batch Opening NSV	Long (2 Decimal Inferred)	4	136
70	Batch Opening Mass	Long (3 Decimal Inferred)	4	140
72	Batch Closing IV	Long (2 Decimal Inferred)	4	144
74	Batch Closing ISV	Long (2 Decimal Inferred)	4	148
76	Batch Closing GSV	Long (2 Decimal Inferred)	4	152
78	Batch Closing NSV	Long (2 Decimal Inferred)	4	156
80	Batch Closing Mass	Long (3 Decimal Inferred)	4	160
82	Slave Variable#1	Long (2 Decimal Inferred)	4	164
84	Slave Variable#2	Long (2 Decimal Inferred)	4	168
88	Slave Variable#1 Tag	8 Chars	8	176
92	Slave Variable#2 Tag	8 Chars	8	184
96	Lease Name 1	8 ASCII/Alphanumeric	8	192
100	Lease Name 2	8 ASCII/Alphanumeric	8	200
104	Lease Name 3	8 ASCII/Alphanumeric	8	208

108	Driver Name	8 ASCII/Alphanumeric	8	216
112	Ract Nr	8 ASCII/Alphanumeric	8	224
116	Transporter	8 ASCII/Alphanumeric	8	232
118	Driver Batch GSV	Long (2 Decimal Inferred)	4	236
120	Driver Batch API	Long (1 Decimal Inferred)	4	240
122	Driver Batch Temperature	Long (2 Decimal Inferred)	4	244
124	Driver Batch BS&W	Long (4 Decimal Inferred)	4	**248**

703 Response Data Format – Last Truck Loading Data (Stream#1 Batch Data)

Additional Data

Total # of point	**Variable Name**	**Data Type**	**Byte**	**Total Byte**
4	Ticket Number	8 ASCII/Alphanumeric	8	8
8	Truck Number	8 ASCII/Alphanumeric	8	16
12	Lease ID 1	8 ASCII/Alphanumeric	8	24
16	Lease ID 2	8 ASCII/Alphanumeric	8	32
20	Lease ID 3	8 ASCII/Alphanumeric	8	40
24	Order Number 1	8 ASCII/Alphanumeric	8	48
28	Order Number 2	8 ASCII/Alphanumeric	8	56
32	Order Number 3	8 ASCII/Alphanumeric	8	64
36	Driver Last Name	8 ASCII/Alphanumeric	8	72
40	Location Name 1	8 ASCII/Alphanumeric	8	80
44	Location Name 2	8 ASCII/Alphanumeric	8	88
48	Location Name 3	8 ASCII/Alphanumeric	8	96
50	CCF (CTPL * LMF)	Long (5 Decimal Inferred)	4	100
52	DCF (Density Correction Factor)	Long (5 Decimal Inferred)	4	104
60	Meter Station Name	16 ASCII/Alphanumeric	16	**120**

Example: Read 701 f or 92 points

Total # of points	Variable Name	Data Type	Data
2	Batch Opening date	Long (ddmmyy)	110113
4	Batch Opening time	Long (hhmmss)	211545
6	Batch Closing date	Long (ddmmyy)	110113
8	Batch Closing time	Long (hhmmss)	212101
10	Driver ID (Max. 8 Digits)	Long	12345678
12	Spare		
14	Lease ID_1 (Max. 8 Digits)	Long	12345678
16	Lease ID_2 (Max. 4 Digits)	Long	1234
18	Spare		
20	Batch Number Sequence (Batch No)	Long	109
22	Lact ID (Max. 8 Digits)	Long	12345678
24	Ship ID (Max. 8 Digits)	Long	12345678
26	Run Ticket_1 (Max. 8 Digits)	Long	12345678
28	Run Ticket_2 (Max. 4 Digits)	Long	1234
30	Customer ID : Customer 0:A/1:B	Long	0
34	Meter ID	8 Chars	Meter1
36	Batch Averaged Temperature	Long (2 Decimal Inferred)	71.50
38	Batch Averaged Pressure	Long (3 Decimal Inferred)	500.500
40	Batch Averaged BS&W	Long (4 Decimal Inferred)	1.3500
42	Batch Averaged API	Long (1 Decimal Inferred)	81.6
44	Batch Averaged GM/CC	Long (6 Decimal Inferred)	.663300
46	Batch Averaged LMF	Long (5 Decimal Inferred)	1.00010
48	Batch Averaged CTL	Long (6 Decimal Inferred)	.991110
50	Batch Averaged CPL	Long (6 Decimal Inferred)	1.006060
52	Batch IV	Long (2 Decimal Inferred)	268.00
54	Batch ISV	Long (2 Decimal Inferred)	267.23
56	Batch GSV	Long (2 Decimal Inferred)	267.25
58	Batch NSV	Long (2 Decimal Inferred)	263.24
60	Batch Mass	Long (3 Decimal Inferred)	61.472
62	Batch Opening IV	Long (2 Decimal Inferred)	326.00
64	Batch Opening ISV	Long (2 Decimal Inferred)	325.05
66	Batch Opening GSV	Long (2 Decimal Inferred)	325.09
68	Batch Opening NSV	Long (2 Decimal Inferred)	320.70
70	Batch Opening Mass	Long (3 Decimal Inferred)	74.776
72	Batch Closing IV	Long (2 Decimal Inferred)	594.00
74	Batch Closing ISV	Long (2 Decimal Inferred)	592.28
76	Batch Closing GSV	Long (2 Decimal Inferred)	592.34
78	Batch Closing NSV	Long (2 Decimal Inferred)	584.34
80	Batch Closing Mass	Long (3 Decimal Inferred)	136.248
82	Slave Variable #1	Long (2 Decimal Inferred)	
84	Slave Variable #2	Long (2 Decimal Inferred)	
88	Slave Variable #1 Tag	8 Chars	
92	Slave Variable #2 Tag	8 Chars	

Previous Truck Loading Data (Stream #1 Batch) Data Packet (702)

Use function code 03 to read requested stream#1 last batch archive flow data 702 is up to 124 points (248 data bytes), and 704 data packet is up to 32 points (64 data bytes)

Two steps are required to complete retrieve previous truck loading batch data
(1) Set **2604** to **1**(lastest truck loading batch data), or **35** (oldest truck loading batch data)

FUNCTION CODE 16 (Single Register Point)

RTU MODE -

ADDR	FUNC CODE	START POINT		# OF POINTS		BYTE COUNTS	DATA		CRC CHECK	
		HI	LO	HI	LO		HI	LO		
01	10	0A	2C	00	01	02	00	01	CA	3C

Response

ADDR	FUNC CODE	START ADDR		# OF POINTS		CRC CHECK	
01	10	0A	2C	00	01	C3	D8

(2) Read 702 Data Packet up to 124 points (248 data bytes).

The long word numeric variable is a *two 16-bit integers* with decimal places inferred
Data: two 16-bit (32 bits, two words: high word, low word).
Sign bit - first bit of high word (0:positive, 1:negative)

FUNCTION CODE 03 (Multiple Register Points)

RTU MODE -

ADDR	FUNC CODE	STARTING POINT		# OF POINTS		CRC CHECK	
		HI	LO	HI	LO		
01	03	02	BD	00	50	D4	6A

Response

ADDR	FUNC CODE	BYTE COUNTS	DATA …(Repeat n Times)		CRC CHECK	
			HI	LO		
01	03	A0	00	01..		

(3) Read 704 Data Packet up to 32 points (64 data bytes).

The MicroMP3 flow computer will set 2604 to 0 after 702 and 704 data packet is polled.

702 Response Data Format - Requested previous trucking loading batch data

Total # of points	Variable Name	Data Type	Byte	Total Byte
2	Batch Opening date	Long (ddmmyy)	4	4
4	Batch Opening time	Long (hhmmss)	4	8
6	Batch Closing date	Long (ddmmyy)	4	12
8	Batch Closing time	Long (hhmmss)	4	16
10	Driver ID (Max. 8 Digits)/Driver Number	Long	4	20
12	Batch Averaged CTPL	Long (6 Decimal Inferred)	4	24
14	Lease ID_1 (Max. 8 Digits)	Long	4	28
16	Lease ID_2 (Max. 4 Digits)	Long	4	32
18	Spare	Long	4	36
20	Batch Number Sequence(Batch No.)	Long	4	40
22	Lact ID (Max. 8 Digits)	Long	4	44
24	Ship ID (Max. 8 Digits)	Long	4	48
26	Run ticket_1 (Max. 8 Digits)	Long	4	52
28	Run ticket_2 (Max. 4 Digits)	Long	4	56
30	Customer ID : Customer 0:A/1:B	Long	4	60
34	Meter ID/Site Name	8 Chars	8	68
36	Batch Averaged Temperature	Long (2 Decimal Inferred)	4	72
38	Batch Averaged Pressure	Long (3 Decimal Inferred)	4	76
40	Batch Averaged BS&W	Long (4 Decimal Inferred)	4	80
42	Batch Averaged API	Long (1 Decimal Inferred)	4	84
44	Batch Averaged GM/CC	Long (6 Decimal Inferred)	4	88
46	Batch Averaged LMF	Long (5 Decimal Inferred)	4	92
48	Batch Averaged CTL	Long (6 Decimal Inferred)	4	96
50	Batch Averaged CPL	Long (6 Decimal Inferred)	4	100
52	Batch IV	Long (2 Decimal Inferred)	4	104
54	Batch ISV	Long (2 Decimal Inferred)	4	108
56	Batch GSV	Long (2 Decimal Inferred)	4	112
58	Batch NSV	Long (2 Decimal Inferred)	4	116
60	Batch Mass	Long (3 Decimal Inferred)	4	120
62	Batch Opening IV	Long (2 Decimal Inferred)	4	124
64	Batch Opening ISV	Long (2 Decimal Inferred)	4	128
66	Batch Opening GSV	Long (2 Decimal Inferred)	4	132
68	Batch Opening NSV	Long (2 Decimal Inferred)	4	136
70	Batch Opening Mass	Long (3 Decimal Inferred)	4	140
72	Batch Closing IV	Long (2 Decimal Inferred)	4	144
74	Batch Closing ISV	Long (2 Decimal Inferred)	4	148
76	Batch Closing GSV	Long (2 Decimal Inferred)	4	152
78	Batch Closing NSV	Long (2 Decimal Inferred)	4	156
80	Batch Closing Mass	Long (3 Decimal Inferred)	4	160
82	Slave Variable#1/Opening	Long (2 Decimal Inferred)	4	164
84	Slave Variable#2/Current	Long (2 Decimal Inferred)	4	168
88	Slave Variable#1/Opening Tag	8 Chars	8	176
92	Slave Variable #2/Current Tag	8 Chars	8	184
96	Lease Name 1	8 ASCII/Alphanumeric	8	192
100	Lease Name 2	8 ASCII/Alphanumeric	8	200
104	Lease Name 3	8 ASCII/Alphanumeric	8	208

108	Driver Name	8 ASCII/Alphanumeric	8	216
112	Ract Nr	8 ASCII/Alphanumeric	8	224
116	Transporter	8 ASCII/Alphanumeric	8	232
118	Driver Batch GSV	Long (2 Decimal Inferred)	4	236
120	Driver Batch API	Long (1 Decimal Inferred)	4	240
122	Driver Batch Temperature	Long (2 Decimal Inferred)	4	244
124	Driver Batch BS&W	Long (4 Decimal Inferred)	4	**248**

704 Response Data Format – Requested previous trucking loading batch data

Additional Data

Total # of point	**Variable Name**	**Data Type**	**Byte**	**Total Byte**
4	Ticket Number	8 ASCII/Alphanumeric	8	8
8	Truck Number	8 ASCII/Alphanumeric	8	16
12	Lease ID 1	8 ASCII/Alphanumeric	8	24
16	Lease ID 2	8 ASCII/Alphanumeric	8	32
20	Lease ID 3	8 ASCII/Alphanumeric	8	40
24	Order Number 1	8 ASCII/Alphanumeric	8	48
28	Order Number 2	8 ASCII/Alphanumeric	8	56
32	Order Number 3	8 ASCII/Alphanumeric	8	**64**
36	Driver Last Name	8 ASCII/Alphanumeric	8	72
40	Location Name 1	8 ASCII/Alphanumeric	8	80
44	Location Name 2	8 ASCII/Alphanumeric	8	88
48	Location Name 3	8 ASCII/Alphanumeric	8	96
50	CCF (CTPL * LMF)	Long (5 Decimal Inferred)	4	100
52	DCF (Density Correction Factor)	Long (5 Decimal Inferred)	4	104
60	Meter Station Name	16 ASCII/Alphanumeric	16	120

RDA5(701)– Previous Batch Data

(One Stream Configuration and Truck Loading Feature is disabled)

Polling Sequence

1. Read Batch Sequence Number 5095*(2x16 bit integer)*

2. Write 3 to 31753 to indicate a batch report request (Batch or Monthly Batch)

3. Set 31755 *(2x16 bit integer)* ***to 1: latest*, 35:*oldest batch data index***

4. Read 33771 and 125 points (Total of 250 data bytes).

***5095, 31753, 31755, 33771 – 2x16 bits register**

Total # of points	Variable Name	Data Type	Bytes	Total Bytes
3	Polling Date/Time	mmddyyhhmmss in HEX	6	6
4	Flow Direction	16 Short	2	8
8	Meter ID	ASCII-8	8	16
12	Batch Closing Date	ASCII-8 (mm/dd/yy)	8	24
16	Batch Closing Time	ASCII-8 (hh:mm:ss)	8	32
20	Batch Opening Date	ASCII-8 (mm/dd/yy)	8	40
24	Batch Opening Time	ASCII-8 (hh:mm:ss)	8	48
28	Product Table	ASCII-8	8	56
32	Batch ID (First 8 Chars)	ASCII-8	8	64
36	Batch ID	ASCII-8	8	72
38	Batch IV	32 Integer (0 Decimal)	4	76
40	Batch GSV	32 Integer (0 Decimal)	4	80
42	Batch Mass	32 Integer (3 Decimals)	4	84
44	Batch NSV	32 Integer (0 Decimal)	4	88
46	Batch Opening IV	32 Integer (0 Decimal)	4	92
48	Batch Opening GSV	32 Integer (0 Decimal)	4	96
50	Batch Opening Mass	32 Integer (3 Decimals)	4	100
52	Batch Opening NSV	32 Integer (0 Decimal)	4	104
54	Batch Closing IV	32 Integer (0 Decimal)	4	108
56	Batch Closing GSV	32 Integer (0 Decimal)	4	112
58	Batch Closing Mass	32 Integer (3 Decimals)	4	116
60	Batch Closing NSV	32 Integer (0 Decimal)	4	120
62	Batch Report Number	32 Integer (0 Decimal))	4	124
64	Batch Product Number	32 Integer (0 Decimal)	4	128
66	Snapshot API@60	IEEE Floating Point	4	132
68	Snapshot SG	IEEE Floating Point	4	136
70	Snapshot SG@60	IEEE Floating Point	4	140
72	Current K Factor	IEEE Floating Point	4	144
74	Current Day – Averaged K Factor	IEEE Floating Point	4	148
76	Density Correction Factor	IEEE Floating Point	4	152
78	Densitometer Constant K0	IEEE Floating Point	4	156
80	Meter Factor	IEEE Floating Point	4	160
82	BFWA Temperature	IEEE Floating Point	4	164
84	BFWA Pressure	IEEE Floating Point	4	168
86	BFWA Density	IEEE Floating Point	4	172
88	BFWA VCF	IEEE Floating Point	4	176
90	BFWA CPL	IEEE Floating Point	4	180
92	BFWA Meter Factor	IEEE Floating Point	4	184
94	BFWA SG	IEEE Floating Point	4	188

96	BFWA SG@60	IEEE Floating Point	4	192
98	BFWA Density Temperature	IEEE Floating Point	4	196
100	BFWA Density Pressure	IEEE Floating Point	4	200
102	BFWA Density Correction Factor	IEEE Floating Point	4	204
104	BFWA Factored Density	IEEE Floating Point	4	208
106	BFWA K Factor	IEEE Floating Point	4	212
108	BFWA Viscosity	IEEE Floating Point	4	216
110	BFWA Linear Factor	IEEE Floating Point	4	220
112	BFWA Gross Flow Rate	IEEE Floating Point	4	224
114	BFWA BS&W	IEEE Floating Point	4	228
116	BFWA Equilibrium Pressure	IEEE Floating Point	4	232
118	BFWA API@60	IEEE Floating Point	4	236
120	Sample Counter	32 Integer	4	240
122	Spare	IEEE Floating Point	4	244
124	Sample Rate (Pulse per Unit)	IEEE Floating Point	4	248
125	Spare	16 Short	2	250

Alternative Polling RDA5 (701) -PreviousBatch Method
***(*Truck Loading Feature is disabled**)
Use function code 03 to read stream#1 previous batch archive flow data 701 is a fixed length 250 data bytes. The data field is used to address an individual record
Up to 35 batches are stored (1=Latest, 35=Oldtest)

FUNCTION CODE 03

RTU MODE -

ADDR	FUNC CODE	STARTING POINT **701**		#of Points Record Number (1-35)		CRC CHECK	
		HI	LO	HI	LO		
01	03	02	BD	00	01	15	96

Response

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

RDA5(705)– Previous Daily Data

(One Stream Configuration and Truck Loading Feature is Disabled)
Polling Sequence
1. Read Daily Sequence Number 5093 *(2x16 bit integer)*
2. Write 2 to 31753 *(2x16 bit integer)* ***to indicate a daily report request***
3. Set 31759 *(2x16 bit integer)* ***to 1:latest*, 35:*oldest daily data index***
4. Read 32771 and 116 points *(Total of 232 data bytes).*
***5093, 31753, 31759, 32771 – 2x16 bits register, daily sequence number will be incremented by one at the end of day and roll over at 999999999**

Total # of points	Variable Name	Data Type	Bytes	Total Bytes
3	Polling Date/Time	mmddyyhhmmss in HEX	6	6
4	Flow Direction	16 Short	2	8
8	Running Product Name	ASCII-8	8	16
12	Product Table	ASCII-8	8	24
16	Current Batch ID(first 8 Chars)	ASCII-8	8	32
20	Current Batch ID	ASCII-8	8	40
24	Meter ID	ASCII-8	8	48
28	Day Start Time	ASCII-8 (hh:mm:ss)	8	56
32	Day Start Date	ASCII-8 (mm/dd/yy)	8	64
36	Day End Time	ASCII-8 (hh:mm:ss)	8	72
40	Day End Date	ASCII-8 (mm/dd/yy)	8	80
42		32 Integer (0 Decimal)	4	84
44	Running Product	32 Integer (0 Decimal)	4	88
46		32 Integer (0 Decimal)	4	92
48	In Progress Batch Report Number	32 Integer (0 Decimal)	4	96
50	Daily Batch IV	32 Integer (0 Decimal)	4	100
52	Daily Batch GSV	32 Integer (0 Decimal)	4	104
54	Daily Batch Mass	32 Integer (3 Decimal)	4	108
56	Daily Batch NSV	32 Integer (0 Decimal)	4	112
58	Day's Opening IV	32 Integer (0 Decimal)	4	116
60	Day's Opening GSV	32 Integer (0 Decimal)	4	120
62	Day's Opening Mass	32 Integer (3 Decimal)	4	124
64	Day's Opening NSV	32 Integer (0 Decimal)	4	128
66	Day's Closing IV	32 Integer (0 Decimal)	4	132
68	Day's Closing GSV	32 Integer (0 Decimal)	4	136
70	Day's Closing Mass	32 Integer (3 Decimal)	4	140
72	Day's Closing NSV	32 Integer (0 Decimal)	4	144
74	Densitometer Constant#1 (K0)	IEEE Floating Point	4	148
76	Meter Factor	IEEE Floating Point	4	152
78	DFWA API@60	IEEE Floating Point	4	156
80	DFWA Temperature	IEEE Floating Point	4	160
82	DFWA Pressure	IEEE Floating Point	4	164
84	DFWA Density	IEEE Floating Point	4	168
86	DFWA VCF	IEEE Floating Point	4	172
88	DFWA CPL	IEEE Floating Point	4	176
90	DFWA Meter Factor	IEEE Floating Point	4	180
92	DFWA SG	IEEE Floating Point	4	184
94	DFWA SG@60	IEEE Floating Point	4	188
96	DFWA Densitometer Temperature	IEEE Floating Point	4	192

98	DFWA Densitometer Pressure	IEEE Floating Point	4	196
100	DFWA Density Correction Factor	IEEE Floating Point	4	200
102	DFWA Factored Density	IEEE Floating Point	4	204
104	DFWA K Factor	IEEE Floating Point	4	208
106	DFWA IV Flow Rate	IEEE Floating Point	4	212
108	DFWA BS&W	IEEE Floating Point	4	216
110	DFWA Equilibrium Pressure	IEEE Floating Point	4	220
112	Spare	IEEE Floating Point	4	224
114	Sample Rate (Pulse per Unit)	IEEE Floating Point	4	228
116	Density Correction Factor in use	IEEE Floating Point	4	232

Alternative Polling RDA5-Previous Daily Method (Truck Loading Feature is disabled)
Use function code 03 to read stream#1 ***previous daily archive flow data 705 is a fixed length 232 data bytes.*** *The data field is used to address an individual record*
Up to 35 daily data are stored (1=Latest, 35=Oldtest)

FUNCTION CODE 03

RTU MODE -

ADDR	FUNC CODE	STARTING POINT **705**		#of Points Record Number (1-35)		CRC CHECK	
		HI	LO	HI	LO		
01	03	02	C1	00	01	D4	4E

Response

ADDR	FUNC CODE	BYTE COUNTS	DATA …(Repeat n Times)		CRC CHECK	
			HI	LO		
01	03	E8	00	01..		

Modbus Address Table - Floating Point

ADDRESS	DESCRIPTION	READ/WRITE
Densitometer Constants – Sarasota Density		
7001	Sarasota Density Constant D0	Read/Write
7002	Sarasota Density Constant T0	Read/Write
7003	Sarasota Density Constant K	Read/Write
7004	Sarasota Density Tcoef	Read/Write
7005	Sarasota Density Tcal	Read/Write
7006	Sarasota Density Pcoef	Read/Write
7007	Sarasota Density Pcal	Read/Write
7008	Spare	
7009	Spare	
7010	Spare	
7011	Spare	
7012		
Densitometer Constants – UGC Density		
7001	UGC Density Constant K0	Read/Write
7002	UGC Density Constant K1	Read/Write
7003	UGC Density Constant K2	Read/Write
7004	UGC Density Constant KT	Read/Write
7005	UGC Density Constant Tcal	Read/Write
7006	UGC Density Constant K	Read/Write
7007	UGC Density Constant PO	Read/Write
7008	Spare	
7009	Spare	
7010	Spare	
7011	Spare	
Densitometer Constants – Solartron Density		
7001	Solartron Density Constant K0	Read/Write
7002	Solartron Density Constant K1	Read/Write
7003	Solartron Density Constant K2	Read/Write
7004	Solartron Density Constant K18	Read/Write
7005	Solartron Density Constant K19	Read/Write
7006	Solartron Density Constant K20A	Read/Write
7007	Solartron Density Constant K20B	Read/Write
7008	Solartron Density Constant K21A	Read/Write
7009	Solartron Density Constant K21B	Read/Write
7010	Solartron Density Constant KR	Read/Write
7011	Solartron Density Constant KJ	Read/Write
7023	Stream#1 SLope	Read/Write
7024	Stream#1 Intercept	Read/Write
7025	Stream#2 SLope	Read/Write
7026	Stream#2 Intercept	Read/Write
7027	Stream#3 SLope	Read/Write
7028	Stream#3 Intercept	Read/Write
7029	Stream#1 BS&W Override	Read/Write
7030	Stream#2 BS&W Override	Read/Write
7031	Stream#3 BS&W Override	Read/Write
7032-7049	Spare	

Modbus Address Table - Floating Point

ADDRESS	DESCRIPTION	READ/WRITE
7050	Multi.Var#1 Spare Override	Read/Write
7051	Multi.Var#1 Pressure Override	Read/Write
7052	Multi.Var#1 Temperature Override	Read/Write
7053	Multi.Var#2 Spare Override	Read/Write
7054	Multi.Var#2 Pressure Override	Read/Write
7055	Multi.Var#2 Temperature Override	Read/Write
7056	Multi.Var#1 Spare Low Limit	Read/Write
7057	Multi.Var#1 Spare High Limit	Read/Write
7058	Multi.Var#1 Spare Maintenance	Read/Write
7059	Multi.Var#1 Pressure Low Limit	Read/Write
7060	Multi.Var#1 Pressure High Limit	Read/Write
7061	Multi.Var#1 Pressure Maintenance	Read/Write
7062	Multi.Var#1 Temperature Low Limit	Read/Write
7063	Multi.Var#1 Temperature High Limit	Read/Write
7064	Multi.Var#1 Temperature Maintenance	Read/Write
7065	Multi.Var#2 Spare Low Limit	Read/Write
7066	Multi.Var#2 Spare High Limit	Read/Write
7067	Multi.Var#2 Spare Maintenance	Read/Write
7068	Multi.Var#2 Pressure Low Limit	Read/Write
7069	Multi.Var#2 Pressure High Limit	Read/Write
7070	Multi.Var#2 Pressure Maintenance	Read/Write
7071	Multi.Var#2 Temperature Low Limit	Read/Write
7072	Multi.Var#2 Temperature High Limit	Read/Write
7073	Multi.Var#2 Temperature Maintenance	Read/Write
7074	Analog Input #1 @4mA	Read/Write
7075	Analog Input #1 @20mA	Read/Write
7076	Analog Input #1 Low Limit	Read/Write
7077	Analog Input #1 High Limit	Read/Write
7078	Analog Input #1 Maintenance	Read/Write
7079	Analog Input #2 @4mA	Read/Write
7080	Analog Input #2 @20mA	Read/Write
7081	Analog Input #2 Low Limit	Read/Write
7082	Analog Input #2 High Limit	Read/Write
7083	Analog Input #2 Maintenance	Read/Write
7084	Analog Input #3 @4mA	Read/Write
7085	Analog Input #3 @20mA	Read/Write
7086	Analog Input #3 Low Limit	Read/Write
7087	Analog Input #3 High Limit	Read/Write
7088	Analog Input #3 Maintenance	Read/Write
7089	Analog Input #4 @4mA	Read/Write
7090	Analog Input #4 @20mA	Read/Write
7091	Analog Input #4 Low Limit	Read/Write
7092	Analog Input #4 High Limit	Read/Write
7093	Analog Input #4 Maintenance	Read/Write
7094-7113	Reserved	
7114-7115	Spare	
7116	RTD Low Limit	Read/Write
7117	RTD High Limit	Read/Write
7118	RTD Maintenance	Read/Write
7119-7133	Reserved	

Modbus Address Table - Floating Point

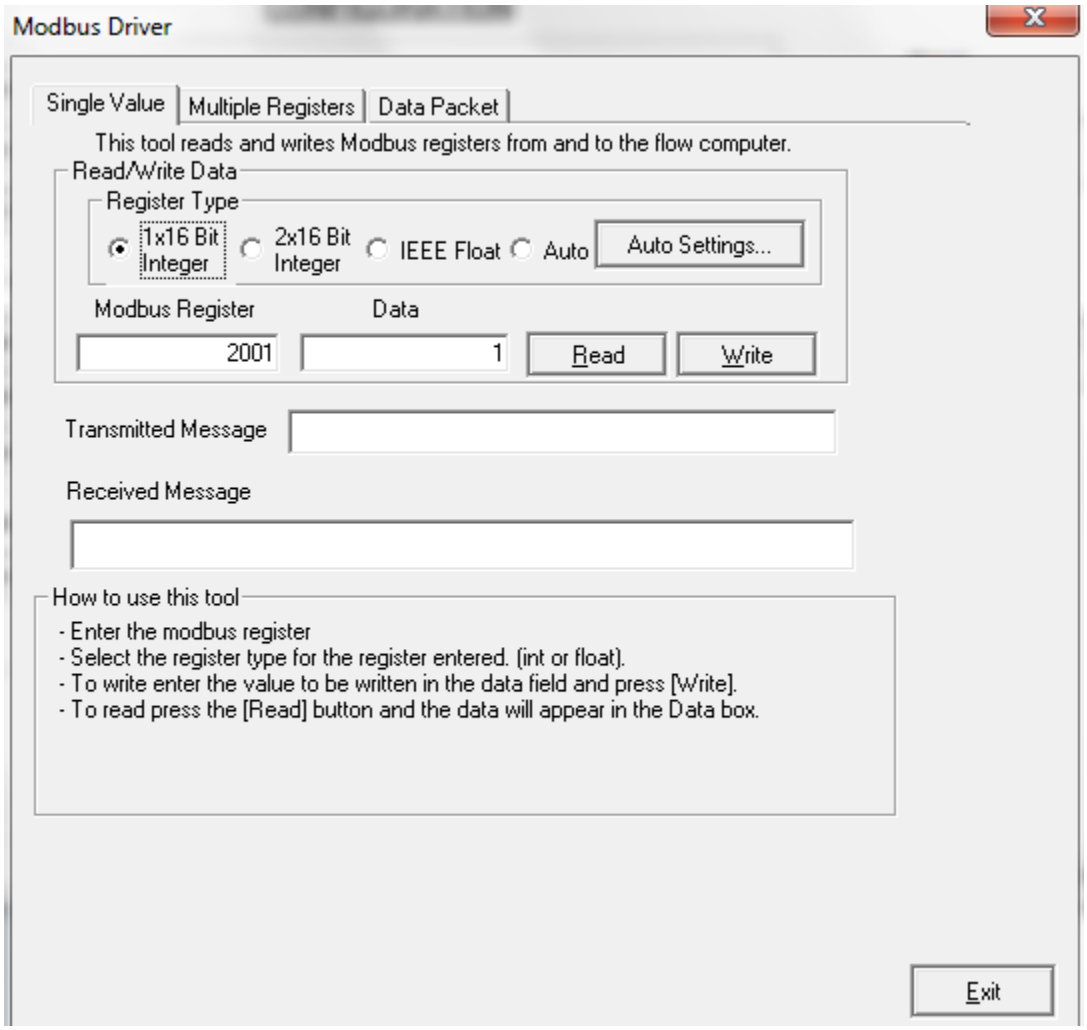
ADDRESS	DESCRIPTION	READ/WRITE
7134	Analog Output @4mA	Read/Write
7135	Analog Output @20mA	Read/Write
7136-7154	Reserved	
7155-7157	Spare	
7158	Densitometer Data	Read
7159	Analog Input #1 Live Value	Read
7160	Analog Input #2 Live Value	Read
7161	Analog Input #3 Live Value	Read
7162	Analog Input #4 Live Value	Read
7167	RTD Live Value	Read
7164-7170	Reserved	
7171	Analog Input #1 Numerical Value	Read
7172	Analog Input #2 Numerical Value	Read
7173	Analog Input #3 Numerical Value	Read
7174	Analog Input #4 Numerical Value	Read
7175-7178	Reserved	
7179	RTD Numerical Value	Read
7180-7182	Reserved	
7183	Analog Output #1 Numerical Value	Read
7184	Analog Output #2 Numerical Value	Read
7185	Analog Output #3 Numerical Value	Read
7186	Analog Output #4 Numerical Value	Read
7187	Analog Output#1 0-100	Read
7188	Analog Output#2 0-100	Read
7189	Analog Output#3 0-100	Read
7190	Analog Output#4 0-100	Read
7191	Live Density	Read
7192	Un-Corrected Density	Read
7193	Live API	Read
7194	Live SG	Read
7195	Reserved	
7196-7200	Spare	
7201	Analog Input #1 mA Value	Read
7202	Analog Input #2 mA Value	Read
7203	Analog Input #3 mA Value	Read
7204	Analog Input #4 mA Value	Read
7205-7208	Reserved	
7209	RTD Input Ohm Value	Read
7210-7212	Reserved	
7213	Analog Output#1 mA Value	Read
7214	Analog Output#2 mA Value	Read
7215	Analog Output#3 mA Value	Read
7216	Analog Output#4 mA Value	Read
7217-7220	Spare	
7221-7246	Reserved Calibration Offset Data Area	
7247-7280	Spare	
7281	Historical Data- Stream#1 Slave Data #1	Read
7282	Historical Data- Stream#1 Slave Data #2	Read
7283	Historical Data- Stream#2 Slave Data #1	Read
7284	Historical Data- Stream#2 Slave Data #2	Read
7285	Historical Data- Stream#3 Slave Data #1	Read
7286	Historical Data- Stream#3 Slave Data #2	Read

DFC Modbus Driver Program (RTU Mode only)

Use this tool to check and verify Modbus Protocol or data from or to the flow computer.

Press function key **F11** to pop up the DFC Modbus Driver Program to read or write data to a single variable, read multiple registers, or read data packets.

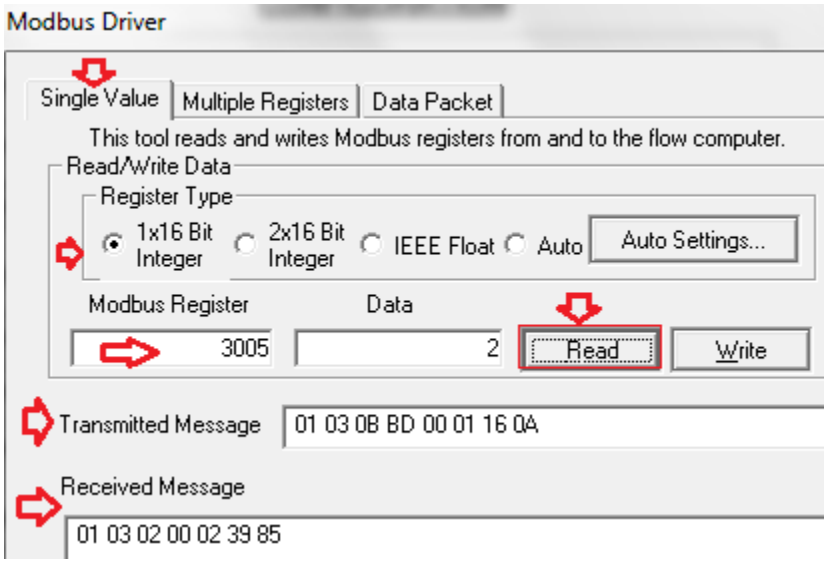
Check Modbus table listed in manual, enter a valid address and select the register type – 1x16 bit integer, 2x16 bit integer, or IEEE float. An exception response for any invalid address or wrong register type



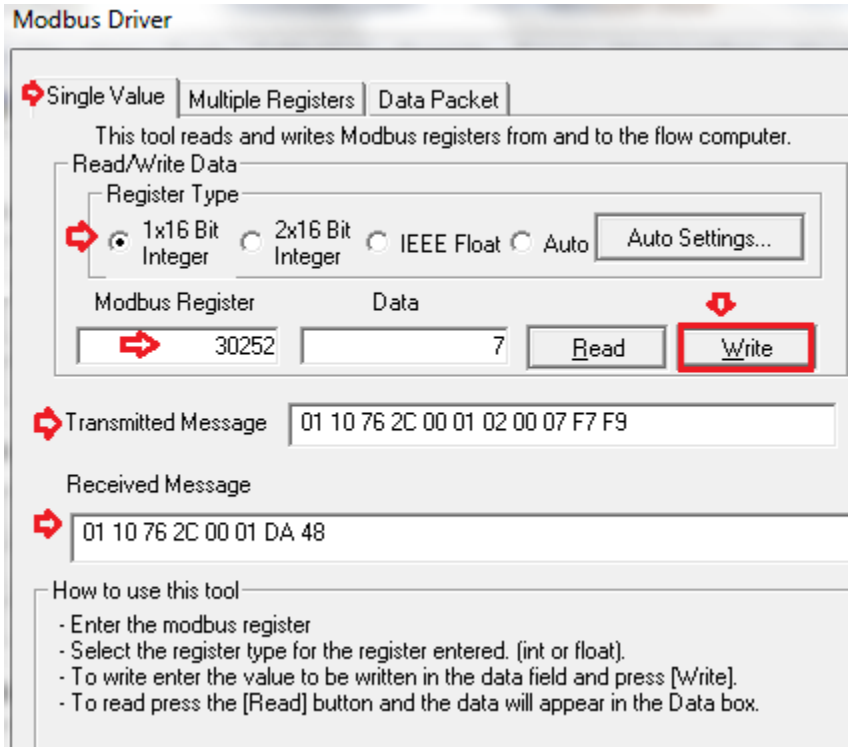
DFC Modbus Driver

Example:

Read 1x16 bit integer – <3005> Meter#2 Stream Number (Read Only)



Write 1x16 bit integer - <30252> Day Start Hour (Read/Write)

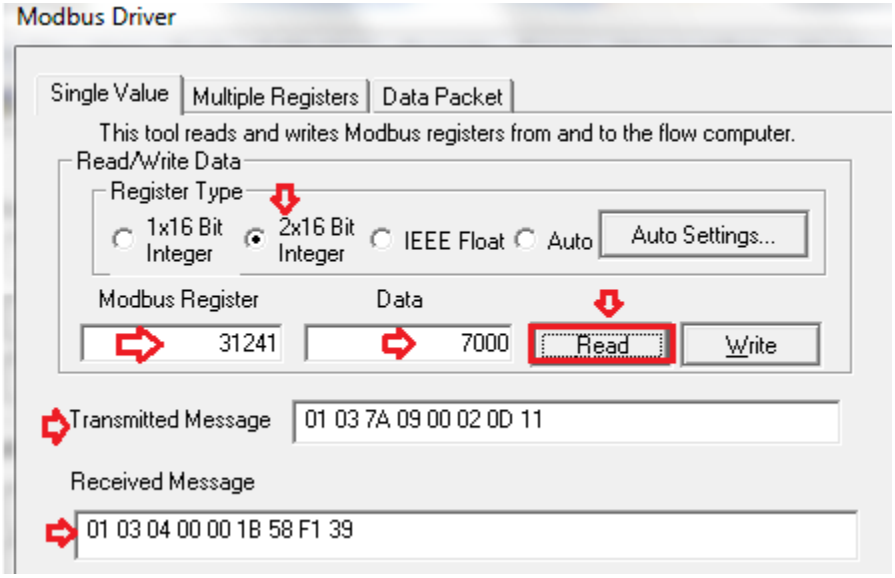


DFC Modbus Driver

Example:

Read 2x16 bit integer with decimal inferred

<31241> Meter#1 Temperature (2 decimal inferred) = 70.00

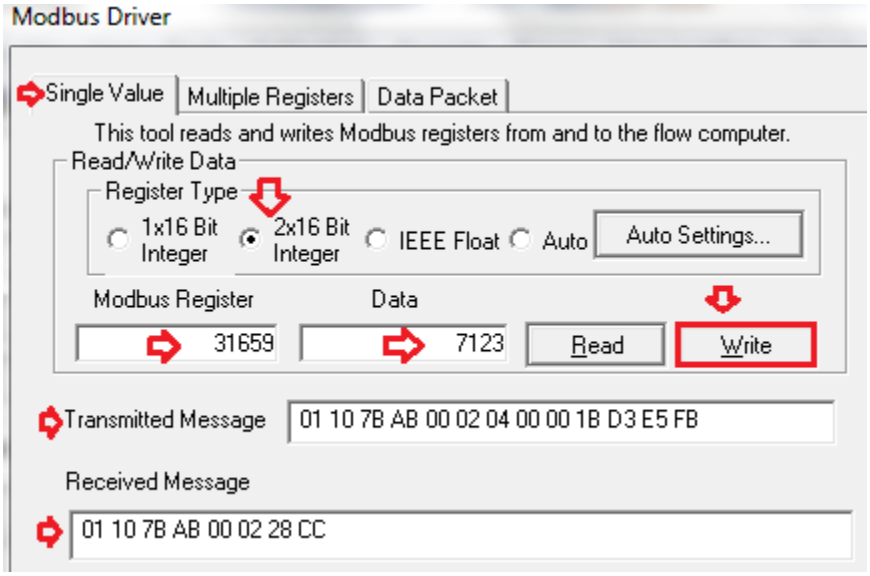


Example:

Write 2x16 bit integer with decimal inferred

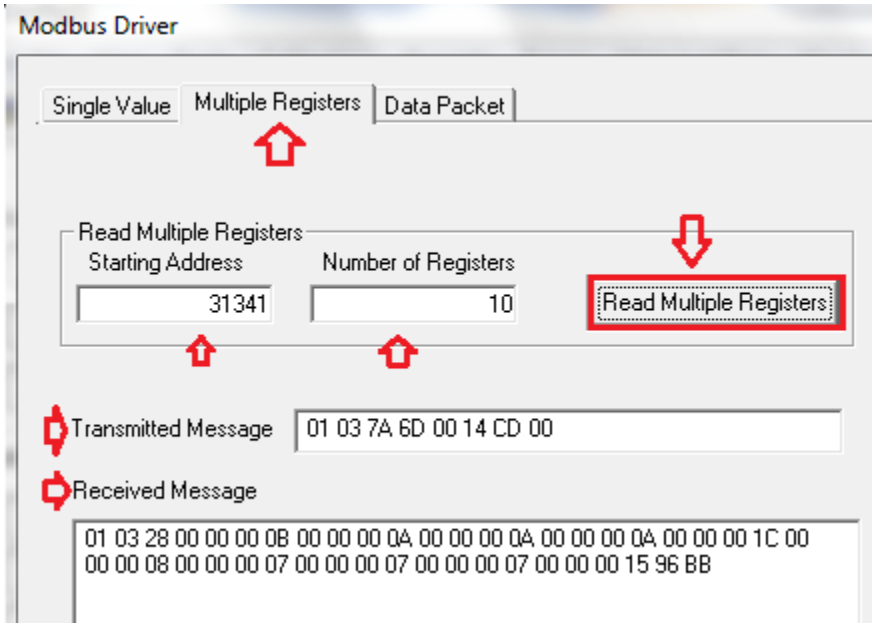
<31659> Meter#1 Temperature Override (2 decimal inferred, Read/Write)

Set temperature override to 71.23



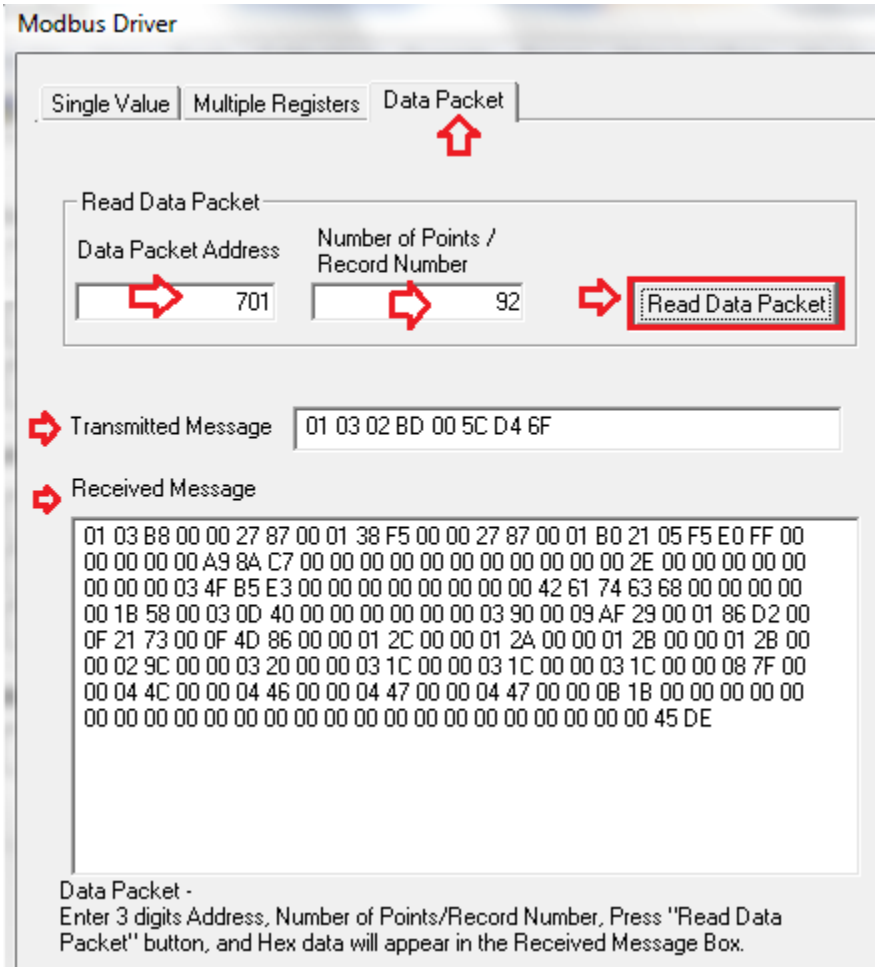
Example:

Read Multiple registers (2x16 bit integer with decimal inferred)



DFC Modbus Driver

Read Data Packet
Example: Truck Loading Ticket 701



CHAPTER 6: Installation Drawings

Explosion-Proof Installation Drawings

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

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

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

8. DIVISION 2 WIRING METHOD.

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

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

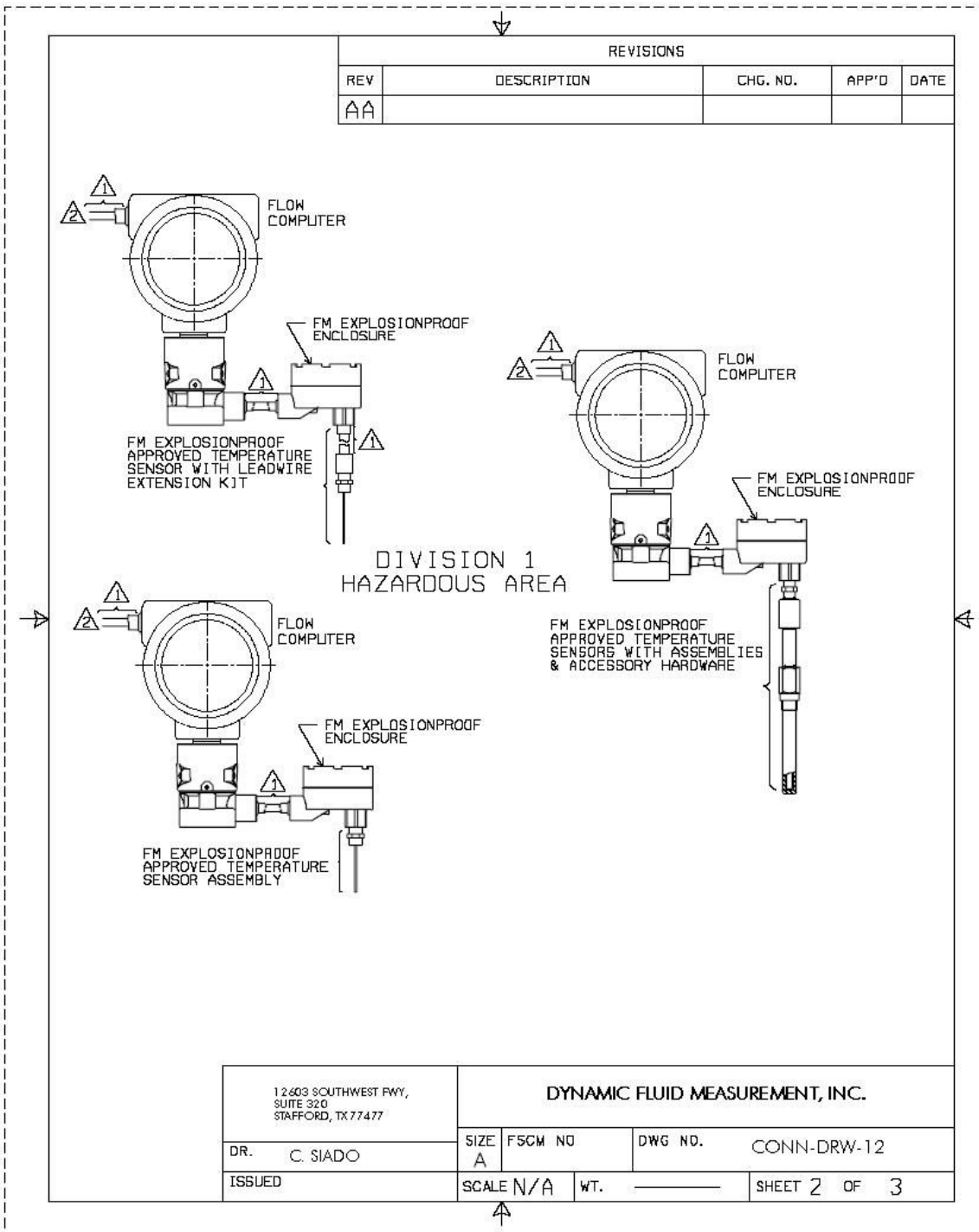
4. COMPONENTS REQUIRED TO BE APPROVED MUST BE FOR GAS GROUP APPROPIATE TO AREA CLASSIFICATION.

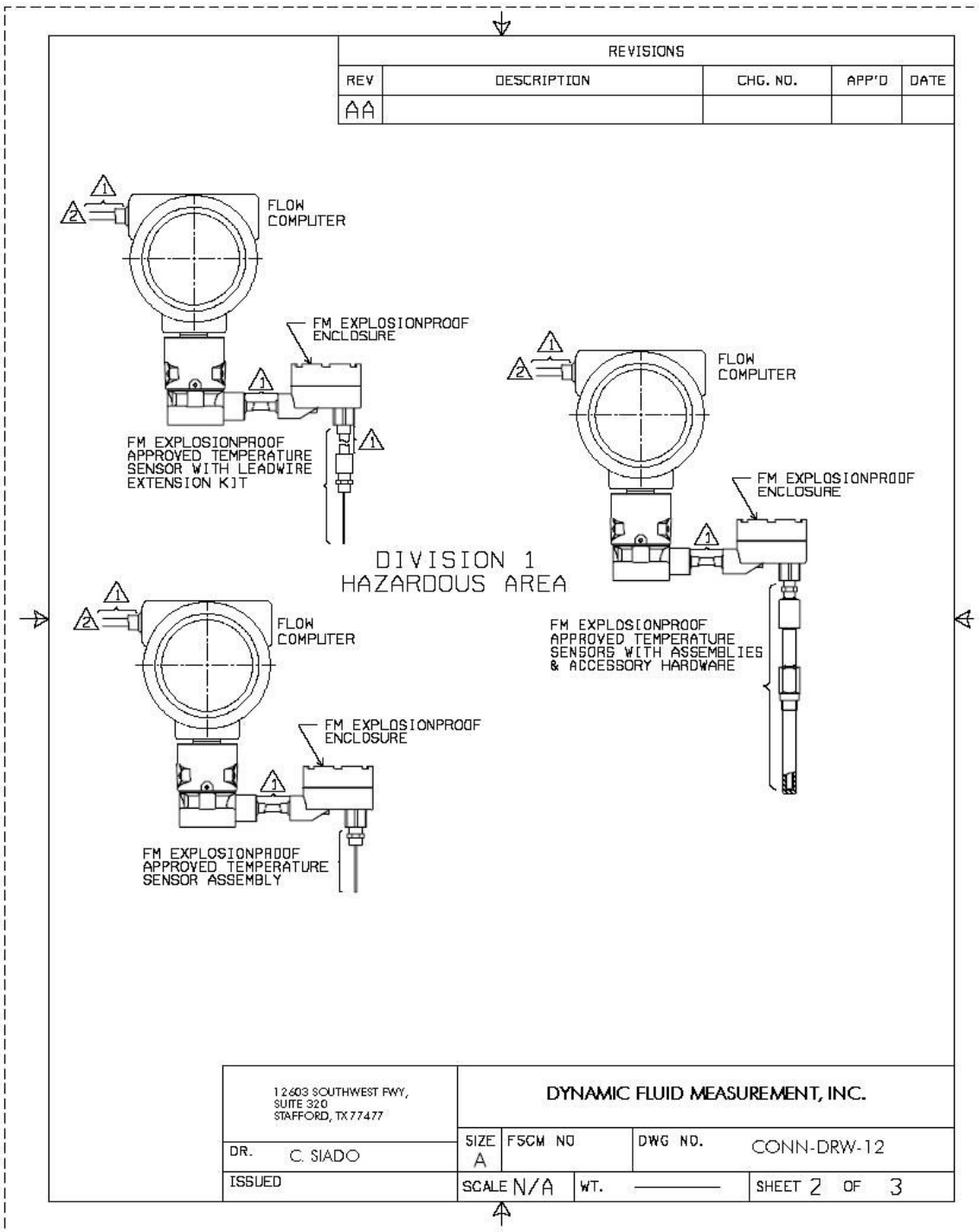
3. ALL CONDUITS THREADS TO BE ASSEMBLED WITH FIVE FULL THREADS MINIMUM.

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

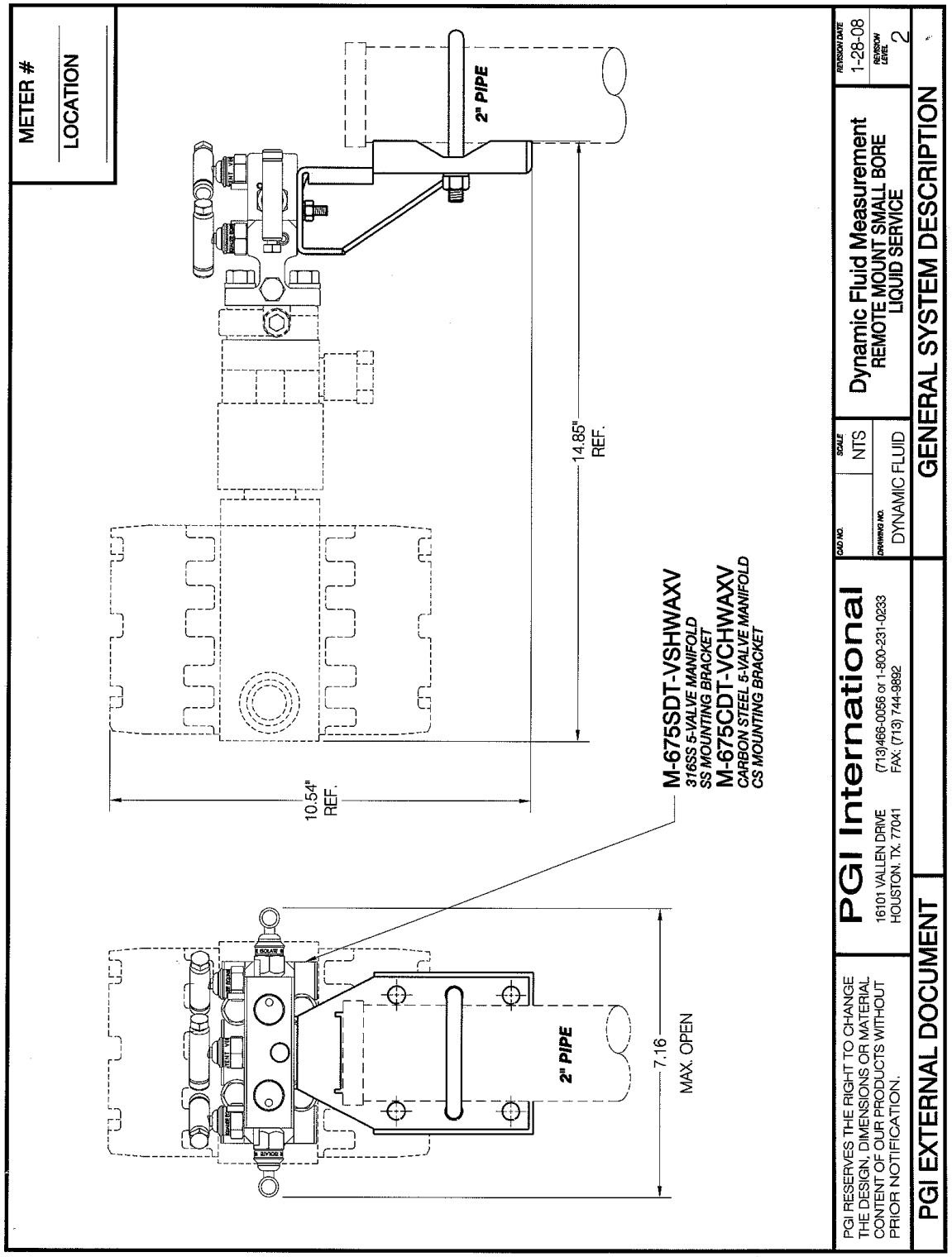
1. WIRING METHOD SUITABLE FOR CLASS I, DIV 1, ANY LENGTH.

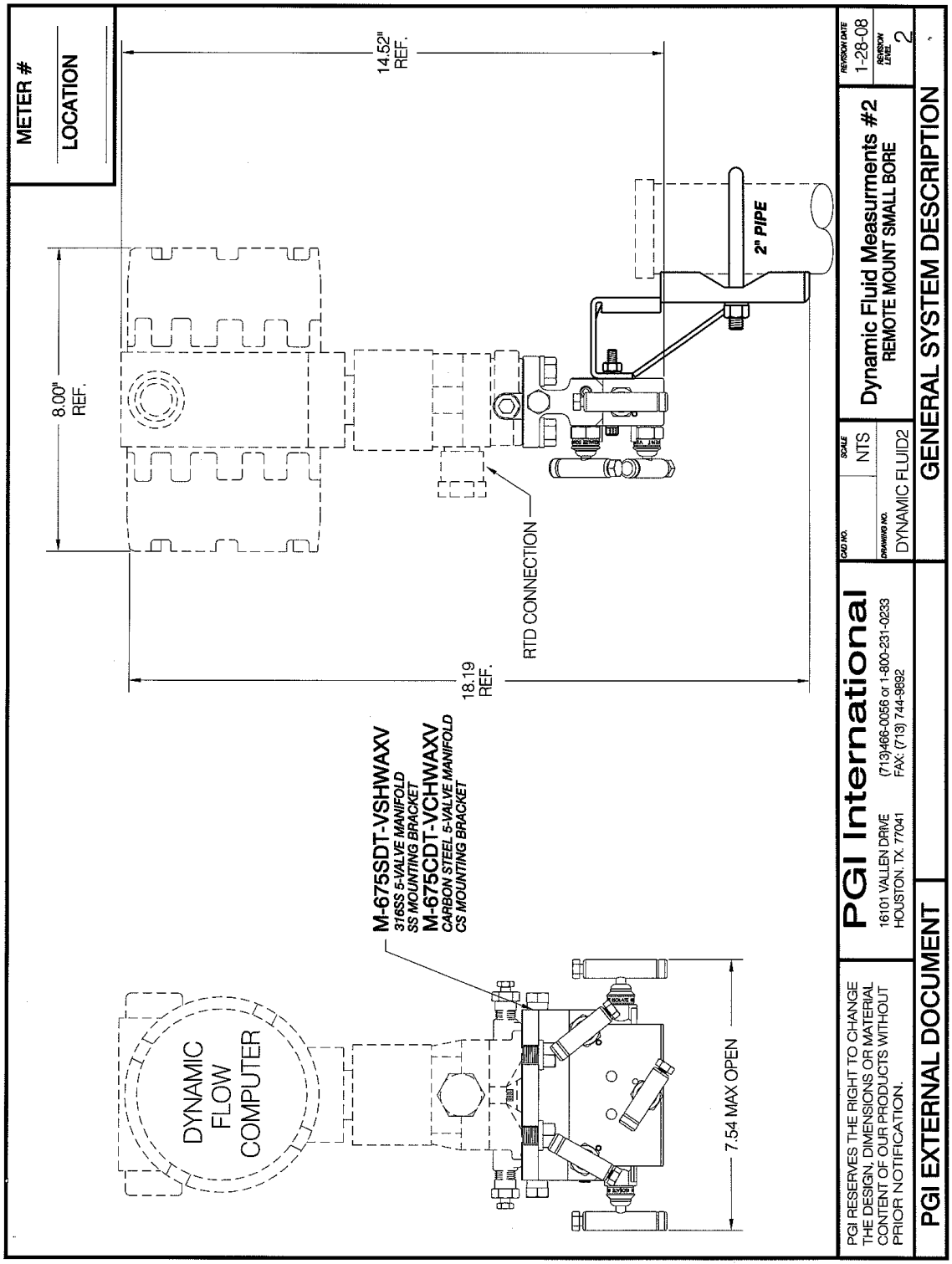
UNLESS OTHERWISE SPECIFIED DIMENSIONS IN INCHES [mm]. REMOVE ALL BURRS AND SHARP EDGES. MACHINE SURFACE FINISH 125	CONTRACT NO.	DYNAMIC FLUID MEASUREMENT, INC.	12603 SOUTHWEST FWY, SUITE 320 STAFFORD, TX 77477
	DR. C. SIADO	TITLE: MODEL MICROMV AND ECHART EXPLOSIONPROOF INSTALLATION DRAWING, FACTORY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

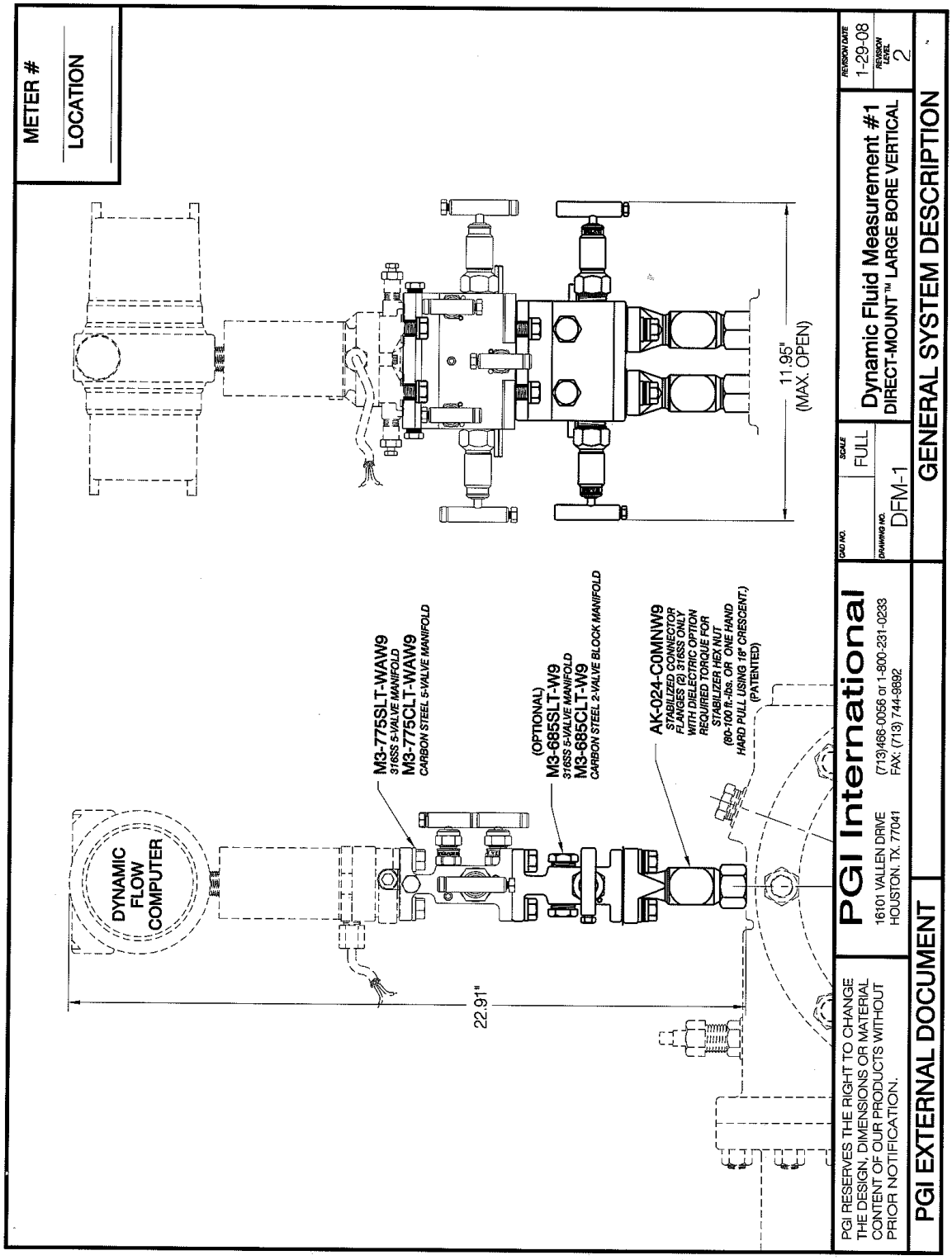

REVISIONS
REV
DESCRIPTION
CHG. NO.
APP'D
DATE
AA
FLOW COMPUTER
FM EXPLOSIONPROOF ENCLOSURE
FM EXPLOSIONPROOF APPROVED TEMPERATURE SENSOR WITH LEADWIRE EXTENSION KIT
DIVISION 1 HAZARDOUS AREA
FLOW COMPUTER
FM EXPLOSIONPROOF ENCLOSURE
FM EXPLOSIONPROOF APPROVED TEMPERATURE SENSORS WITH ASSEMBLIES & ACCESSORY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

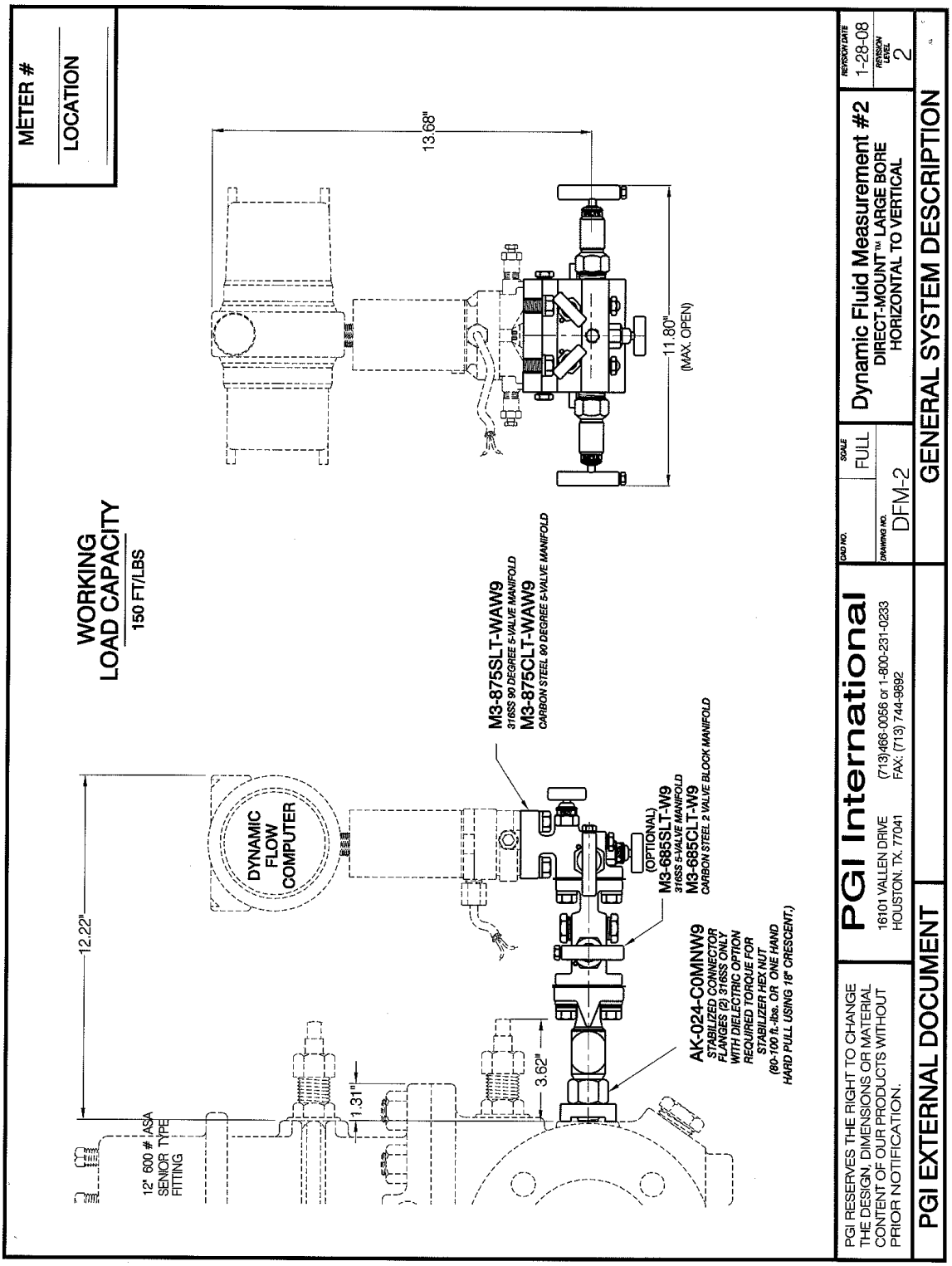

REVISIONS
REV
DESCRIPTION
CHG. NO.
APP'D
DATE
AA
FLOW COMPUTER
FM EXPLOSIONPROOF ENCLOSURE
FM EXPLOSIONPROOF APPROVED TEMPERATURE SENSOR WITH LEADWIRE EXTENSION KIT
DIVISION 1 HAZARDOUS AREA
FLOW COMPUTER
FM EXPLOSIONPROOF ENCLOSURE
FM EXPLOSIONPROOF APPROVED TEMPERATURE SENSORS WITH ASSEMBLIES & ACCESSORY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

Manifold Installation Drawings




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


METER #
LOCATION
DYNAMIC FLOW COMPUTER
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.
SCALE FULL
DRAWING NO. DFM-2
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